

GEW RHINO/RLT UV SYSTEM
**OPERATING
MANUAL**



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1 About This Manual

1.1 Introduction

This Operating Manual provides Original Instructions, as defined in Machinery Directive 2006-42-EC, for the safe operation and maintenance of your GEW UV system. Read it carefully before attempting to operate the equipment it describes.

Always use trained and competent people for installation, operations, maintenance, repairs or modifications. Each GEW UV system is engineered to meet the requirements of a given installation. Any change in requirements may require re-commissioning or modification of the system.

Do not modify any GEW UV system without the prior written approval of GEW.

1.2 Symbols, Warnings, Cautions and Information

This document, and GEW equipment, use the symbols set out below. They highlight possible dangers where you need to take safety precautions and follow good practice. Failure to follow the Warnings and Cautions may invalidate your warranty.



WARNING: Risk of electric shock.



Caution: a reminder of safety practices, or directs attention to unsafe practices that could result in personal injury or damage to the equipment, or its components, or to the environment.



Caution: Hot surface.



WARNING: Risk of exposure to ultra violet light.



Additional information and/or essential documentation: Read before attempting to install or operate equipment.



Check list: Follow a structured set of checks to install or operate equipment.

Electronic copies of this document contain [underlined links](#) to essential documentation.

2 About Your RHINO UV System

2.1 System Description

A typical GEW UV system consists of one or more UV lampheads located on the body of the host press, their associated cooling systems, electrical RHINO Rack (RR) power supply cabinets and RHINO Power Supply Units (RPSUs), connector cables and an HMI (Human Machine Interface) that controls the operation of the system. See Figure 1. Standard operating procedures for the complete system and its components are set out in this manual.



Figure 1: Typical GEW UV system

- 1 Lampheads
- 2 RHINO Rack power supply cabinet
- 3 Ducting
- 4 Fan
- 5 HMI

2.2 RLT Power Supply Variant

The RLT power supply is a variant of the RPSU and is driven by the same RHINO control technology. It is compatible with both LED UV and conventional mercury arc lamp systems and is available in both dual and single channel versions. The introduction of RLTs brought about a change in RR design to include a set of indicator LEDs situated at the top of the breaker cover. Any warning or fault indicated would be accompanied by the appropriate code flag at the HMI.

2.3 System Software

The GEW RHINO system is operated by control software installed in the HMI. The software contains the features required across the broad spectrum of customer machine integrations. The software features offered on any one installation depends on the system type, the options purchased by the customer and by the configuration of those options. Hence, some features detailed in this manual may not be available to your system and you will not see the associated menus on your HMI or your display may not match completely what is shown in this manual.

GEW may periodically release bug fixes and new features for its software. You will be notified by GEW when these new releases become available. With prior agreement, updated software will be prepared for you and you must then manually initiate the connection necessary for the update to happen. It is your responsibility to provide internet access that is correctly configured and secure.

Software integration with the host machines is possible. This may allow low level access to system operation and provide remote control of the UV system by the host machine. In such installations it is your responsibility to:

- Write, test and maintain the machine software.
- Operate the machine safely, with the operator panel within line of sight of the machine.
- Ensure IT network security to prevent unauthorised remote control of the system.

By using these methods of integration you must abide by guidelines issued by GEW.

2.4 Optional Features

2.4.1 LED UV Curing

GEW LED lampheads differ from their conventional arc-UV counterpart in that LED lampheads are far more efficient and their output can be instantaneously switched on and off. LED lampheads run cooler so they do not need a shutter to protect the substrate from heat. GEW LED cassettes are either water-cooled or air-cooled. As the UV-LED output is concentrated at a single wavelength, special LED curable inks are required which must be matched to the output wavelength.

Operation of the LED system is essentially the same as for the arc-UV system and the same control software is used as described in section 4.

2.4.2 ArcLED

ArcLED systems enable the use of both arc-lamp and LED technology within the same lamp housing. The lamp housings are designed to accept standard arc-UV cassettes and LED cassettes interchangeably and all power and control systems automatically adjust to provide a seamless switchover.

2.4.3 Process Control

Process control functionality is included with all inert gas curing systems and with all systems fitted with **mUVm** Multi-point UV Monitoring. A dedicated Process Control page displayed on the HMI provides a good overview of performance, displaying oxygen level and UV dose (as appropriate) and giving a clear display of related warning and alarm conditions. Data logging is available with user-settable flags at the start and end of jobs.

2.4.4 Inert Gas Curing

GEW inert gas curing systems:

- allow the curing of low migration inks for food grade applications
- allow the curing of free radical silicone coatings
- improve the curing speed of all free radical inks
- reduce ink odour

Process control software provides closed-loop control of oxygen levels within the curing chamber. Data logging on a job by job basis is available.

2.4.5 *mUVm*, Multi-point UV Monitoring

mUVm allows Good Manufacturing Processes (GMP) as outlined in regulation EC No. 2023/2006 by providing 100% inspection of UV dose during production. Multiple UV sensors positioned along the length of the lamphead(s) provide live data from which the UV dose to the substrate is continuously calculated and recorded (a speed input signal from the press is required). Data logging on a job by job basis is available.

2.5 Intended Use

GEW UV systems are used to cure inks on printing presses via timed exposure to UV light.



WARNING: GEW UV equipment must not be used for any other purpose. Unauthorised use may damage it and impair its safety, unless otherwise stated in writing by GEW (EC) Ltd.

2.6 Environmental Conditions

GEW UV systems may only be operated within the environmental parameters set out below:

All parts excluding LED lamphead -

1. Temperature range: +5°C to +40°C
2. Relative Humidity:
(RH): 0 - 80% at +40°C, non-condensing (UV System)
(RH): 0 - 95% at +40°C, non-condensing (HMI only)
3. Altitude: To a maximum of 1000m above mean sea level. De-rate by 2% per additional 100m of altitude

LED lampheads are subject to additional constraints as specified in datasheet DS1032.

2.7 Maximum Sound Power Levels

Maximum sound power levels generated by components of the GEW UV system when in operation are less than 80dBA (@1m) and are less than the level at which a hazard may be caused. Sound power levels are insignificant in the context of the environment in which the system operates.

2.8 Certifications for GEW Manufactured Equipment

GEW equipment has been designed and manufactured to the standards set out below.

2.8.1 European (EN) Standards

Reference	Title
EN60204-1:2006 + A1:2009	<i>Safety of Machinery – Electrical equipment of machines</i>
EN61010-1:2010	<i>Safety Requirements for electrical equipment for measurement, control, and laboratory use</i>
EN61000-6-4:2007 + A1:2011	<i>Electromagnetic Compatibility – Emission Standard for industrial environments</i>
EN61000-6-2:2005	<i>Electromagnetic Compatibility – Immunity for industrial environments</i>
EN12100:2010	<i>Safety of machinery General principles – Risk assessment and risk reduction.</i>

2.8.2 British Standards

Reference	Title
BS7671:2008 + A3:2015	<i>Requirements for Electrical Installations IEE Wiring Regulations Seventeenth Edition</i>

2.8.3 North American and Canadian Standards

Reference	Title
NFPA79:2018	<i>Electrical Standard for Industrial Machinery</i>
UL508	<i>Standard for Industrial Control Equipment</i>
UL508A	<i>Standard for Industrial Control Panels</i>

2.9 EC Declaration of Incorporation

A copy of the appropriate EC Declaration of incorporation for the GEW equipment covered by this manual is included in the documentation pack delivered with your system.

2.10 Qualifying and Training Operators

GEW UV systems may only be operated and maintained by properly qualified personnel. Regular training courses are necessary to ensure personnel have the specialist knowledge required.

Personnel must be provided with regular training on all safety aspects of GEW UV systems and in particular on the safety regulations currently in force.

This requirement for qualifications and training also applies to local and national safety regulations that may be applicable at the user's location and are not mentioned in this document.



GEW offers custom training for all installations. For further information contact GEW.

2.11 Health and Safety, COSHH and Personal Protective Equipment

A GEW UV system must be considered as a hazardous light source. Exposure to the UV light generated causes burns to skin and eyes even for momentary or brief exposure. The precautions taken by GEW include the provision of shielding to block unwanted light emission, the use of interlocks on removable shielding and the running of lamps at the correct (i.e. not excessive) power for the application. However, these precautions alone may not prevent all hazards, and when integrated on a machine, supplementary shielding/guarding and PPE equipment such as UV glasses, goggles or masks may be required to meet local health and safety regulations. Regular checks must be made to ensure all shielding is firmly fixed in place and any interlocks are operating correctly.



Please refer to the following standards in regard to personal eye protection:

BS EN 166. Personal eye protection. Specifications.

BS EN 170. Personal eye-protection. Ultraviolet filters. Transmittance requirements and recommended use.



WARNING: Immediately stop the UV system if UV leakage is discovered and do not operate it until the issue is resolved.

UV lamps may generate ozone. This is exhausted from the lamphead via the air cooling system. Ducting must either exit the building at a suitable location or be connected to a specifically designed ozone filter. Either method allows the ozone to quickly degrade to oxygen. Guidance on ducting design is provided in your order acknowledgement and in RHINO installation manuals.

Relevant health and safety documentation is provided on the USB flash drive supplied with all GEW systems. General guidance regarding UV printing is included along with safety data sheets relating to UV lamps, ozone, nitrogen, cooling additives and others. Some maintenance tasks require PPE as detailed in the relevant procedures of this manual and in the included safety data sheets as appropriate.

PPE may be required to safely operate the host equipment. Please refer to documentation provided by the supplier of the host equipment.

2.12 Workstations

The GEW UV system is operated from the GEW HMI. It is the duty of the user to ensure the HMI is located so that it may be accessed without the need to lean over moving machinery, or expose the operator to any hazards.

2.13 End of Life Information

GEW products are designed for reliability and will, with regular preventive maintenance, provide a long service life. However, in future the host press system and ancillary equipment, such as the UV system, may become surplus to requirement and will need to be dismantled or disposed of.

2.13.1 De-commissioning, Dismantling and Disposal



WARNING: Isolate power before dismantling the UV system.

After isolating the mains power, the equipment may be dismantled by unplugging connectors and unbolting fixings from the host equipment.

GEW products contain a number of materials requiring different disposal or recycling methods. In accordance with the *European Waste Electrical and Electronic Equipment (WEEE) Directive* these materials must be recovered by an approved recycling facility.



Please contact your local authority for details of the nearest licensed recycling facility.

3 UV Systems Operation Overview and Maintenance

3.1 Starting and Stopping the System

3.1.1 Starting the System

The system is switched on using the main isolator on the RR. See Figure 2. The RR distributes power to the HMI, the RPSUs, and the cooling fan(s). The RPSUs distribute power to the individual UV lampheads and autodampers. The UV lampheads and autodampers are brought into service on using the HMI. See Sections 3.5 and 4 of this manual.

1. Power up the power supply cabinet using the main isolator.



Figure 2: System power supply main isolator (circled), shown in the OFF and ON positions



Always follow the correct lamp stop and system shutdown procedure under normal operating conditions; refer to Sections 4.3.8 and 4.6.6

The main isolator should only be used to switch off power to the system in an emergency.

3.1.2 Stopping the System

In normal operations the system is stopped via the HMI. See Section 4.3.8 of this Manual. When the stop command is issued:

1. The lampheads will be switched off instantaneously.
2. The fan(s) will continue to run for a pre-programmed cool-down period.
3. The HMI will remain active to enable a quick restart.

Automatic stops

In certain circumstances, for example if there is a fault with the fan(s), the GEW control software will stop the lampheads automatically. Refer to Section 3.4.1 of this Manual.

Emergency Stop of Host Press

The GEW UV system is typically interfaced with the emergency stop controls of the host press. If the press operator initiates an emergency stop, lamps will stop automatically.

Emergency Stop

The system may be stopped in an emergency by switching off power at the rotary switch on the RR. See Figure 2. Individual RPSUs may also be switched off in an emergency using the MCBs on the left hand panel inside the RR. See Figure 3.

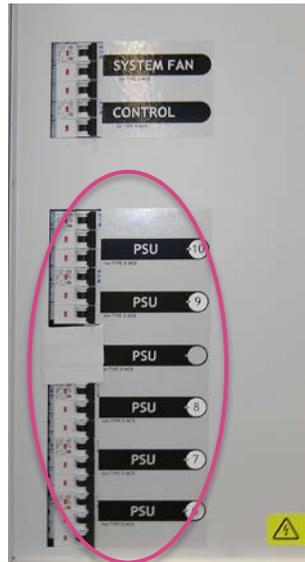


Figure 3: PSU breakers on RR (circled)



WARNING: To avoid lamp damage due to overheating, or a potential fire hazard on the web, avoid stopping the system by isolating the power. It is recommended that power is maintained to the RPSUs when a press emergency stop occurs. This will ensure that the lamphead shutters operate correctly and UV lamps are properly cooled.



Depending on lamp temperature, the stop method, and the duration of the stop, it may take a few minutes to restart the GEW system. The GEW control software will only allow the PSUs to run when all safety interlocks are in place and lamphead temperatures are within acceptable limits.

External Circuit Breaker

GEW requires an external circuit breaker to be fitted to the electrical supply of its UV systems as part of the installation process. The system may be stopped in an emergency by isolating the power at the external circuit breaker.

3.2 UV Lampheads (Arc, LED and ArcLED)

3.2.1 Normal Operations

Overview

In normal operations, each GEW UV lamphead is supplied with electrical power from a RPSU and is operated via the GEW HMI as described in Section 3.5 of this manual. The HMI also controls the operation of the lamphead cooling system. Arc-UV lampheads with pneumatically operated shutters are supplied with compressed air from control valves within the RPSUs and the shutter positions are controlled as required by the HMI.

3.2.2 Routine Maintenance Procedures

Visual Inspection

Perform a regular visual inspection of the lampheads and their connections to the electrical, cooling, and pneumatic systems. Refer to checklist, Appendix C. Check that:

1. The lampheads are clean, especially any quartz windows, reflectors and lamps. For LED lampheads, ensure all LEDs are free from charring.
2. Ensure all UV shielding is securely fixed in position, providing satisfactory protection and any interlocks are working correctly.
3. GEW connector cables are in good condition, neatly routed and protected from damage at all times.
4. Air cooled lampheads: Check that the flexible ducting that connects the lampheads to the air-cooling system is free from kinks, cracks and perforations. Check that the worm drive clips that secure the ducting to the lampheads are secure.
5. Water cooled lampheads: Check the lamphead for water leaks and check the serviceability of any quick-release water connectors within the lamp housings as applicable.
6. Arc-UV and ArcLED systems: Check that the pneumatic supply to the lampheads is between 5 and 6 bar. Check that the connections (1), (2) are secure. Check the moisture trap (3) for any accumulated liquid and drain from the tap (4) if necessary following instructions on bowl. See Figure 4.

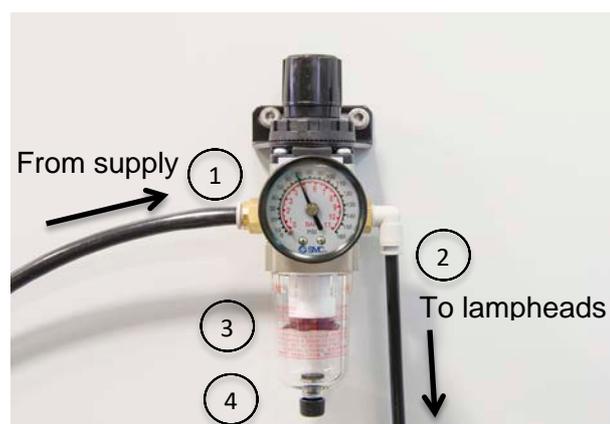


Figure 4: Pneumatic supply moisture trap

Cleaning Reflectors, Lamps and Quartz Windows.

Reflectors, lamps and quartz windows must be free from contamination, including finger prints. All can be cleaned using isopropyl alcohol ('IPA', CAS#67-63-0) and a lint-free cloth. However, please note the following warnings:



Wear PPE as appropriate for handling potentially sharp glass components and for working with IPA.



LED lampheads have components that are highly sensitive to electrostatic discharge. Under NO circumstance should the LED arrays be touched. The arrays are mounted behind quartz windows for protection. Should the quartz windows need cleaning, they must be removed from the lamphead first and electrostatic precautions, such as the use of earth straps, are required during removal and replacement. If in doubt, contact the GEW service department.

Light contamination of reflector glass, lamps and quartz windows on arc-UV lampheads can be cleaned in situ using minimal finger pressure on the lint-free cloth dampened with IPA. For heavier contamination, please remove the components first. Stubborn marks on reflectors can often be cleaned using GEW ReflectorBrite (GEW part number 42989). Do not use abrasive substances or materials to clean glass parts.

3.3 Cooling Systems

3.3.1 Air Cooling System Normal Operation

In normal operations fresh air is drawn through the UV lampheads via slots in their casings and extracted via flexible ducting and autodamper(s) (one per lamphead) to rigid ducting by electrically powered fan(s). It is then discharged from the installation to atmosphere via rigid exhaust ducting. The electricity supply to the fan(s) is controlled by the RR distribution. The RPSUs provide the low voltage power and control signals to the autodamper(s).

The air cooling system is operated via the HMI. The fan(s) may be isolated manually using the SYSTEM FAN MCB (1) on the inner panel of the power supply cabinet. See Figure 5.

Note, on systems with multiple fans, there may be a separate isolator or circuit breaker fitted per fan.



Figure 5: Fan circuit MCB

3.3.2 Fan Overload Safety Device

The power supply to the fans is protected by an overload protection safety device. See Figure 6.

In the event that the device is tripped, the lampheads will stop automatically. The device may be reset by pressing the switch on the panel.

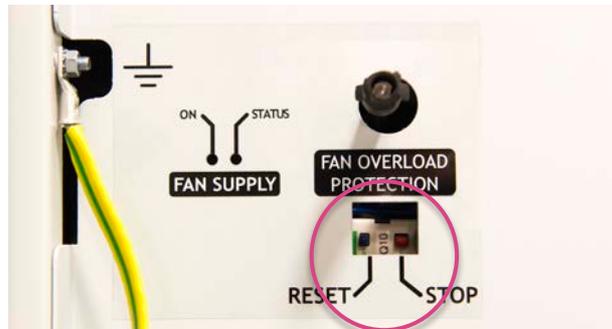


Figure 6: Fan overload protection switch (circled)

3.3.3 Routine Maintenance Procedures

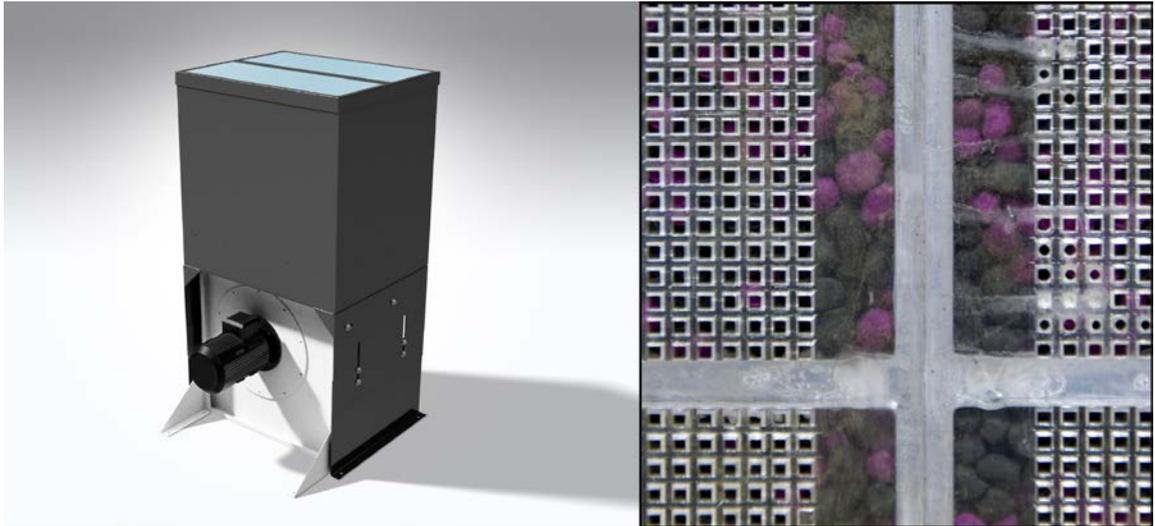
Visual Inspection

Perform a regular visual inspection of the air-cooling system and its connections to the electrical systems. Refer to checklist, Appendix C. Check that:

1. The rigid ducting is airtight.
2. The duct clamps are secure and their internal rubber seals have not perished. See Figure 7.
3. Autodamper valves operate smoothly.
4. Autodamper connections to ducting are secure and airtight.
5. GEW cable connectors are in good condition, neatly routed and protected from damage at all times.
6. The fan mounting(s) do not vibrate when running.
7. Back pressure on the exhaust ducting does not exceed 150 Pa at fan exit while the system is in operation.
8. The ozone filter elements (if fitted) are active. Elements remain active while the indicator pellets are purple in colour. Replace elements when the indicator pellets become brown or white. See Figure 8.



Figure 7: duct clamp showing rubber seal



**Figure 8: Typical ozone filter mounted above the exhaust fan.
Close-up of a new filter element and the purple indicator pellets.**

3.3.4 Liquid Cooling System Normal Operation

Liquid cooling systems are used to cool rollers, heatsinks and some lamphead models. Such systems feature an electrically powered water chiller that circulates chilled, conditioned water in a closed loop circuit.



Refer to the chiller OEM literature for standard operating procedures:

Water-cooled UV systems may be fitted with distribution manifolds to balance the water flow evenly between UV lampheads and any other associated water-cooled equipment. Two types of water manifold can be fitted, a standard manifold or an Intelligent Manifold. The later, shown in Figure 9, electronically senses the temperature and flow rate of the return water from the lampheads and feeds data back to the HMI via the communications bus. The HMI logs and processes this data and will activate alarms should parameters exceed preset limits.

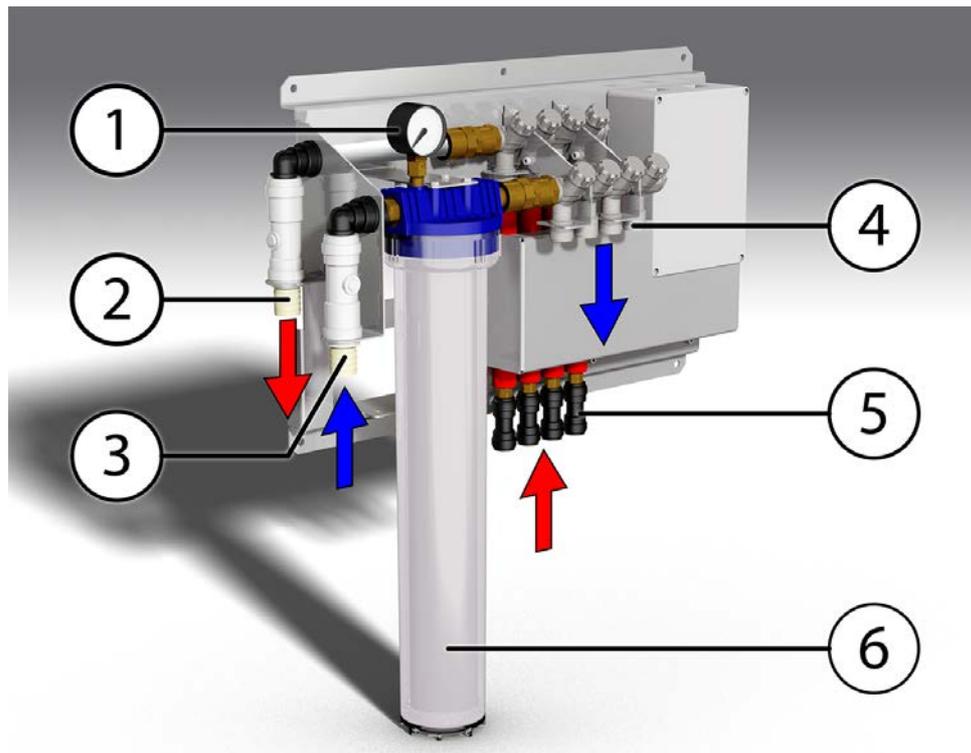


Figure 9: Typical Intelligent Manifold.

