

CHAMELEON SAFETY INSTRUCTIONS

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These safety instructions are complementary to, and in addition to those instructions in the main Manual section. Both should be read and understood thoroughly before use of the Chameleon.

It is the responsibility of the user to be fully aware of all potential consequences and actions when using this machine.

The manufacturer cannot be held responsible for events occurring due to use of this machine by unqualified or untrained personnel.



Warning: All directions in the manual should be read thoroughly and completely understood before any attempt to use the machine.
The machine should only be operated by or under the instruction of trained personnel.

Any maintenance of the machine should only be carried out by the manufacturer or after the manufacturers strict approval.

Should there be any doubt as to the safety of operation of the machine under any circumstances, the machine should be taken out of service immediately.

The Chameleon must not be used in confined spaces, under any conditions of rain, snow or precipitation of any fluids, or moving air which will cause the flame to divert from a vertical path.



Warning: Failure to observe correct operating procedures may lead to serious injury, damage by fire, or explosion.



Warning: Before initial use, and each subsequent use, the Chameleon should be checked for functional suitability. Should any damage be observed or doubt about suitability of use occur, it should be immediately decommissioned and held for service. The Chameleon should not be subjected to temperatures below 5 degrees Celsius or above 45 degrees Celsius nor exposed to unsheltered conditions.



Warning: It should always be assumed that gas remains within the Chameleon system. Never assume otherwise. The Chameleon should be purged of gas as described in the manual either by flaming, or safely releasing the gas.

Conditions of use



The Chameleon is only suitable for indoor use, or situations that meet the same environmental conditions.

The machine must only be used vertically, secured in position, protected from unauthorised interference, impact forces and vibration.

Any installation or re positioning should only be performed when the machine is cool, disconnected from the mains supply and all data communication.



Safety distances must be given a priority when using the Chameleon.

This not only includes those in the performance area, but to surrounding flammable objects and the base area upon which the Chameleon is sited.

Full risk assessments must be made before use, and all relevant emergency failure procedures must be immediately available. i.e. qualified personnel, fire extinguishers and medical aid.

All operations should have undergone preliminary tests and rehearsal.

Should any conditions change that would indicate an unsafe operation an emergency shut down should be instigated.

E-stop control should always be included in any installation format.

An absolute minimum guidance is a safety radius of 2m.

An absolute minimum guidance is a height safety distance of 8m.

These distances should not less than that dictated by risk assessment.

These distances will not apply to instances where drafts or airflow will cause the calculated safety distances to be greater.



The use of an electronic gas sensor, which should be part of standard equipment used by qualified personnel, is recommended for checking the integrity of the Chameleon as a standard safety procedure.



No canister, fuel supply or alternative gas / fluids should be used with the Chameleon unless specifically approved by the manufacturer.

No modifications, alterations or service is permitted unless specifically approved by the manufacturer.



The Chameleon should be regularly checked and serviced as required relating to the frequency of use and the application conditions.



The Chameleon is commanded by instructions using the DMX protocol. The manufacturer cannot be held responsible for incorrect application or malfunction of data sent via this medium. Each DMX address must be correctly set and stored as per the manual instructions. Should DMX isolation or other devices be required for the safe application of DMX control then this will be deemed the responsibility of the operator.



It is repeated that the use of the Chameleon in any form by untrained or unqualified personnel will relinquish the manufacturer of all responsibility relating to any consequence.

Operational Guidance and Notes:



Risk assessment, Usage, Compliance with Authority requirements, Effect demonstration, Approval, Safety distances, Fire prevention, Fire procedures, Emergency fail equipment and procedures. These and local legislation must all be taken into account before the Chameleon can be used.



It must be stated that under no conditions should the Chameleon be modified or used in an exposed condition that might lead to injury of any kind. (fire, explosion, burns, electric shock etc)

Follow all of the recommended safety procedures and safety distance guidance.

Do not insert, change, remove canisters in any environment that could induce ignition. i.e. Smoking, open flame, spark contacts or hot surfaces, including a recently fired machine.

Do not attempt to move the Chameleon until it has cooled, or attempt to lift it by the grilled flue cover.

The Chameleon is not designed for continual flame use. It is intended for fire ball and short duration flame bursts. I.e. Typical 5 second bursts maximum.



A suitable fire extinguisher should always be available and sited close to the operation of the machine.

Canisters should never be changed when the machine is on, or still hot enough to cause possible ignition.

Should a canister or canister base fail, such that leakage occurs when removing the canister, DO NOT remove it. Re-tighten the canister and leave it in the machine. (Note: there will always be a slight hiss when removing a canister, as the canister valve shuts, this is normal.)

The machine can then be taken to a safe area where the canister can be safely removed, or the gas burnt off, whichever is deemed safe to do. The failure can then be investigated and corrected.



Always be aware of the potential dangers involved in using a flame machine of this nature. In every instance of use the user should be confident that all possible scenarios involving safety issues are fully and confidently covered.



Regularly test the operation of both solenoid valves.

Recommended procedure is outlined below – it requires program type 2 (PrG2, see page 10). The test should be given the same safety precautions as normal operation.

Load the machine with fuel canisters and arm the unit. Open the firing (nozzle) valve without opening the safety (canister) valve. If fire is observed, the safety valve has failed in open state. Close the firing valve. Open the safety valve. If fire is observed, the firing valve has failed in open state. Open the firing valve. Fire should be produced; if it is not, then one of the solenoid has failed in a closed state. If this test is failed, the machine should be taken out of service immediately.

CHAMELEON + (software upgrade v3*)

Update: February 2016

Operation and Safety Manual

* Software v3 has included an option to deactivate tilt switch.

* Software v2 has an added dmx data filter selectable on/off. This is a five stage median filter followed by a majority equal value stage. It will increase the safety integrity within the dmx environment. Although this will cause a small delay in response (in the order of 75mS), in practice the effect of this delay will not be noticed.

The tilt switch sensing has been improved in order to deal within concussive type pressure waves that would otherwise trigger the sensor.

The display of each channel value (when in dmx mode) now includes an autoscroll so that each value is displayed for two seconds.

The Chameleon is a small canister driven flame effect for use with theme parks, stage shows and concerts etc. Various colours are available which allow a rich colour flame set to be produced.

Overview

The Chameleon burns Methanol / Ethanol combined with a propellant or Butane / Propane plus colour 'salts' to provide its impressive flame effects. This method allows very low percentages of the colour mix to create the vivid colours without compromising safety issues.

The Chameleon is DMX driven, using three channels to control its operation. These three channels control the ignition mechanism (Hot surface igniter, Hsi), the flame solenoids, and an external mains power output socket. Channel is considered active when its value is raised to more than 50%. Use of flash button is advised for the firing channel.

The Hot surface igniter will take approximately 10 seconds to reach the correct operating temperature, after which flame operation will be allowed. A flashing display indicates that this heating process is taking place. The current passing through this device is constantly monitored such that a failing device will be detected and shut all operations down.

The flame solenoids control the supply from the canisters and are physically situated at the 'source' and output stages of the machine, providing maximum operational safety. These will be shut down on both the above error, as well as if the machine is tilted more than 60 degrees.

The external mains power output socket provides a means of controlling warning beacons in the area of flame operations for further safety measures.

All three DMX channels on any one machine can be set and stored to any value desired, the only restrictions applying being that channels cannot be set equal or more than 256 channels apart. This allows for common Hot surface igniter and Beacon channels whilst the Flame channels can be set either common or individually in multiple unit use.

If fitted, a 'flow' adjustment valve is accessible on the underside of the machine, which allows a pre-determined flame height to be set. Once set, and the Chameleon in situ, this adjustment feature is purposely not readily accessed. This is a further safety feature.

Any serious operational error will be indicated by a rapid flashing display, and will require a mains off/on reset in order to resume operation.

The Chameleon is supplied set to PrG 2 mode whereby separate DMX channels control the two solenoids.

Hsi = channel1, Nozzle solenoid = channel2, Canister + Beacon output = channel3

Please refer to the Program Type information at the end of this document if the alternate mode is required.

Dangers and Safety Precautions

The Chameleon produces real flame effects, which by their very nature, are extremely hot and potentially dangerous.

Safety must be paramount when using any flame effect, particularly indoors. Because of this the Chameleon is designed to be used by professional users only and not by unqualified users.

The user is responsible for ensuring that all reasonable safety precautions are taken before using the Chameleon.

In all situations, no matter what the application, it must be ensured that no person can touch, get within 3 metres or look over the Chameleon unit as severe burns can be caused by the flame and the unit may “fire” without any prior notice – this is also why a direct line-of-sight must be maintained between the operator and the unit.

Tests must be carried out before use in any new installation. The maximum flame height must be ascertained and set via the flame height adjuster before programming begins. Remember that the temperature immediately above the flame can be as hot as the flame itself so the height adjustment must also take this into consideration.

Under no circumstances should any foreign body or chemical be introduced into the flame itself – this is potentially very dangerous.

There are no user serviceable parts within the Chameleon system and any faults should be dealt with by a qualified engineer or the unit should be returned to the manufacture for repair.

The Chameleon should only be used in sheltered conditions and never in the wet or rain. Care should also be taken if using the Chameleon in windy conditions as the flame could be blown sideways or at an unexpected angle.

Never use the Chameleon near flammable surfaces.

If in any doubt about the safe use of the Chameleon, contact the manufacturer or your supplier, before using it.

Turn on

Following procedure turns on the Chameleon. **Read this document in full beforehand.**

1. **Only if unit is to be fired**, load it with canisters. **Otherwise ensure none are fitted.**
2. Connect DMX control via DMX IN socket.
3. Supply power to the machine via the power socket.
4. Switch the power switch to the ON position.
5. If canisters are present, treat the unit as if it could fire at any moment and immediately move to safe distance.

Precautions and Using the Chameleon.

The Chameleon is a two-canister machine, and ideally should only be used with two canisters fitted.

Any colour mix is allowable, although the 'expected' flame colour may not result due to the mixing of flame colour temperatures.

The nature of the design allowing flame ball effects will mean that fluid will remain within the machine after the removal of canisters. This fluid should be ignited and thus the system 'flushed' as a final shutdown procedure. Failure to do this might result in an unexpected flame output when the Chameleon is next commissioned.

Canisters should be removed from the Chameleon and the system 'flushed' (as above) during transport or when not in use.

Care should be taken not to allow the ingress of any particles or foreign body into the canister bases, as this could lead to the solenoids jamming open.

Regardless of knowing if the Chameleon has been flushed or not, it should be checked before use, without canisters, and assumed that a flame will result upon flame activation. The Chameleon should be sited in a safe environment (assuming maximum flame height) and run through operational procedures.

The DMX channels should be set, and the panel set to receive DMX signals. Ideally the DMX signals should be transmitting before the unit is switched on. The Hot surface igniter should be activated until the control display stops flashing, then the flame channel(s) activated. If fluid remains in the system, this will be burnt off. When viewing the Hot surface igniter stay at least 3 metres from the machine.

After all fluid has been burnt off, solenoids can be heard to 'click' on flame activation.

Attach a mains driven beacon, or similar device, to the external power socket and check that the allocated DMX channel can activate this.

The Chameleon should be tilted to check the operation of this safety device. Tilting the Chameleon away from the display side will allow the flashing display to be viewed.

The Chameleon should now be switched off and all surfaces allowed to cool. At this point canisters can be fitted. No fluid should eject from the canister bases. Listen for any escaping fluid (hissing sound), be it from internal fittings or from the output nozzle in the flame flue. Ideally use a gas leak detector if one is available.

After these checks have been made, the Chameleon can be commissioned for use.

Shutdown

Each of the following steps disables the machine. The order presented is for a recommended normal shutdown procedure. In case of an emergency always perform the easiest, safest and quickest step available first.

1. Disarm via the control system – set HSI DMX channel (and solenoid channels) to 0.
2. Cut the power to the machine.
3. Switch the power switch to the OFF position.

Flame Height

As standard, the Chameleon is **not** fitted with a height adjustment valve. Units can be made to order with adjustable height, or a height adjustment valve can be fitted to an existing unit. Please contact the manufacturer for further information.

If fitted, the height adjustment valve wheel is located on the right hand underside of the machine (viewed from the rear), the perimeter of which can be felt protruding from case. **Anticlockwise** rotation opens this valve for **maximum flame** height (hand movement from rear to front of machine). **Clockwise** rotation closes this valve for **minimum flame** height (hand movement from front to rear of machine)

It should be noted that if the canister solenoid is left open and only the Flame solenoid used for control, then the gas storage between the solenoids will create a flame ball or higher initial flame before the flame reduces to the set height.

To have a consistently lower flame height, control both solenoids simultaneously, so that the gas storage is not replenished.

To create a flame ball, allow the canister solenoid to be open first, and then operate the flame solenoid.

The Control Panel

The control panel provides the following functions:

A SELECT button allows the Hot surface igniter, Flame, and Canister DMX addresses to be selected individually as well as setting the Chameleon into the DMX receive mode. Continual presses of this button will cycle through these events.

UP and DOWN buttons allow each address to be adjusted to suit the user. These addresses are not allowed to be equal or more than 256 steps apart. A warning will be given on the display to reset these values should this occur. Whilst in the mode of setting addresses the STORE/VIEW button will place these values in memory.

When the DMX mode is selected for receiving data, the STORE/VIEW button will allow the received DMX data value to be viewed for each channel. (0 to 99%) or scrolled through. H = Hot surface igniter. F = Flame. C = Canister. Pressed a fourth time it will autoscroll.

When the DMX mode is selected, and there is no DMX data the display will read doF. (DMX off)

With no DMX connection a special function STORE/VIEW + UP button will set a value in memory which relates to the time required for the Hot surface igniter to reach the correct working temperature and allow the Flame solenoids to function.

The UP/DOWN buttons will vary the set value from 0 to 254. To exit from this feature, press the SELECT button.

Typically a value of 50 will equal a 5 second delay. A value of 100 will equal 11 seconds and a value of 200 will equal around 35 seconds. Each time this value is changed by the button presses, it will be stored in memory.

This value may need to be changed if the Hot Surface igniter is replaced, or special user circumstances require it.

Changing this value and allowing a shorter time before Flaming is allowed may well create unsafe or hazardous conditions, allowing unburned fluid to be ejected. The onus of responsible will lie with user.

Software System Control

HSI Delay Time

The delay time associated with the Hot surface igniter can be varied and set for particular conditions.

This can be set by disconnecting the DMX signal where the 'doF' display is active. Pressing the 'Store/View' button along with the 'Up' button will display a scrolling 'dEL'. After this disappears a numeric value will appear. This can be altered and stored. A value of 50 is approximately 5 seconds, 100 = 11 seconds 200 = 35 seconds. After setting and storing pressing the 'Select' button will revert to normal mode.

Filter On/Off

This menu is selected whilst waiting for the 'dEL' to end and display the Hsi delay time. Pressing the down button whilst the dEL is scrolling will now display FILtEr option. It can be Yes or No (1 or 0).

Tilt Switch On/Off

This menu can be assessed by pressing 'Store/View' along with the 'Up' button when 'dof' is displayed. When 'dEL' is scrolling press 'Down' and then press 'Up' and 'tilt Loc' will be displayed. Pressing 'Up' and 'Down' then toggles the Tilt Switch on or off.

Purge Setting

This allows solenoid action with no Hot surface igniter action. Where gas can be issued safely, this mode allows the system to be purged of gas. The Hsi will be disabled to prevent flames. To access this mode, reduce the above delay setting to below 10. Remember to return the delay setting value to its original value and store it.

Program Type

Note: This will require internal wiring changes which should only be performed by qualified personnel.

This setting is accessed by disconnecting the DMX signal where the 'doF' display is active and pressing the 'Store/View' along with the 'Down' button. A scrolling PrG display appears before displaying PrG 1 or PrG 2, depending which setting is presently active. The 'Up' button selects PrG 2 and the 'Down' button selects PrG 1.

PrG 1 : This mode uses the DMX channels as follows.

DMX channel 1 = Hot surface igniter.
DMX channel 2 = both Flame Solenoids
DMX channel 3 = Beacon output.

The Flame solenoid will not operate until the Hot surface igniter has timed out, and will be shut down on igniter failure or tilt.

The Beacon output can be operated at any time.

Wiring - Solenoids to 'Sol can' and 'Sol FI' connections on the PCB
Beacon output to 'Beacon' connection on the PCB

PrG 2: This mode uses the DMX channels as follows. This is the Default setting.

DMX channel 1 = Hot surface igniter
DMX channel 2 = Flame nozzle solenoid
DMX channel 3 = Canister solenoid and Beacon output.

The Flame and Canister solenoids, along with the Beacon will not operate until the Hot surface igniter has timed out, and will both be shut down on igniter failure or tilt.

This mode allows for independent control of both solenoids, but requires two DMX channels to initiate the flame. It allows for individual solenoid proofing in the above 'purge' mode.

Hardwiring of the solenoids to the PCB connectors must be altered depending on what program is selected.

Wiring - Nozzle Solenoid to 'Sol FI' connection on the PCB
Canister Solenoid and Beacon wires to the 'Beacon' connection on the PCB.

Service Note: It is possible, that under certain conditions of use, a fine layer of evaporated coloured salts may build up on the one way valve discs within the canister base. This will lead to gas leaking back out of the base when the canister is removed. Should this occur the Chameleon should be referred to service. (If qualified expertise is available then it is possible that a small amount of hot water placed into the canister base pin cavity, and fired through the system with gas, will clear this film off. A 10mL syringe would be useful for this task as it can apply and withdraw fluid easily.

Technical Details.

Size: (mm)	H 405	L 360	W 275
Weight:	12Kg (approx)		
Flame media	Le Maitre Canisters : 2 required		
Flame Height Control	Fitted on request		
Flame Height Max	5m		
Flame Height Min	1m		
Control	3 Channel DMX		
Channels	Hot surface igniter, Flame, Beacon output		
Suitable for outdoor use	No		
Line-of-site required	Yes		
Power Requirements	230Vac 50Hz 250 Watts max or 110Vac 60Hz 250Watts Max		
Fuse Rating	3.15 Amps T	6.3 Amp T	

Note: although the machine should not be used below 5C, if it is switched on when extremely cold, there is a chance that the mains fuse may break, due to large current peaks taken by the Hot Surface igniter under such conditions. Replace the fuse with the same rating and wait until the machine has returned to normal working temperature conditions.

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Control Panel Layout

