



Spirit 900 Operating Instructions

High Output Smoke Generator

ID: 15342-6

Please read these instructions fully before operating your Smoke Machine!

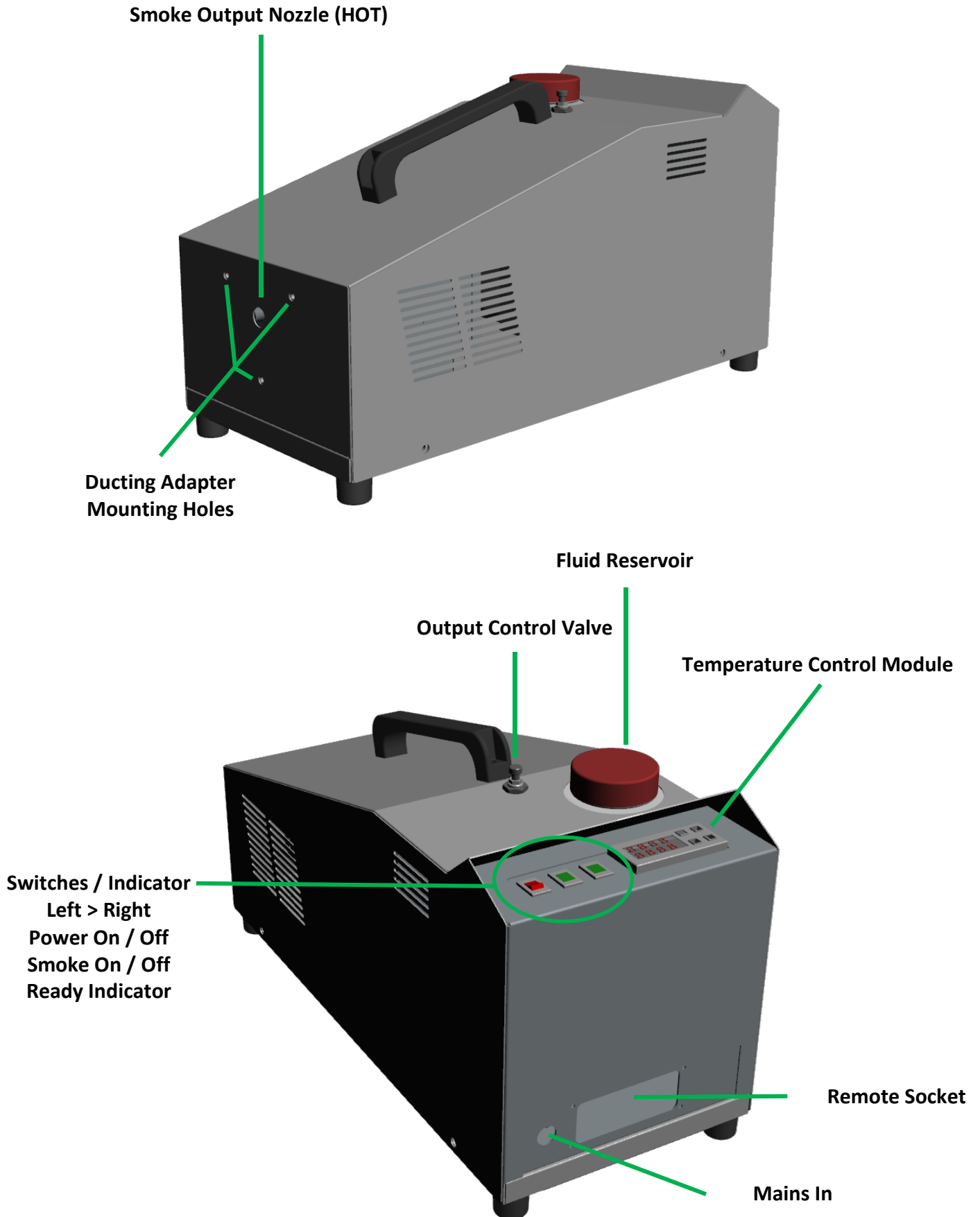
General Information

- Spirit 900 machines should only be used in conjunction with the appropriate Concept Smoke Fluid. Damage will occur if incorrect fluid is used.
- Always keep the machine upright and allow adequate ventilation to the machine. Do not cover or obstruct louvers in any way. Use the machine only in well ventilated areas.
- When smoke is required to be hosed away from the machine, a Ducting Adapter (available from Concept) must be used. This acts as an adaptor flexible hose, and also serves to remove any large droplets of fluid from the smoke.
- At regular intervals the Ducting Adapter should be detached from the machine and drained of fluid. Failure to do so could cause contamination of fluid within the machine, possibly causing damage. The maximum length of ducting that can be used with the Spirit 900 depends on rises, bends and falls in the run, but on average approximately 10 metres may be used. Longer distances can be achieved when used in conjunction with a centrifugal blower.