Key, Figure 9:

1. Pressure gauge.
2. Return water connection, to chiller.
3. Feed water connection, from chiller.
4. Feed water connections, to lampheads.
5. Return water connections, from lampheads.
6. Water filter.

The standard water manifold has a similar layout but the water flow rate is indicated by mechanical flowmeters which are fitted in place of the electronic sensors. The rotameters provide a means to visually verify satisfactory flow rates.

In normal operations the chiller draws power from a stand-alone connection to the mains, and is interlocked with a control cable to the RR. The chiller is operated via its dedicated built-in control panel.

3.3.5 Liquid Cooling System Maintenance Procedures

Visual Inspection

Perform a regular visual inspection of the liquid cooling system and its connection to the electrical system. Refer to checklist, Appendix C. Check:

1. Hoses and manifold for leaks
2. Hose connections to lampheads are secure.
3. The flow rate on the rotameter is correct (standard water manifold only).
4. Water manifold filter condition and water pressure.
5. Coolant level and inhibitor concentration.

Water Manifold Filter Cleaning and Replacement

The filter element can be visually inspected through the transparent filter bowl. A blocked or contaminated filter can be identified by discolouration of the element, by the appearance of foreign objects in the bowl and, importantly, by high lamphead temperatures as a result of reduced water flow rate. Once removed, the filter element can be cleaned by back-flushing with water. The procedure for cleaning or replacing the filter element is as follows:

1. Shut down the UV system but leave the chiller running for a minimum of ten minutes to cool the system components.
2. Make preparations to contain and clear up any water leaks and spills that may arise.
3. Shut down the chiller.
4. Isolate the water supply either side of the filter by closing the valve on the feed side and the multiple valves on the feed to lamphead side. **IMPORTANT NOTE:** Do not adjust the valves on the return (from lamphead) side as these are used to balance flows.
5. Using the wrench provided, unscrew the filter bowl from the housing. See Figure 10. Care should be taken to avoid losing or damaging to the o-ring at the top of the bowl and the seals at each end of the element.
6. Remove the filter element and carefully pull off the seals at each end.
7. Using clean running water, flush out the filter bowl and back-flush the element. Clean and inspect the o-ring and seals. Discard and replace worn/damaged parts as necessary.
8. Refit the element and bowl together with all seals and o-rings, taking care to correctly seat the element at each end. Tighten the filter bowl using the wrench provided.
9. Fully open all valves either side of the filter. See important note in step 4.
10. Check the chiller reservoir for satisfactory water level and refill as required with water and the appropriate concentration of additives.
11. Turn on the chiller and check the manifold for leaks. Where possible, check the water flow rates are satisfactory for each branch of the manifold.
12. Recheck the chiller reservoir and fill as required.



Figure 10: Using the supplied wrench to remove the filter bowl

Changing the Coolant



Refer to the chiller OEM literature for coolant changing procedure,



Caution: observe all safety advice on inhibitor product data sheets before handling inhibitor and other additives. Wear personal protective equipment as applicable.

3.4 Power Supply Systems

3.4.1 Normal Operations

In normal operations the RR(s) supply electrical power to the RPSUs, the fans, and the HMI. Distribution is subject to interlocks that may halt it, limit it, or generate a warning on the HMI, as set out in Appendix A of this manual.

Manual Controls on the Power Supply System

Manual controls and their functions on the power supply cabinet are set out in the table below.

Control	Location	Function
Rotary power switch	RR cabinet façade	Switches the mains electricity supply to the cabinet on and off
MCBs	RR cabinet interior	Isolate the power supply to the RPSUs, the fan(s) and the HMI

The RPSUs have no manual controls.

Power Supply Front Panel Display

The RPSU features a display on the front panel which provides information about its status that may be useful when fault-finding on the system. See Figure 11.



Figure 11: The RPSU Front Panel Display

The display is formed by two main parts; the numerical “7-segment” display and the 3 status LEDs.

The “7-segment” display is used to show the lamp number of the RPSU.

The colour of the display is also significant;

- Green: The lamp is selected and fault-free
- Red: The lamp has one or more faults

- Amber: The lamp is deselected
- Rotating Red: The RPSU is currently being reprogrammed

The status LEDs represent the following;

	Off	Flashing	Solid On
Can Err LED (Red)	-	The communication bus is damaged, disconnected or the HMI is powered off	-
Can OK LED (Green)	-	The RPSU cannot communicate with the HMI	The RPSU is successfully communicating with the HMI
Lamp On LED (Amber)	The UV lamp is off	The UV lamp is burning in	The UV lamp is on

Transient Suppression

GEW RRs are fitted with transient suppression protection. The status of the transient suppression protection is monitored on 3x surge protective devices on the inner panel, which must show green in their display windows. See Figure 12.



If transient suppression protection has been activated and a display window on a surge protective device is red contact GEW immediately.

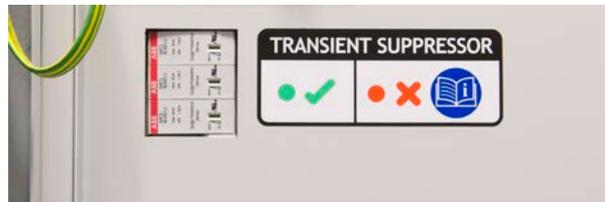


Figure 12: Transient suppressor display

3.4.2 Routine Maintenance Procedures



Caution: With the exception of the cooling fan filters, there are no user serviceable parts in either the RRs or the RPSUs. Do not remove covers or attempt maintenance under any circumstances. In the event of a fault, contact GEW.

Visual Inspection

Perform a regular visual inspection of the RR (s) and RPSUs. Refer to checklist, Appendix C. Check:

1. Cable connectors are secure.
2. Air intakes for air filters are unimpeded.
3. Exhaust air flow from filters is unimpeded

3.4.3 Replacing the Filter for the Internal Fans

The RR internal cooling fans draw air through a filter in the front door of the RR cabinet. The filter should be inspected regularly and replaced as necessary.

To replace the filter:

1. Unlock front grille of cabinet using key. See Figure 13, Step 1.
2. Remove grille. See Figure 13, Step 2.
3. Remove filter and replace. See Figure 13, Step 3.
4. Replace grille and filter assembly and lock.



Replacement filter part No.: 53073.



Step 1



Step 2



Step 3

Figure 13: RR air filter replacement

3.5 HMI

3.5.1 Normal Operations

In normal operations the HMI provides touchscreen control of the GEW UV system. See Figure 14.



Refer to Section 4 of this manual for operating instructions.



Figure 14: GEW HMI

The power supply to the HMI may be isolated using the CONTROL MCB on the inner panel of the power supply cabinet. See Figure 23.

3.5.2 Maintenance Procedures



Caution: There are no user serviceable parts in the HMI. Do not remove casing or attempt maintenance under any circumstances. In the event of a fault, refer to GEW.

Visual Inspection

Perform a regular visual inspection of the HMI and its GEW cable connector to the RR. Refer to checklist, Appendix C. Check:

1. That the panel is secure on its mounting and is not subject to high temperatures or vibration from working parts of the host press.
2. That the cable is secure, neatly routed and protected from damage at all times.

HMI Software Updates

The HMI remote monitoring application will check the GEW server at regular intervals for operating software updates if an internet connection is available. If updates are available, they will be downloaded automatically and available for installation by the operator after the next power cycle of the system.



To install software updates refer to Section 4.2.1 of this manual.

3.6 Inert Gas Curing Systems

3.6.1 Normal Operations

Overview

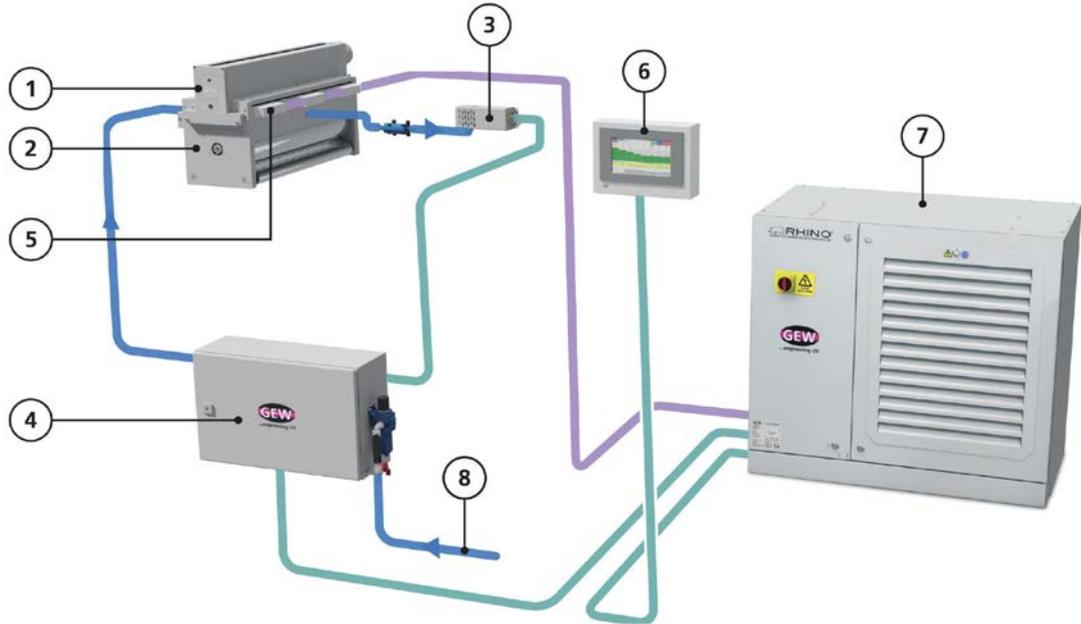


Figure 15: Schematic of a typical inert gas curing system.

1. UV lamphead.
2. Inert gas curing chamber.
3. Oxygen analyser.
4. Inert gas control box.
5. *mUVm* UV output sensors (optional).
6. HMI.
7. RHINO control electronics.
8. Inert gas feed.

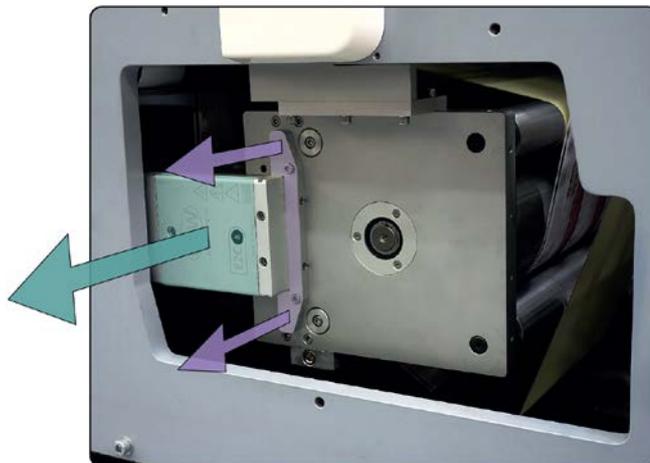


Figure 16: Typical inert gas curing installation showing the removable lamphead cassette and quartz window.

The presence of oxygen in the curing chamber is detrimental to the curing process in some critical applications. To overcome this, inert gas (usually nitrogen) is used to purge the curing chamber of oxygen. The resultant level of oxygen in parts per million (ppm) is accurately measured by the oxygen analyser and the inert gas control box compares measured ppm levels to the operator-set oxygen ppm level. The control box then automatically adjusts the flow of inert gas to the curing chamber, ensuring the measured oxygen ppm is less than the set-point while minimising the consumption of inert gas.

Oxygen analyser:

A pump housed in the inert gas control box draws a continuous sample of the curing chamber gas mixture past the oxygen analyser.



Figure 17: Oxygen analyser.

Inert gas control box:

The box contains the electronics to process the data from the oxygen analyser and can control the proportional gas valves that regulate the flow of inert gas to the curing chamber.



Figure 18: Inert gas control box.

Inert gas pressure regulator and moisture trap:

A pressure regulator and moisture trap is fitted at the inert gas input to the inert gas control box.



Figure 19: Inert gas pressure regulator and moisture trap

HMI

The measured oxygen levels within the curing chamber and all associated warnings and alarms are displayed on the HMI's Process Control page. All parameters relating to inert gas curing can be set here too.

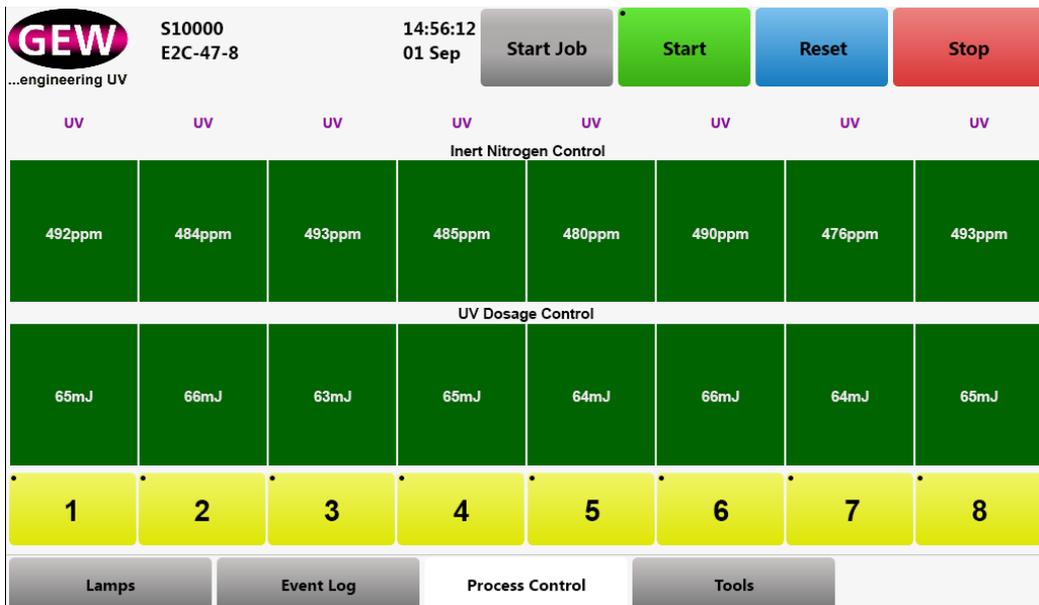


Figure 20: HMI Process Control page.

3.6.2 Regular Adjustments

Where the substrate enters and exits the curing chamber there will be an adjustable seal. The purpose of the seals is to minimise the intake of oxygen from outside the chamber and to minimise the consumption of inert gas. The gap between seal and substrate will therefore be set to the minimum distance practically possible. This gap will need checking from time to time and will need resetting when changing to a substrate of different thickness. Drawings supplied with the system will provide guidance.

3.6.3 Routine Maintenance Procedures

Visual Inspection

Perform a regular visual inspection of the curing chambers, the inert gas control box, the oxygen analysers and the gas cylinders or storage vessels. Check their connections to the electrical, inert gas and gas sampling systems as appropriate. Check that:

1. The gas cylinders and/or storage vessels are in serviceable condition, safe and secure.
2. Inert gas supply pipework is in good condition, leak-free, neatly routed and protected from damage at all times.
3. The inert gas regulator is set to between 1.5 and 3 bar unless specified otherwise. Check the moisture trap for accumulated liquid and drain if necessary, following any instructions on the bowl.
4. The oxygen analysers are clean and that any slots are free from obstruction.
5. The gas sampling pipework is in good condition, leak-free, secure, neatly routed and protected from damage at all times.
6. Electrical/control cables are in good condition, secure, neatly routed and protected from damage at all times.
7. The curing chambers are clean and that all chamber seals are in good condition.
8. The quartz windows are clean and window seals are serviceable.

Refer to checklist, Appendix C, for the items listed above and for other maintenance items.



Caution: Keep clear of all moving parts while completing the above checks. Observe applicable health and safety rules/guidelines and wear PPE as appropriate.

3.7 *mUVm*, Multi-point UV Monitoring

3.7.1 Normal Operations

A number of calibrated UV sensors are placed along the length of each lamphead. The sensors use the CANbus system to relay the data back to the HMI which then calculates the UV output based on a number of operator-set parameters (see section 4.5.3). Where possible, the press speed signal is used to calculate the UV dose. The HMI displays the UV dose on the Process Control page (see section 4.5.3). Data logging is possible on a job by job basis by placing named markers in the data stream received at GEW (see section 4.5.4).

3.7.2 Routine Maintenance Procedures

Visual Inspection

Perform regular inspection of the **mUVm** system cables, checking that they are in good condition, secure, neatly routed and protected from damage at all times. Refer to checklist, Appendix C.

Calibration

All GEW **mUVm** sensors have a unique serial number and are provided with a unique calibration certificate for each sensor. Under normal operating conditions, calibration is valid for one year at which point a recalibration service is available at GEW. It is the user's responsibility to ensure calibration records are kept and inspected to ensure all sensors have a valid calibration.

3.8 Fault Finding

A comprehensive guide to all faults and warnings displayed by the HMI is in Appendix A of this manual.



All faults in a GEW system that may be corrected by the press operator are indicated by the HMI. In the event of a fault occurring that cannot be cleared by the operator, please contact GEW.

3.9 Spare Parts and Servicing

GEW recommends that a supply of spares is carried at all times. GEW keeps a comprehensive inventory of parts in stock to ensure a fast and efficient response to any customer request. We will ship any part to any destination worldwide.

GEW are dedicated to helping customers operate their systems at the lowest possible cost. We offer discounts on lamps, parts and service rates. All spare parts are subject to a 12 month return to base warranty.

Spare Parts Manuals for standard parts are included in the USB flash drive supplied with your system.



Caution: Only use GEW supplied spare parts. Use of any other parts will invalidate your warranty and may result in damage to the system.



For identification of spare parts refer to GEW spare parts manuals.

GEW spare parts manuals refer to specific GEW service procedures for instruction as appropriate.

3.9.1 Contact Details

Address: GEW (EC) Limited,
Crompton Way, Crawley,
West Sussex, RH10 9QR, UK.

Telephone: +44 (0) 1737 824500 – main switchboard
+44 (0) 1737 824510 – service and spares

Email: service@gewuv.com
spares@gewuv.com
sales@gewuv.com

Website: www.gewuv.com

Distributors: www.gewuv.com/contact

4 HMI Operation and UV System Control

4.1 HMI Overview and Setup

4.1.1 Product Overview

The GEW HMI (Human Machine Interface) panel is used to control the operation of your GEW UV system via a touchscreen interface with the press operator. The panel is 24V DC powered, and connects to the GEW RHINO Rack (RR) via a single cable.



Figure 21: The GEW HMI Display

4.1.2 Connection to the GEW RHINO Rack (RR)



WARNING: Ensure the RR is isolated from the electricity supply before connection.

The HMI panel is connected to the RR via a single connector cable that incorporates both power and data signals. The cable terminates with a keyed male adaptor that plugs into a female connector on the RR through a supplied length of Rhino Bus Cable. Figure 22 shows the adaptor and connector.



Figure 22: Connection to the RR

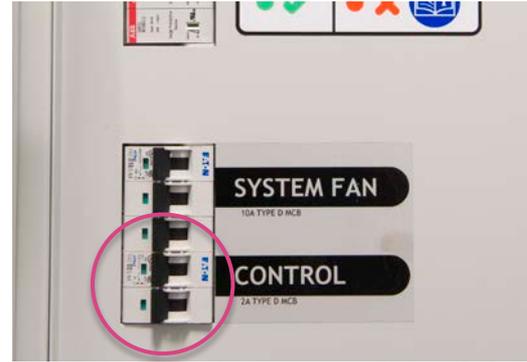


Figure 23: Control MCB on RR

The power supply to the HMI may be isolated via the 'Control' MCB on the front of the inner panel of the RR. See Figure 23.



WARNING: Do not mix HMI units across systems. Each HMI is programmed for a specific system and you may damage your installation by using another HMI.

4.1.3 Connecting the HMI to the Internet

GEW's RHINO control system requires a permanent connection between the HMI and the internet to enable the Embedded Service Package and to activate and maintain any extended guarantee arrangements that may exist.

The HMI must be connected via cable to an Ethernet network with internet access.

1. Remove the 4 screws and detach back panel of HMI enclosure.
2. Connect Ethernet cable to the LAN socket marked 'ETHERNET REMOTE LINK' as shown in Figure 24.



Refer to the GEW RHINO System Installation Manual regarding the requirements and setup procedure for the Ethernet and Remote Monitoring features of this system.



WARNING: The HMI must be firewalled at all times, do not connect the HMI directly to the public internet as this poses a security and safety risk to your system.



Figure 24: Connections on the HMI

4.2 Operating Instructions

4.2.1 Switching on the HMI

Ensure the mains supply to the RR is on.

- The HMI will power up automatically.
- The **Startup** screen will appear on the HMI. See Figure 25.



Figure 25: Startup screen

New Software / Updates

If new software or updates are available for the HMI, the Startup Screen will display the message:

**There is new software available.
Would you like to update now?**

See Figure 26.

The operator can choose to **Update Now**, or **Update Later**, by pressing the relevant button on the screen.

The **Update Now** option will:

- Download and install new software/ updates;
- Reprogram the power supplies if required; and
- Restart the HMI to complete the process.



Figure 26: Startup screen showing new software available

Screensaver

If the HMI is not used for a period of more than twenty minutes, it will switch to screen saver mode. This will make the screen appear blank. Touch any part of the screen to return to operating mode.



The screensaver is disabled if any of the lamps in the GEW system are active.

4.2.2 HMI Pages

The HMI's functions and commands are accessed via three principal pages, as follows:

1. **Lamps** page
2. **Event Log** page
3. **Tools** page

Pages are accessed via tabs on the Menu bar at the base of the screen. Operations are performed by pressing buttons on each page.

Buttons with a circle (•) in the top left corner must be pressed and held for at least two seconds to function.



Figure 27 shows the HMI **Lamps** page, which will be displayed after start up.

