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1.0 INTRODUCTION

Check•Line’s 3000/FX Series gauges provide precise, non-destructive digital coating thickness measurement on steel and non-ferrous metals.

Three models are available:

DCF-3000FX: For testing non-magnetic coatings such as varnish, paint, enamel, chrome, copper, zinc, etc., on steel and iron.

DCN-3000FX: For testing varnish, paint and anodizing on non-ferrous metals and on austenitic stainless steels.

DCFN-3000FX: Combines the ferrous and non-ferrous testing capabilities of the DCF-3000FX and DCN-3000FX.

3000FX Series gauges employ the same familiar menu technique that is used in cellular telephones.

There are 4 main menu sections: Calibrations, Statistics, Limit Values and Options. All gauge functions are accessed from one of these main sections. The steps to necessary to reach and activate a particular gauge function appear on the display in clear, easily understood language—place probe on Cal foil, for example. A confirming message appears on the display as each step is completed.

The Appendix provides a diagram of the menu structure. It will be helpful to take a few minutes to study the Appendix while practicing using the ▲, ▼, OK and ESC keys to move through the menus selections. The 3000FS Series gauges are very easy to use. A few minutes spent familiarizing yourself with using the keys to move through the menus is all the training required.

WARRANTY

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Appendix: Diagram of Menu Structure

After turning on the instrument, press ▲ or ▼ repeatedly to move to the desired main section (Calibration, for example). Next, press OK to access the second level subsections within the main section. Press ▼ to scroll through the second level subsections and OK to select one. Use the same technique of pressing ▲ or ▼ and OK to access third level subsections; use ESC to move back to the next higher level up to the - - - - screen, delete the last reading immediately after taking it and interrupt a setting action.

1/4 CALIBRATION
1/4 Zero Setting
2/4 Foil Calibration
3/4 Zero Offset
2/2 Offset setting
2/2 Detection of Offset
4/4 Deletion of Calibration
5/1 Works Calibration Activated

1/4 OPTIONS
1/9 Measuring Unit
2/2 µm
2/2 mils
2/9 Measuring Mode
1/3 Auto Fn (dent)
2/3 Ferrous (F)
3/3 Non-Ferrous (N)
3/9 Switch Off Mode
1/2 Auto
1/2 Permanent
4/9 Backlight
1/3 On
2/3 3 Secs
3/3 Permanent
5/9 Beep
1/2 On
2/2 Off
6/9 Online Statistics
1/2 Mean & Std. Dev.
2/2 Max and Min
7/9 Welcome Test
1/2 On
2/2 Off
8/9 Power Supply
1/2 Batteries
2/2 Rechargeable Batteries
9/9 Language
1/3 English
2/3 Español
3/3 Français

1/4 STATISTICS
1/5 Print Out of Statistics
2/5 Print Out of Measurements
3/5 Display of Statistics
4/5 Display of Measurements
5/5 Detection of Statistics

1/4 LIMITS
1/2 Limit Setting
1/2/1 Set Lower Limit
2/2/1 Set Upper Limit
2/2/2 Deletion of Limits

2.0 Overview

2.1 Display

If this symbol flashes, the batteries have to be changed, see page 9.

-------- Appears if limit values are exceeded or not reached

ZERO
Appears when Zero calibration is complete.
If flashing: ZERO setting begun but not completed.
CAL
Appears when Foil calibration is complete.
If flashing: CAL setting begun but not completed.
LIMIT
Appears if Limit values have been set.
If flashing: LIMIT setting begun but not completed.
AUTO FN
Appears when automatic ferrous / non-ferrous measuring mode is active.
Ferr
Appears when ferrous measuring mode is active.
Non-Ferr
Appears when non-ferrous measuring mode is active.
µm
All measured values given in µm unit.
mils
All measured values given in mils unit.
12.0 **Optional Accessories**

- **Infrared Adapter**
- **Data Transfer Software**
- **Test Stand**

---

2.2 **Gauge**

![Image of a gauge with labeled parts A, B, C, D, E, F, G, H.](image)
**11.0 Resolution Table**

