DFO Development Control Chamber
Catalog No. DFC100A, DFC200A

Background and Purpose

These chambers are specifically designed for the development of DFO treated latent prints. DFO is a fluorescent agent that attaches to fingerprint residues on paper and other porous surfaces, causing them to emit light when viewed under blue light. It develops up to two and a half times the number of prints as Ninhydrin and can be repeated several times to enhance development.

DFO treated prints will slowly develop unaided, but research shows that they can be accelerated safely and significantly by the judicious application of heat. The DFC100 conforms to the findings of current research by independent forensic investigators and laboratories to provide an optimum acceleration environment.

The DFC100 chamber features a solid-state, single set point temperature controller with a digital readout. Temperature is pre-set for optimum DFO development and can be easily adjusted to individual needs. Efficient, high-temperature insulation surrounds the oven chamber.

For efficiency, the chamber is designed to allow for the hanging of multiple documents and removable shelves are provided for the development of items not easily hung. Optically clear, double-pane, tempered glass door allows monitoring of development without disturbing the chamber's controlled atmosphere.

The most accurate judgment of DFO development is accomplished using fluorescence techniques. Its broad excitation band requires that DFO treated prints be excited with blue light such as a BLUEMAXX™ system and can be viewed through its barrier filter.

Unpacking / Set-up

USE A TWO-PERSON LIFT TEAM. Place the shipping carton on the floor. To unpack the chamber, open the top flaps of the shipping carton. Remove any top / corner foam from the box. Position one person along each short dimension of the box. Reach down into the container and grasp the chamber near the bottom of the cabinet.

Carefully lift the unit from its carton using the power of your legs, not your back. Place the chamber on a nearby stable flat surface. Remove the plastic cover/bag and any other packing materials from the chamber. Other included accessories in the shipping carton require only one person to lift or carry.

Make certain that the surface at the destination is capable of supporting the chamber's weight – **DFC100**: 42.5 lbs (19.3 Kg) unloaded or **DFC200:** 73.0 lbs (33.1 Kg) unloaded. Also, certain that the surface at the destination is capable of withstanding elevated temperatures up to 150°F (66°C).

Setup for operation consists of connecting the AC power cord & turning the chamber on.

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Safety Precautions

Before using this unit, consult the appropriate (DFO, Ninhydrin) Material Safety Data Sheets (MSDS) found on our website at www.sirchie.com/support.

Temperatures in excess of 200°F (93°C) can be reached inside the chamber. DO NOT touch the support rods, document clips, shelf or other interior parts ,as serious burns may result.

DO NOT spray Ninhydrin / DFO onto documents inside the chamber.

DO NOT perform iodine or cyanoacrylate fuming inside the chamber.

Allow treated items to thoroughly air dry before placing them into the chamber.

DFO formulations utilize flammable mixtures whose flash points and auto-ignition temperatures are often below temperatures that are reached within the chamber. Loss of evidence may occur in such circumstances. To avoid this, DO NOT spray items within the oven chamber, and allow all items treated with DFO to thoroughly air dry before placing them within the oven chamber.

Electrical Info

AC Power Consumed (nominal)	DFC100	120 VAC ±10%,	5.8A,	50-60 Hz,	690 watts
	DFC100220	220 VAC ±10%,	3.1A,	50-60 Hz,	690 watts
	DFC200	120 VAC ±10%,	11.5A,	50-60 Hz,	1380 watts
	DFC200220	220 VAC ±10%,	6.3A,	50-60 Hz,	1380 watts

Fusing	DFC100	6.3A,	250V Slo-Blo,	5X20 mm cartridge
	DFC100220	3.15A,	250V Slo-Blo,	5X20 mm cartridge
	DFC200	12.8A,	250V Slo-Blo,	5X20 mm cartridge
	DFC200220	6.3A,	250V Slo-Blo,	5X20 mm cartridge

Controls / Operation

Note: Evidence treated with DFO or Ninhydrin may be processed in this unit. DO NOT process iodine or cyanoacrylate in this chamber.

1. If you will be processing more than one document in the chamber, remove the support rods and document clips and set them aside. Remove the shelf if documents are to be suspended from document clips. Be certain to include control prints along with the evidence to be processed.

2. Turn the oven chamber ON and allow it to preheat to at least 200°F (93°C). This may take an hour or more.

3. Spray the documents and items to be examined in an approved fuming hood or forensic workstation. After air drying the documents, attach the document clips.

4. Assure that the oven temperature is at least 200°F (93°C), and then open the oven door by lifting and them turning the door latch clockwise. Close and latch the oven door. Be careful not to touch any of the interior surfaces, as burns may result.

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6. Opening the chamber door may cause a dip in temperature. If this happens, allow the temperature to return to 200°F (93°C).

7. Documents should remain in the heated chamber for at least 20 minutes. You may check for the state of development by directing the beam of an alternate light source (455 nm) through the glass door and observing with an orange barrier filter..

8. After 20 minutes of heating, the evidence can be removed. Be careful not to touch the hot surfaces.

9. Place the removed evidence on a clean dry surface to cool further. 10. If complete, turn the oven power off.

CHAMBER CONTROLS

The chamber controls are located on the instrument's front panel. They consist of an on/off switch and a temperature controller. The temperature controller has been set to optimum at the factory, and should not need adjustment. To adjust the controller's settings, follow the instructions, below.

• **Temperature Controller**: The controller displays the measured temperature (left-hand digits) and the set-point temperature (right-hand digits). The front panel has four (4) switches: raise temp (∧), lower temp (∨), Index, and Enter. These switches are active only when oven power is ON. When first powered up, the display momentarily shows "*6190 rr*" and then displays the measured temperature & the set-point values. The left-hand number group is the measured temperature in degrees Fahrenheit (which can be displayed as Celsius if desired). Temperature changes within the chamber can be monitored by watching the display. When the chamber reaches a temperature between 200°F (93°C) and 212°F (100°C), it is ready to process treated evidence samples. This typically takes less than an hour from "cold start".

Adjusting the Set Point (SV)

The Up arrow (Raise Temp) and Down arrow (Lower Temp) keys allow adjustment of the controller's set point. The set point is the temperature at which power to the heating element is shut OFF. The set point is factory programmed at 200°F (93°C). The Set Point is also referred to as SV (set value). The Measured Value is also referred to as the PV (Process Value).

• Programmin**g Sequence**: To adjust the set point precisely, press and release the UP or DOWN arrow key. Each press changes the set point by 0.1 degree. To change the set point a large amount, press and hold the UP or DOWN arrow key. After a couple of seconds, the rate of change increases significantly. Release the key to stop the change. When done with your changes, press the Enter key.

• **IMPORTANT**: If the Enter key is not pressed within 15 seconds after changing the set point temp, the value will revert to its former setting, ignoring any changes that have been made.

• The controller's maximum attainable temperature (tP-H) is programmed to 350°F (177°C). If the (tP-H) factory setting is not lowered, the set point temperature must be programmed between 200°F (93°C) and 212°F (100°C), to reduce the possibility excessive temperature damaging evidence samples. Even

after the heating elements are shut off by the controller, the temperature may continue to rise several degrees.

Factory default programmed heat tolerance (allowable swing above and below the set point temperature) is ±4 degrees (Fahrenheit or Celsius). This can be adjusted in the controller.

Controller Modes

• **PID mode**: The controller is factory set to operate in what is called, "PID mode". This allows the controller to learn the response characteristics of the heater and the air mass it is heating, in order to achieve and maintain ±1°F / ±1°C thermal stability within the chamber.

•**ON/OFF mode**: The controller can be set to operate in "ON/OFF mode". In this mode, the heater is turned on until the set point temperature is achieved, then it is turned off. The heater will only come on again when the internal temperature drops below the set point.

•**Considerations**: ON/OFF heating mode is quicker to achieve the set point value from a cold start; however, due to "thermal inertia" of the heater element and air mass in the chamber, temperature swings of more than ±20°F (±11°C) around the desired (set point) temperature can be expected. While PID mode controls temperature much more precisely, it is somewhat slower to bring the temperature to the precisely controlled set point from a cold start. You can reasonably expect a bit more than 1 hour for the chamber to reach 200°F (93°C) from room temperature, operating in PID mode.