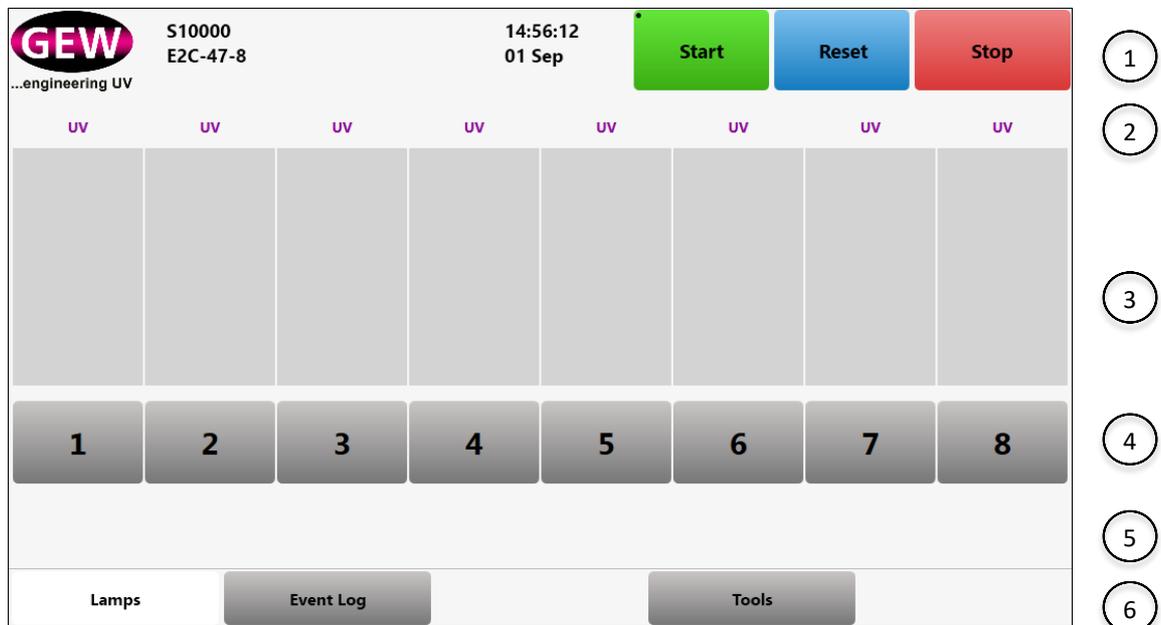


Figure 27 : HMI Lamps page at startup

- 1 Tool bar
- 2 Lamp type. 'UV' (arc) or 'LED'
- 3 Page display
- 4 Lamphead selection buttons (**Lamps** page only)
- 5 Lamphead alert bar (**Lamps** page only)
- 6 Menu bar

4.3 Lamps Page

The **Lamps** page is the principal operating page and is used to control the function of the lampheads. It is configured at installation to display the number of lampheads in your GEW UV system.

At the top of the Lamps page, the display will indicate the type of lamphead fitted; for instance 'ARC' for mercury arc based lampheads and 'LED' for LED based lampheads.

4.3.1 Selecting Lampheads for Operation

To select a lamphead for operation press the Selection button at the base of each lamphead column. The icon will change colour from grey to yellow.



To deselect a lamphead press and hold the Selection button for at least 2 seconds. The icon will change colour from yellow to grey.



Figure 28 shows an eight lamphead system with lampheads 1 to 4 selected for operation.

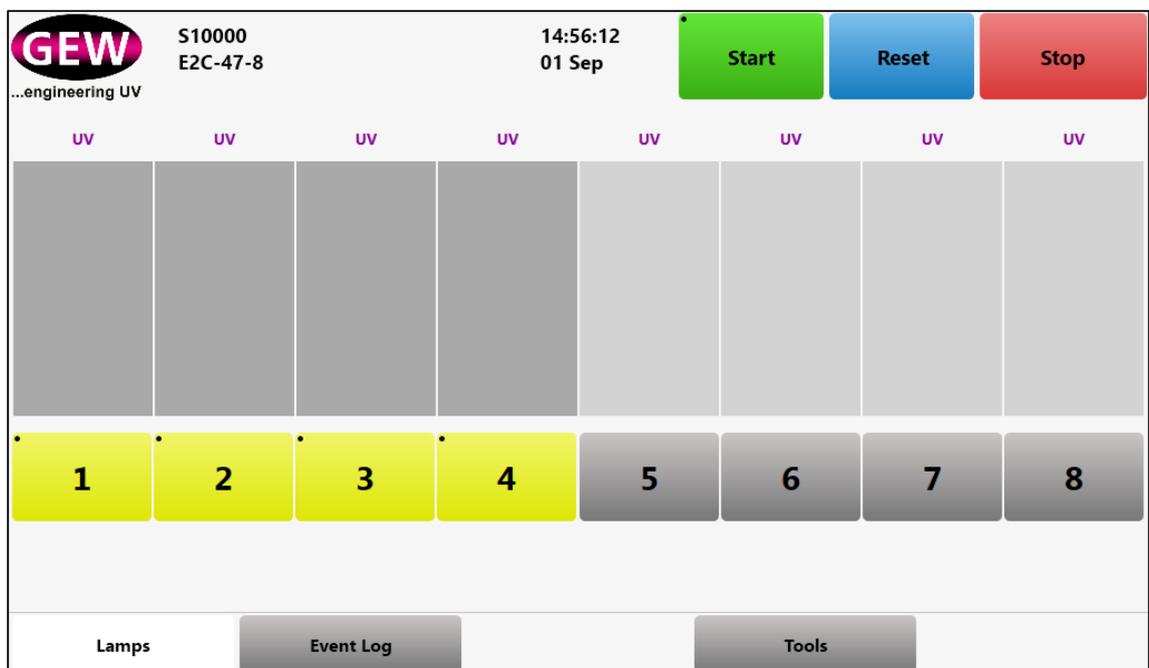


Figure 28: Lampheads 1 to 4 selected for operation

4.3.2 Burning In

Once lampheads have been selected, press and hold the **Start** button on the Toolbar for 2 seconds.



The lampheads will start to burn in, and the bar displays for each lamp will flash orange.



Burn In is not used on LED based lampheads. Instead, these will skip directly to the Ready state, see Section 4.3.3.

Figure 29 shows an eight lamphead system with all lampheads burning in prior to operation.

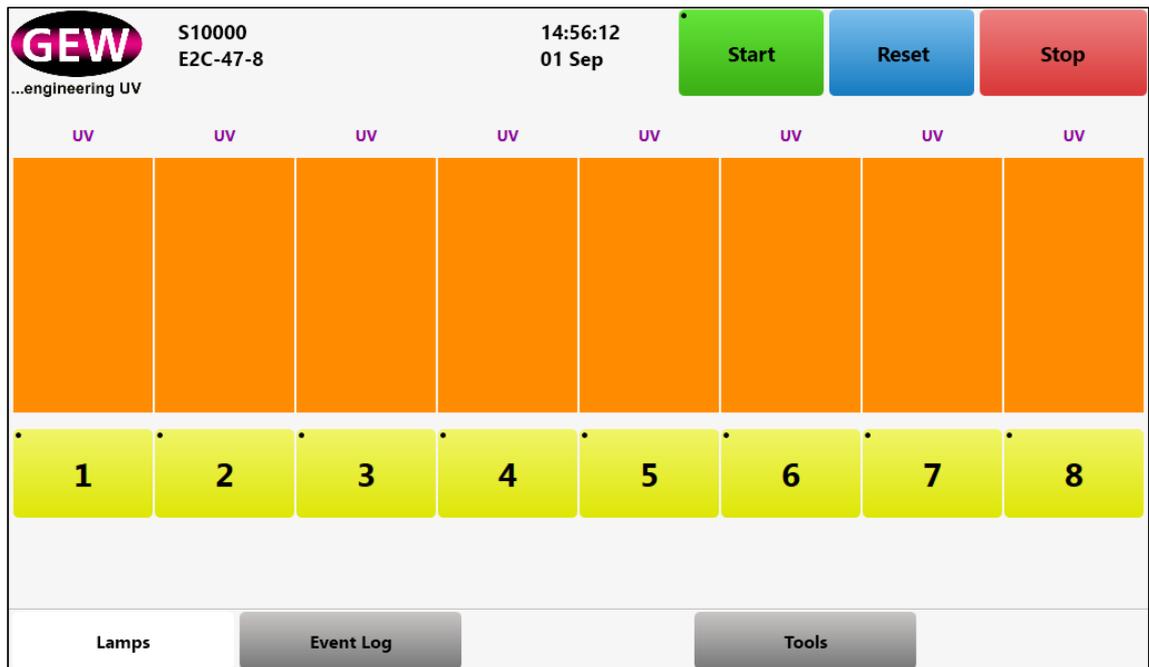


Figure 29: Lampheads burning in

4.3.3 Ready for Operation

When the selected lampheads are ready to operate, the bar displays for each will flash pale green, indicating that the lampheads are ready for the host press to run and will observe press speed and press impression signals.

Figure 30 shows an eight lamphead system with all lampheads ready for printing.

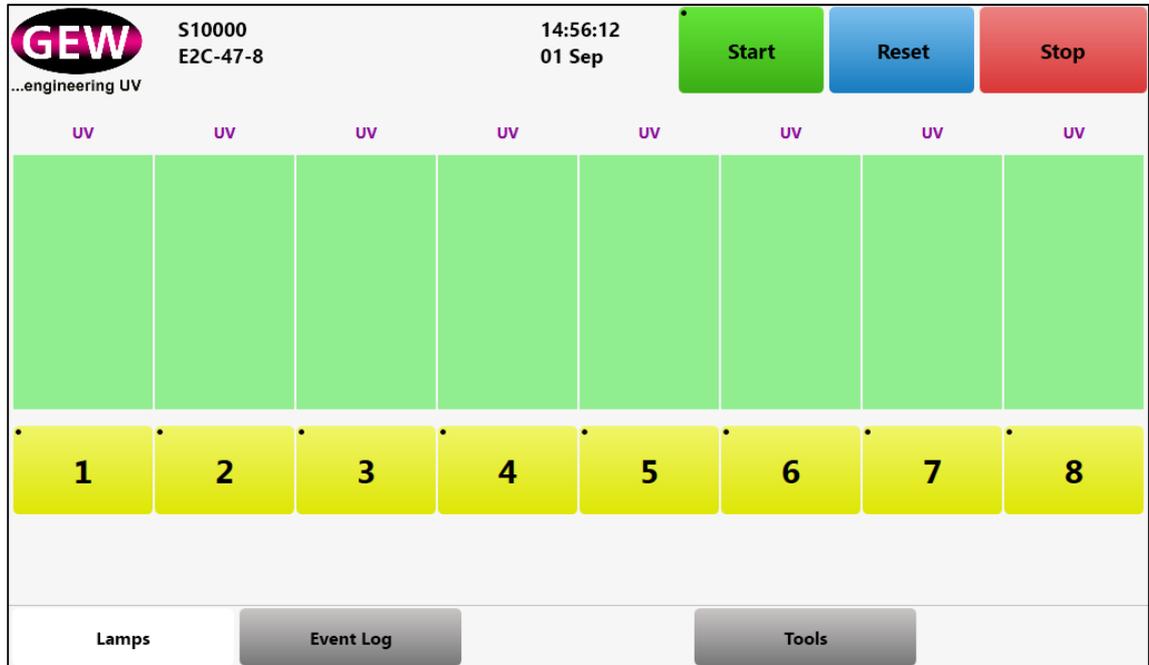


Figure 30: Eight lamphead system showing lampheads ready for printing

4.3.4 Operating Lampheads during Printing

Whilst the host press is printing, the operation of lampheads will be governed by signals from the press. The **Lamps** page will display the status of each in its respective bar.

Figure 31 shows an eight lamphead system with all lampheads operating at 100%.

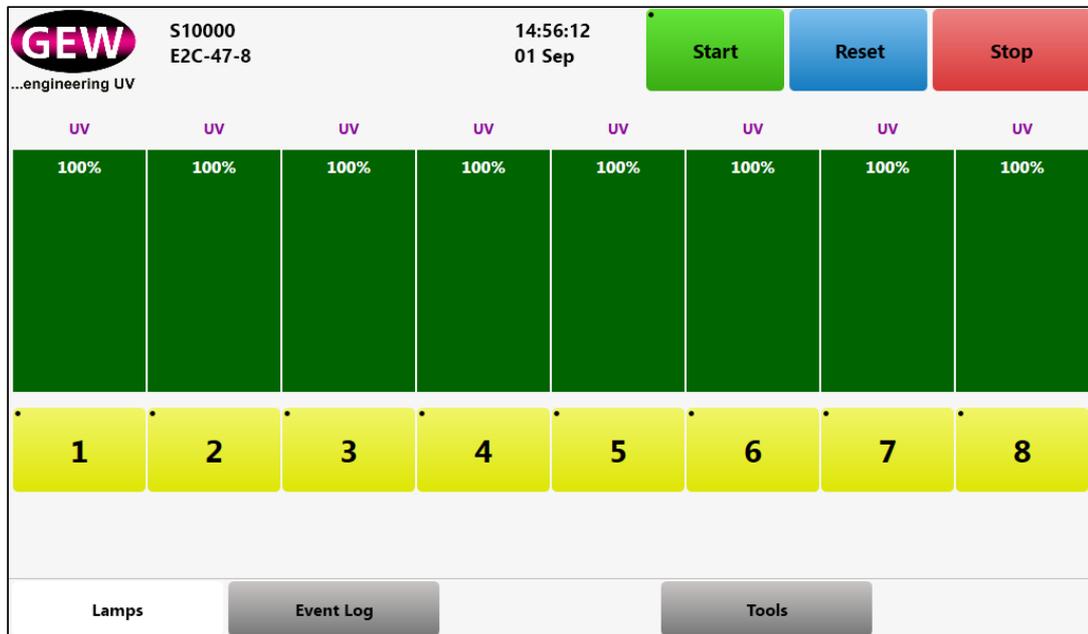


Figure 31: Eight lamphead system – all lamps at 100 %

For systems with the optional Process Control functionality, additional information may be shown on the **Lamps** page as shown in Figure 32.

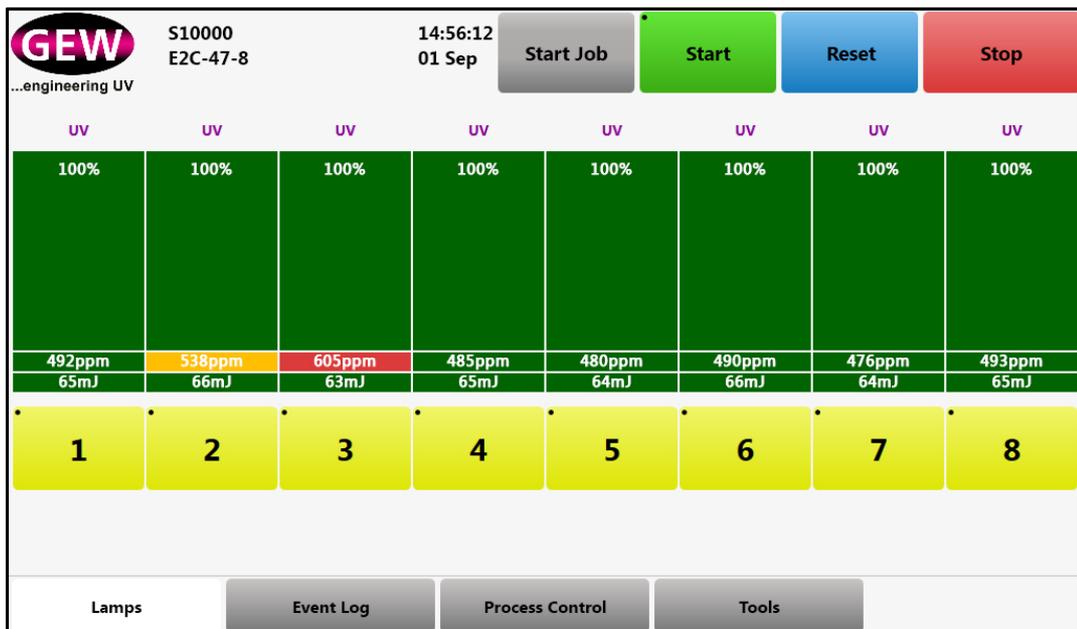
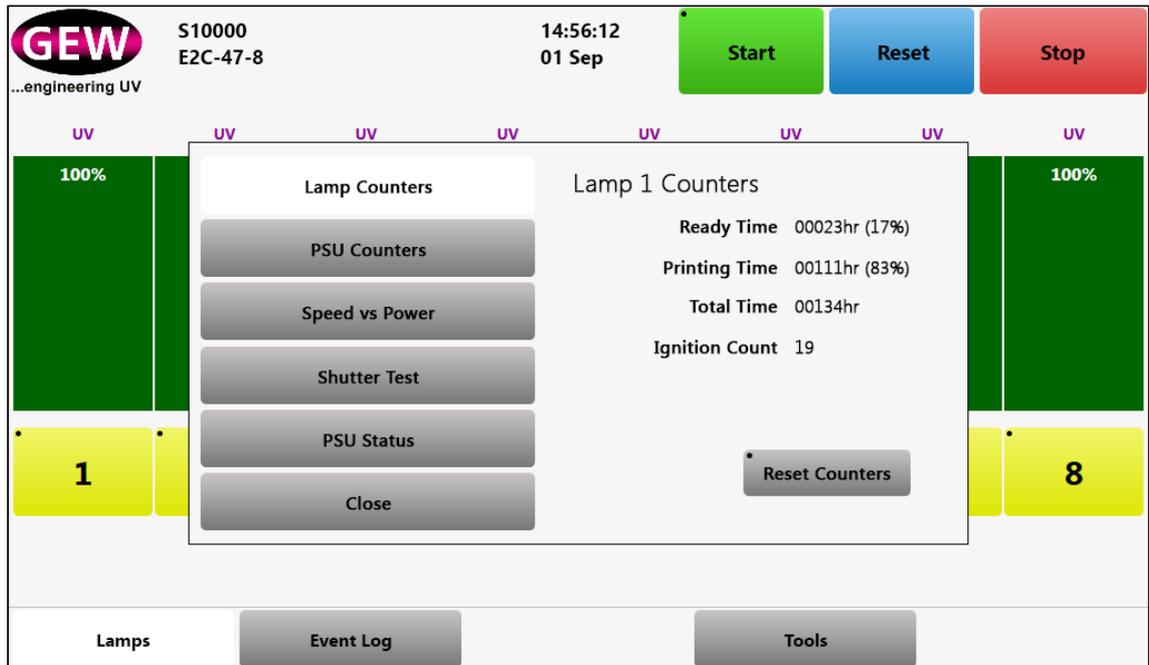


Figure 32: Typical Lamps page for systems with Process Control

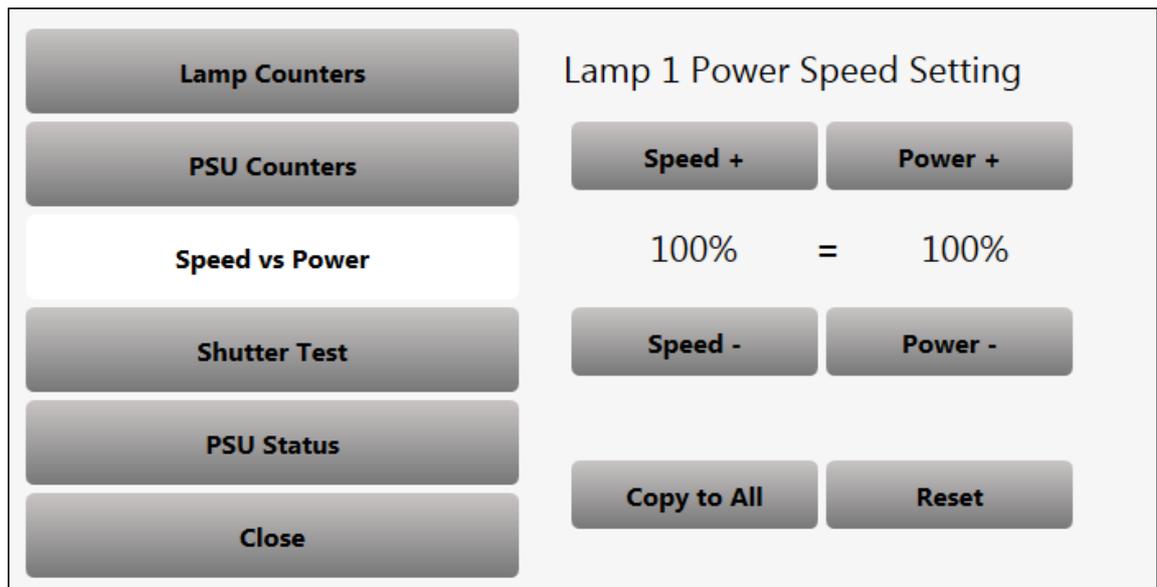
4.3.5 Adjusting Lamphhead Speed and Power during Printing

Lamphhead operating speed and power are adjusted via a dialogue box on the **Lamp** page. Speed and power are adjusted for individual lamps. Settings may be copied to other lamps in the system.

Select the lamphhead to be adjusted by touching its bar display. The Lamp Dialogue box will appear in the centre of the display.



Click the **Speed vs Power** button. The **Lamp Power Speed Setting** box will appear.



Speed or power may be adjusted using the **Speed +**, **Speed -**, **Power +**, and **Power -** buttons. Each press of a button will change the setting by 1%. Alternately, press and hold the required button for larger adjustments.

Speed and power may also be adjusted using the keypad. Press the percentage display for either function and the keypad will appear.



Enter a value of between 1 and 100 for the new speed required and press **OK**.

New settings for one lamphead may be applied to the other lampheads in the system using the **Copy to All** button.



Copy to All

Press the button once and the changes will be applied to all lampheads.

After adjusting speed and/or power, press **Close** on the Lamp Dialogue box.

4.3.6 Warnings and Faults



WARNING: Do not ignore warning and fault messages.

Warning and fault messages, their meanings, and the appropriate remedial actions are set out in Appendix 1.

If a problem occurs in the system whilst it is in operation the HMI will flag the lamphead(s) where the problem has occurred on the **Alert** bar.

Figure 33 shows a display with a problem flagged on lamphead 5 on the **Alert** bar. The lamp has automatically stopped and entered cooldown.

If the alert displays an orange '?' it is a warning and the lamphead will continue to operate. If the alert displays a red '!' it is a fault and the lamphead will be stopped automatically by the system.

The alert will also display a number in its top right hand corner showing how many faults are present at that time on each station. The example in Figure 33 shows lamp 5 has one fault.