<table>
<thead>
<tr>
<th>Mils</th>
<th>Microns (µm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>00.00 – 9.99 mils</td>
<td>000.0 – 999 µm</td>
</tr>
<tr>
<td>10.00 – 24.98 mils</td>
<td>100.0 – 249.8 µm</td>
</tr>
<tr>
<td>25.00 – 49.95 mils</td>
<td>250.0 – 499.5 µm</td>
</tr>
<tr>
<td>50.00 – 60 mils</td>
<td>500.0 – 999.0 µm</td>
</tr>
<tr>
<td>1,000 – 1500 mils</td>
<td>1,000 – 1500 µm</td>
</tr>
<tr>
<td>0.01 mils</td>
<td>0.1 µm</td>
</tr>
<tr>
<td>0.02 mils</td>
<td>0.2 µm</td>
</tr>
<tr>
<td>0.05 mils</td>
<td>0.5 µm</td>
</tr>
<tr>
<td>0.1 mils</td>
<td>1.0 µm</td>
</tr>
<tr>
<td></td>
<td>0.002mm</td>
</tr>
</tbody>
</table>

**A IR Sensor** Transmits stored measurement data to a PC or printer equipped with an infrared adapter.

**B LED Screen** Displays numerical data & operator prompts.

**C ▲▼ Keys** *Use to:*
1. Scroll through main menu
2. Set calibration
3. Set zero offset
4. Set limit alerts

**D OK Key** *Use to:*
1. Confirm menu selection
2. Complete setting an action

**E ESC Key** *Use to:*
1. Move back to next higher menu level
2. Delete last reading (immediately after recording it)
3. Delete of statistics & stored readings
4. Exit calibration, zero offset and limit alert setting procedures.

**F Probe** Place on test sample at a right angle to take measurement.

**G Measurement Sensor** Must be in contact with test sample for measurement data to be recorded.

**H Power Switch** Turns the gauge on and off.
2.3 Complete Kit

3000 Series gauges are supplied as a complete kit, including:
  - Gauge
  - Probe
  - Zero calibration standards (Fe-stainless and/or Al)
  - Calibration foils (2)
  - Batteries (2x AA)
  - Operating manual
  - NIST calibration certificate
  - Carrying case

---

10.0 Measuring Limits

- Minimum Radius
  - for Convex Surfaces: 0.12" (3mm)
  - for Concave Surfaces: 0.2" (5mm)
- Minimum Headroom: 4" (100 mm)
- Minimum Sample Diameter: 0.2" (5mm)
- Minimum Substrate Thickness - F: 20 mils (0.5 mm)
- Minimum Substrate Thickness - NFe: 2 mils (50 µm)

---

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  - Calibration foils (2)
  - Batteries (2x AA)
  - Operating manual
  - NIST calibration certificate
  - Carrying case

