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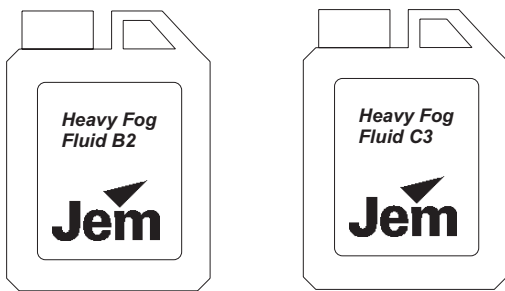
USER GUIDE  
VERSION 1.1



# **Heavy Fog Glaciator**

## HEAVY FOG GLACIATOR

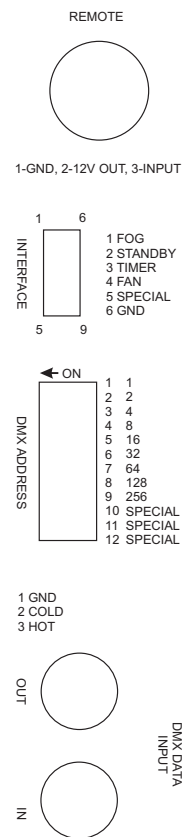
Fluids Suitable for this system:



**NOTE!** The JEM warranty will be void if any fluid other than JEM approved fluid is used. If other fluids are used there could be serious damage to the machine and the fluid may not have been tested for use in public areas.

## HEAVY FOG GLACIATOR

### CONNECTIONS



### FUSE RATINGS

The Heavy Fog Glaciator uses four fuses. They should be replaced with the value and type detailed below:

DMX receiver low voltage  
2AT

Power PCB  
12AT

Compressor control relay  
12AT

Main input fuse  
20AT

Three of these fuses are located internally and should not be accessed without first disconnecting the power supply.

### FILTERS

The Heavy Fog Glaciator uses a washable synthetic fibre filter in the air intake for the condenser unit (located at the top of the machine). This can be removed for cleaning by removing the ventilation grill above it (two M5 screws). Use the following guidelines for when to check the filter.

**Normal Conditions:**  
Inspect and clean/replace every 250 hours

**Severe Conditions:**  
Inspect and clean/replace every 150 hours

**SPECIFICATION****HEAT EXCHANGER**

2.5KW heater (240V)  
Wide bore steel vaporizing coil  
Ceramic thermal trip for over-temperature protection  
Electronic Temperature control using thermocouple

**FLUID SYSTEM**

Oscillating piston high pressure fluid pump  
Low fluid detection by electronic sensor  
9.5L fluid containers (2.5 US Gal.)  
Maximum fluid consumption 120mL/minute

**REMOTE CONTROL OPTIONS**

DMX512 decoder:  
Required Channels = 2  
Output is proportional for all levels above 12%  
Channels supported = 1 to 511  
Valid start codes = 0 (dimmer data only)  
Full framing error detection implemented  
Analogue control via standard JEM Multifunction Controller.  
Optional PLC interface for simple switching control of the system.

**CONTROL PANEL**

2 x LED displays with 4 button keypad  
Output level control from 0 to 100% for Fog  
Timer range:  
Delay time (toF) 0 seconds - 90 seconds  
Run time (ton) 0 seconds - 90 seconds

**REFRIGERATION UNIT**

2/3 HP compressor with thermostatic control  
Uses refrigerant R404A (0.850 Kg)

**OUTPUT CONNECTION**

Ducting adaptor to accept 150mm (6") flexible ducting

**POWER REQUIREMENTS**

Input voltage 200 - 250vac  
Input power (max) 3.1Kw  
Main fuse 20AT  
Frequency 50/60Hz dependant on model.

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**INTRODUCTION**

The Heavy Fog Glaciator is the first of a new generation of JEM professional Heavy Fog machines, designed for touring and installation in a variety of applications. Provision has been made for easy integration into most common control systems currently used in the entertainment industry. As well as providing remote control options via DMX, the machine comes with a comprehensive control panel for local operation and display of operating parameters.

The Heavy Fog effect is provided by cooling the smoke output from the main heat exchanger until it is at a temperature lower than the ambient in which the machine is operating. Air is added to the smoke, prior to cooling, from the fan mounted in the rear of the machine. This increases the volume of the effect and allows the output to be pushed through ducting.