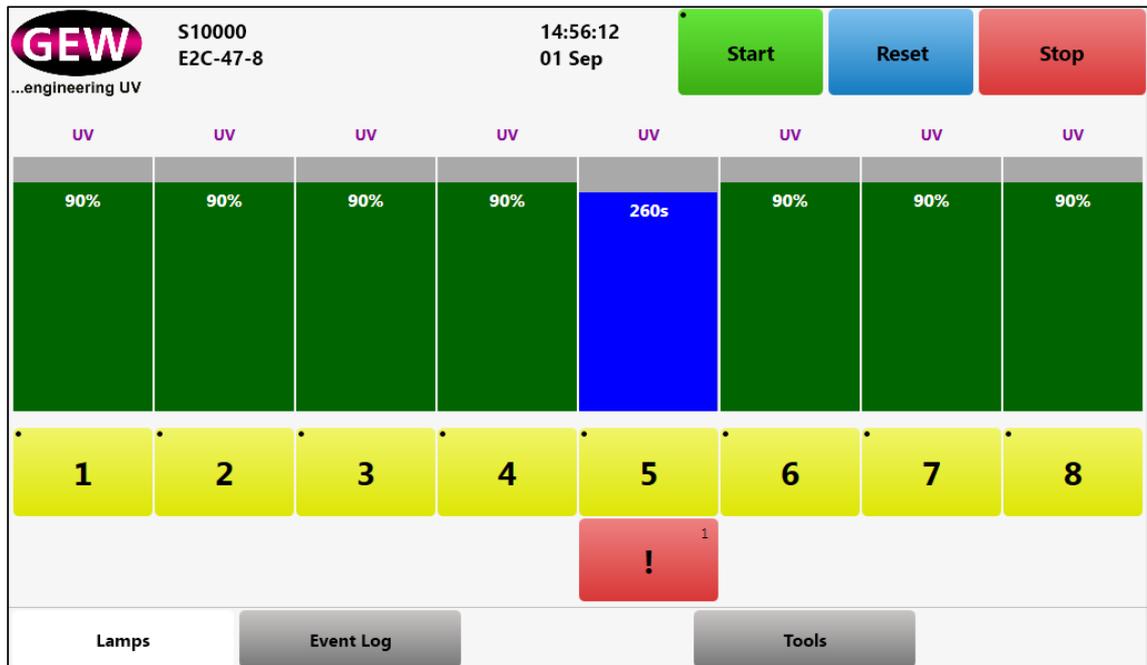


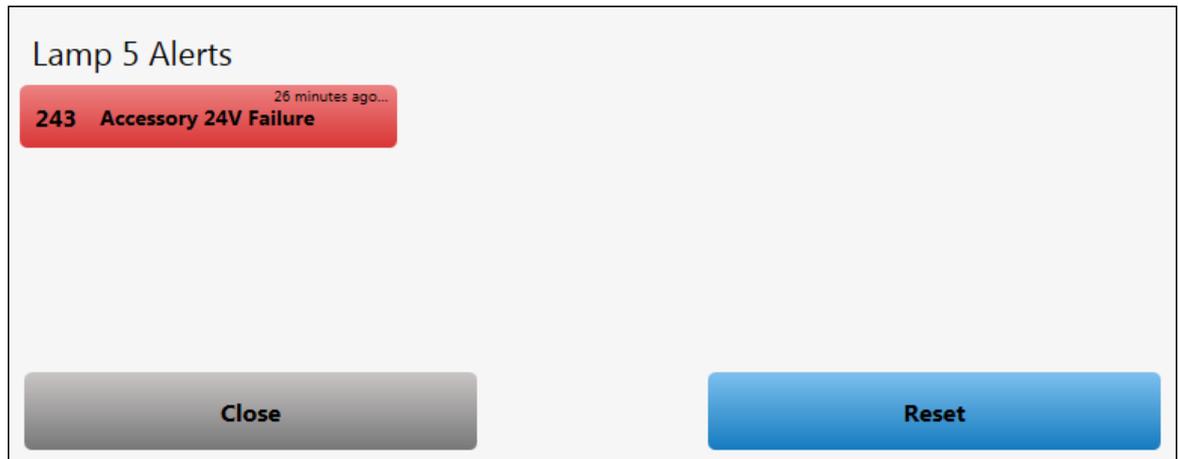
Figure 33 : Lamp page indicating a fault with lamphead 5

Investigating Warnings and Faults

Click the button beneath the relevant lamphead(s) on the **Alert** bar.



The **Lamp Alert** box will appear in the centre of the display, showing a fault code, a brief description of the problem, and the time that has elapsed since it occurred.



Press **Close** on the **Lamp Alert** box.

4.3.7 Clearing Warning and Fault Alerts

To reset individual faults on one lamp only, press the blue **Reset** button on the **Lamp Alert** box.

To clear faults and warnings for all lampheads press the **Reset** button on the **Tool** bar.



4.3.8 Switching Lampheads Off

Press the **Stop** button on the Toolbar.



The lampheads will stop operating, and switch to cool-down mode. See Figure 34.

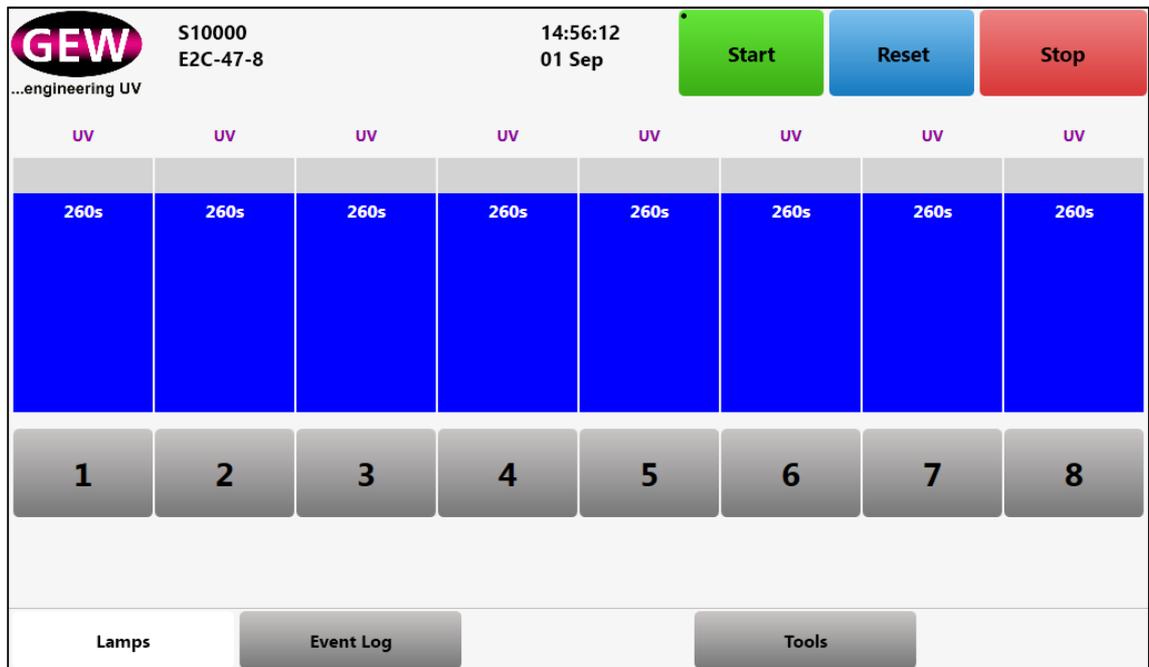


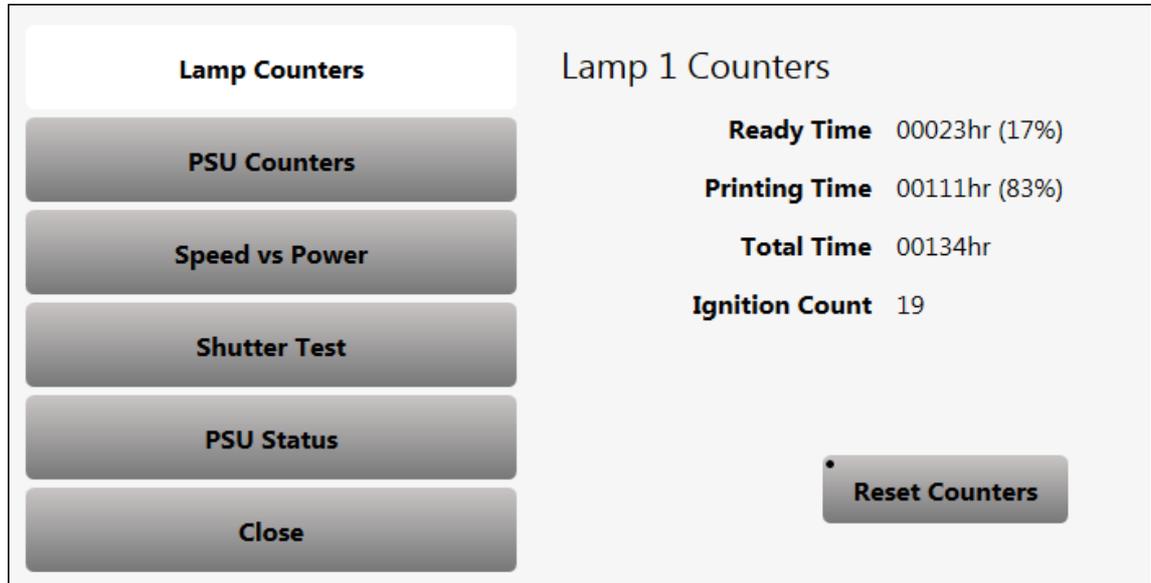
Figure 34: Lampheads in cool-down mode

After a pre-set cool-down period, the lampheads will revert to Idle mode, as shown in Figure 27. The bars for each lamphead will indicate how many seconds of the cool-down period remain. The duration of cool-down depends on lamphead type and in some cases may be zero.

4.3.9 Monitoring Lamphheads and PSUs

Lamp Counters

Select the lamphhead to be monitored by touching its bar display. The **Lamp** Dialogue box will appear in the centre of the screen. Press the **Lamp Counters** button to view operational data on the Lamp.



The “Total Time” will list the number of hours the lamp has been running since last counter reset.

To reset the counters for the lamp press and hold the **Reset Counters** button on the dialogue box for at least 2 seconds.



All counters will reset to zero.



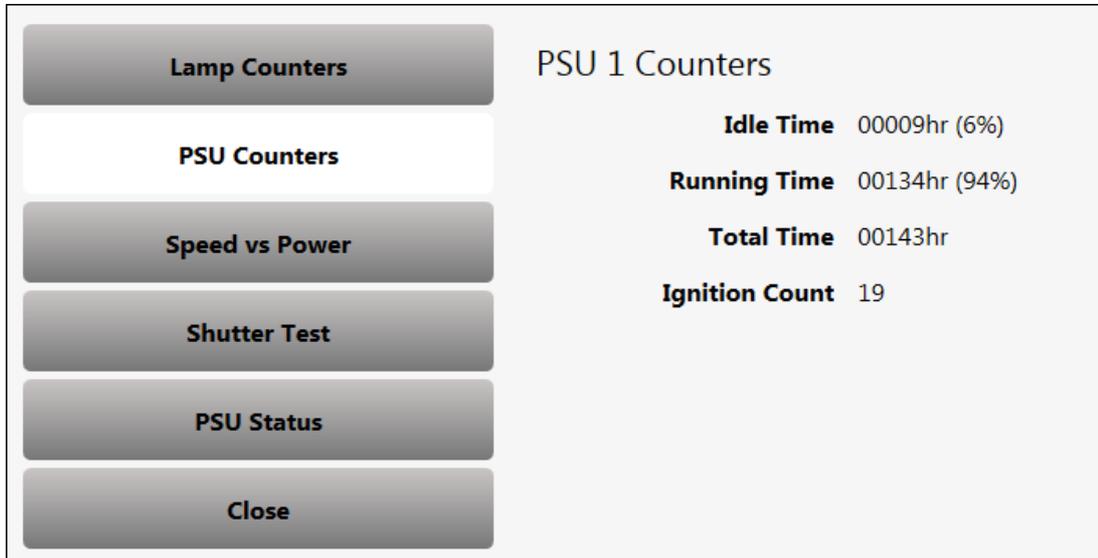
It is recommended that lamp counters are reset only after fitting a new lamp.

Currently, genuine GEW UV lamps are warranted for 1000 hours of operation and LEDs for a one year period.

Press **Close** on the Lamp Dialogue box.

PSU Counters

Select the PSU to be monitored by touching the bar display of its respective lamphed. The **Lamp** Dialogue box will appear in the centre of the screen. Press the **PSU Counters** button to view operational data on the PSU.



Category	Value
Idle Time	00009hr (6%)
Running Time	00134hr (94%)
Total Time	00143hr
Ignition Count	19



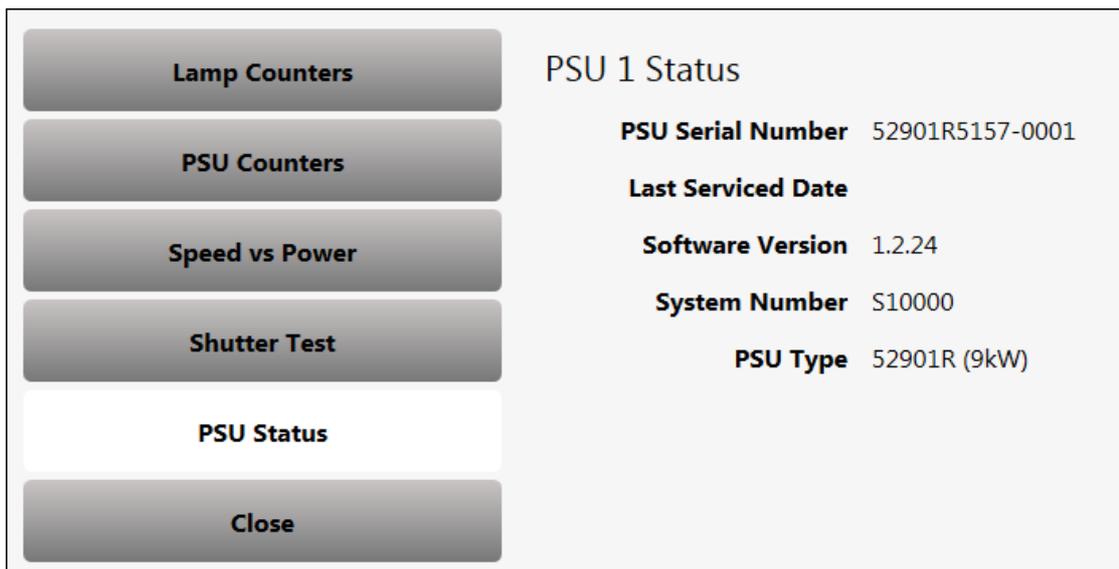
PSU Counters cannot be reset by the operator.

Press **Close** on the Lamp Dialogue box.

PSU Status

To view the status of a PSU, touch the bar display of its respective lamphed.

The **Lamp** Dialogue box will appear in the centre of the screen. Press the **PSU Status** button to view its status.



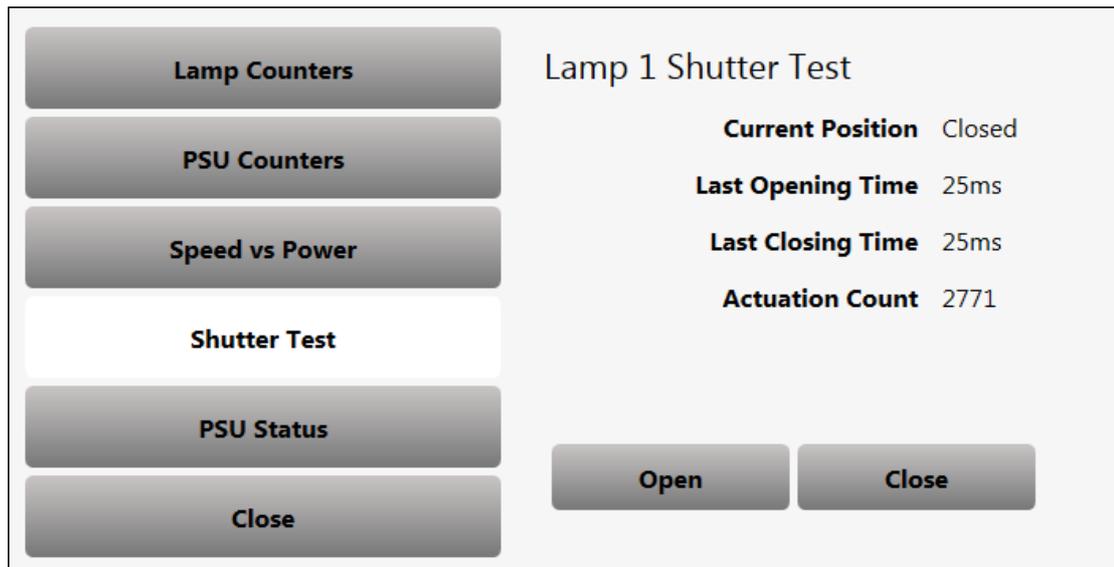
Category	Value
PSU Serial Number	52901R5157-0001
Last Serviced Date	
Software Version	1.2.24
System Number	S10000
PSU Type	52901R (9kW)

Press **Close** on the Lamp Dialogue box.

Shutter Test

GEW UV lampheads fitted with arc-lamps feature a shutter which closes on system standby to protect the substrate from the heat of the UV lamp. The shutter test does not apply to LED lampheads as they do not have such a feature.

Shutters of lampheads that have not been selected for operation may be tested via the **Lamp** dialogue box. Touch the relevant bar display and the **Lamp** Dialogue box will appear in the centre of the screen. Press the **Shutter Test** button.



To test the shutter, press the Open or Close buttons.



The shutter test buttons will not function if the lamp is on.

Press **Close** on the Lamp Dialogue box.

4.4 Event Log Page

The Event Log page records operator actions, plus all warnings and faults on the HMI, which it displays as a chronological list for each day.

The operator can cycle back and forth through each 24 hour period based on the HMI's local time settings, using the **Next Day** and **Previous Day** buttons.

Events are stored in the HMI's memory, for a maximum of 30 days, or until cleared by the operator. The event log page is selected by pressing the **Event Log** tab on the **Menu** bar. Figure 35 shows a typical **Event Log** display.

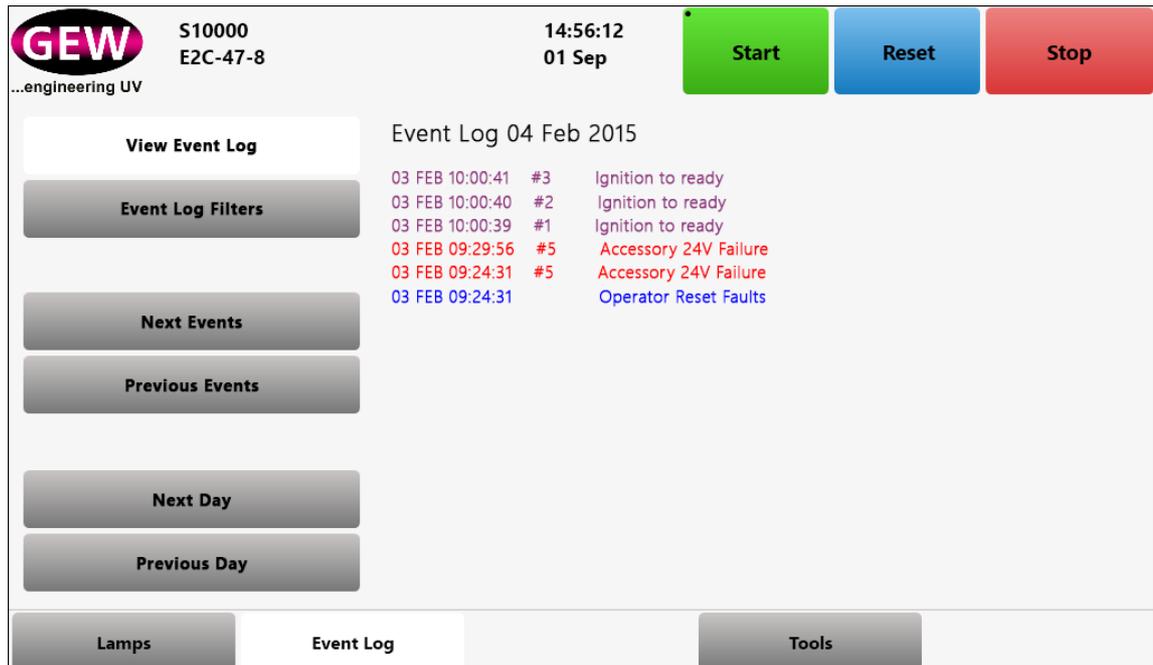


Figure 35 : Typical event log display

Events displayed in **blue** are operator-initiated actions.

Events displayed in **red** are faults generated by the system.

Events displayed in **orange** are warnings.

Events displayed in **purple** are lamp status events.

Events displayed in **pink** are host press status events.



The log may take several seconds to refresh after an event has occurred.

Each message in the log shows:

- The date and time of the event occurring
- The lamp number (if appropriate) on which the event occurred
- Text identifying the name of the event

For example;

04 Feb 14:50:31 #5 Lamp Burn-In Failure

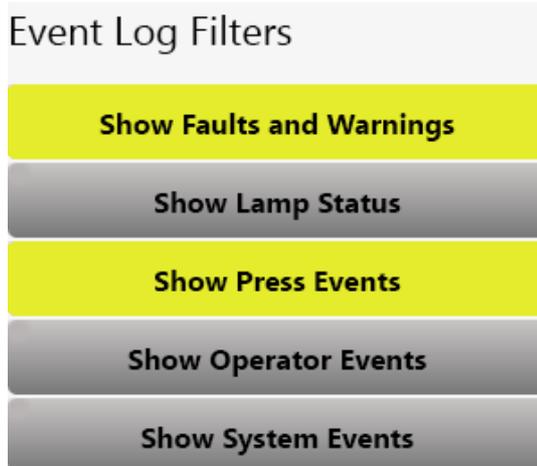
Filtering Events

The operator may filter events by type using the **Event Log Filters** Button on the Event Log page.

Press the **Event Log Filters** Button



The Event Log Filters List of buttons will appear in the centre of the screen.



Select type of event to be displayed by pressing respective buttons.

Selected buttons will turn yellow.

Press the **View Log** button to return to **Event Log** page.

4.5 Process Control Page (Inert Gas & UV Dosage Control)

GEW offers two process control systems to monitor and/or control different aspects of UV curing:

- With inert gas curing systems, a closed-loop control system that continually monitors the oxygen concentration (in parts per million, ppm) within each curing chamber, adjusting the flow of the inert purging gas to ensure the operator-set oxygen concentration is not exceeded.
- '*mUVm*' (multi-point UV monitoring), an optional system that continually monitors UV intensity at multiple positions along the UV lamps and calculates the UV dose applied to the substrate by each lamphead (when linked to substrate speed).

To provide a good overview of system performance, the inert gas and UV dosage control displays are shown together on the Process Control Page (where applicable). A visual display shows measured/calculated results together with clear indication of warning and alarm conditions should operator-set limits be exceeded. A means to log results on a job by job basis is also provided via the Start Job button which can be accessed from all main pages.

The Process Control Page is accessed by pressing the Process Control button at the bottom of the HMI screen. A typical HMI Process Control page display is shown in Figure 36. In this example a system featuring both of the above mentioned process control systems is shown, i.e. an eight lamp inert gas curing system with *mUVm*.