---

10.0 Measuring Limits

- Minimum Radius
  - for Convex Surfaces: 0.12" (3mm)
  - for Concave Surfaces: 0.2" (5mm)
- Minimum Headroom: 4" (100 mm)
- Minimum Sample Diameter: 0.2" (5mm)
- Minimum Substrate Thickness - F: 20 mils (0.5 mm)
- Minimum Substrate Thickness - NFe: 2 mils (50 µm)
## 9.0 Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0 – 60.00 mils (0 - 1500 µm)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.04 mils / 1µm + 1% of reading)</td>
</tr>
<tr>
<td>Display</td>
<td>Back-lit, 4-digit alphanumeric, digit height</td>
</tr>
<tr>
<td></td>
<td>0.4” (10mm)</td>
</tr>
<tr>
<td>Minimum Measuring Area</td>
<td>0.2” x 0.2” (5mm x 5mm)</td>
</tr>
<tr>
<td>Minimum Curvature Radius</td>
<td>concave: 0.2” (5mm), convex: 0.12” (3mm)</td>
</tr>
<tr>
<td>Substrate Thickness</td>
<td>20 mils (0.5 mm)</td>
</tr>
<tr>
<td>Calibration</td>
<td>Factory calibration, zero calibration, foil calibration,</td>
</tr>
<tr>
<td></td>
<td>Off-set function: addition or subtraction of a constant value</td>
</tr>
<tr>
<td>Memory</td>
<td>80 readings</td>
</tr>
<tr>
<td>Statistics Program</td>
<td>Number of readings, mean value, standard deviation, maximum and minimum reading of max. 10,000 readings</td>
</tr>
<tr>
<td>Set Limits</td>
<td>Adjustable selectable with acoustic alarm</td>
</tr>
<tr>
<td>Data Output</td>
<td>Infrared IrDA standard</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>32 °F to 122 °F (0 °C to 50 °C )</td>
</tr>
<tr>
<td>Surface Temp.</td>
<td>5 °F to 140 °F (-15 °C to 60 °C)</td>
</tr>
<tr>
<td>Storage Temp.</td>
<td>-4 °F to 140 °F (-20 °C to +60 °C)</td>
</tr>
<tr>
<td>Power</td>
<td>2 AA 1.5V</td>
</tr>
<tr>
<td>Dimensions</td>
<td>5.6” x 2.5” x 1.2” (140mm x 562mm x 30mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>7 oz (200 g) — gauge + probe</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP 52 (proof against dust and dripping water)</td>
</tr>
<tr>
<td>Standards</td>
<td>DIN, ISO, ASTM, BS</td>
</tr>
</tbody>
</table>

### 3.0 Basic Procedures

#### 3.1 Turning Power ON and OFF

To turn the gauge on, press and hold the power switch (item H, page 4) for two seconds, until the chime sounds. The start screen appears briefly, followed by - - - -. The gauge is now ready to use.

To turn the gauge off, press and hold the power switch (item H, page 4) for two seconds, until the chime sounds.

**Auto Power Off / Permanent On modes**

When in the automatic power-off mode, the gauge will automatically turn itself off after 90 seconds of non-use. In the permanent on mode, the gauge will remain on continuously, even during extended periods of non-use. To switch between modes:

1. Press the ▼ key repeatedly until Options shows on the display.
2. Press OK.
3. Press the ▼ key repeatedly until Switch Off Mode shows on the display.
4. Press OK.
5. Press the ▼ key to select either permanent on or auto switch off.
6. Press OK to confirm your selection.

**NOTE:** To cancel a selection and exit from the menu subsection press ESC.
3.2 Selecting Units of Measure (µm-metric or inch-mils)

1. Press ▼ repeatedly until display shows Options.
2. Press OK. The display shows Measuring Unit.
3. Press OK. The display shows µm unit
4. Press OK to confirm µm as unit of measurement OR
5. Press ▼ again. The display shows mils unit.
6. Press OK to confirm mils as unit of measurement

The selected unit of measure (mils or µm) will appear on the display, followed by the start screen - - - -.

3.3 Backlight

3000FX Series gauges equipped with a backlight function to improve the readability of the display in certain lighting conditions. The operator can select permanent on, 3-second on (after each measurement) and off:

1. Press the ▼ key until Options shows on the display.
2. Press OK.
3. Press the ▼ key to scroll to the desired backlight state.
4. Press OK to confirm your selection.

The selected backlight state will appear on the display briefly, followed by the start screen - - - -.

3.4 Beeper

To turn the audible signal on and off:

1. Press the ▼ key until Options shows on the display.
2. Press the OK key.
3. Press the ▼ key until Beeper shows on the display.
4. Press OK.

8.0 ERROR MESSAGES

Faults or malfunctions identified by the instrument are indicated by an error message appearing on the display:

Batteries are empty:
Please insert new batteries.

Probe is too close to metal:
The probe was too close to the metal during switch-on. Hold the probe free in the air and then switch the instrument on.

Magnetic interference fields:
Close to the probe are too strong magnetic interference fields (e.g. transformers, PC-display screens).

Probe defective:
If this error message appears, please send the instrument to your supplier or to the manufacturer for repair.