A fluid container with 9.5L capacity (2.5US Gal.) is provided for Heavy Fog fluid. To allow reliable unattended operation, the fluid level is monitored electronically, and the machine shut down if necessary.

All machines come with robust carrying handles, and heavy duty braked castors.

**FEATURES**

Tubeless condenser	Electronic low fluid detection
9.5L fluid capacity	High pressure piston pump.
Pump Ramping system for continuous operation	LED displays for FOG and ICE controls.
All digital control system	Fog and Density controls for easy set-up.
2.5KW heat exchanger	Accurate timer
DMX512 interface (two channel)	Remote interface.
Optional PLC interface	
Non-volatile memory for user settings	

**Fan Display**

dEn/OFF	Displayed when the Standby switch is set to OFF.
dEn/nor	Shows the current Density setting.
St	Compressor is starting
StL	Compressor is stalled

**BASIC FAULT FINDING**

The Heavy Fog Glaciator is a complex machine and will require a competent service technician to repair any major faults. However, the following guide will allow the user to overcome the more common problems.

SYMPTOM	CAUSE	CURE
No fog output when the machine is fired using the Fog or Timer switch.	Machine is not ready	Allow time to reheat
	Fluid is below min level	Add fluid
	Standby switch is OFF	Set standby to ON
No fog output when using DMX to fire the machine.	Incorrect DMX address	Check settings
	Machine not ready	Allow time with DMX on
	No DMX termination	Fit 120 ohm resistor
Flu Lo is displayed on the Fog display	Fluid level is below min	Add more fluid
Machine is not ready after 20 minutes heating time	Standby switch is OFF	Set Standby ON
	Blown fuse on Power control PCB	Disconnect supply and replace fuse.
Fog disperses too quickly	Wrong grade of fluid used for the application	Choose a longer lasting fluid (see front cover)
	Fan level too high	Increase density setting (Reduces fan speed)

**DISPLAY MESSAGES**

The following list shows the messages possible, and the context under which they are displayed. Only the messages available under normal operation are shown. Messages shown when using the menus, are detailed in other sections of this handbook.

**Fog Display**

Fog/oFF	Displayed when the Standby switch is set to OFF, indicating that the machine can not be fired and the heaters are OFF.
Fog/Err	Shows that the Standby switch is ON but the heater is not on. This is an error condition and should not normally occur.
Fog/Ht	Displayed when the heater is running but the machine is not ready.
Fog/rdy	The machine is ready to fire using the Fog or Timer switches.
FLu/Lo	Indicates that the fluid in the container is below the minimum level to operate the machine. Only visible when the machine has reached the ready state.
Fog/08	The FOG switch is being used to fire the machine. The number displayed is the current Fog output level in the range 0 to 20

**SAFETY GUIDELINES**

Always use JEM approved fluid in the container supplied with the machine. Do not bypass the fluid sensor, this could cause damage to the machine.

Check the voltage is correct for use with the machine, the voltage setting is printed on the serial label.

The machine must be operated in a horizontal position and should not be suspended overhead.

Observe the warnings displayed on the machine (yellow labels).

Do not remove the covers or attempt to repair a faulty machine, an authorized JEM dealer should be contacted in the event of a faulty machine.

Always use smoke machines in well ventilated areas, over-use could affect sufferers of asthma or other chest conditions.

Smoke machines can cause condensation to form. Floors and surfaces may become slippery and should be checked regularly.

This machine is not waterproof, and should not be exposed to wet outdoor conditions.

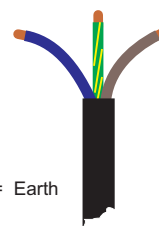
Do not spill fluid over the machine, if fluid is spilt clean with a damp cloth and contact an approved JEM dealer for advice.

Refer servicing to qualified service personnel. Disconnect the machine from the power supply before removing any covers.