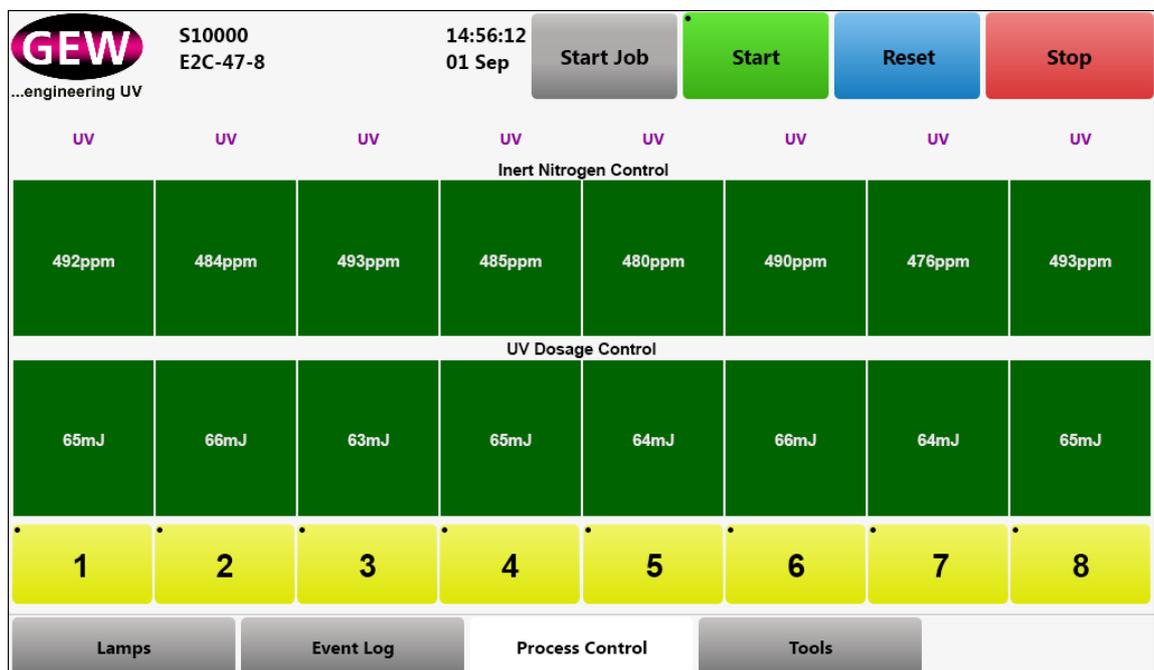
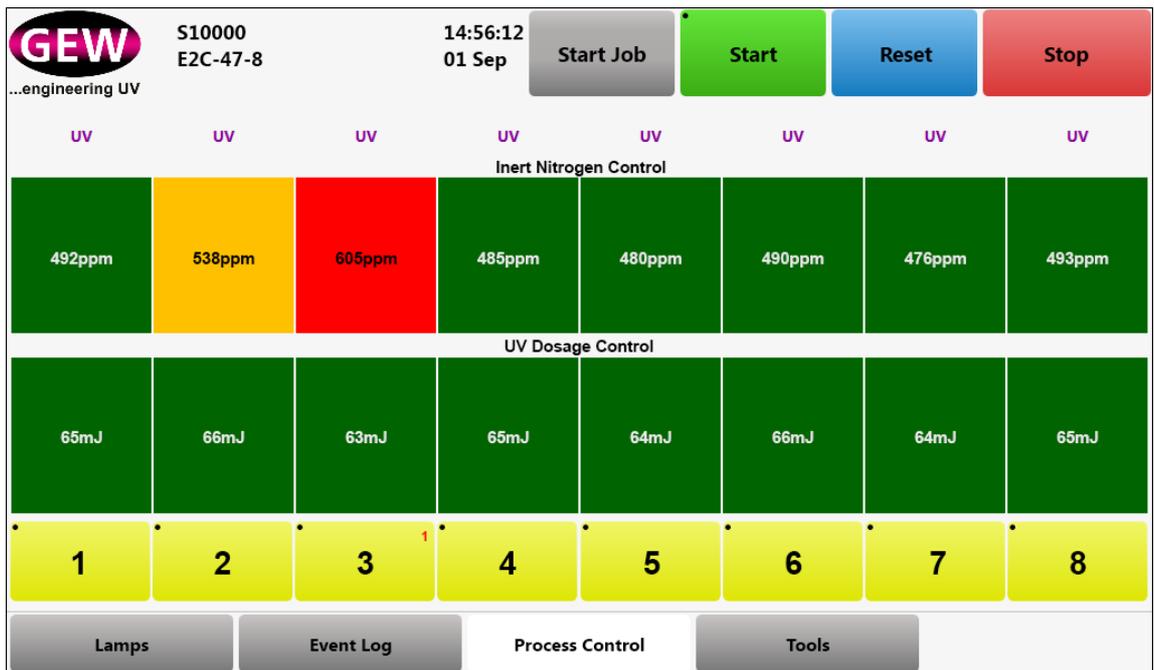


Figure 36: Process Control page display

In this example all eight lamps are selected and the lampheads are running with oxygen levels and UV dosage within the required parameters. The central green blocks indicate a normal satisfactory condition. Measured, live values of oxygen level (ppm) and UV dose (mJ, calculated) are displayed within the blocks.

4.5.1 Warning and Fault Condition Settings and Displays

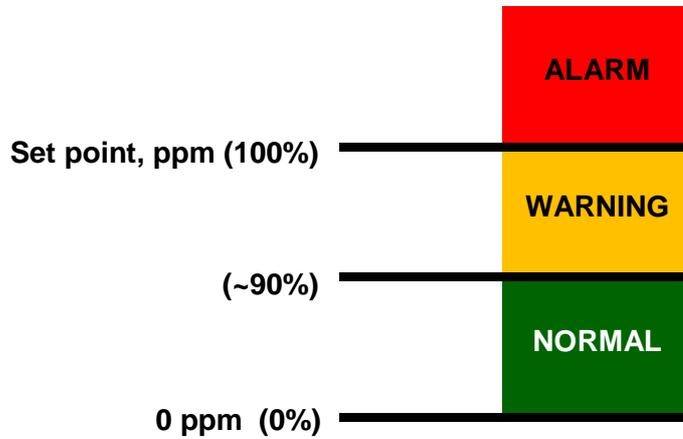
Should the oxygen level or UV dose deviate from the required settings, the central green blocks will change to solid orange or red, indicating a warning or a fault condition respectively. See Figure 37.



**Figure 37: Lamp 2 oxygen ppm warning condition (orange block).
Lamp 3 oxygen ppm fault condition (red block).**

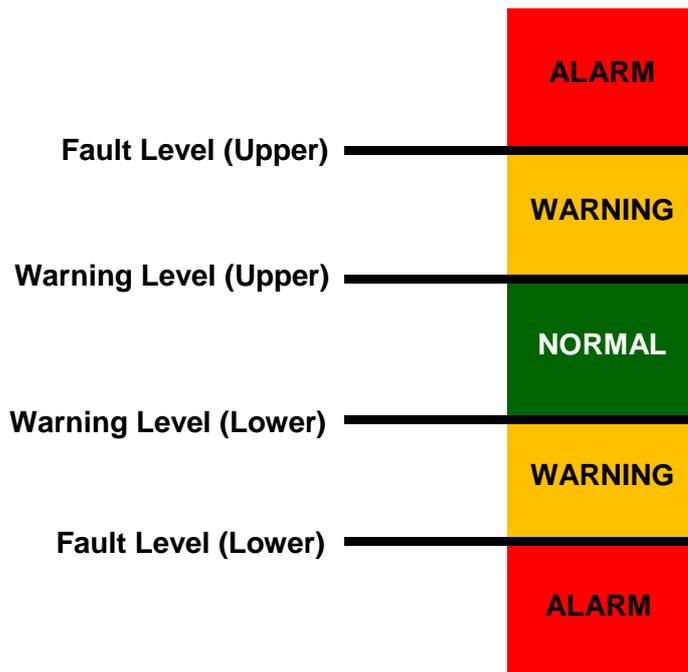
Relationship between warning and fault settings and display colour:

Inert Gas Process Control –



See section 4.5.2 to adjust the ppm set point.

***mUVm* Process Control -**



See section 4.5.3 to adjust the warning and fault levels.

4.5.2 Adjusting Parameters – Inert Gas Curing Process Control

To adjust the Inert Gas Curing Process Control parameters, press the Inert Nitrogen Control bar display for the required lamp as shown in Figure 38 and a dialogue box will appear as shown in Figure 39.



Figure 38: Preparing to adjust Inert Gas Process Control parameters for lamp 2.

Oxygen Level ppm Set-point

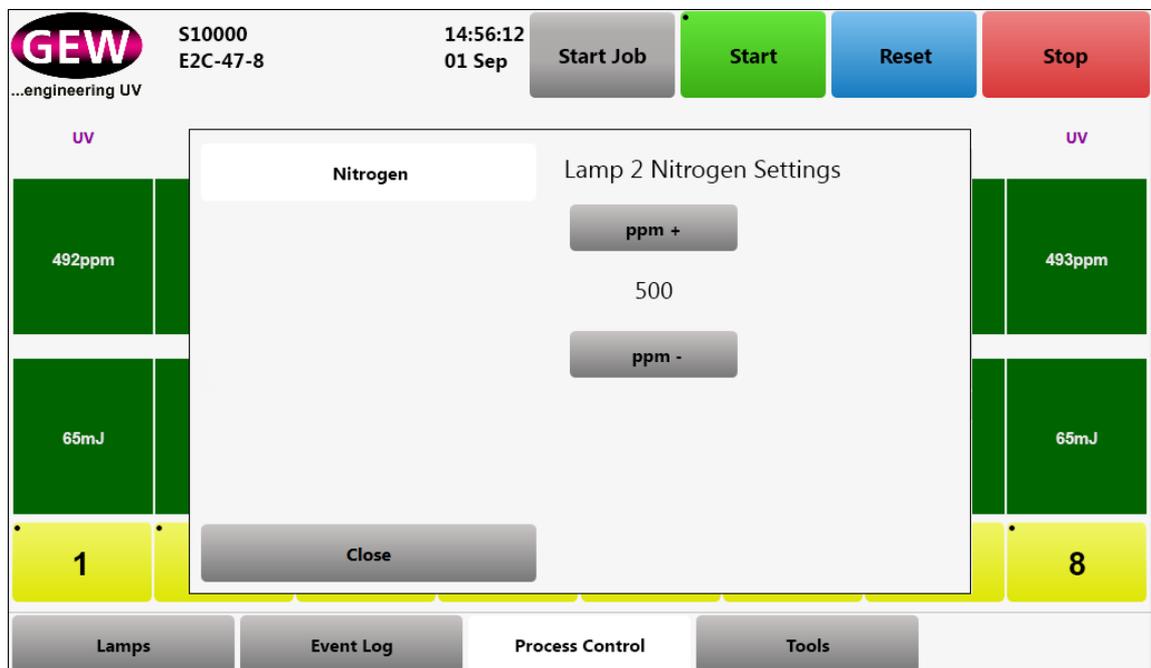


Figure 39: Adjusting the oxygen level ppm set-point for lamp 2.

Press the ppm+ and ppm- buttons until the desired ppm level is achieved. The warning level will be set automatically at approximately 90% of the ppm set point.

Press the **Close** button to return to the Process Control page.

4.5.3 Adjusting Parameters - mUVm UV Dosage Process Control

To adjust *mUVm* parameters, press the UV Dosage Control bar for the required lamp as shown in Figure 40 and a dialogue box will appear as shown in Figure 41.



Figure 40: Preparing to adjust *mUVm* parameters for lamp 2.

UV Monitoring Settings

Press the Monitoring Settings button on the left of the dialogue box to reveal the options shown in Figure 41.

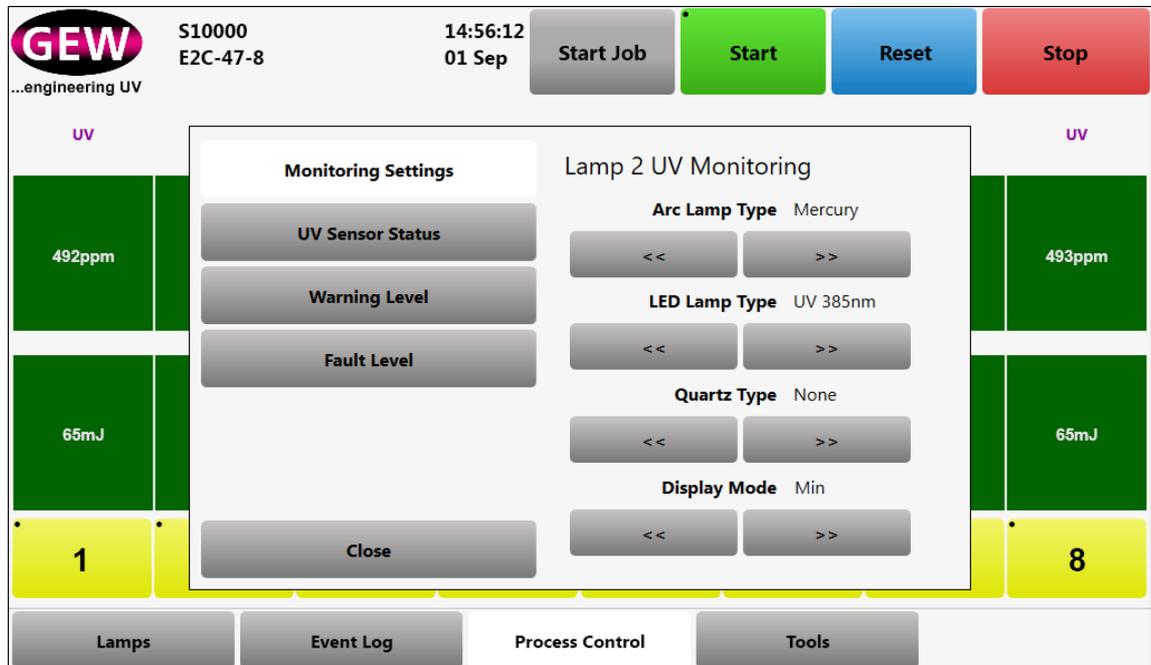


Figure 41: UV Monitoring Settings

Arc Lamp Type, LED Lamp Type, Quartz Type and Display Mode parameters can be set using the appropriate selection keys:



It is critical that the actual press setup is reflected the above settings in order to allow the calculation, logging and display of the correct dose.

The Display Mode setting relates to the UV dosage in mJ displayed on the UV Dosage Control screen. UV Dosage is a calculated figure based on the running speed of the press and the measured UV intensity. Each lamphead senses UV intensity at various positions along the lamphead and calculation of UV dose can be based on the average, the minimum or the maximum of those output readings. The user can select accordingly.

Press the **Close** button to return to the Process Control page.



UV Sensor Status

Press the UV Sensor Status button on the left of the dialogue box to reveal the UV intensity reading for each sensor within the selected lamphead. The current press speed is also indicated. See Figure 41. Should the speed be incorrect, please contact GEW for recalibration.

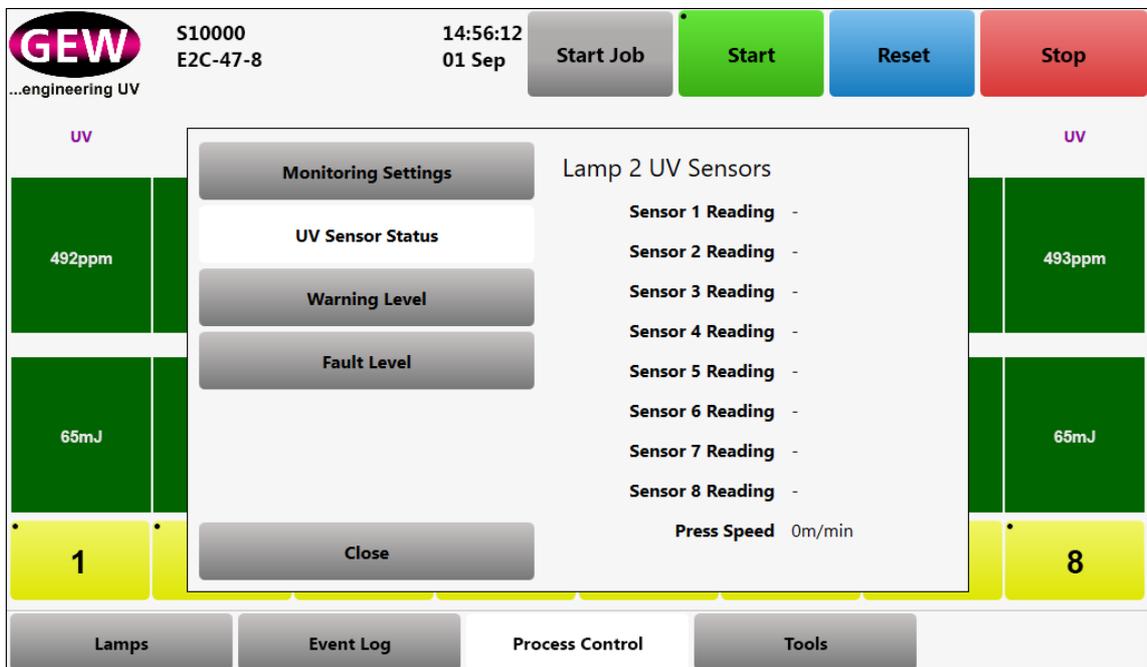


Figure 42: UV Sensor Status

Press the **Close** button to return to the Process Control page.



UV Warning Level

Press the Warning Level button on the left of the dialogue box to reveal the options shown in Figure 43. From here the UV dose upper and lower warning limits for each lamphead can be set. Should the displayed UV dose exceed one of these limits, a warning will be displayed (should a fault condition not exist).

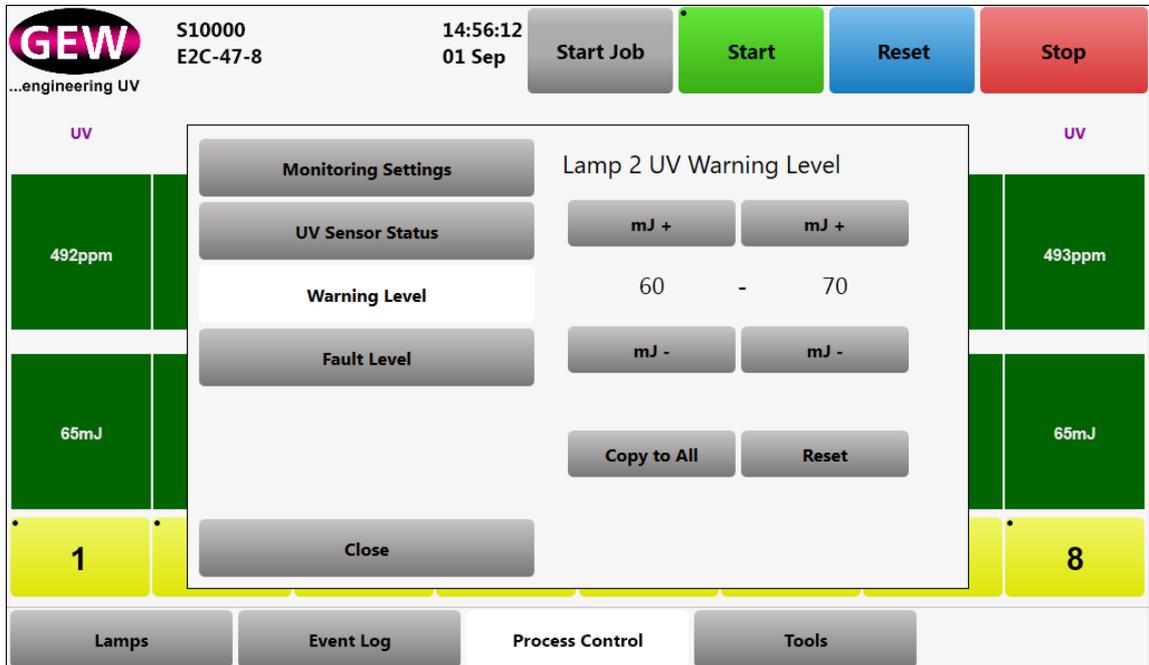


Figure 43: UV Warning Level

New settings for one lamphead may be applied to the other lampheads in the system using the **Copy to All** button.



Press the button once and the changes will be applied to all lampheads.

Pressing the **Reset** button returns the values to the factory set default warning levels.



Press the **Close** button to return to the Process Control page.



NOTE: To avoid the possibility of a UV fault notification occurring before a UV Warning notification, the user is blocked from setting levels in an order other than that shown in section 4.5.1.

UV Fault Level

Press the Fault Level button on the left of the dialogue box to reveal the options shown in Figure 43. From here the UV dose upper and lower fault limits for each lamphead can be set. Should the displayed UV dose exceed one of these limits, a fault condition will be displayed.

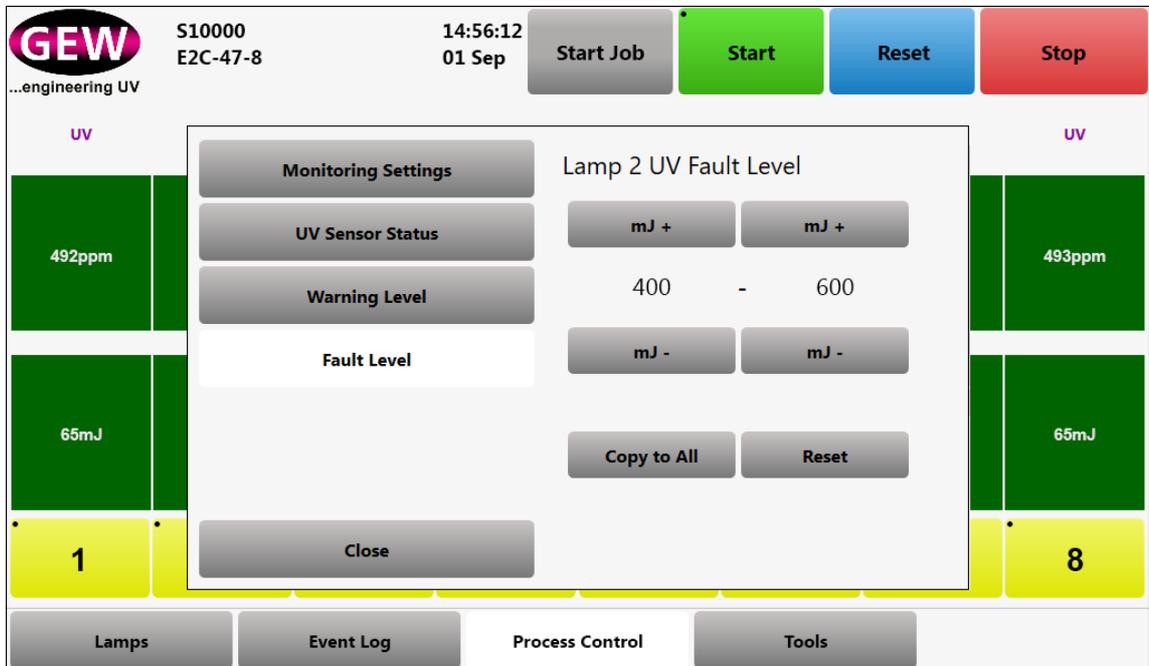


Figure 44: UV Fault Level

New settings for one lamphead may be applied to the other lampheads in the system using the **Copy to All** button.



Press the button once and the changes will be applied to all lampheads.

Pressing the **Reset** button returns the values to the factory set default fault levels.



Press the **Close** button to return to the Process Control page.



NOTE: To avoid the possibility of a UV fault notification occurring before a UV Warning notification, the user is blocked from setting levels in an order other than that shown in section 4.5.1.

4.5.4 Job Logging

In accordance with EC Regulation No. 2023/2006 on “good manufacturing practice for materials and articles intended to come into contact with food”, the GEW Process Control package includes a means of recording live system curing performance data on a job by job basis. Data appropriate to the UV system configuration is recorded such as oxygen level (ppm), UV dose and any warning and fault conditions that occur during the logged period. This is achieved by setting up flags in the continuous data automatically sent to GEW on internet connected UV systems. The flagged data can be retrieved from GEW, usually in the form of a PDF document.