Other errors:
If the following errors appear on your instrument
• Instrument does not allow any further measurements
• Illogical display values
a total reset usually helps (see page 9)
- 9 -

5. Press the ▼ key to select the on or off states.
6. Press OK to confirm your selection

3.5 Manually Setting Measurement Mode (DCFN only)

In some cases, especially with varnish applied to zinc on steel, it is advisable to manually set the measuring mode—F mode (Ferrous) for measurements on steel/iron, N mode (Non-Ferrous) for measurements on non-ferrous metals.

1. Press ▼ repeatedly until display shows Options.
2. Press OK. Measuring Unit appears on the display.
3. Press ▼ repeatedly until Measuring Mode appears.
4. Press OK. Auto FN Identifications appears.
5. Press ▼ repeatedly until either Ferrous (F) or Non-Ferrous (N) or Auto FN appears on the display.
6. Press OK to confirm the measurement mode that you want to activate. The display shows - - - - and either Auto FN or Ferr or Non-Ferr. See diagram of display on page 3.

3.6 Total Reset To Factory Defaults

This procedure deletes all single and statistical values. It also deletes set calibration values and optional items and resets the gauge to the factory default.

1. Switch off the gauge
2. Press and hold the ESC key (item E, page 4). At the same time turn the power back on.
3. An acoustic signal will sound and all factory default settings are restored.
4. Release both keys and the gauge will restart with all factory default settings restored.

- 20 -

• Do not expose the window of the infrared adapter to direct solar radiation.
• Do not operate any filament and halogen lamps in the immediate vicinity of the adapter. The distance between adapter and lamp should be more than 1 meter.
• The infrared windows of the test instrument and of the adapter must be parallel and facing each other at a distance of around 30 cm to 50 cm.

After pressing OK to start infrared data transmission, keep the gauge’s infrared window pointed at the IR adapter as long as the green LED is lit.

- 9 -

5. Press the ▼ key to select the on or off states.
6. Press OK to confirm your selection

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3. An acoustic signal will sound and all factory default settings are restored.
4. Release both keys and the gauge will restart with all factory default settings restored.
3.7 Battery Replacement

3000FX gauges use two AA alkaline or rechargeable batteries. When battery power becomes low, the Battery Indicator will flash. The gauge will continue to operate, but batteries should be replaced as soon as possible. When battery power is depleted, the Battery Indicator remains on continuously, indicating that less than 60 seconds of power remain shut down.

Replacing batteries

1. Turn the gauge over. Slide the release switch down to unlock the battery compartment.
2. Carefully pull the battery compartment cover away from the gauge.
3. Insert new batteries, following the polarity diagram on the inside of the battery compartment.
4. Replace the battery compartment cover by inserting the hooks at the bottom edge, then pushing the cover forward until it snaps into position.
5. Slide the release switch up to lock the cover in place.

NOTE: Battery exchange should be accomplished within 20 seconds to preserve saved measurement data.

7.0 Data Transfer

For data transfer from a 3000FX series gauge to a PC you must not use a possible enclosed drive disc. For the infrared data transmission from the gauge to a printer or to a PC, the following three requirements must be met:

1. The infrared adapter (accessory part) must be connected to the printer or PC. The infrared window of the gauge and of the adapter must be parallel and face each other at a distance of approximately 12” to 20” (30cm to 50cm) for the data transmission.

2. The serial interface parameters of the PC and the printer must be set as follows:
   - Baud rate: 9600
   - Data bits: 8
   - Stop bit: 1
   - Parity: none
   - Handshake non

3. A data transmission program must be installed for the data transmission to a PC.

General information regarding the infrared data transfer using 3000FX

It is of special importance with reference to the infrared data transfer that the transmitted light-induced pulses can be perfectly received and evaluated. The infrared adapter receiving the light-induced pulses must therefore be protected from any external interferences. For this reason, please observe the following:
To continue measuring, press **ESC** repeatedly until the start screen with the four dashes - - - - is displayed.

**To print statistical values:**
1. Press ▼ repeatedly until Statistics appears on display.
3. Point instrument with the IR transmitter (top end face) towards the IR adapter installed on the printer. The distance should be approx. 12” to 20” (30cm to 50cm).
4. Press OK. The data are transmitted, and Printing... will briefly appear, followed by the start screen with the four dashes - - - -.