- When the machine is to be wired into a customer's control panel or system, separate instructions and wiring diagrams should be obtained from Concept.
- Store and use the Spirit 900 only in dry conditions.
- If operating the Spirit 900 from a power generator (e.g. petrol, diesel, etc.) as opposed to conventional mains supply, you must ensure the power generator produces both sufficient power and a 'voltage stabilised' (pure sine wave) output otherwise damage can be caused to components inside the machine.

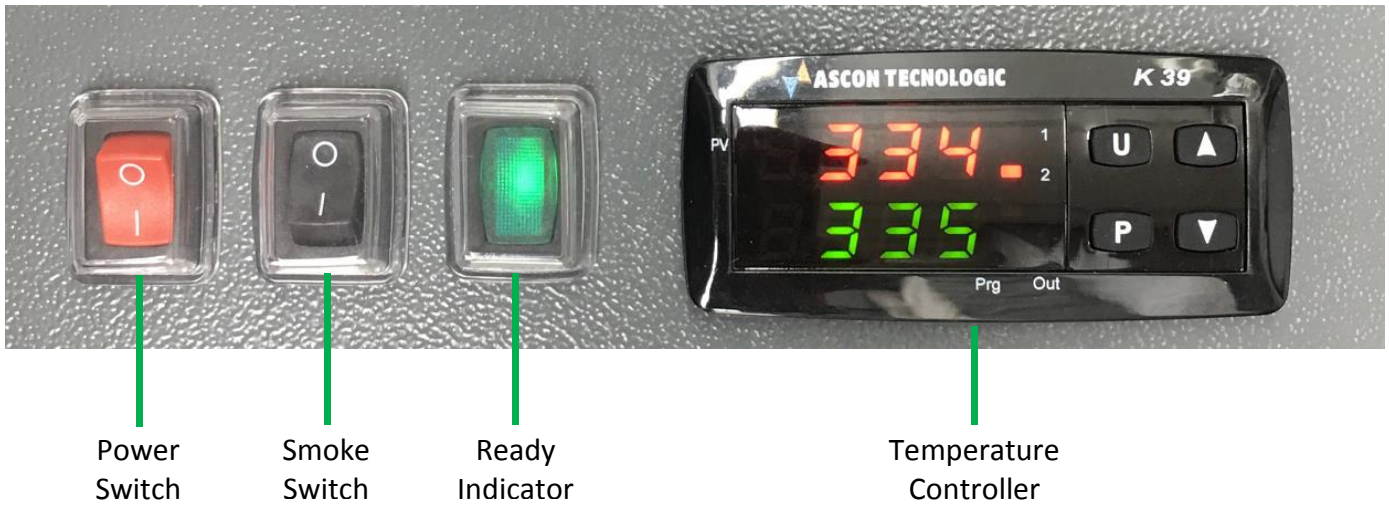
Preparation of Spirit 900

- Fit suitable fused plug to the mains lead if not supplied.
- Remove transit cap (visible when red reservoir cap is removed) from the Internal Reservoir. This cap protects against fluid spillage during transit. With the cap removed, fill the Internal Reservoir as required the appropriate Concept Smoke Fluid (A, B, C). Please note unless otherwise specified the Spirit 900 will be calibrated for Smoke Fluid A. Do not mix Smoke Fluids. Take care not to overfill the Internal Reservoir or cause spillage. Refit the red reservoir top tightly. Always ensure that the Internal Reservoir contains only non-contaminated Concept Smoke Fluid.
- Check all switches are in the OFF (0) position.
- Ensure that the Output Rate Control (if fitted) is fully open (fully anticlockwise).