To set a flag at the start of a job, press the “Start Job” button at the top-centre on any main HMI page.



Note that this button’s function toggles between “Start Job” and “End Job”.

Enter a convenient name for the job using the pop-up keyboard.

Enter Job Number

A	B	C	D	E	F	0	5	<<
G	H	I	J	K	L	1	6	
M	N	O	P	Q	R	2	7	
S	T	U	V	W	X	3	8	Close
Y	Z	.	-			4	9	OK

When the job is complete, press the “End Job” button.



4.6 Tools Page

The **Tools** page allows the operator to:

- Change the language displayed on the HMI.
- Perform maintenance tasks including opening and closing the lamphead shutters and forcing the cooldown cycle.
- Perform supervisor tasks including re-addressing devices on the GEW UV system.
- Adjust the time, date and location settings of the GEW UV system.
- View network settings such as IP address and gateway.
- Shutdown the system.

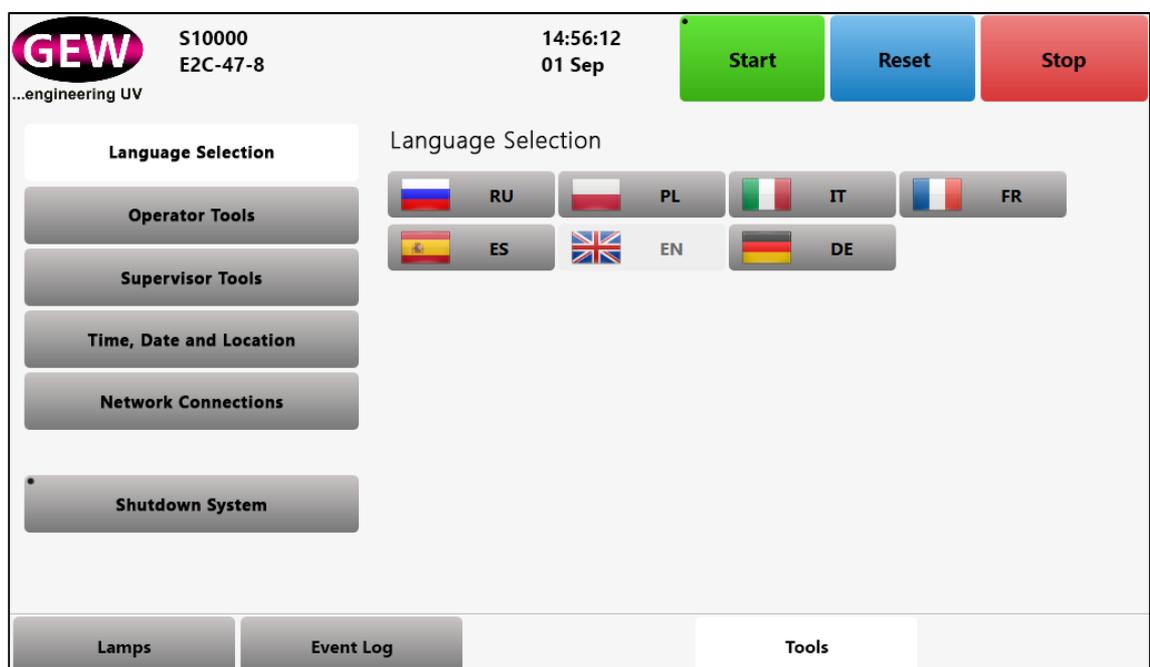


Figure 45: Tools page display

The pages within the Tools menu are selected using the buttons on the left hand side of the page.

4.6.1 Language Selection

The Language Selection menu allows the operator to choose the language that will be used on the HMI.

Press the **Language Selection** button on the left hand side of the **Tools** page. The Language Selection menu will appear with buttons for the available languages, each identified by a label and a flag.

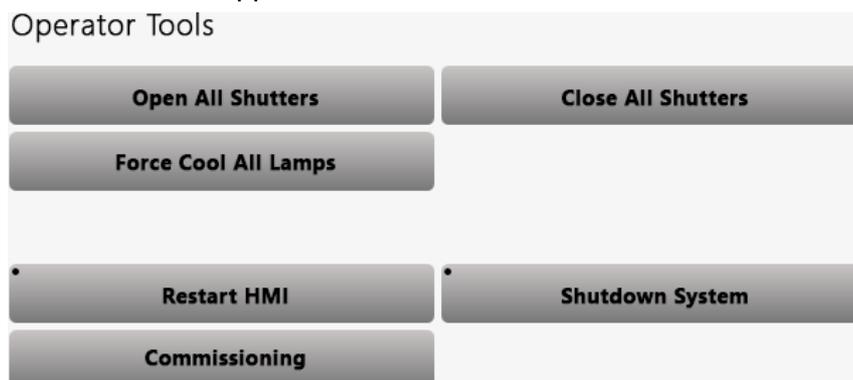


Select the required language by pressing the relevant button.

4.6.2 Operator Tools

The Operator Tools menu allows the operator to perform various maintenance tasks and tests on the UV system.

Press the **Operator Tools** button on the left hand side of the **Tools** page. The Operator Tools menu will appear.



The operator may select to:

- Open the shutters;
- Close the shutters;
- Force an additional cooldown cycle to start; or
- Shutdown or Restart the UV system (HMI)
- Enter a commissioning code

Commissioning

GEW's RHINO system requires commissioning to ensure it is operating within the conditions specified by GEW. This allows us to validate your warranty and helps minimise any problems that may occur in the future. Before being activated, the HMI will operate in a mode known as 'Commissioning Time'.

During this time:

- The system can be operated at full power, with no limitations on functionality or performance.

- The operator will be regularly notified how long is remaining until the warranty must be activated.
- The time will continue to decrease at any point ANY lamp is running on the system. The time will not decrease if all lamps on the system are off or de-selected.
- The time can be extended, if required, by contacting the GEW Service Department.

At the end of the commissioning procedure, the warranty needs to be activated within the RHINO HMI. This is done via an 8-digit code provided by the GEW Service Department.

If the warranty is not activated, lamp power may be reduced to 40% of full power. The operator will be warned this will occur via pop-up messages and a banner at the bottom of the display.

How to Enter a Code:

Ensure all lamps on the system are OFF and have completed cool-down. You cannot enter a code whilst lamps are running. Press the Commissioning button from within the Operator Tools menu and enter the eight-digit code. Successful activation will be indicated by a confirmation pop-up.

4.6.3 Supervisor Tools

The **Supervisor Tools** function allows the operator to perform more specific tasks as requested by GEW, and would not be considered as day-to-day maintenance activities.



The Supervisor Tools function is PIN code protected and shall only be used by qualified operators under the direction of GEW.

Press the **Supervisor Tools** button on the left hand side of the Tools page.

A Keypad will appear, requesting the entry of a PIN number.



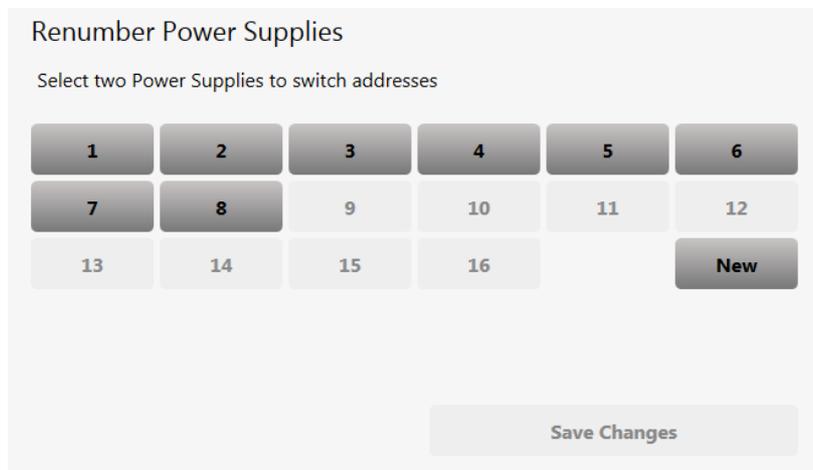
The PIN number is provided by GEW when required.

Enter the PIN number and the Supervisor Tools menu will appear.



Renumber Power Supplies

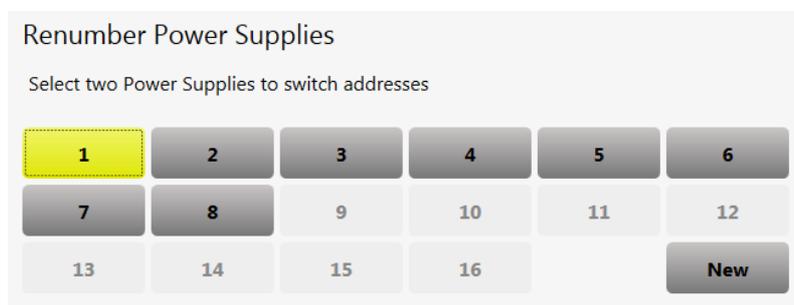
To switch addresses of individual power supply units in the system, press the **Renumber Power Supplies** button on the Supervisor Tools menu tab. The Renumber Power Supplies keypad will appear.



Select the existing PSU button by number to readdress. The button will turn yellow.

Select the new address for the PSU by pressing its number button.

If an existing Power Supply is already present on the new address, it will switch places with the current unit.



Ensure when adding or removing RPSUs from a system, for instance in the case of replacing a unit with a spare, that each address is only allocated to one RPSU.

Press the **Save Changes** button for changes to take effect.



Renumbering Power Supplies is disabled if any lamp on the system is active.

Force Remote Connection

The HMI will establish a remote connection to GEW on a regular basis to upload remote monitoring data and check for updates.

However, it is possible to force a connection to GEW's servers. This is recommended after altering or changing the physical network connection or IP address settings on the HMI.



Force Remote Connection

If updates are available they will be downloaded automatically in the background.

A message will appear on the Network Connections page notifying the operator that updates are available once downloading has completed. Depending on your connection speed this could take several minutes to appear.

USB Upload Tool

The USB Upload tool allows the operator to upload the HMI Events Log to a USB storage device connected to the HMI USB port, for further analysis at GEW. Insert a formatted USB storage device into the USB socket at the front of the HMI and press the **USB Upload** button on the Management Tools menu tab.



USB Upload

If the HMI cannot detect a valid type of memory storage device, this option is disabled. It may take several seconds after a USB device is inserted before it will be recognised by the system.



WARNING: The USB port is designed for suitable memory storage devices only.

Do not attempt to connect any other type of USB device or it may interfere with the operation of your system.

Restart HMI Application and Restart System Services

These options should only be used under the instruction of GEW.

4.6.4 Time, Date and Location Tool

The Time, Date and Location tool allows the operator to:

- Set the time zone in which the system is installed; and
- Set the location in which the system is installed.

Press the **Time, Date and Location** button on the left hand side of the **Tools** page. The Time and Date Settings box will appear.

Time and Date Settings

Current Time 22/10/2014 10:28:56

Time Zone (UTC) Dublin, Edinburgh, Lisbon, London

DST << >>

Current Country United Kingdom

<< >>

Current City or Region West Sussex

<< >>

Select the time zone in which the system is installed using the << and >> buttons.

Once the time zone has been set the HMI will receive the correct time and date for that time zone automatically via the internet.

To set the location of the system use the << and >> buttons to select the country.

Then use the << and >> buttons to select the region within that country.



Ensuring these settings are accurate will assist GEW in supporting your system.

4.6.5 Network Connections

The Network Connections menu allows the operator to monitor the status of the network interfaces of the HMI, and to determine whether it is connected to the GEW server.

Press the **Network Connections** button on the left hand side of the **Tools** page. The Network Connections box will appear.

Network Connections

NIC 1 IP Address	192.0.0.110
NIC 2 IP Address	
Network Gateway	192.0.0.255
Network DNS Server(s)	192.0.0.9, 192.0.0.7
Hostname	
Public IP Address	82.144.144.22
Last Connection Time	2014-12-22 14:42:22 UTC
Service IP Address	
Software Upgrade	Updates Available

If the Public IP Address line shows “No Connection”, then the HMI has NOT been able to communicate with the GEW server within the last 10 minutes.

Firewall settings and Network Configuration settings must be checked on the customer’s IT network in order to re-establish a connection.

If updates have downloaded and are waiting to be installed, a message will also appear on the Network Connections page to this effect.



For further information about remote monitoring, see the installation manual.

4.6.6 Shutdown System

If the operator needs to shutdown the system for any reason, the **Shutdown System** button should be used to shutdown the HMI.

Press and hold the **Shutdown System** button on the left hand side of the Tools page.

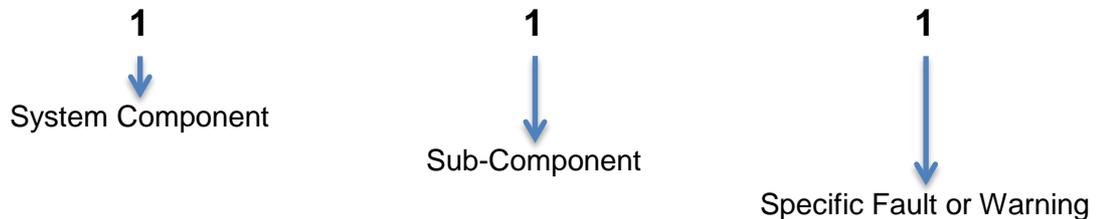


The HMI will shutdown safely after ensuring all lamps are switched off.

Ensure any cooldown cycles have completed and the system fan stopped before isolating power to the system.

Appendix A: Warning and Fault Codes

All warning and fault messages display a code in the form of a three digit number, e.g.



For example, a Fault Code of '111' equals a Lamp Burn In Fault.

A warning or fault message will be displayed for each lamphead that is affected. Messages are colour coded, as described in the table below;

Code Colour	Message	Action
Red	Fault	System shuts down the lamphead(s). You must investigate and rectify fault immediately.
Orange	Warning	You must investigate the warning immediately.



WARNING: Ensure the system is switched off and isolated from the electrical supply before working on any of its components.



WARNING: Always consult a qualified electrician when remedying any electrical fault including removal of the RR distribution cover.



Caution: Allow lamps to complete cooldown cycle before trying to remedy any faults.

Code 111: Lamp Burn In Fault

A lamp in the system has failed to burn in within the allotted time.

Possible causes	Further checks	Remedy
Lamp has reached the end of its useful life	Check lamp counter. See Section 4.3.9 Lamp Counters. Check for damaged ceramics or other wear and tear.	Replace lamp. See GEW Spare parts and servicing manuals for procedure.
Incorrect type of lamp	Check lamp part number is correct for your model of lamphead.	Fit correct type of lamp.
Power supply failure	Try switching cassettes between lampheads to ensure the problem is not specific to one power supply.	Replace power supply if faulty.
Damper damage or failed	Check damper and flexible ducting for obstructions, signs of wear or failure.	Replace damper or ducting if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 112: Lamp Fault

A lamp in the system has failed during operation. No current flow is detected through the lamp.

Possible causes	Further checks	Remedy
Lamp has reached the end of its useful life	<p>Check lamp hour counter. See Section 4.3.9 Lamp Counters.</p> <p>Check for damaged ceramics or other wear and tear.</p>	<p>Replace lamp.</p> <p>See GEW Spare parts and servicing manuals for procedure.</p>
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Power supply failure	<p>Try switching cassettes between lampheads to ensure the problem is not specific to one power supply.</p>	<p>Replace power supply if faulty.</p>

If the problem persists:

- Contact GEW Service for further assistance.

Code 113: Lamp Ignition Fault

A lamp has failed to ignite when started.

Possible causes	Further checks	Remedy
Lamp is too hot to strike	Lamphead has not completed its cooldown cycle. Previous cooldown cycle was interrupted (for instance by a power failure or emergency stop).	Allow lamp to complete its cooldown cycle before reattempting to start. Force a further cooldown cycle from the Maintenance Tools menu.
Lamp has reached the end of its useful life	Check lamp hour counter. See Section 4.3.9 Lamp Counters. Check for damaged ceramics or other wear and tear.	Replace lamp. See GEW Spare parts and servicing manuals for procedure.
Faulty wiring or connection	Check all electrical connections between the lamphead and power supply are clean and secure. Check for any signs of damage to lamp cabling or connectors. Cassette is not properly engaged in lamphead.	Ensure all cable connections, in particular the lamp cable, are securely latched together. Clean cable connections. Replace faulty cable. Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.
Power supply failure	Try switching cassettes between lampheads to ensure the problem is not specific to one power supply.	Replace power supply if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 114: Lamp Voltage Warning

A lamp has reached a higher voltage than expected during operation or ignition.

Possible causes	Further checks	Remedy
Lamp is too hot to strike	Ensure lamp has completed a full cool down cycle with the fan running	Run a 'Force Cooldown Cycle' to further cool the lamps. Refer to operator tools, section 4.6.2. Wait 5 minutes before re-attempting lamp strike.
Incorrect type of lamp	Check lamp part number is correct for your model of lamphead.	Fit correct type of lamp.

If the problem persists:

- Contact GEW Service for further assistance.

Code 121: Lamphead Over-Temperature Trip Fault

A lamphead temperature has become too high for safe operation and the lamp has been stopped for safety.

Possible causes	Further checks	Remedy
Cooling fan is not working correctly	Check system fan is working correctly	See Code 411 troubleshooting.
Constricted, obstructed or damaged ducting	Check all ducting and dampers for debris or obstructions.	Replace ducting or ducting components if necessary.
Dirt or debris inside the lamphead	Check the lamphead and shutters for any dirt, debris and ink.	Clean the lamphead.
Chiller or water cooling system is not working correctly (if fitted)	<p>Check chiller is operational and the temperature setpoint is correct.</p> <p>Check coolant levels and pressure.</p> <p>Check all water piping, valves and manifolds for correct flow, settings and any potential leaks or constrictions.</p>	<p>See Code 511 troubleshooting.</p> <p>Ensure chiller settings match requirements by GEW.</p>
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Damper damage or failed	Check damper and flexible ducting for obstructions, signs of wear or failure.	Replace damper if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 122: PT100 Disconnected Warning

The PT100 temperature sensor in the lamphead cannot be detected.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Faulty connection inside lamphead.	Check PT100 wires are secure and free from damaged inside cassette.	Ensure all electrical connections and wiring is securely fitted.

If the problem persists:

- Replace the PT100 sensor, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 123: PT100 Under-Range Warning

The PT100 temperature sensor in the lamphead is reading a value below the expected temperature range.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Faulty connection inside lamphead.	Check PT100 wires are secure and free from damaged inside cassette.	Ensure all electrical connections and wiring is securely fitted.

If the problem persists:

- Replace the PT100 sensor, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 124: PT100 Over-Range Warning

The PT100 temperature sensor in the lamphead is reading a value above the expected temperature range.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Faulty connection inside lamphead.	Check PT100 wires are secure and free from damaged inside cassette.	Ensure all electrical connections and wiring is securely fitted.

If the problem persists:

- Replace the PT100 sensor, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 125: Lamphead Over-Temperature Warning

The PT100 temperature sensor in the lamphead is reading a value that is close to the operating limit for the lamphead and may cause a Lamphead Over-Temperature Trip if the problem is not rectified.

Possible causes	Further checks	Remedy
Cooling fan is not working correctly	Check system fan is working correctly.	See Code 411 troubleshooting.
Constricted, obstructed or damaged ducting	Check all ducting and dampers for debris or obstructions.	Replace ducting or ducting components if necessary.
Dirt or debris inside the lamphead	Check the lamphead and shutters for any dirt, debris and ink.	Clean the lamphead.
Chiller or water cooling system is not working correctly (if fitted)	Check chiller is operational and the temperature setpoint is correct. Check coolant levels and pressure. Check all water piping, valves and manifolds for correct flow, settings and any potential leaks or constrictions.	See Code 511 troubleshooting. Ensure chiller settings match requirements by GEW.
Faulty wiring or connection	Check all electrical connections between the lamphead and power supply are clean secure. Check for any signs of damage to lamp cabling or connectors. Cassette is not properly engaged in lamphead.	Ensure all cable connections, in particular the lamp cable, are securely latched together. Replace faulty cable. Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.
Damper damage or failed	Check damper and flexible ducting for obstructions, signs of wear or failure.	Replace damper if faulty.

If the problem persists:

- Replace the PT100 sensor, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 131: Shutter Spurious Opening Fault

The shutter has been detected as opening when the RPSU control has not requested the shutter to move.

Possible causes	Further checks	Remedy
Faulty or dirty microswitch	<p>Check reliable operation using the Shutter Test feature in the HMI.</p> <p>Check the microswitch for dirt or debris.</p>	Clean and reseal microswitch PCB in lamp cassette.
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>

If the problem persists:

- Replace the shutter microswitches, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 132: Shutter Opening Fault

The shutter has failed to open when requested by the RPSU control.

Possible causes	Further checks	Remedy
Insufficient pressure in compressed air supply	<p>Check pressure regulator, ensure it is set between 5 and 6 bar.</p> <p>Check regulator is clean and free of condensation.</p> <p>Check regulator's moisture trap is empty and clear of contamination.</p>	<p>Adjust pressure regulator to ensure air supply is within requirements.</p> <p>Clean air regulator.</p>
Faulty pneumatic connections	<p>Check all air connections are secure and tight with no leaks.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Shutter jammed or clogged	<p>Check the shutter mechanism for build-up of ink or debris.</p> <p>Check shutter mechanism operates freely when cassette is out of lamphead.</p>	<p>Clean as necessary with isopropyl alcohol.</p> <p>Replace any worn or damaged parts in the shutter mechanism.</p>
Blocked actuation valve screw	Check the actuation valve screw for dirt or debris.	Clean as necessary.

If the problem persists:

- Replace the shutter solenoids, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.



Note: It is not possible to adjust shutter speed by adjusting the valve screws. Ensure air metering ports are clean and clear.

Code 133: Shutter Opening Timeout Fault

The shutter has failed to open within the allotted time when requested by the RPSU control.

Possible causes	Further checks	Remedy
Shutter jammed or clogged	<p>Check the shutter mechanism for build-up of ink or debris.</p> <p>Check shutter mechanism operates freely when cassette is out of lamphead.</p>	<p>Clean as necessary with isopropyl alcohol.</p> <p>Replace any worn or damaged parts in the shutter mechanism.</p>
Faulty or dirty microswitch	<p>Check reliable operation using the Shutter Test feature in the HMI.</p> <p>Check the microswitch for dirt or debris.</p>	<p>Clean and reseal microswitch PCB in lamp cassette.</p>
Insufficient pressure in compressed air supply	<p>Check pressure regulator, ensure it is set between 5 and 6 bar.</p> <p>Check regulator is clean and free of condensation.</p> <p>Check regulator's moisture trap is empty and clear of contamination.</p>	<p>Adjust pressure regulator to ensure air supply is within requirements.</p> <p>Clean air regulator.</p>
Blocked actuation valve screw	<p>Check the actuation valve screw for dirt or debris.</p>	<p>Clean as necessary.</p>

If the problem persists:

- Contact GEW Service for further assistance.

Code 134: Shutter Spurious Close Fault

The shutter has been detected as closed when the RPSU control has not requested the shutter to move.