To continue measuring, press **ESC** repeatedly until the start screen with the four dashes - - - - is displayed again.

**6.4 Deletion of statistical values and of single values**
1. Press ▼ repeatedly until Statistics appears on display.
4. Press OK. The statistical values with the single values are deleted. Statistics deleted will briefly appear on the display, then the start screen with the four dashes - - - -.

**Quick deletion of statistics and stored readings**
1. Press ESC repeatedly until the start screen with the four dashes - - - - is again displayed.
2. Press ESC until Deleted Statistic? appears on the display.
3. Press ESC again. Statistics Deleted will briefly appear, then the start screen with the four dashes - - - -.

---

**Using Rechargeable batteries**

When using rechargeable batteries, the battery symbol always flashes, because rechargeable batteries provide a lower voltage than non-rechargeable batteries. To eliminate this situation:

1. Press ▼ repeatedly until Options appears on the display.
2. Press OK.
3. Press ▼ until Power Supply appears on the display.
4. Press OK.
5. Press ▼ until Rechargeable Batteries appears on the display.
6. Press OK.

Supply with Rechargeable Batt appears briefly on the screen, followed by - - - -. The procedure is complete.

---

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1. Press ▼ repeatedly until Options appears on the display.
2. Press OK.
3. Press ▼ until Power Supply appears on the display.
4. Press OK.
5. Press ▼ until Rechargeable Batteries appears on the display.
6. Press OK.

Supply with Rechargeable Batt appears briefly on the screen, followed by - - - -. The procedure is complete.
4.0 CALIBRATION

4.1 Measuring Using Factory (Works) Calibration

1. Press ▼. Calibration appears on the display.
2. Press OK. Zero Setting appears on the display.
3. Press ▼ repeatedly until Delete Calibration appears.
4. Press OK. Works Calibration Activated appears briefly, then the start screen with - - - -. You can now carry out the measurement.

4.2 One-point calibration (zero procedure)

This procedure requires an uncoated test object having similar dimensions and material properties to those of the coated object to be measured.

1. Press ▼. Calibration appears on the display.
2. Press OK. Zero Setting appears.
3. Place the Measuring Sensor (item G, page 4) on the test object at a right angle. Press gently and hold until chime sounds, then lift up. Repeat several times.
4. Press OK. Zero has been set appears briefly on the display, followed by the start screen with the four dashes - - - -.

You can now carry out the measurement.

4.3 Two-point calibration (using calibration foil)

As with Zero setting, this procedure requires an uncoated test object having similar dimensions as the coated object that will be measured. Choose a calibration foil that is closest to the expected coating layer thickness.

To continue measuring, press ESC repeatedly until the start screen with the four dashes - - - - is displayed.

To print single values:

1. Press ▼ repeatedly until Statistics appears on display.
3. Press ▼ repeatedly until Printout of Single Values appears.
4. Point instrument with the IR transmitter (top end edge) towards the IR adapter installed on the printer. The distance should be approx. 12” to 20” (30cm to 50cm)
5. Press OK. The data are transmitted, and Printing... will briefly appear, followed by the start screen with the four dashes - - - -.

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

6.3 Display and print statistical values

To display statistical values:

1. Press ▼ repeatedly until Statistics appears on display.
4. Press OK repeatedly. Each time OK is pressed, a different statistical value will be displayed in this order: N, x, s, and then N, Max, Min. At the conclusion, Display of Statistics appears again and the sequence of statistics displayed will repeat.

1. Press ▼ until Display of Single Values appears.
To continue measuring, press ESC repeatedly until the start screen with the four dashes - - - - is displayed.

To print single values:

1. Press ▼ repeatedly until Statistics appears on display.
3. Press ▼ repeatedly until Printout of Single Values appears.
4. Point instrument with the IR transmitter (top end edge) towards the IR adapter installed on the printer. The distance should be approx. 12” to 20” (30cm to 50cm)
5. Press OK. The data are transmitted, and Printing... will briefly appear, followed by the start screen with the four dashes - - - -.