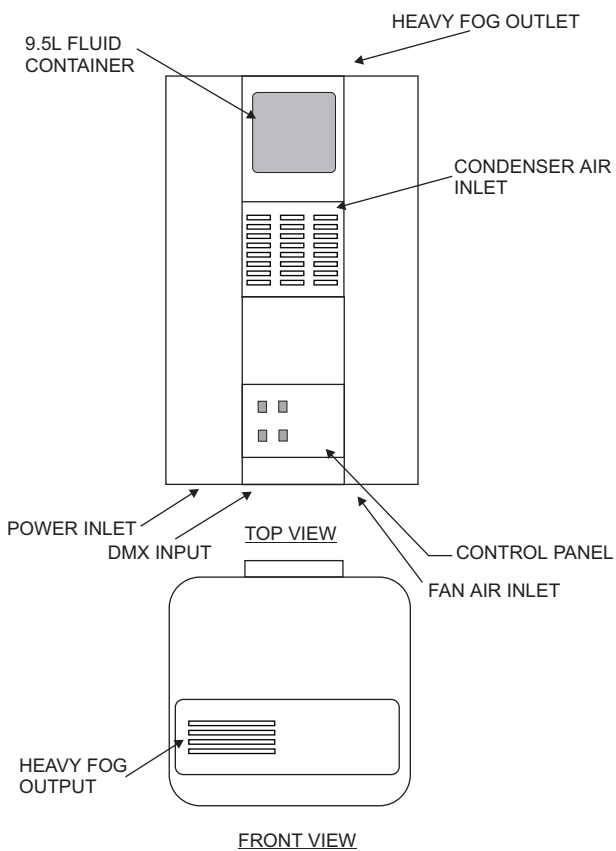
**Mains Cable Wiring Instructions**

The Heavy Fog Glaciator is fitted with an un-terminated 16A cable. A suitable 16A connector should be used to connect to the supply system.

To connect to US 208V supplies, the neutral conductor can be connected to the second phase of the 120V system, while phase 1 is connected to the Live pin.  
This equipment must be earthed.



Brown = Live  
Blue = Neutral  
Green / Yellow = Earth

**MACHINE LAYOUT****THE FLUID SYSTEM**

The Heavy Fog Glaciator uses a 9.5L (2.5 US Gal.) container to give approximately 4.5 hours of continuous operation at full output. This will vary with power supply voltage, which will determine the maximum continuous output level.

The machine control system uses a 'Pump Ramping' technique to allow continuous operation with moderate input power requirements. When the output level is set to maximum, the machine will give maximum output until the heat exchanger has used its energy reserves. The control system will then override the output level setting and reduce the pump speed to match the output to the available input power. This ensures that the output will be continuous, although at a reduced level.

Continuous operation gives rise to the possibility of pump damage if the machine runs out of fluid. This is overcome in the Heavy Fog Glaciator by using an electronic fluid sensing system, ensuring that the pump is shut down when the fluid level is too low. The Left-hand display will show a Lo Flu message to warn the user that the machine is shut down due to lack of fluid.

Variations in pump performance due to supply frequency differences (50/60Hz), are compensated for automatically. Supply voltage changes will also affect the pump performance, and can be catered for by using the Supply Voltage menu (SuP) on the right-hand display unit. Using the Menu key, select the SuP menu and press enter. Now adjust the voltage to match the local power supply voltage (valid range is 200 - 250V). Press the enter key to store the new setting in non-volatile memory. The pumps will now run at the optimum level for the conditions.

Remember that the type of fluid used will play a large part in determining the resulting effect. The list of fluids inside the front cover of this handbook shows the main fluids compatible with this machine. Choose a fluid suitable for the venue and type of effect you want to create. Generally, use the standard B2 fluid, but for longer lasting effects, contact a distributor for advice on using another fluid grade.

**BASIC OPERATION**

The following instructions explain how to operate the basic functions of the machine. It is assumed that the machine is being started from cold.

Starting with all the control panel switches OFF, and the display showing 'OFF', go through the following sequence.

Set the Standby switch to ON.  
Fog display shows FOG/Ht  
Ice display shows Den/nor

Set the output to Fog = 8

Set the Ice switch to ON

When the machine is ready (after approx. 20 minutes heat-up time) fog can be produced.

Fog display shows FOG/Rdy  
Ice display shows Den/nor

If starting the machine for the first time, or after the fluid has been changed, the pump may need to be primed.

Do this by setting the Fog output to 15 and firing the machine for 10 seconds, or until fog is produced at the output.

If the pumps have not primed after 20 seconds, there may be a problem with the fluid system. Refer to the Fault Finding section of the handbook for advice.

Set the Fog switch to ON to produce continuous output of Heavy Fog.

Fog display shows FOG/08  
Ice display shows Den/nor

Set the Timer switch to ON to produce timed output (read the Timer section to see how to configure the timer). Note that the Fog switch overrides the timer switch.

Fog display shows ton/04, toff/03 etc  
Ice display shows Den/nor

**COMMISSIONING THE MACHINE**

Unpack the machine and look for any obvious signs of damage.

Place the machine on a level surface and fit a container of JEM/Martin approved fluid into the fluid compartment. Fit the fluid line and cap to the container.

Check the wiring instructions in the Safety Guidelines section of this handbook and connect the machine to the power supply.

Set the power switch in the power inlet box to the ON position, and look for the start-up message on the displays.

Set all the switches on the control panel to OFF and refer to the Basic Operation section of this handbook for information on how to use the main functions of the machine. Read the Safety Guidelines before using the machine.

**REMOTE CONTROL OPTIONS**

The Heavy Fog Glaciator provides the user with 3 ways to implement a remote control on the machine. The main control panel is fixed and can not be removed for remote operation.

All the remote interfaces are located on the panel adjacent to the control panel.

The options are:

**DMX 512 Digital Interface.**

The interface uses the two XLR 3 connectors marked DMX on the interface panel, and uses the usual DMX electrical standards (RS 485). The inputs are protected against overvoltage and an output connector is provided to allow multidrop operation of the link.

**Remote Interface.**

The remote interface uses an XLR 3 connector to allow a standard JEM remote to fire the machine.

Full proportional control of the Fog output can be achieved, but the Density level must be set on the control panel.

**PLC Interface.**

This connection is an option available to installers who wish to control the machine using the outputs from a standard Programmable Logic Controller (PLC). When the interface PCB is fitted, 12/24v DC control signals can be used to switch the Fog, Standby, Timer and Ice functions. The output levels and timer settings must be made using the control panel.

**DMX OPERATION**

The machine may be operated using the industry standard DMX 512 digital control protocol. This allows the control of the fog system to be easily integrated with the lighting system in most installations.

DMX may be used without changing any of the settings on the main control panel. When the system detects a valid DMX data stream on the input, the control will default to the DMX system levels. Any attempts to control the machine from the control panel will have no effect until the DMX signal is removed. The displays will show the current input values for Fog and Density.

To ensure correct operation of the displays, the standby switch should be set to the ON position when using DMX.

The machine requires two channels, with the address of the first channel set on the DIP switch. The channels control the FOG and Density settings in the following manner.

## Channel 1

FOG output level  
0 - 32 zero output (dead-band)  
33 - 255 proportional output level control  
Implemented in 20 discrete steps

## Channel 2

Compressor switching and Density setting  
0 - 32 Compressor off  
33 - 65 Low (Lo) density  
66 - 98 Normal (Nor) density  
99 - High (Hi) density

The system implements true proportional control of the fog output rather than the simple switching functions found on other equipment. The output levels of FOG and FAN are linked during DMX operation via the Density setting.

The DMX base address can be set to any channel in the range 1 - 511 using the DIP switches. The channel number must first be decoded into binary format before being set into the switches.

**ICE:** Setting this switch to ON, will start the compressor (displays 'St' while starting). If the compressor fails to start within 10 seconds, the display will show 'StL' and the compressor will be shut down. This function is independent of the status of the STANDBY switch.

**THE TIMER**

The timer system is implemented in software using the machine's main control PCB. As such, the timing is crystal controlled and will be of good accuracy when compared to the usual analogue timers commonly found on fog machines. The timer is enabled by setting the Timer switch on the control panel to ON.

Pressing the Timer switch will cause the timer to start from the beginning of the ON period and run through to the end of the OFF period, the cycle will then repeat until the Timer switch is set to OFF. The timer will only function when the Standby switch is set to ON and the machine is ready (RdY). Switching the Timer to OFF at any time during the cycle will halt the operation.

While the timer is running, the left-hand display will show the elapsed time in seconds. The display will alternate between the period name (ton/toF) and the elapsed time in seconds.

To set the time periods, use the Menu key on the left-hand display to set the 'ton' menu as current. Press the Enter key to see the current value for the On Time (ton), and make adjustments using the Up/Down keys. Now press enter to store the value and use the menu key to select the Off Time (toF) menu. Adjust the value as for the On Time, and then enable the Timer switch on the control panel to test the settings.

The current Fog and Density levels will be used by the timer system when in the ON period.

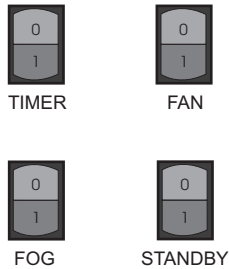
**CONTROL PANEL FUNTIONS**

The control panel provides a means to enable the various functions that control the Fog and Fan operation. The switches have a maintained action, and are used to set the operating mode of the machine. The settings for Fog and Density levels are made using the LED display keypad.

The Lo,Nor & Hi density settings are used to relate the fan speed to the current level of fog output. Use Lo density when using ducting to get maximum thrust from the fan , and use Hi density to create a very dense effect (although with reduced volume).

The ramping control system may override the density setting if required.

The layout of the control panel is shown in the following drawing.



The switches are used to set the operating mode of the machine and are used individually or in combination. The functions available are explained below.

**FOG:** Gives Fog and Fan output at the levels currently set using the display system. The machine must be Ready before fog can be produced.

**STANDBY:** The standby switch brings the machine into operating mode and will start the heater. This switch must be ON to use the Fog switch or the Timer. When Standby is OFF, the machine will display OFF on both displays. With standby ON, and the machine ready, Rdy will be on the Fog display.

**TIMER :** When the machine is Ready, (at operating temperature), the timer switch will start the timer running using the settings from the display.

The machine uses a 'pump ramping' technique to allow continuous operation. This means that transmitting DMX 100% will cause the machine to run at full output until the temperature falls and the output is automatically reduced. The output will remain at this level until the DMX signal is reduced, or the fluid is exhausted. There is no possibility of damage, since the electronic fluid level sensor will shut the machine down.

The fan output level is affected by the ramping system via the Density setting.

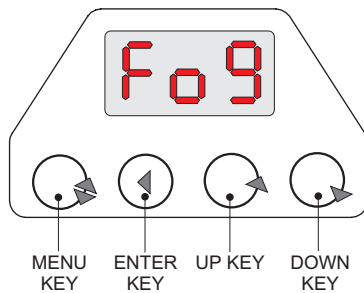
The onboard timer functions are not accessible via the DMX system. Any timing of the output must be done using the programming capabilities of the DMX console being used to control the system.

The binary weighting of the DIP switches is shown on the panel next to the switches.

**THE DISPLAY**

Two LED displays are used in the Heavy Fog Glaciator to show status and control information. The left display shows all information for the fog generation functions of the machine, whilst the right display shows the information for the Ice functions.

Located below each display are 4 function keys that can be used to control the display and the settings on the machine. The functions of the keys are shown in the following drawing.



The message displayed will depend on the operating mode of the machine at the time. However, pressing the menu key at any time will cause the display to go into the edit mode, allowing the operating parameters to be adjusted. After approximately 5 seconds since the last keystroke, the display will leave the edit mode and revert to displaying the current status information.

Pressing the menu key will display the current menu function, whilst pressing and holding will scroll through the available menus. All keys work the same way, and can be operated with single keystrokes or held down to force the display to scroll through the available options/values. The scrolling function comes into operation 1 second after the key is pressed.

When the user has set the required menu function, pressing the enter key will display the current value associated with that menu item. The user can now use the UP/DOWN keys to move through the available options/values either by single keystrokes or by scrolling.

To store the new value into non-volatile memory, the enter key must be pressed before moving on to another menu or leaving the edit mode.

When not in edit mode, the display will show information appropriate to the current operating mode. To do this, the display will alternate between two messages. The duration of the first message is typically 1 second, whilst the second message will be visible for 2 seconds. Some messages are compounded together to form one message, eg FLu/Lo indicating low fluid in the fluid container.

As an example, when the STANDBY switch on the control panel is set to OFF (0), the display will alternate between FOG and OFF. For more information about the messages to expect, see the sections covering the different control functions on the machine, eg 'THE TIMER'. The section entitled 'DISPLAY MESSAGES' contains a complete list of the messages and the circumstances under which they are displayed.

The menus available on each display and the functions they perform are as follows:

**Fog Display**

- Fog**  
Sets the current Fog output level in the range 0 to 20.
- TON**  
Sets the ON time of the Timer in the range 0 to 90 (seconds).
- TOF**  
Sets the OFF time of the Timer in the range 0 to 90 (seconds).

**Ice Display**

- Den**  
Sets the output density level (Lo,Nor,Hi).
- SuP**  
Sets the supply voltage in the range 200 to 250v.
- Ice**  
Displays current system temperatures.

The software that controls the displays and the other functions of the machine is stored in 'Flash' memory on the DMX receiver PCB. As new features become available, this program code can be updated by using the Martin Uploader programming device for the AVR microprocessor.