Possible causes	Further checks	Remedy
Faulty or dirty microswitch	<p>Check reliable operation using the Shutter Test feature in the HMI.</p> <p>Check the microswitch for dirt or debris.</p>	Clean and reseat microswitch PCB in lamp cassette.
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>

If the problem persists:

- Replace the shutter microswitches, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 135: Shutter Closing Fault

The shutter has failed to close when requested by the RPSU control.

Possible causes	Further checks	Remedy
Insufficient pressure in compressed air supply	Check pressure regulator, ensure it is set between 5 and 6 bar. Check regulator is clean and free of condensation. Check regulator's moisture trap is empty and clear of contamination.	Adjust pressure regulator to ensure air supply is within requirements. Clean air regulator.
Faulty pneumatic connections	Check all air connections are secure and tight with no leaks. Check for any signs of damage to lamp cabling or connectors. Cassette is not properly engaged in lamphead.	Ensure all cable connections, in particular the lamp cable, are securely latched together. Clean cable connections. Replace faulty cable. Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.
Shutter jammed or clogged	Check the shutter mechanism for build-up of ink or debris. Check shutter mechanism operates freely when cassette is out of lamphead.	Clean as necessary with isopropyl alcohol. Replace any worn or damaged parts in the shutter mechanism.
Blocked actuation valve screw	Check the actuation valve screw for dirt or debris.	Clean as necessary.

If the problem persists:

- Replace the shutter solenoids, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.



Note: It is not possible to adjust shutter speed by adjusting the valve screws. Ensure air metering ports are clean and clear.

Code 136: Shutter Closing Timeout Fault

The shutter has failed to close within the allotted time when requested by the RPSU control.

Possible causes	Further checks	Remedy
Shutter jammed or clogged	<p>Check the shutter mechanism for build-up of ink or debris.</p> <p>Check shutter mechanism operates freely when cassette is out of lamphead.</p>	<p>Clean as necessary with isopropyl alcohol.</p> <p>Replace any worn or damaged parts in the shutter mechanism.</p>
Faulty or dirty microswitch	<p>Check reliable operation using the Shutter Test feature in the HMI.</p> <p>Check the microswitch for dirt or debris.</p>	<p>Clean and reseal microswitch PCB in lamp cassette.</p>
Insufficient pressure in compressed air supply	<p>Check pressure regulator, ensure it is set between 5 and 6 bar.</p> <p>Check regulator is clean and free of condensation.</p> <p>Check regulator's moisture trap is empty and clear of contamination.</p>	<p>Adjust pressure regulator to ensure air supply is within requirements.</p> <p>Clean air regulator.</p>
Blocked actuation valve screw	<p>Check the actuation valve screw for dirt or debris.</p>	<p>Clean as necessary.</p>

If the problem persists:

- Contact GEW Service for further assistance.

Code 137: Shutter Switch Fault

The shutter switches are reporting incorrect status of the shutter.

Possible causes	Further checks	Remedy
Faulty or dirty microswitch	<p>Check reliable operation using the Shutter Test feature in the HMI.</p> <p>Check the microswitch for dirt or debris.</p>	Clean and reseal microswitch PCB in lamp cassette.
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>

If the problem persists:

- Replace the shutter microswitches, following the procedure in the GEW Spare Parts and Servicing Manuals.
- Contact GEW Service for further assistance.

Code 141: Cassette Removed Fault

The cassette has been removed from the lamphead casing.

Possible causes	Further checks	Remedy
Cassette is not properly engaged in lamphead.	Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.	
Faulty wiring or connection	Check all electrical connections between the lamphead and power supply are clean secure. Check for any signs of damage to lamp cabling or connectors.	Ensure all cable connections, in particular the lamp cable, are securely latched together. Clean cable connections. Replace faulty cable.

If the problem persists:

- Contact GEW Service for further assistance.

Code 151: Lamphead Safety Switch Tripped Fault

The external safety switch wired to the lamphead has been opened or disconnected.

Possible causes	Further checks	Remedy
Safety switch has become misaligned or damaged	Check the alignment of the switch and actuator tab. Check the safety switch indicator lights (if fitted). Check the safety switch for damage.	Reseat the safety switch, ensuring the actuation of the switch is reliable and obstruction free. Replace the safety switch if damaged.
Faulty wiring or connection	Check all electrical connections between the lamphead and power supply are clean and secure. Check for any signs of damage to lamp cabling or connectors. Cassette is not properly engaged in lamphead.	Ensure all cable connections, in particular the lamp cable, are securely latched together. Clean cable connections. Replace faulty cable. Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.

If the problem persists:

- Contact GEW Service for further assistance.

Code 152: Lamphhead Guarding Lifted Warning

The external safety switch wired to the lamphhead guarding has been opened or disconnected.

Possible causes	Further checks	Remedy
Safety switch has become misaligned or damaged	<p>Check the alignment of the switch and actuator tab.</p> <p>Check the safety switch indicator lights (if fitted).</p> <p>Check the safety switch for damage.</p>	<p>Reseat the safety switch, ensuring the actuation of the switch is reliable and obstruction free.</p> <p>Replace the safety switch if damaged.</p>
Faulty wiring or connection	<p>Check all electrical connections between the lamphhead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphhead.</p>	<p>Ensure all cable connections, in particular the lamp cable, are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphhead and locked shut.</p>

If the problem persists:

- Contact GEW Service for further assistance.

Code 161: Lamp Type Mismatch

An incompatible lamp type is reported.

Possible causes	Further checks	Remedy
The arc-lamp/LED cassette is not configured correctly.	Ensure the cassette type is compatible with the system type.	Fit a compatible spare cassette if possible and contact GEW for assistance.
An LED cassette has been inserted into a non-ArcLED system.	Ensure the cassette type is compatible with the system type.	Fit a compatible arc-lamp cassette.

If the problem persists:

- Contact GEW Service for further assistance.

Code 162: Lamp Parameter Error

The RPSU has read a cassette's memory chip and one or more values are invalid or out of range. The cassette cannot be operated with this error.

Possible causes	Further checks	Remedy
The cassette is not configured correctly.	Ensure the cassette type is compatible with the system type.	Fit a compatible spare cassette if possible and contact GEW for assistance.
An LED cassette has been inserted into a non-ArcLED system.	Ensure the cassette type is compatible with the system type.	Fit a compatible arc-lamp cassette.
Faulty memory chip on the cassette.	Swap cassette with another from the same system. Does the fault stay with the cassette?	Replace the cassette or have it serviced by GEW.

If the problem persists:

- Contact GEW Service for further assistance.

Code 163: Lamp Parameter Warning

- The RPSU has read a cassette's memory chip and one or more values are invalid or out of range. The cassette can still be used with this error but it may be at a degraded or 'safer' state until the problem is resolved.

Possible causes	Further checks	Remedy
The cassette is not compatible, not configured correctly or is faulty.	Ensure the cassette type is compatible with the system type.	Fit a compatible cassette.
	Swap cassette with another from the same system. Does the fault stay with the cassette?	Replace the cassette or have it serviced by GEW.

If the problem persists:

- Contact GEW Service for further assistance.

Code 211: Power Supply Unknown Fault

The RPSU has an internal fault that does not fit into one of the other categories below.

Possible causes	Further checks	Remedy
Power supply has detected an internal fault	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 213: Lamp Output Shorted Fault

The lamp power output from the RPSU has become shorted to Earth.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to lamp cabling or connectors.</p> <p>Cassette is not properly engaged in lamphead.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p> <p>Reseat the cassette, ensuring it is fully inserted into the lamphead and locked shut.</p>
Lamp has become damaged	<p>Check condition of lamp and lamp connectors for any sign of wear or damage.</p>	<p>Replace lamp.</p> <p>See GEW Spare parts and servicing manuals for procedure.</p>
Internal wiring fault in cassette	<p>Try switching cassettes between lampheads to ensure the problem is specific to one cassette.</p>	<p>Replace damaged wiring or lamp connectors in cassette.</p> <p>Replace cassette.</p>
Power supply failure	<p>Try switching cassettes between lampheads to ensure the problem is specific to one power supply.</p>	<p>Replace power supply if faulty.</p>
LED lamphead shorted	<p>Look for condensation inside quartz window and on lamp body.</p>	<p>Place the LED lamphead in a warm, dry place for a length of time and retry when dry.</p> <p>Only use the LED lamphead within the environmental envelope set out in datasheet DS1032.</p>

If the problem persists:

- The cassette may need returning to GEW for servicing, Contact GEW Service for further assistance.

Code 214: Power Supply Drive Fault

There is an error with the feedback signals internal to the RPSU.

Possible causes	Further checks	Remedy
Power supply failure	Try switching cassettes between lampheads to ensure the problem is specific to one power supply.	Replace power supply if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 215: Power Supply Mains Fault

There is a problem with the 3 phase electrical supply to the RPSU.

Possible causes	Further checks	Remedy
One or more phases in the supply is missing	Have the supply checked by a qualified electrician.	
One or more modules of a 18kW or 27kW RPSU is switched off	Ensure all modules forming an 18kW or 27kW RPSU are switched on.	Turn on the circuit breakers for module.
One or more phases is outside the specified operating range of the power supply	Have the supply checked by a qualified electrician.	
Faulty electrical component in the RR distribution	Have the supply checked by a qualified electrician.	

If the problem persists:

- Contact GEW Service for further assistance.

Code 221: Power Supply Over-Temperature Trip Fault

The Power Supply has safely shutdown due to operating outside of its specified temperature.

Possible causes	Further checks	Remedy
Ambient temperature is too high	Ensure ambient temperature of installation location is within GEW specification.	Increase cooling around cabinet or re-site the RR in a more suitable location.
Insufficient ventilation around cabinet	Check siting of RR is in accordance with GEW specification.	Move other equipment away from RR or re-site the RR in a more suitable location.
Air intake to RR is clogged	Check filter for debris, dirt or obstruction.	Replace filter.
RR cooling fans not working correctly	Ensure internal fans in the cabinet are operating.	Ensure the Control circuit breaker in the cabinet is switched on. Replace faulty fan in RR.
Power supply fan(s) have malfunctioned	Check fans internal to the power supply are operating correctly. Note: PSU fans will not run all the time and are controlled based on the demand from the PSU and ambient temperature.	Replace power supply if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 231: Power Supply Contactor Fault

The internal contactor in the Power Supply has failed to operate correctly.

Possible causes	Further checks	Remedy
Power supply has detected an internal fault	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 241: Power Supply System 24V Output Fault

One of the voltage rails in the Power Supply has become overloaded, shorted or has been damaged.

Possible causes	Further checks	Remedy
Faulty wiring or connection	Check all electrical connections between the each power supply are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.
Power supply's internal voltage regulators have been overloaded	Remove and/or switch off additional equipment such as Chiller Interface boxes and see if fault remains.	Fault is with externally attached equipment and may need replacement.
Power supply's internal voltage regulation has failed	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 242: Lamphead 24V Output Fault

The voltage rail in the Power Supply which supplies the lamphead has become overloaded, shorted or has been damaged.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between the lamphead and power supply are clean and secure.</p> <p>Check for any signs of damage to cabling or connectors.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Replace faulty cable.</p>
Internal wiring fault in cassette	Try switching cassettes between lampheads to ensure the problem is specific to one cassette.	<p>Replace damaged wiring or lamp connectors in cassette.</p> <p>Replace cassette.</p>
Power supply's internal voltage regulators have been overloaded	Remove cassette and see if fault persists.	Replace power supply.
Power supply's internal voltage regulation has failed	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 243: Accessory 24V Output Fault

The voltage rail in the Power Supply which supplies lamphead accessories such as O₂ sensors and dampers has become overloaded, shorted or has been damaged.

Possible causes	Further checks	Remedy
Faulty wiring or connection	Check all electrical connections between the power supply and accessories are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.
Faulty external equipment	Remove and/or switch off additional equipment such as autodampers and O ₂ sensors and see if fault remains.	Fault is with externally attached equipment and may need replacement.
Power supply's internal voltage regulation has failed	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 251: Communications Fault

The HMI cannot communicate with one or more Power Supplies.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between each power supply and HMI are secure.</p> <p>Check for any signs of damage to cabling or connectors.</p> <p>Check RPSU MCBs are ON and all RPSU displays are lit. See section 3.1.2 Figure 4.</p> <p>Check for "CAN Error" LED on front of power supply unit.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Replace faulty cable.</p> <p>If any MCBs are OFF, reset them and check all RPSU displays are lit.</p> <p>A "CAN Error" indicates a short or overload of the communications cabling, replace/swap cabling until fault rectified.</p>
Power supply's internal control card has failed	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.
HMI has an internal fault	<p>Check to see if this fault has appeared on all lamps simultaneously.</p> <p>Shutdown and restart entire system to ensure the fault remains.</p>	Replace HMI.

If the problem persists:

- Contact GEW Service for further assistance.



WARNING: Do not mix HMI units across systems. Each HMI is programmed for a specific system and you may damage your installation by using another HMI.

Code 252: Power Supply CPU Fault

The Power Supply's internal control card is reporting a CPU failure.

Possible causes	Further checks	Remedy
Power supply has detected an internal fault	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 253: Power Supply Configuration Fault

The Power Supply's internal control card is reporting that its configuration is invalid or missing.

Possible causes	Further checks	Remedy
Configuration has become corrupted	Shutdown and restart entire system to ensure the fault remains. Install any outstanding software updates on the system. Firmware is out of date on the power supply, check the software version matches on the PSU Status dialogue box.	Contact GEW.
An LED cassette has been inserted into a non-ArcLED system.	Ensure the cassette type is compatible with the system type.	Fit a compatible arc-lamp cassette.

If the problem persists:

- The configuration for your system may need to be reset, contact GEW for assistance.

Code 254: Power Supply Type Fault

The Power Supply cannot detect or understand its internal configuration settings.

Possible causes	Further checks	Remedy
Power supply has detected an internal fault	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.

If the problem persists:

- Contact GEW Service for further assistance.

Code 255: HMI Configuration Fault

The HMI cannot start operating the UV system if a configuration setting is missing or invalid.

Possible causes	Further checks	Remedy
Configuration has become corrupted	Shutdown and restart entire system to ensure the fault remains. Install any outstanding software updates on the system. Firmware is out of date on the power supply, check the software version matches on the PSU Status dialogue box.	Use the Supervisor Tools to perform a software update or full firmware update.

If the problem persists:

- The configuration for your system may need to be reset, contact GEW for assistance.

Code 256: HMI Communications Fault

The HMI cannot communicate with one or more Power Supplies.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between each power supply and HMI are secure.</p> <p>Check for any signs of damage to cabling or connectors.</p> <p>Check RPSU MCBs are ON and all RPSU displays are lit. See section 3.1.2 Figure 4.</p> <p>Check for "CAN Error" LED on front of power supply unit.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Replace faulty cable.</p> <p>If any MCBs are OFF, reset them and check all RPSU displays are lit.</p> <p>A "CAN Error" indicates a short or overload of the communications cabling, replace/swap cabling until fault rectified.</p>
Power supply's internal control card has failed	Shutdown and restart PSU to ensure the fault remains.	Replace power supply.
HMI has an internal fault	<p>Check to see if this fault has appeared on all lamps simultaneously.</p> <p>Shutdown and restart entire system to ensure the fault remains.</p>	Replace HMI.

If the problem persists:

- Contact GEW Service for further assistance.



WARNING: Do not mix HMI units across systems. Each HMI is programmed for a specific system and you may damage your installation by using another HMI.

Code 258: Commissioning Expired

- Commissioning period has expired (usually 100 hours). Lamp power will be restricted (usually to 40%) one hour after each system switch-on. Refer to Module 6 of “DOC7001-6-EN RHINO System Installation Manual” and contact GEW Service for further assistance.

Code 259: PSU Type Code Disallowed

The power supply type is incorrect for this configuration of system.

Possible causes	Further checks	Remedy
Attempted installation of an 18kW RPSU on a 9kW system, an RLT on a standard RHINO system, ArcLED on a non-ArcLED system, etc.	Check RPSU part number is correct for system.	Contact GEW for further assistance.
	For 18 and 27kW systems, check the slave RPSUs are powered-on correctly.	Contact GEW for further assistance.

Code 311: Press Emergency Stop Fault

The external emergency stop input from the press has been opened or disconnected.

Possible causes	Further checks	Remedy
Emergency stop on press has been activated	Investigate the cause of the problem on the press.	Restart the system once it is safe to do so.
Master power supply is switched off	Ensure that all power supplies and circuit breakers in the cabinet are switched on.	Switch on all power supplies and system components.
Faulty wiring or connection	<p>Check all electrical connections between the press and power supply/RR are secure.</p> <p>Check for any signs of damage to press cabling or connectors.</p> <p>Check press interface is wired correctly and the correct signals are present on the press connector.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Replace faulty cable.</p> <p>Ensure all press connections are correct.</p>

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 312: Internal Emergency Stop Fault

The internal emergency stop circuit between RPSUs has been opened or disconnected.

Possible causes	Further checks	Remedy
Emergency stop on press has been activated	Investigate the cause of the problem on the press.	Restart the system once it is safe to do so.
Master power supply is switched off	Ensure that all power supplies and circuit breakers in the cabinet are switched on.	Switch on all power supplies and system components.
Faulty wiring or connection	<p>Check all electrical connections between all components in the system are secure.</p> <p>Check for any signs of damage to cabling or connectors.</p> <p>Check press interface is wired correctly and the correct signals are present on the press connector.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Replace faulty cable.</p> <p>Ensure all press connections are correct.</p>

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 313: Press Safety Stop Fault

The external safety switch input from the press has been opened or disconnected.

Possible causes	Further checks	Remedy
Safety stop on press has been activated	Investigate the cause of the problem on the press.	Restart the system once it is safe to do so.
Safety switch has become misaligned or damaged	Check the alignment of the switch and actuator tab. Check the safety switch indicator lights (if fitted). Check the safety switch for damage.	Reseat the safety switch, ensuring the actuation of the switch is reliable and obstruction free. Replace the safety switch if damaged.
Master power supply is switched off	Ensure that all power supplies and circuit breakers in the cabinet are switched on.	Switch on all power supplies and system components.
Faulty wiring or connection	Check all electrical connections between the press and power supply/RR are secure. Check for any signs of damage to press cabling or connectors. Check press interface is wired correctly and the correct signals are present on the press connector.	Ensure all cable connections are securely latched together. Replace faulty cable. Ensure all press connections are correct.

If the problem persists:

- Contact GEW Service for further assistance.

Code 411: Fan Failure Fault

The system fan is not correctly operating.

Possible causes	Further checks	Remedy
Fan supply has tripped	Check the MCB for the fan in the RR has not tripped.	Reset the circuit breaker.
Fan overload has tripped	Check the overload device for the fan in the RR has not tripped.	Reset the fan overload.
An emergency stop is present	Check if an emergency stop fault is also present as this will not allow the fan to run.	Reset the emergency stop when it is safe to do so.
Fan contactor has failed	Listen for the fan contactor in the RR engaging when the fan is switched on/off by the system.	Have the contactor replaced by a qualified electrician.
Faulty wiring or connection	Check all electrical connections between the fan and RR are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.
Remote fan not detected (presses with remote fan option)	Check press documentation. Check "Faulty wiring or connection" as above but for press to RR cable.	Follow instructions given in press documentation.
One or more phases in the supply is missing or wired out of order	Check if the phase rotation relay for the fan in the RR is correctly lit.	Have the supply checked by a qualified electrician.
One or more phases is outside the specified operating voltage range or frequency of the fan	Have the supply checked by a qualified electrician.	
Faulty electrical component in the RR distribution	Have the supply checked by a qualified electrician.	

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 412: Fan AC Failure Fault

The system fan is not correctly operating. The AC voltage supply to the fan has failed.

Possible causes	Further checks	Remedy
Fan supply has tripped	Check the MCB for the fan in the RR has not tripped.	Reset the circuit breaker.
One or more phases in the supply is missing or wired out of order	Check if the phase rotation relay for the fan in the RR is correctly lit.	Have the supply checked by a qualified electrician.
One or more phases is outside the specified operating voltage range or frequency of the fan	Have the supply checked by a qualified electrician.	
Faulty electrical component in the RR distribution	Have the supply checked by a qualified electrician.	
Fan contactor has failed	Listen for the fan contactor in the RR engaging when the fan is switched on/off by the system.	Have the contactor replaced by a qualified electrician.
Faulty wiring or connection	Check all electrical connections between the fan and RR are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 413: Fan DC Failure Fault

The system fan is not correctly operating. The DC voltage supply to the fan has failed.

Possible causes	Further checks	Remedy
Fan supply has tripped	Check the MCB for the fan in the RR has not tripped.	Reset the circuit breaker.
Fan DC supply has failed	Check the low voltage DC supply is operating correctly.	Replace the low voltage DC supply if faulty.
Faulty wiring or connection	Check all electrical connections between the fan and RR are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.
One or more phases is outside the specified operating voltage range or frequency of the fan	Have the supply checked by a qualified electrician.	
Faulty electrical component in the RR distribution	Have the supply checked by a qualified electrician.	

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 414: Fan Connection Failure Fault

The system fan is not correctly connected to the RR.

Possible causes	Further checks	Remedy
Cable (Fan to RR) disconnected	Check all electrical connections between the fan(s) and RR(s) are connected and secure.	Ensure all cable connections are securely latched together.
Faulty wiring or connection	Check for any signs of damage to cabling or connectors.	Replace faulty cable.
Faulty electrical component in the RR distribution	Have the supply checked by a qualified electrician.	

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 415: Fan Over-Current Detection Fault

The system fan is not correctly operating. The over-current detection circuitry has tripped to protect the fan motor.

Possible causes	Further checks	Remedy
Fan overload has tripped	Check the overload device for the fan in the RR has not tripped.	Reset the fan overload.
Faulty wiring or connection	Check all electrical connections between the fan and RR are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.
Faulty electrical component in the RR distribution	Have the supply checked by a qualified electrician.	

If the problem persists:

- Contact GEW Service for further assistance.



Please note that during an Emergency Stop, all cooling fans on the system will stop.

Code 421: Autodamper Disconnected Fault

The Power Supply has not detected an autodamper for more than 1 minute.

Possible causes	Further checks	Remedy
Faulty wiring or connection	<p>Check all electrical connections between the autodamper and power supply are clean and secure.</p> <p>Check for any signs of damage to cabling or connectors.</p>	<p>Ensure all cable connections are securely latched together.</p> <p>Clean cable connections.</p> <p>Replace faulty cable.</p>
Damper damaged or failed	Check damper for signs of wear or failure.	Replace damper if faulty.
Power supply failure	Try switching autodampers between lampheads to ensure the problem is not specific to one power supply.	Replace power supply if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 422: Damper Position Warning

The Power Supply has detected the damper is more than 10% from its set position for more than 1 minute.

Possible causes	Further checks	Remedy
Blocked paddle	Detach autodamper from flexible ducting and check paddle for any obstructions or debris. Disengage the clutch on the damper and ensure the paddle can move freely.	Remove debris or obstruction and clean damper paddle.
Faulty wiring or connection	Check all electrical connections between the autodamper and power supply are clean and secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Clean cable connections. Replace faulty cable.
Damper damaged or failed	Check damper for signs of wear or failure.	Replace damper if faulty.
Power supply failure	Try switching autodampers between lampheads to ensure the problem is not specific to one power supply.	Replace power supply if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 423: Damper Position Fault

The Power Supply has detected the damper is more than 20% from its set position for more than 2 minutes.