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

6.3 Display and print statistical values

To display statistical values:

1. Press ▼ repeatedly until Statistics appears on display.
4. Press OK repeatedly. Each time OK is pressed, a different statistical value will be displayed in this order: N, x, s, and then N, Max, Min. At the conclusion, Display of Statistics appears again and the sequence of statistics displayed will repeat.
6.0 MANAGING SINGLE AND STATISTICAL VALUES

The 3000FX gauge is provided with online statistics. The statistical values are re-calculated and displayed in the two bottom lines after every measurement. The statistical values calculated by the 3000FX gauges are:

N: Number of measured values
x: Average of measured values
s: Standard deviation
Max: Maximum single value of the measurement series
Min: Minimum single value of the measurement series

Note: The DCFN-3000FX can store a total of 80 readings combining the F-mode N-mode, not 80 readings in each mode (160 total).

6.1 Selecting which statistical values will be displayed.

1. Press ▼ repeatedly until Options appears on the display.
2. Press OK.
4. Press OK.
5. Press ▼ to select either Maximum and Minimum or Mean and Std Deviation for display.
6. Press OK to confirm your selection.

6.2 Displaying and printing single values

To display single values:

1. Press ▼ repeatedly until Statistics appears on display.
2. Press OK. Printout of statistics appears on the display.

4.4 Zero Offset

In this menu item, a constant positive or negative value can be set. This value is automatically added to the measured value or subtracted from the measured value every time a measurement is carried out. The display then shows the addition or the difference. Moreover, the zero offset setting is always indicated below in the display as a reminder.

This measuring mode is useful when determining the upper coating layer of a multi-layer system. If the lower layer(s) is (are) known and show an adequately uniform thickness, the coating thickness of this (these) layer(s) can be set as a negative offset value. The display then only shows the thickness of the top layer.

When measuring coated rough metal surfaces, this mode can also be selected. In this case, the roughness effect, which is determined on the basis of the uncoated rough metal surface, is
set as a negative offset value. The instrument will then display the coating thickness above the peaks of the rough surface.

**Setting Zero Offset Value**

1. Press ▼. **Calibration** appears on the display.
2. Press OK. **Zero Setting** appears on the display.
3. Press ▼ twice. **Zero Offset** appears on the display.
4. Press OK. **Offsets** appears on the display.
5. Press OK. **Set Offset Value** appears on the display.
6. Press ▼ or ▲ repeatedly until the required offset value appears on the display.
7. Press OK. **Offset Has Been Set** appears on the display briefly, followed by the start display with - - - -.

**Deleting Zero Offset Value**

1. Press ▼ **Calibration** appears on the display.
2. Press OK. **Zero Setting** appears on the display.
3. Press ▼ twice. **Zero Offset** appears on the display.
4. Press OK. **Setting of Offset** appears on the display.
5. Press ▼. **Deletion of Offset** appears on the display.
6. Press OK. **Offset Deleted** appears briefly, followed by the start display with the four dashes - - - -.

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**Setting Audible Limit Alerts**

To monitor your measured values, you can set an upper and a lower limit value. This setting is useful during the measurement, for the evaluation of the measured values later when displaying the single values or for the printout of measured values. If the limit value is exceeded or if it's not reached, an audio signal will sound, and a warning note will appear on the display (_ or _).

**Setting**

1. Press ▼ repeatedly until **Limits** appears on the display.
2. Press OK. **Limits Setting** appears on the display.
3. Press OK again. Set Lower Limit appears.
4. Press ▼ or ▲ repeatedly until the desired lower limit value appears on the display.
5. Press OK. **Set Upper Limit** appears on the display.
6. Press ▼ or ▲ repeatedly until the desired upper limit value appears on the display.
7. Press OK. **Limits have been set** will appear briefly, then the start screen with - - - -.

**Deleting**

1. Press ▼ repeatedly until **Limits** appears on the display.
2. Press OK. **Limits Setting** appears.
3. Press ▼ until **Deletion of Limits** appears.
4. Press OK. **Limits Deleted** appears briefly, followed by the start screen with - - - -.
Operating Instructions

Coating Thickness Gauges
DCF-3000FX, DCN-3000FX, DCFN-3000FX