Computer Control

Single or multiple DFC100A & DFC200A chambers may be operated and monitored remotely via software and hardware supplied with the chamber. The hardware is a USB to Serial converter device that runs on either Windows 32-bit or Windows 64-bit operating system, and implements a two-wire RS485 serial connection to the chamber(s). Multiple chambers may be "daisy-chained" together and controlled from a single computer having the USB device plugged into it. **IMPORTANT**: *Each chamber must have a unique controller address.*

The DFC100-DFC200 User's Manual contains complete instructions regarding setting up and using the hardware and software for remotely controlling the chamber(s).

Cleaning and Maintenance

Sirchie has designed the DFO chambers to require no periodic maintenance other than cleaning. Do not disassemble the chamber or remove panels, as there are no user-serviceable parts within.

Wipe down the exterior and interior of the chamber on a regular basis. Use only a water-damped cloth. ***DO NOT use any commercial cleaning materials.***

Technical Specifications

Weight (unloaded)	DFC100: 42.5 lbs (19.3 Kg), DFC200: 73.0 lbs (33.1 Kg)
(max load)	DFC100: 15.0 lbs (6.8 Kg), DFC200: 25.0 lbs (11.3 Kg)
(weight w/max load)	DFC100: 57.5 lbs (26.1 Kg), DFC200: 98.0 lbs (44.4 Kg)
Dimensions	DFC100: SAE: 13.0 in W x 25.8 in H x 16.4 in D
	SI: 32.0 cm W x 64.4 cm H x 41.6 cm D
	DFC200: SAE: 26.0 in W x 26.0 in H x 16.4 in D
	SI: 66.0 cm W x 66.0 cm H x 41.6 cm D
AC Power	DFC100 (120 VAC ±10%), 5.8A, 50-60 Hz, 690 watts
(nominal conditions)	DFC100220 (220 VAC ±10%), 3.1A, 50-60 Hz, 690 watts
	DFC200 (120 VAC ±10%), 11.5A, 50-60 Hz, 1380 watts
	DFC200220 (220 VAC ±10%), 6.3A, 50-60 Hz, 1380 watts
Voltage Fluctuation	Tolerance of up to ±10% of specified nominal operating voltage
Transient Overvoltage	Tolerance of up to "Overvoltage Category II"
	DFC100, DFC200: 110/120v mains 1500v
	DFC100220, DFC200220: 220/240v mains 2500v
Power cord, 120V	13A/125V, 5-15P Plug/IEC320-C13 Receptacle, 16AWG, 6'-7" (2M)
Power cord, 220V	10A/250V, CEE7/7(M) Plug/IEC320-C13 Receptacle, 14AWG, 8' (2.4M)
AC Receptacle	IEC320 15A, 250V receptacle w/integrated fuse holder (tool required for fuse access)
Fusing	DFC100 6.3A, 250V Slo-Blo, 5mmX20mm cartridge
	DFC100220 3.15A, 250V Slo-Blo, 5mmX20mm cartridge
	DFC200 12.8A, 250V Slo-Blo, 5mmX20mm cartridge
	DFC200220 6.3A, 250V Slo-Blo, 5mmX20mm cartridge
Heaters	DFC100: One 600 watt (nominal) metallic tubular heater
	DFC200: Two 600 watt (nominal) metallic tubular heaters
	Heater operation via programmable electronic controller
Control	Programmable electronic controller: ON/OFF, PID or Manual modes
	PID Control: capable of controlling temp within ±1°F / ±1°C of set-point temp
	On/Off: approx. ±20°F (11.2°C) of set-point - hysteresis of heater(s) & air volume
Ports	Data+ (red wire) & Data- (green wire), quick connect terminal blocks
	Alarm+ & Alarm-, dry relay contacts, 3A max current, quick connect terminal blocks
Internal Volume	DFC100: 1.18 ft3 (0.042 m3), DFC200: 2.72ft3 (0.077 m3)
Construction	Aluminum sheet, cold-rolled steel sheet, glass, steel screw fasteners
Supplies included	DFC100: 3 - Document Support Rods DFC200: 5 - Document Support Rods
	1 - Spare fuse (unit-specific; see "Fuses", above)
Environmental	Indoor use only
	Operating temperature range: 41°F (5°C) – 104°F (40°C)
	Operating relative humidity range: 20% - 80%, non-condensing
	Altitude range: "Sea level": 0 ft (0 M) to 6,562 ft (2,000 M)
	Pollution Degree 2: only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

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Trouble Shooting Guidelines

Symptom	Possible Causes	Solution
Controller does not come on, heater does not heat.	Unit not plugged in.	Check both ends of power cable, plug in unit.
	AC cord defective.	Replace with identically-rated cord. (see Specifications)
	Power failure.	Check AC mains circuit breaker.
	Main power switch not ON.	Push switch to ON.
	Blown fuse.	Check fuse (inside fuse holder, rear of cabinet). Tool required for fuse removal. Unplug cord, replace fuse with unit rated for the cabinet. (see Specifications)
	Internal wiring defect.	Contact Sirchie to arrange repairs.
Controller powers up but chamber does not heat to set temp.	Controller not set up or is programmed incorrectly.	Consult the Love Controls 32B User Manual for detailed programming instructions.
Controller powers up but chamber does not heat at all.	Heater defective.	Contact Sirchie to arrange repairs.
	Controller defective.	
Fumes leak out thru door when it is closed and latched.	Door Gasket defective.	
	Door Latch defective.	
Support rod does not remain in place.	Rod defective or hardware damaged/missing.	
Cabinet tends to tip over when evidence is loaded into it.	Maximum load rating exceeded.	Reduce load (see Specifications). Always distribute load across the span of the rod(s).
	Heavy items too high in cabinet.	Rearrange items. Heaviest items should be lowest in the cabinet.
	Cabinet feet broken, missing or defective.	Contact Sirchie to arrange repairs.
	Support surface not level.	Place cabinet only on level surface.
Chamber connected to a computer running LoveLink3 software via MN-1 USB-RS485 Serial Converter		
Zero instruments found (no communication PC–chamber)	MN-1 drivers not installed on host PC	Install MN-1 drivers for your PC's O/S, following instructions in DFC100-DFC200 User's Manual

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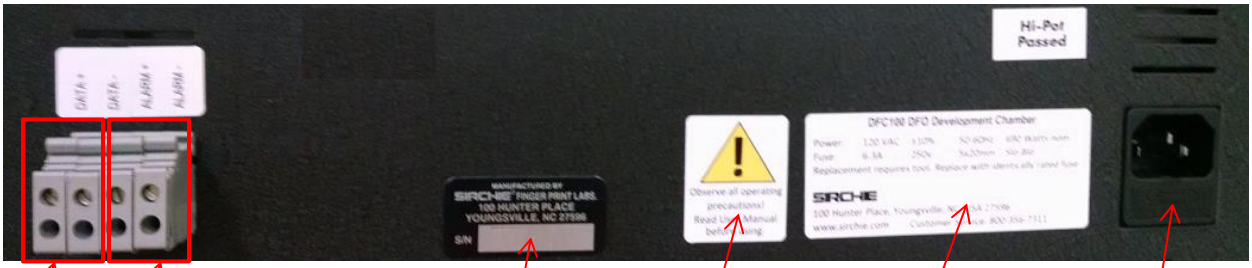
	LoveLink GUI configured for wrong virtual COM port	LoveLink GUI defaults to COM 1, which is rarely ever the actual virtual COM port for this USB device. Check Control Panel, System, Hardware tab, Device Manager for "Silicon Labs CP210x" for the installed COM port number. Configure the actual COM port number in the LoveLink GUI.
	Serial cable disconnected	Check for proper insertion of the RJ-11 serial cable in the MN-1 USB converter device and the DATA+/DATA- blocks on back of the chamber.
	MN-1 Serial cable connected with wrong polarity on chamber	The RED wire goes into the DATA+ block. The GREEN wire goes into the DATA- block. The device will not communicate with the chamber if these are reversed.
	MN-1 Serial cable inserted into wrong blocks on chamber	The serial cable must be inserted into the DATA+/DATA- blocks on back of the chamber. Do not insert it into the ALARM+/ALARM- blocks.
	MN-1 Serial cable broken/defective	Check ohmic continuity from RJ-11 pins to corresponding ends of wire. Contact Sirchie to arrange replacement of defective serial cable.
	MN-1 USB-Serial Converter defective	Contact Sirchie to arrange replacement.
SPECIAL NOTE	***No field repairs are recommended for this unit. If the troubleshooting solutions above do not rectify the issues with your unit, please contact Sirchie Customer Service at 800-356-7311 or 919-554-2244. Returned units must have a Sirchie RMA number. Retain all records of your transactions.***	

DFC Front Panel

DFC Rear Panel



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