Identification



Control Panel



Temperature Controller: The temperature controller displays two temperatures. In **RED**, on top is the current heat exchanger temperature. In **GREEN**, on the bottom is the target temperature.

Please Note: The settings on the temperature controller are set and calibrated during production. The buttons (U, P, ▲, ▼) have no functionality.

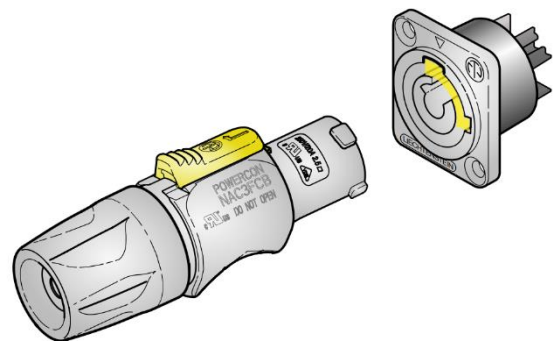
Operation of the Spirit 900

- Connect the Spirit 900 to a suitable electrical supply and put the Mains Switch to the ON (1) position. The temperature controller will activate in “TEST” mode for approx. 5 seconds.
- After approx. 3-4 minutes the Green Ready Indicator will illuminate. This occurs when the minimum operating temperature is achieved. It is recommended to allow the current heat exchanger temperature (**RED**) to reach the target temperature (**GREEN**). For optimum performance pre-heat for 15 minutes.
- To produce smoke, put the Smoke Switch to ON (1).
- The smoke output is adjustable by means of the Output Rate Control (if fitted).
- When smoke is no longer required, put the Smoke Switch to OFF (0).
- When shutting down, put mains switch to OFF (0) and disconnect the machine from power supply.

Remote Operation

Standard 5mtr Wired Remote

A 5mtr Wired Remote Control is supplied with all standard Spirit 900's. This connects into the rear of the smoke machine via a Neutrik powerCON connector. When this is connected to the Spirit 900 generator the Remote Smoke Switch performs exactly the same function as the Smoke Switch on the machine (which should be left in the OFF (0) position).



Concept Engineering / Smoke Systems Limited

Radio Remote Control (Optional)

If fitted the radio remote control will allow you to activate the Spirit 900 from a distance of up to 100mtr (line of sight). The button on the transmitter gives the smoke on / off signal.



Other Remote Options

The Spirit 900 can be configured to operate via a PLC Interface, DMX or Timer module. Specific components instructions are available for these, contact Concept.

External Fluid Reservoir (Optional)

The Spirit 900 can operate from an external fluid reservoir. The external fluid reservoir is connected via a feed tube and quick connector (supplied). To assist with the initial priming of the feed tube ensure that the smoke output valve is fully open (fully anticlockwise). It will take a few seconds for this tube to become primed in the first instance and for smoke to be produced. Once primed however smoke can be produced with virtually no delay. The external fluid reservoir has a float switch installed to prevent the Spirit 900 from running dry.



Float Switch
Connection

Fluid Feed
Pipe

Smoke Fluids

Smoke Fluid A – Very Persistent Smoke

Unless otherwise specified, the Spirit 900 is set for Smoke Fluid A, producing a dense and extremely persistent smoke with a long hang time.

Smoke Fluid B – Quickly Dispersing Smoke

Smoke Fluid B can be used with the Spirit 900, producing a rapidly dispersing smoke.

Smoke Fluid C – Medium Persistency Smoke

Smoke Fluid C can be used with the Spirit 900, producing an effect of medium persistency.

To use Smoke Fluid B or C the temperature controller must be reprogrammed and all existing smoke fluid must be drained from the smoke generator. Instructions are available upon request from Concept. Please note your unit must be fitted with a reprogrammable temperature controller in order adjust these settings.

Continuous Smoke Operation

Your machine has the ability to produce smoke continuously (dependent on Smoke Fluid supply). If however you find that smoke production cuts out for short periods of time and then restarts automatically, simply close the Output Rate Control slightly (turn clockwise) until continuous smoke production is achieved.

Maintenance

Very little maintenance is required for your smoke machine. If this maintenance is regularly carried out, unnecessary servicing will be avoided. Remove plug from mains supply before undertaking any maintenance operations.

- Frequently clean the nozzle of the Heat Exchanger using the drill and pin chuck supplied, drilling out by hand any dirt or deposit to a maximum depth of 25mm. We recommend doing this after every 1-2 hours of smoke production.
- Ensure that the machine is kept clean and dry.

- To access the inside of Spirit 900:
 - Remove the screws located either side of the machine.
 - Remove the locknut from the Output Control Valve (if fitted)
 - Carefully lift the cover vertically off the machine chassis & disconnect the earth lead.

- Ensure that the Internal Reservoir (External if applicable) contains only clean Concept Smoke Fluid. The coupling at the base of the Internal Reservoir (and brass coupling on the end of the External suction hose, if used) contains a fine mesh filter to help prevent any dirt from getting into the pipework. This filter may be cleaned by:
 - Draining the reservoir completely.
 - Removing the machine cover from the chassis (steps above)
 - Disconnect hose from fitting. Carefully blow compressed gas in the opposite direction of normal flow. Any filter contamination will be blown back into the Reservoir and can be cleaned by rinsing the Reservoir with water and swilling away.

- Should it be necessary to remove the Heat Exchanger completely:
 - Carefully remove Transfer Tube from the Heat Exchanger
 - Disconnect the Heater, Thermocouple & Thermal Cut Out wires at terminal strip and earth tab.
 - Remove mounting screws and lift out unit from machine base.
 - To refit the unit, reverse.

SPECIAL NOTE Unlike conventional cast Heat Exchangers, all Concept Heater Blocks are precision machined and completely serviceable. Where exceptionally heavy use has been made of your smoke machine (e.g. Fire Brigade Training) we recommend the Heater Block is stripped and cleaned every 6 months. This operation takes approximately 15-30 minutes, full instructions are available from CONCEPT.

Servicing

We recommend that your smoke generator is returned to Concept or an authorised distributor (details available from Concept) on an annual basis for cleaning, servicing and testing to ensure that the equipment and its resulting smoke remains in optimum condition.

Fault Finding

If smoke is poor or not produced at all:

- Check the mains supply is live and fuse is intact.
- Check the Reservoir contains the appropriate Concept Smoke Fluid and that the filter is clean.
- If using the Spirit 900 with the External Fluid Reservoir, ensure the Fluid Feed Pipe is correctly connected and the External reservoir contains the appropriate Concept Smoke Fluid
- Check that the Output Rate control is fully open.
- Check that the Heat Exchanger Nozzle is clear by carefully drilling out with the 2mm drill and pin chuck supplied, to a depth of 25 mm.
- If smoke is still not produced, remove the Transfer Tube and blow through both ways using an airline. If there is no flow through, straighten the Transfer Tube and push through a length of fine wire (supplied). Refit Transfer Tube, leaving the Heat Exchanger end disconnected. Switch machine on. When 'Temp' indicator comes on, place a cup under the open end of the Transfer Tube and put the Smoke Switch to ON (1) to ensure that there is a flow of fluid. Switch the machine off and reconnect the Transfer Tube to Heat Exchanger when it has cooled. If smoke is still not produced satisfactorily, consult CONCEPT.

Thermal Cut Out

All Spirit 900 Heat Exchangers are fitted with a Thermal Cut Out (TCO). In the event of a fault occurring causing overheating, the TCO trips before any further damage is done. When the TCO trips, all lights on the machine will go out. To check if TCO has operated, disconnect mains power, remove cover and carefully depress the red button on TCO. If it clicks, the TCO has operated - consult CONCEPT. If the TCO has not operated, check the supply is live and that the fuse in plug is intact.

NOTE - If operating the machine with the cover removed, ensure that you keep clear of connections.

Installation Warning

Design and installation facilities are available to meet any special requirements, from advice about simple hosing of smoke to complete automatic systems. Concept cannot accept responsibility for any damage or malfunction caused to or by Concept smoke machines, or any consequential damage, where ducting of smoke or electrical switching or any other deviation from the standard machine supplied is carried out by anyone other than Concept Engineering Ltd. Concept reserves the right to change specification of products without prior notice.

Health & Safety

The smoke produced by all Concept smoke generators has been rigorously tested to ensure that in normal conditions it is non-toxic. Independent health and safety reports indicate that dense smoke concentrations can be entered without any serious health risk for short periods of time. However, we recommend that persons who are asthmatic or suffer from a respiratory complaint are not subjected to dense smoke concentrations, and the use of suitable PPE in the event of extended exposure to such environments. Should the artificial smoke be used in conjunction with live fires, where, by definition the potential for products of combustion to be formed, breathing apparatus should be worn. Copies of independent reports on the safety aspects of Concept smoke are available on request.

CE Marking and WEEE Marking

All Concept smoke generators produced from 1st January 1996 comply, as appropriate with the EMC Directive EN89/336/EEC, in that they meet the requirements of EN50081/1 and EN50081/2 and the Low Voltage Standard EN60204, Low Voltage Directive 72/23/EEC, 98/37/EC Machinery Directive and 87/404/EEC Simple Pressure Vessels directive. Units are CE marked accordingly.

Concept are a member of an Environment Agency Approved WEEE producer compliance scheme. Our WEEE producer Registration Number is WEE/BC0414VY. Products may be returned to Concept for disposal under the terms of the scheme.

Concept Engineering / Smoke Systems Limited

Specific Controller Settings (Optional)

Integral Timer Module

A timer module can be installed on the Temperature Control Module allowing users to set specific smoke on / off times. To operate this function:

- With the machine switched on, press and hold **P** on the Temperature Control Module until **tr.t1** (time on) is displayed in red.
- Use the ▲ ▼ to adjust the smoke on time. it is adjustable between 0.01 (1 second) and 99.59 (99 minutes and 55 seconds).
- Press and hold **P** again, until **tr.t2** (time off) is displayed in red.
- Use the ▲ ▼ to adjust the smoke on time.
- To capture / save these settings press **P** and wait 15 seconds for the controller to save.



To use the “Smoke On / Smoke Off” function you must connect the remote control cable lead. The rocker switch on the remote control lead allows an operator to turn on the smoke or turn off the smoke manually.

To Use the Timer Function

(having installed the desired settings in the controller beforehand)

- Make sure the Smoke Switch (both on the machine and remote handset) are set to off (0)
- To start the time sequence, press red push button.
- To stop the time sequence, or to just give a burst of smoke, press black push button.



Automatic Purge System

If fitted with an Automatic Purging System, the Spirit 900 will blast compressed gas through the heat exchanger after every smoke operation. After smoke off, (either locally or from the PLC control), the machine will rest for 3 seconds (tr.t1) and then the gas purge line will open for 15 seconds (tr.t2) allowing any residual smoke fluid in the system to be purged. These periods can be adjusted:

- Press and hold **P** on the Temperature Control Module until **tr.t1** (time on) is displayed in red.
- Use the ▲ ▼ to adjust the smoke on time.
- Press and hold **P** again, until **tr.t2** (time off) is displayed in red.
- Use the ▲ ▼ to adjust the smoke on time.
- To capture / save these settings press **P** and wait 15 seconds for the controller to save.

Always ensure a clean airline is used, free from debris or any other foreign matter.

Concept Engineering / Smoke Systems Limited

PLC Interfacing (Optional)

Pin 1	+	+24v DC to power up
Pin 2	-	0v
Pin 3		Volt free contacts
Pin 4		Closing when minimum ready state reached
Pin 5	+	+24v DC to make smoke
Pin 6	-	0v

For optimum performance, we recommend not producing smoke for a period of 10 minutes after the machine initially reaches 'ready'. Thereafter, the unit can produce smoke on demand.

Centrifugal Fan Setup

The Spirit 900 can be used in conjunction with a centrifugal fan if ducting smoke over long distances. To achieve the optimum smoke effect we recommend:

- Ensure that the smoke output nozzle aligns with the centre of the centrifugal fan. The height of the Spirit 900 may need to be adjusted in order to do this.
- The Spirit 900 should be positioned as far away as possible from the centrifugal fan whilst it can still capture all of the smoke.