Possible causes	Further checks	Remedy
Blocked paddle	Detach autodamper from flexible ducting and check paddle for any obstructions or debris. Disengage the clutch on the damper and ensure the paddle can move freely.	Remove debris or obstruction and clean damper paddle.
Faulty wiring or connection	Check all electrical connections between the autodamper and power supply are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.
Damper damaged or failed	Check damper for signs of wear or failure.	Replace damper if faulty.
Power supply failure	Try switching autodampers between lampheads to ensure the problem is not specific to one power supply.	Replace power supply if faulty.

If the problem persists:

- Contact GEW Service for further assistance.

Code 511: Cooling Chiller Fault

The water chiller is not operating correctly or the water temperature is measured to be outside the operating limits of the system.

Possible causes	Further checks	Remedy
Incorrect setpoint on water chiller	Check settings on chiller match GEW and manufacturer's specification.	Adjust chiller setpoint to correctly specified value.
Chiller is switched off or there is a fault with the mains supply	Check the chiller is powered and switched on.	Reset any circuit breakers if required. Consult a qualified electrician.
The intelligent manifold has measured the water temperature to be outside the operating limits of the system.	Ensure the water temperature is within defined limits for your system. This may also be caused by the water being too cold to operate LED lampheads	Ensure water is allowed time to warm to the correct temperature before operating the system.
Low coolant level	Check coolant level in chiller.	Replenish as necessary.
Low coolant water pressure	Check all water piping, valves and manifolds for correct flow and settings.	Adjust valves as necessary.
Leaks or blockages in piping	Check for any potential leaks or constrictions in the water flow.	Replace any damaged water piping or fittings. Check all pipework connections are securely fastened together.
Chiller control interface/box has failed	Check all electrical connections between the chiller interface box and chiller, and between the chiller interface box and RR are secure. Ensure the DIP switch settings on the chiller interface module are correct.	Ensure all cable connections are securely latched together. Replace faulty cable. Consult system electrical drawings for correct DIP switch settings.

Continued overleaf.

Code 511: Cooling Chiller Fault, continued...

Possible causes	Further checks	Remedy
Chiller unit has failed	Consult Chiller OEM Literature for specific fault-finding procedures with the chiller unit.	
Faulty wiring or connection	Check all electrical connections are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.

If the problem persists:

Contact GEW Service for further assistance.

Code 512: Cooling Flow Failure Fault

The chilled water supply is not operating or flow rate is too low for safe operation of the lamphead.

Possible causes	Further checks	Remedy
Blocked filter element on water manifold	Check filter element. See section 3.3.5	Clean or replace filter element. See section 3.3.5
Low coolant water pressure	Check all water piping, valves and manifolds for correct flow and settings.	Adjust valves as necessary.
Leaks or blockages in piping	Check for any potential leaks or constrictions in the water flow.	Replace any damaged water piping or fittings. Check all pipework connections are securely fastened together.
Low coolant level	Check coolant level in chiller.	Replenish as necessary.
Chiller is switched off or there is a fault with the mains supply	Check the chiller is powered and switched on.	Reset any circuit breakers if required. Consult a qualified electrician.
Chiller or manifold control interface/box has failed	Check all electrical connections between the chiller interface box and chiller, and between the chiller interface box and RR are secure. Check all electrical connections between the manifold interface box and RR are secure. Ensure the DIP switch settings on the chiller interface module are correct.	Ensure all cable connections are securely latched together. Replace faulty cable. Consult system electrical drawings for correct DIP switch settings.
Faulty wiring or connection	Check all electrical connections are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.

If the problem persists:

- Contact GEW Service for further assistance.

Code 521: Cabinet Transient Protection Fault

The mains power transient protector(s) in the RR have failed.

Possible causes	Further checks	Remedy
Transient suppressor has reached the end of its useful life	Check if any indicator windows on the transient suppressor are showing red.	Replace the transient suppressor unit and protection fuses with suitable replacement.
Master power supply is switched off	Ensure that all power supplies and circuit breakers in the cabinet are switched on.	Switch on all power supplies and system components.
Faulty wiring or connection	Check all electrical connections between the RR and power supply are secure. Check for any signs of damage to cabling or connectors.	Ensure all cable connections are securely latched together. Replace faulty cable.

If the problem persists:

- Contact GEW Service for further assistance.

Code 611: Nitrogen Flow Fault

A sensor is reading too low a flow.

Possible causes	Further checks	Remedy
Nitrogen control box not powered or faulty	Check cabinet is powered and flow sensor is showing a reading.	Switch power on.
Low or no flow of nitrogen	Check nitrogen supply valve is open. Check supply reserves. Check for nitrogen flow.	Open supply valve. Replace/refill supply as required. Check for blockages.
Communications bus problem	Check LEDs flash green on CAN module in nitrogen control box:	Check wiring/connection to RHINO cabinets/CANbus connections.

If the problem persists:

- Contact GEW Service for further assistance.

Code 621: Nitrogen PPM Fault

A PPM level is out of range.

Possible causes	Further checks	Remedy
PPM is greater than the user-set fault level.	Check for leaks in the curing chamber, Increase the flow of nitrogen and check connections to the oxygen sensor.	See CODE 611.
	Reduce web speed. See if fault remains.	Run slower or ask GEW to alter performance settings.

If the problem persists:

- Contact GEW Service for further assistance.

Code 622: Nitrogen PPM Warning

The PPM level is not maintaining within the customer's limits for longer than X settings.

Possible causes	Further checks	Remedy
PPM is greater than the user-set warning level.	Check for leaks in the curing chamber, Increase the flow of nitrogen and check connections to the oxygen sensor.	See CODE 611.
	Reduce web speed. See if fault remains.	Run slower or ask GEW to alter performance settings.

If the problem persists:

- Contact GEW Service for further assistance.

Code 631: Oxygen Sensor Fault

A sensor is not connected or is faulty.

Possible causes	Further checks	Remedy
Oxygen sensor not powered on or faulty.	Check MCB and connections to sensor.	Replace oxygen sensor.
Sample valve faulty.	Check for sample air flow.	Replace sample valve.
Low concentration of nitrogen in curing chamber.	Check nitrogen supply system is fully functional.	

If the problem persists:

- Contact GEW Service for further assistance.

Code 651: UV Monitor Sensor Warning

One or more sensors missing from the comms bus or malfunctioning.

Possible causes	Further checks	Remedy
Lamp cable not connected correctly.	Check Process Control page, Sensor Status tab. Missing sensors will be displayed.	If the sensors from an entire lamhead are missing, check lamp cable and refit correctly.
Sensor interconnection problem or faulty sensor.	Check sensor interconnection cables. Look for green LED on each sensor. (Red LED indicates fault).	Repair, replace & refit as required.
Sensor address incorrectly set.	None.	Ensure address settings are correct for all sensors, starting at 1 closest to the door and highest number sensor close to duct. Note that sensors must be power-cycled for address to take effect.

If the problem persists:

- Contact GEW Service for further assistance.

Appendix B: Glossary

Terms and abbreviations used in this document and their meanings are set out in the table below.

Term	Abbr.	Sub system	Description
Active Air cooling	AAC	E2C NUVA2	A patented GEW design which allows air to flow around reflector/shutters of E2C and NUVA2, reducing air consumption. Patent GB2495161.
Air Blast cooler	ABC	Water	A packaged cooler which has large finned panels through which ambient air is drawn by a large fan. A recirculating pump and header tank are integrated into the design. Water temperature can be held at no less than 10°C above ambient.
Auto Damper		Exhaust	An automatic butterfly valve which regulates the volume of air being drawn from the lamphead. An electric servo regulates the damper position precisely to regulate air flow according to the lamp requirement. A control wire links the servo to the control power supply.
Back pressure		Exhaust	The resistance offered to the air from the fan as it passes to outside the building. The ducting diameter, length and straightness, all influence the back pressure.
Burn in (state)		UV lamp	The part of the starting sequence when the lamp power is building and the lamp is heating up; only at the end of the burn in is the lamp ready to go into production use.
CAN Bus		Control	Controller Area Network Bus. The physical wiring network which connects each element of the UV system and the touch screen to allow digital communication.
CANOpen		Control	A standard communication protocol allowing the devices of the UV system to share information with each other and with other CANOpen compliant devices.
chiller (Refrigerated water)	RWC	Water	A packaged cooler which uses a refrigerator to cool recirculating water, a circulating pump and header tank are integrated into the design. Water temperature can be held below ambient.
Chinaman's Hat		Exhaust	A cap on the outside of the building protecting the ducting exit from rain and debris ingress must not seriously restrict the airflow movement.
CIA		Control	Can in Automation, an organisation that controls and develops the CANOpen standard. GEW is registered with CiA as a vendor of CANOpen compliant equipment.

Term	Abbr.	Sub system	Description
Cold casing technology		E2C NUVA2	A GEW patented technology which brings cooling air in at the top of the lamphead, directs it carefully around the inside of the lamphead providing cooling for the housing, this ensures the outside of the lamphead remains cool. Patent GB2495901
Cool Down (State)			When a lamp is stopped it will enter the Cool Down sequence for a set time. This will ensure the lamphead is fully cooled by running the fan and opening dampers.
Corrosion Inhibitor		Water	A chemical added to water to prevent internal corrosion or bacterial activity occurring in the circuit. This is essential to prevent costly blockage to the small inner water passages in the lamphead.
Dichroic coating	DC	E2C NUVA2	Multi-layer coating on borosilicate glass or polished aluminium reflectors which reflects UV light but allows IR to be absorbed. Highest reflectance on glass of any material.
Doped lamp		UV lamp	A standard lamp which has small traces of iron/gallium/lead added during manufacture. The output characteristic is altered by this doping for special printing curing processes.
Ducting (Flexible)		Exhaust	Composite plastic material with wire wound reinforcement used for connecting from the lamphead to the rigid exhaust manifold. For connecting into the fan. Best used in short lengths only and kept relatively straight to avoid excessive back pressure.
Ducting (Rigid)		Exhaust	Rigid galvanised steel tube of large diameter for ducting exhaust from lampheads to the fan and then from the fan out of the building. Ducting from the fan must be air tight to prevent the escape of ozone.
eBrick	eB	Control	Integrated power and control electronic module. Can be linked together to form complete system, Available in 9, 12, 16, and 32kW capacities.
Embedded service	ES	Control	RHINO has been developed with the capability built in to communicate over the Internet with GEW. We have software available to monitor any system and report back out of range performance parameters. This will reduce unplanned downtime and increase the efficiency of the UV system over a long period of time.
Electromagnetic Compatibility	EMC	Control	The ability of an apparatus to accept electromagnetic interference from other devices while continuing to operate normally and the ability not to radiate electromagnetic interference which causes abnormal operation in other equipment.

Term	Abbr.	Sub system	Description
Fan		Exhaust	The exhaust fan which draws air through the lamphead and discharges it through rigid ducting to outside the building. The back pressure and installation are important in the correct operation of the fan.
Fan pressure characteristic		Exhaust	The higher the flow through the fan the lower is the pressure the fan can deliver.
Fan stalled		Exhaust	The fan appears to be working, delivering pressure but the flow, due to the fan characteristic, is not high enough.
Harmonics		Control	Harmonics voltages and currents in an electric power system are a result of non-linear electric loads. Harmonics in power systems result in increased heating in the equipment and conductors, misfiring in variable speed drives, and torque pulsations in motors. Reduction of harmonics is considered desirable.
Heatsink	HSK	E2C NUVA2	Aluminium plate situated behind the web to absorb heat and light beyond the width of the web. Can be air or water cooled. Contributes a little to reducing the temperature of the web.
Hot mirror coating		E2C NUVA2	Multi-layer coating on quartz glass which reflects the IR but allows UV to pass through, this reduces the temperature on the substrate.
Idle (State)			When the lamps are off but may or may not be Selected.
Ignition (State)			The part of the lamp starting sequence when a high voltage is applied to the lamp to initiate the arc. This is directly following by the Burn In sequence.
Impression Signal			A control signal provided to the Rhino system from the press which instructs the lamps when to enter the Printing state.
Infrared arc lamp	IRL	UV lamp	A conventional UV lamp specially treated on the outside to allow it to emit IR. Not suitable for accelerated flow out of UV varnish.
Inert Gas Chamber	IGC		A sealed chamber with a quartz window fitted below the UV lamp, seals to the web/roller, and a means of removing entrained oxygen from the web surface. This is a precision engineered solution.
Inert Gas Control			The oxygen analyser can be linked via this control to automatically regulate the flow of inert gas into the curing chamber to maintain the desired oxygen level. All parameters are controlled via the RHINO touchscreen.

Term	Abbr.	Sub system	Description
Inert Gas Curing			Reducing free oxygen during curing significantly improves cross linking. Commonly this is achieved by injecting nitrogen into the inert gas curing chamber to displace the oxygen. Curing can be improved by a factor of 4x. The oxygen concentration varies between 50ppm for silicones and 1,000ppm for low migration inks.
IR Cassette	IRCS S	E2C NUVA2	Special cassette designed to reflect, rather than absorb, infrared energy. Maximises the drying effect of infrared arc lamps.
Lamp arc		UV lamp	The intensely hot plasma held within the lamp body and from which UV is emitted at high intensity.
Lamp body		UV lamp	A quartz tube of high purity and extreme cleanliness must not be handled directly with fingers or hands as they cause skin oil to be burnt into the glass which reduces lamp life.
Lamp cable		UV lamp	Cable connecting the power supply to the lamphead.
Lamp cassette	CSS	E2C NUVA2	A complete sub assembly of all the user accessible parts, UV lamp, reflector/shutter mechanism and pneumatics. At the connector end the PCB control is exposed for cleaning and maintenance.
Lamp ceramics		UV lamp	Ceramic insulators which hold the lamp at each end in the cassette, they also provide access for the lamp lead to exit the lamp.
Lamp electrodes		UV lamp	Situated at each lamp end, the electrodes are connected to the power supply. They are made from tungsten metal.
Lamp lead		UV lamp	PTFE coated high voltage cable which connects the UV lamp to the electrical power supply.
Lamp life		UV lamp	The time during which the lamp will start and run successfully. It does not mean that curing under all conditions will be acceptable.
Lamphead	LHD	E2C NUVA2	Complete assembly of all parts necessary to run the UV lamp safely. Including lamp cassette, outer casing and light shielding assemblies. Lamphead is attached rigidly to the printing machine and cannot be modified in any way without a possible safety issue.
LED array		LED	The term for a series of LED modules placed next to one another and mounted upon a heat sink. The LED array is the equivalent of the UV lamp cassette and housing.

Term	Abbr.	Sub system	Description
LED module		LED	The circuit board upon which UV LEDs are mounted. Modules are 25mm wide and placed next to one another in series to make up the required web width. Modules use patented nanotechnology to ensure market leading thermal performance
Light Shielding	SHLD	E2C NUVA2	Safety critical devices which prevent stray light escaping from the lamphead. Fixes to the outer casing above and below the web, must not be modified without approval from GEW. Their design depends upon where and how the lamphead is installed.
NetZero cooling		Exhaust	A method of ducting cooling air into the lamphead and exhausting normally, this eliminates 90% of the cooling air requirement being taken from the factory saving on both cooling and heating costs.
Outer casing		E2C NUVA2	An aluminium extrusion which forms the outer part of the lamphead assembly which is securely attached to the machine, the cassette slides in and the shielding attaches to the outer casing.
Oxygen Analyser			A zirconium oxide based device for accurately measuring the ppm level of oxygen in the inert gas curing chamber. These devices need annual calibration to remain accurate.
PCB control card (Lamphead)	PCB	E2C NUVA2	Provides control of solenoids, micro switches, PT100 and connection to lamphead connector. Eliminates individual lamphead wiring.
Pneumatic actuator drive system		E2C NUVA2	Powerful rotary actuator to drive the shutter mechanism, driven by integrated solenoid valves, one for opening one for closing.
Positive purge		Exhaust	The method of using positive forced air cooling, usually ducting air in and out of the building.
Power Tower	PT	Control	A rack which allows eBricks to be stacked and linked together in one tidy module housing an integrated power distribution panel supplying power for auxiliary equipment.
Printing (State)			When the Impression signal is on, the press has signalled to the UV system to open the shutters and raise the lamp power.
Purging (State)			Before the lamp is started, a forced Purge state may be required on some systems. This will run the fans for a set time to ensure the lamphead is purged of any explosive gasses before the lamp is ignited.
Quartz Window	QW	E2C NUVA2	Plain quartz material to seal the lamp and reflector from the web slot, prevents any disturbance of web and reduces IR output.

Term	Abbr.	Sub system	Description
Quick change lamp system	QCL	E2C NUVA2	GEW patented method of tool free lamp change, quicker and less likely to damage the lamp. Patent GB2495355
Ready (State)			When the lamps have completed the Burn In sequence the lamps will enter the Ready state. This will keep them operating at a low power level with the shutters closed. When Impression signal is turned on, the lamps will enter the printing state.
Reflector	RFC	E2C NUVA2	A surface that reflects light in a required direction. All new arc lamp products use an elliptical reflector (made from borosilicate glass or polished aluminium), to direct the light from behind the lamp to converge on a given point. This focal point coincides with the position of the substrate passing through the lamphead.
Reflector support	REF	E2C NUVA2	Aluminium support designed to hold reflector material in place whilst in operation. May form part of the moving shutter.
RHINO PSU	RPSU	Control	RHINO power supply unit, developed to provide the lowest energy consumption possible. High efficiency low loss electronics with class leading EMC performance. Currently 3 power ranges available, N, M and W.
RHINO rack	RR	Control	A GEW patented design which allows the RHINO PSUs to be racked in a compact footprint, front access only, cabinet. Large air inlet filter and integrated power distribution makes this an essential part of protecting RHINO for the long term. Two racks can be stacked one on top of the other.
RHINO touchscreen control (HMI)	RTC	Control	A high performance embedded computer with an 8" high resolution touchscreen. Provides a user interface to the UV system and manages the system's communication network.
Selected/Deselected			When a lamp is selected it is able to be started by the HMI. When a lamp is Deselected, it will not start when the operator starts the system. If a lamp is Deselected during operation, it will switch off the lamp and enter the Cool Down cycle. When a lamp is deselected, faults will be ignored for that station.
Shutter		E2C NUVA2	A moving part designed to obscure the emitted UV radiation from the lamp when the printing press is at stand still.
Shutter mechanism	SHM	E2C NUVA2	Mechanical rotary cam which drives the shutters open as the rotary actuator rotates. Fixes the shutter travel accurately, provides smooth motion to the shutters enabling glass inserts to be used.

Term	Abbr.	Sub system	Description
Standby power		UV lamp	The power at which the UV lamp is run when the shutters are closed.
Terminal plug		UV lamp	Insulating plug which allows quick connection of the lamp to the cassette, they are heat resistant.
UV lamp	UVL	UV lamp	Medium pressure mercury arc lamp as it is technically known. Comprises a quartz glass tube, sealed at both ends charged with argon gas at slight pressure and filled with very small quantity of mercury. Internally at each end are electrodes which provide the means of power input to the lamp.
UV LED		LED	Ultra- Violet Light Emitting Diode. A solid state light emitting electronic component that directly converts electrical energy into ultra-violet light. Emits a narrow band of long wave UVA radiation at extremely high intensity. Alternative technology to medium pressure mercury arc lamps that requires specially formulation inks amongst a host of advantages & disadvantages.
Water manifold		Water	A device to share water flow between several devices, both on the flow and return side of a water circuit. It must be sized correctly to function without loss of flow rate to any device.
Water to water heat exchanger	WWX	Water	A packaged cooler which has a water to water plate heat exchanger through which recirculating cooling water flows. The primary side of the heat exchanger has water from a centralized cooling system flowing through. A recirculating pump and header tank are integrated into the design. Water temperature can be held close to the flow temperature of the primary circuit.
Wavelength of UV light		UV lamp	200-400 nm, UVC= short wavelength UVB=medium wavelength UVA=long wavelength.
Web path roller		E2C NUVA2	A free running idler roller for diverting the web path direction. Must be accurate and rigid. The wrap angle is important in driving the roller at speed. Can be fitted anywhere on the machine or outer casing.
Web Slot		E2C NUVA2	The slot through which the web runs, clearance is necessary at each side to allow for web wander.

Appendix C: Routine Maintenance Checklist

Maintenance Item	Check	Clean	Replace	Frequency (hours)
UV lampheads, Arc-UV (see section 3.2.2)				
Visual inspection of lampheads	X	X		40
Check cable connections and terminations	X			100
Check pneumatic supply is between 5 and 6 Bar	X			40
Empty pneumatic supply moisture trap	X			40
Clean shutter, reflector and inside cassette as appropriate		X		100
Clean quartz windows, if fitted		X		100
Check drying performance, change lamphead lamp	X		X	1,000
Lubricate shutter pivot	X	X		2,000
UV lampheads, LED-UV (see section 3.2.2)				
Visual inspection of lampheads	X	X		40
Check cable connections and terminations	X			100
Clean outside of cassette		X		100
Clean quartz windows		X		100
Check drying performance	X		X	1,000
Check for water leaks at the lamphead quick-connectors, if applicable	X	X		100
UV lampheads, ArcLED (see section 3.2.2)				
Follow checklists above for arc-UV and LED-UV lampheads				
Cooling system – air (see section 3.3.3)				
Visual inspection of ducting, fans and autodampers	X			40
Check lamphead air intakes are clear of obstructions	X			40
Check back pressure on exhaust ducting	X			100
Replace damaged flexible ducting	X		X	
Replace damaged rigid ducting	X		X	
Inspect Ozone filter, change panel when necessary	X		X	4,000
Cooling system - liquid (see section 3.3.5)				
Visual inspection for leaks	X			40

Maintenance Item	Check	Clean	Replace	Frequency (hours)
Check flow rate to lampheads (Standard water manifold)	X			40
Visual inspection of water filter on water manifold	X			40
Clean water filter on water manifold (if necessary)		X		1 month
Check pressure on water manifold (usually 3-5bar)	X			40
Check coolant level and inhibitor concentration	X		X	OEM
Drain and refill. Add fresh inhibitor		X	X	OEM
Power supply system (see section 3.4.2)				
Visual inspection of cables and connections	X			40
Visual inspection of air flow through cabinet filters	X			40
Clean/replace cabinet air filters		X	X	500
Check terminals, report any damage	X			4,000
HMI (see section 3.5.2)				
Visual inspection of HMI and cable	X	X		40
Inert gas curing system (see section 3.6.2 & 3.6.3)				
Visual inspection of inert gas cylinders / storage vessels	X			40
Visual inspection of inert gas pipework	X			40
Visual inspection of inert gas pressure regulators	X			40
Set pressure of inert gas pressure regulators as required	X			40
Empty moisture trap on the inert gas pressure regulators	X	X		40
Visual inspection of oxygen analysers	X			40
Visual inspection of gas sampling pipework	X			40
Visual inspection of electrical / control cabling	X			40
Visual inspection of curing chambers and seals	X	X		40
Visual inspection of quartz windows and seals	X	X		40
Replace quartz window seals			X	6 months

Note: OEM = Consult OEM material

Maintenance Item	Check	Clean	Replace	Frequency (hours)
<i>mUVm</i>, Multi-point UV Monitoring (see section 3.7.2)				
Visual inspection of electrical cabling and housings	X	X		40
Recalibrate UV monitors				1 year

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NOTES: