

FlameSimulator

PRODUCT MANUAL



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1 Warnings



READ MANUAL BEFORE USE



- FAILURE TO FOLLOW THE INSTRUCTIONS AND SAFETY PRECAUTIONS IN THIS MANUAL CAN RESULT IN SERIOUS INJURY, DEATH, OR DAMAGE TO EQUIPMENT.
- THE INSTRUCTIONS IN THIS MANUAL SERVE AS A GENERAL GUIDE AND ARE INTENDED FOR USE BY QUALIFIED PERSONNEL WITH KNOWLEDGE OF EQUIPMENT OF THIS TYPE
- IT IS NOT INTENDED TO COVER ALL POSSIBLE VARIATIONS IN EQUIPMENT OR TO PROVIDE FOR SPECIFIC OPERATING PROBLEMS WHICH MAY ARISE
- YOU ARE RESPONSIBLE FOR ADHERING TO ALL WARNINGS OR CAUTIONS PROVIDED IN THIS MANUAL
- IN ADDITION TO ANY GENERAL SAFETY MEASURES PROVIDED IN THIS MANUAL, YOU MUST COMPLY WITH ALL NATIONAL, STATE, LOCAL, AND COMPANY SAFETY REGULATIONS

Safety Symbols used in this manual comply with ISO 3864.

THESE SYMBOLS ARE USED TO ALERT YOU TO POTENTIAL PERSONAL INJURY HAZARDS.

OBEY ALL SAFETY MESSAGES THAT FOLLOW THESE SYMBOLS TO AVOID POSSIBLE INJURY OR DEATH.



Indicates a hazard with a high level of risk which, if not avoided will result in death or serious injury.



Indicates a hazard with a medium level of risk which, if not avoided could result in death or serious injury.



Indicates a hazard with a low level of risk which, if not avoided will result in minor or moderate injury.



RADIATION HAZARD

This equipment emits Ultraviolet (UV) light. Do not stare into or expose your eyes to the UV beam. Prolonged exposure to UV light sources can cause damage to eyesight or potentially permanent vision loss.

2 Definitions

iScan – The iScan is an optical flame detector, often called a flame scanner, designed to detect the flames produced by hydrocarbon fossil fuels like natural gas, refinery gas, waste gas, fuel oils, and coal in industrial burners.

Flame Simulator – An electronic device designed to simulate flame signals for the functional testing of flame detectors. It works specifically with iScan flame scanners by emitting an ultraviolet (UV) light flicker that mimics the flicker patterns produced by a hydrocarbon flame. The simulator uses a UV LED to create these simulated flame signals.

3 Optical Flame Detectors and Simulation

Chentronics iScan optical flame detectors perform a spectral analysis of the UV light emitted from burning fossil fuels to determine the presence or absence of flame. This information is used by a burner management system to safely stop the flow of fuel into an industrial burner should the flame be extinguished. This information can also be monitored by the iScan Software remote software tool to view the flame spectrum as shown below.

The flame simulator will faithfully reproduce the UV characteristics of a flame spectrum using UV light modulated by various flame profiles. This simulator with its host of profiles allows full functional testing of the iScan optical flame scanner safely at the workbench.

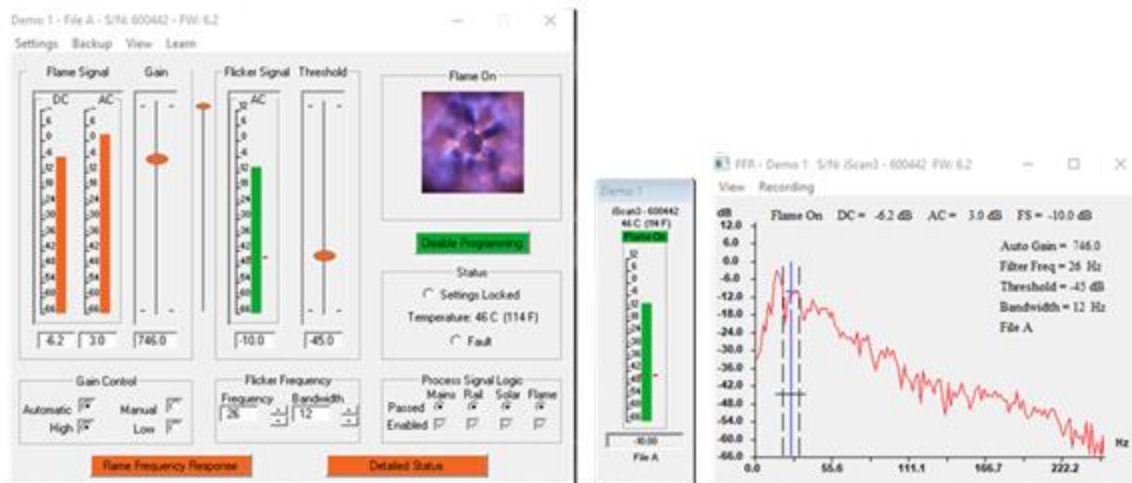


Figure 1: iScan Software interface.

4 Technical Specifications

4.1 Description of Equipment

- The Flame Simulator emits an ultraviolet light that mimics flame signals, but it does not produce an actual flame.
- This portable, rechargeable device contains an internal 7.2V NiMH battery.
- Includes a USB-C power adapter and converters for EURO, UK, and US outlets to charge the battery.
- A 1-inch NPT output threads into the cam-lock fitting of an iScan.
- Features: a tri-color Power LED to indicate power status, an LCD with backlight for displaying mode and battery information, and a rotatory control knob with push-button to control operating modes.
- Preloaded with four flame profiles that each contain between 1 and 30 seconds of data. This data is output in a continuous loop to provide the flame simulation UV flicker.

4.2 Connection to iScan.

The 1-inch NPT fitting on the simulator threads into the scanner's camlock adapter as shown below.



Figure 2: Flame Simulator attachment to iScan3+ Flame Scanner.

4.3 Equipment Conditions of Use

The Flame Simulator is subject to the following conditions of use and limitations:

- The operating temperature range is -20°C to +60°C. Note that the LCD response time may be slower at temperatures below -20°C.
- The unit is not field-repairable. If you encounter any issues, please contact Chentronics for technical support. See Section 9 for more information.
- The internal battery can be charged using the provided USB-C wall charger or any other USB-C PD capable device that can supply 15W, such as a laptop or personal computer.

Note: The USB-C PD specification refers to the ability of the USB-C source and sink devices to negotiate higher power capability.

- Before using the equipment, ensure all connections are secure.

4.4 Flame Simulator Specifications

Table 1: Specifications

Application	For use with iScan flame scanners
Input Power for AC adapter	100-240VAC 50/60Hz, 0.45A max
Input Power for Flame Simulator	5V USB-C, 1.5A max
Operating Ambient Temperature	-20°C to 60°C
Storage Ambient Temperature	-25°C to 60°C
Enclosure	Extruded aluminum enclosure with nylon end panels
Weight	1.25lbs (0.567 kg)
Dimensions	2.59 x 2.59 x 4.33in

5 System Operational Inputs and Outputs

5.1 Rotary Control

The rotary control, located at the end of the enclosure, functions as both a rotary switch and a push-button. To toggle power, push and hold the control for a longer duration. A short press and hold will toggle the flame simulation output on and off. The status of the flame simulation is shown on the LCD display as an animated flame image which disappears when the flame simulation is turned off (see figures 5 and 6). Rotating the control allows you to switch between the available flame modes.



Figure 3: Rotary control, power LED, and USB-C port.

5.2 USB Port

The USB-C port (refer to figure 3) is used to charge the onboard battery. When the simulator is connected to the included USB cable and wall adapter (see figure 13), it automatically charges the battery. This cable, or any other USB-C cable, can also be used to connect the Flame Simulator to another USB source, such as a laptop or PC. Most native USB-C source devices can provide the required power. However, if the connected device cannot supply enough power to both operate the simulator and charge the battery, the Flame Simulator will continue to function, but charging will pause. A message will periodically appear to indicate this mode. Refer to figure 4.



Figure 4: USB low power message

5.3 Power LED Indicator

The Power LED Indicator (see figure 3) is located below the rotary control. When the simulator is running on battery power and fully charged, the LED will light solid green. A solid red LED indicates low battery power. If the battery becomes critically low, the unit will power down, and attempting to turn it on will cause the LED to flash red. When the wall adapter is connected and the battery is charging, the LED will flash green. Once the battery is fully charged, the LED will return to solid green. For more information, refer to Table 2.

Table 2: Power LED functional description

OPERATION CONDITION	BATTERY STATUS	LED BEHAVIOR
- Powered off - USB-C wall adaptor disconnected	None	All LEDs off
- Powered off - USB-C wall adaptor connected	Charging	Green LED flashing
	Fully Charged	Green LED solid
Connected to other USB-C devices with PD capability	Charging	Green LED flashing
	Fully Charged	Green LED solid
Connected to other USB-C devices without PD capability	Not Charging	Green LED solid
- Powered on - Wall adaptor unplugged	Above Low Level	Green LED constant on
	Between Low and Critical Level	Red LED constant on
	Below Critical	Red LED flashes for 4 seconds and then goes off.

5.4 LCD Display – Flame Modes

The LCD displays the selected flame simulation mode. These modes can be selected by rotating the control knob.



Figure 5: LCD Display.

5.5 LCD Display – Flame Status

The LCD displays the UV output status by the presence of the animated flame image. The output can be toggled on and off by pressing briefly and releasing the control.



Figure 6: Output flame LED OFF

6 Scanner Functional Testing

 DANGER		
		• FUNCTIONAL TESTING WITH THE FLAME SIMULATOR SHOULD ONLY BE DONE ON A TEST BENCH • DO NOT CONNECT TO A BURNER CONTROL SYSTEM • FALSELY INDICATING A FLAME WITH A FLAME SIMULATOR TO A BURNER CONTROL SYSTEM CAN CREATE A HAZARD WITH A HIGH LEVEL OF RISK • POTENTIAL DEATH OR SERIOUS INJURY MAY RESULT

When testing an iScan-SB, no scanner settings need to be altered.

When testing an iScan-MB, set the scanner to the following settings using the iScan Software.

- Flame Frequency: 26 Hz
- Bandwidth 12: HZ
- Gain: Auto (High)
- Threshold: -45

NOTE: More information on using the iScan Software can be found in MNL-iScan Software, available on our website. Link can be found in [Section 9](#).

6.1 Flame ON Test

Push and hold the rotary control to turn on the simulator.

To test flame relay operation and the 4-20 mA output of the iScan scanner, connect an ohm meter between #9 (red) and #0 (black) wires on the scanner cable and an ammeter to read flame signal milliamps between #5 (blue) and #7 (white) on the scanner cable. Use the rotary control to select “TARGET BURNER FLAME HIGH” or “TARGET BURNER FLAME LOW” mode (figure 7a). The only difference between the two modes is the brightness of the UV LED. If the flame animation is not present on the display, push briefly then release the rotary control to turn on the flame simulation. The flame relay contacts should CLOSE i.e. the ohm meter will indicate a short between #9 (red) and #0 (black) wires on the scanner cable (figure 7c). The 4-20 mA output should read between 7.5-20 mA range (figure 7b).



Figure 7a: Simulator Flame On

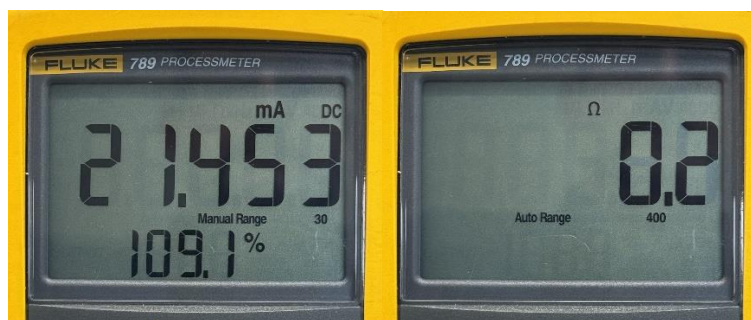


Figure 7b: 4-20 output

Figure 7c: Relay – Closed

Figure 7: Flame On Test

6.2 Flame OFF Test

Push briefly and release the rotary control until the flame animation disappears on the display (figure 8a). The flame relay contacts should OPEN, i.e. ohm meter will indicate an open circuit between #9 (red) and #0 (black) wires on the scanner cable (figure 8c). The 4-20 mA output signal should be approximately 4 mA (figure 8b).



Figure 8a: Simulator Flame Off

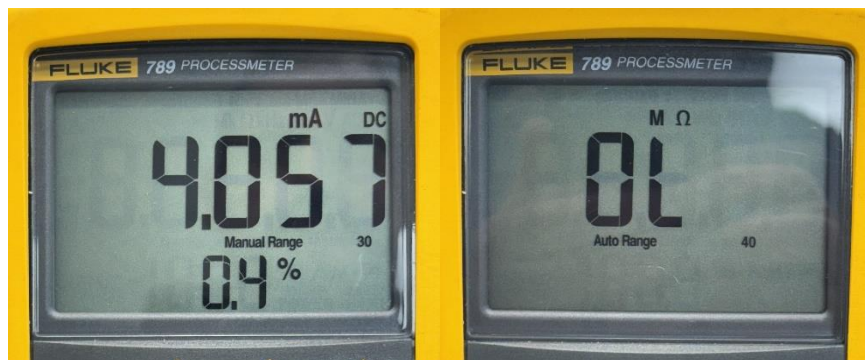


Figure 8b: 4-20ma output

Figure 8c: Relay Open

Figure 8: Flame Off Test

6.3 Flame Profiles

There is a total of four different flame signal profiles pre-loaded in the Flame Simulator. These can be used to bench test iScan flame scanners and confirm operation.



Figure 9: Profile 1 Target Burner, Flame High



Figure 11: Profile 3 Unstable, Flame High



Figure 10: Profile 2 Target Burner, Flame Low



Figure 12: Profile 4 Calibrate, 26Hz Sine

7 Maintenance

7.1 Service

The unit is not field-repairable. Please contact Chentronics for technical questions. Support information can be found in Section [9](#).

NOTE: *Incorrect connections can result in damage to equipment.*

7.2 Cleaning

7.2.1 UV LED and LCD

Power unit off before cleaning. Use a soft microfiber cloth and minimal pressure to wipe off any debris or buildup on the UV LED or LCD screen.

8 Standard Components and Accessories

The following is a sample of standard parts available for use with the Flame Simulator. For additional parts and technical drawings please contact Chentronics.

8.1 USB-C Wall Adapter Kit

Replacement can be ordered. Reference part number: 04005719.

NOTE: *Kit includes 2-meter USB-C to USB-C cable.*

9 Warranty and Technical Support

For warranty and technical support related inquiries beyond the scope of this Installation and Operation Manual, please contact Chentronics.

Technical Support



Inside USA Call: 607.334.5531

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Website: Chentronics.com/Literature-Support

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