

GEW RHINO UV SYSTEM INSTALLATION MANUAL

MODULE 1: UV System Installation Original Instructions



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MODULE 1: UV System Installation

1	About This Manual.....	5
1.1	Introduction.....	5
1.2	Symbols, Warnings, Cautions and Information	5
1.3	Installation Manual Structure.....	5
2	About RHINO UV Systems	7
2.1	System Description	7
2.2	Intended Use	8
2.3	Environmental Conditions	8
2.4	Maximum Sound Power Levels	8
2.5	Certifications for GEW Manufactured Equipment.....	8
2.5.1	European (EN) Standards.....	8
2.5.2	British Standards.....	8
2.5.3	North American and Canadian Standards	9
2.6	EC Declaration of Incorporation	10
2.7	Product Warranty Statement.....	11
2.7.1	General	11
2.7.2	Installation and Commissioning	11
2.7.3	Validation of Warranty.....	11
2.7.4	Warranty Validation Certificate (WVC).....	12
2.7.5	Warranty Terms	12
2.7.6	Making a Claim	12
3	Responsibilities Prior to and During the Installation	15
3.1	Customer's Responsibilities	15
3.2	GEW's Responsibilities	15
4	Installing RHINO UV Systems - General Information	17
4.1	Transportation	17
4.2	Handling	17
4.3	Recommended PPE (Personal Protective Equipment)	17
4.4	Storage.....	18
4.5	Disposal of Packaging Material	18
4.6	End of Life Information	18
4.6.1	De-commissioning, Dismantling and Disposal	19
4.7	Contact Details	19
	Appendix A: Glossary.....	21

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2.0	16.03.16	Minor updates – JNO.

1 About This Manual

1.1 Introduction

This Installation Manual provides Original Instructions, as defined in Machinery Directive 2006-42-EC, for the installation and commissioning of your GEW UV system. Read it carefully before attempting to install or commission 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.

1.3 Installation Manual Structure

This installation manual is divided into modules. Each module describes the installation procedures for different types of GEW equipment, as follows:

- Module 1** Provides general and statutory information about installing GEW products, explains how to activate the GEW warranty and includes a glossary of terms.
- Module 2** Applies to the installation of GEW UV lampheads.
- Module 3** Applies to the installation of GEW and RHINO supplied cooling systems, including chillers, fans and ducting.
- Module 4** Applies to the installation of GEW RHINO power supply systems.
- Module 5** Applies to the installation of GEW HMI control panels.
- Module 6** Contains the commissioning checklist.

NOTE: The installation of GEW custom components including inert nitrogen systems may be detailed separately if appropriate.

2 About RHINO UV Systems

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 and Figure 2.



Figure 1: Typical GEW UV system

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



Figure 2: RHINO Rack Mini power supply for use with 1 and 2 lamp systems

2.2 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.

2.3 Environmental Conditions

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

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

2.4 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 is installed.

2.5 Certifications for GEW Manufactured Equipment

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

2.5.1 European (EN) Standards

Reference	Title
EN60204-1:2006	<i>Safety of Machinery – Electrical equipment of machines</i>
EN61010-1:2001	<i>Safety Requirements for electrical equipment for measurement, control, and laboratory use</i>
EN61000-6-4:2007	<i>Electromagnetic Compatibility – Emission Standard for industrial environments</i>
EN61000-6-2:2005	<i>Electromagnetic Compatibility – Immunity for industrial environments</i>

2.5.2 British Standards

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

2.5.3 North American and Canadian Standards

Reference	Title
NFPA79:2007	<i>Electrical Standard for Industrial Machinery</i>
UL508	<i>Standard for Industrial Control Equipment</i>
UL508A	<i>Standard for Industrial Control Panels</i>

2.6 EC Declaration of Incorporation

A copy of the EC Declaration of incorporation for the GEW equipment covered by this manual is set out in Figure 3.



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EC Declaration of Incorporation

We GEW (EC) Ltd at above address declare that the partly completed machinery identified below

Equipment Reference	Multi Lamp UV Curing system (Generic)
Product Name	E2C-RHINO System, NA2-RHINO System
Serial Number	Not applicable (Generic)

complies with the requirements of the Machinery Directive 2006/42/EC listed below

Annex 1, Sections 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.3.2, 1.3.4, 1.3.7, 1.3.8, 1.5.1, 1.5.2, 1.5.3, 1.5.6, 1.5.8, 1.6.3.

Technical documentation is compiled in accordance with Annex VII(B) of the directive and is retained at the above address. We undertake to transmit, in response to a reasoned request by the appropriate national authorities, relevant information on the partly completed machinery identified above. The method of transmission shall be electronic where possible.

The partly completed machinery supplied with this declaration:

- *is designed and constructed as a component to be incorporated into machinery requiring completion.*
- *it must not be put into service with the EU until the final machinery into which it is to be incorporated has been declared in conformity with the Machinery Directive 2006/42/EC and all other applicable EC directives.*

The following harmonized standards were applied - as far as this is possible with regard to the scope of delivery:

- EN 60204-1:2006 +A1:2009
- EN ISO 12100:2010



Malcolm Rae
Managing Director
Crawley, UK
February 2015

Figure 3: EC Declaration of incorporation

2.7 Product Warranty Statement

2.7.1 General

GEW products are manufactured to the highest standards of mechanical and electrical reliability. GEW supports all its products with a comprehensive warranty. GEW treats all warranty issues seriously and will respond promptly to their resolution.

2.7.2 Installation and Commissioning

It is essential that products are installed and commissioned correctly. The GEW warranty is valid only when an installation is performed by:

- GEW engineers;
- An engineer from an approved GEW agent or distributor; or
- A certified GEW installer.

Please check with GEW if you have any doubts about who is installing your system. Warranty validation is subject to the final approval of a GEW engineer or the GEW Service Department.

2.7.3 Validation of Warranty

Validation of warranty will be granted subject to GEW's review of the following:

1. A completed commissioning checklist*.
2. System data**, recorded once the UV system has operated at the following conditions :
 - All lamps at standby (web not moving) for a minimum of ten minutes.
 - All lamps at 100% power for a minimum of ten minutes.
3. The following photographs:
 - Of the flexible / solid ducting from the lamphead to the fan.
 - Of the solid ducting from the fan to the outside including the final termination.
 - Of the Rhino Rack position and surrounding area.
 - Of the lamphead(s) positions and fixing points.
4. The address and contact details of the end user installation.
5. A system health check sample***, for any system featuring an LED lamphead.

Items 1 to 4 should be emailed to service@gewuv.com

If applicable, the system health check item 5 should be sent to the following address:

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

* A copy of the commissioning checklist can be found on the USB flash drive included with every system. See Module 6 of this manual.

** Data automatically submitted to GEW by the touch screen via direct connection to the internet. See Module 5 of this manual for details of how to configure the internet connection.

*** A water system health check kit will be supplied with any system featuring an LED lamphead. The sample must be sent to GEW (EC) Limited at the above address.

2.7.4 Warranty Validation Certificate (WVC)

Upon request, a WVC can be issued. The WVC states the UV system serial number, the installer's name, the warranty start date and any system specific details. The warranty applies to the specific system at a specific location. It is not transferable to other locations.

2.7.5 Warranty Terms

Warranty terms are detailed in a separate document, GEW Data Sheet DS1004, supplied with your system. Note that any alteration to the UV system or its ducting will require a new warranty approval from GEW. Please supply full details of the alteration complete with photographs as appropriate.

2.7.6 Making a Claim

In the event of a problem becoming apparent contact the company who supplied the product, with a description of your claim. They will either deal with the problem themselves or contact GEW for assistance. In either event, if you do not get a prompt response, please contact GEW and we will help.

3 Responsibilities Prior to and During the Installation

3.1 Customer's Responsibilities

The customer is responsible for:

The removal of any obsolete components necessary to allow the installation of the GEW UV system on the press including the supply of labour and equipment to do so. Ensuring that the machine is oil free and clean to work on and that adequate press down time is planned in advance. Transporting and locating the power and control units into position (with suitable lifting equipment as required), providing electrical power and compressed air to the control cabinets, along with extraction ducting from the fan outlets.



Technical data specific to the installation can be found in the GEW Order Confirmation.

A connection to the internet with a minimum bandwidth of 512kbps is required. This must be provided via an Ethernet connection to the customer's IT infrastructure. The customer is responsible for configuring their IT infrastructure so that a) the system is provided an IP address, Default Gateway address and DNS server addresses via DHCP, or b) provide the GEW service technician with static addresses for IP address, Default gateway and DNS servers. The UV system must be allowed unrestricted HTTP and HTTPS access to all subdomains of gewuv.com. No additional ports are required to be opened in the customer's firewall.

Where installation is delayed because services are not available or the press is not shut down, GEW will charge for our technician's waiting time and any additional visits required. It is customer responsibility to advise GEW if the intended location for the system is 1000m (approx. 3000ft) or more above sea level to ensure a suitable extraction system.

3.2 GEW's Responsibilities

If installation is to be carried out by a GEW Service Technician, he is responsible for: Unpacking and inspecting lamps and cabinets for damage. Checking cabinet position is suitable. Mounting the lamps in the press. Cabling between the lamps and the control cabinets. Connecting the interface with the identified press run, emergency stop, and speed related signals. Connecting extraction ducting between the lampheads and fans. Checking suitability of customer supplied extract ducting from fan. Testing the system (checking and adjusting power output). Providing user training (at one installation site only).

4 Installing RHINO UV Systems - General Information

4.1 Transportation

The complete UV system is normally supplied on one or more pallets with a heavy-duty triwall cardboard outer cover that provides protection during transit and storage. Figure 4 shows a typical UV system packed on pallets.

During transportation and prior to installation the system must be stored indoors in its protective packaging.

4.2 Handling



Caution: Do not stack GEW pallets. Read and follow markings on the packaging.



Caution: UV system components can be heavy (>25kg) so handle them with care to avoid injury. Follow your employer's manual handling limits and, if necessary, use lifting equipment.

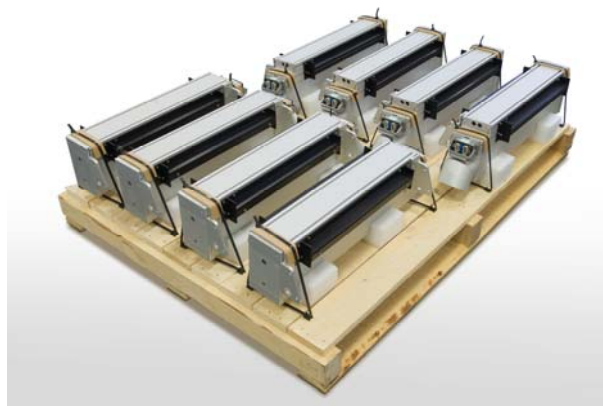


Figure 4: GEW equipment packaging arrangements

4.3 Recommended PPE (Personal Protective Equipment)

Because of its weight, it is recommended that personnel wear safety shoes when installing GEW equipment.

4.4 Storage

GEW equipment must be stored in a location that is protected from the elements. Avoid knocking or banging equipment. Impact from vehicles such as forklift trucks must be prevented, if necessary by installing a protective crash barrier.

Environmental conditions for the storage location must be within the parameters set out below:

1. Storage temperature range: 25°C to +55°C with up to 24h at 60°C.
2. Relative Humidity (RH): <80% at +40°C, non-condensing.

4.5 Disposal of Packaging Material

Refer to the table below for recycling information:

Standard Packaging	Material	Recycling method
Cardboard outer container	Corrugated tri-wall cardboard	Cardboard recycling facilities exist in most areas
Molded end cap	“Stratocell” Polyethylene foam	May be recycled where facilities exist Alternatively, dispose of in normal industrial waste stream
Plastic bag	Polythene	May be recycled where facilities exist
Silica gel sachet	Silica gel / paper sachet	Dispose of in normal industrial waste stream
Pallet	Timber or plastic	GEW pallets are suitable for reuse Alternatively, recycling facilities exist in most areas
Strapping	Polypropylene or polyester	May be recycled where facilities exist

4.6 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.

4.6.1 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.

4.7 Contact Details

Address: GEW (EC) Limited,
Crompton Way, Crawley,
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Email: service@gewuv.com
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Website: www.gewuv.com

Distributors: www.gewuv.com/contact

Appendix A: Glossary

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

Term	Abbr.	Description
Active Air cooling	AAC	A patented GEW design which allows air to flow around reflector/shutters of E2C and NUVA2, reduces air consumption Patent GB2495161
Air Blast cooler	ABC	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	AD	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		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)		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		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		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	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.
CiA		Can in Automation, an organisation that controls and develops the CANOpen standard. GEW is registered with CiA as a vendor of CANOpen compliant equipment.
Cold casing technology		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.

Term	Abbr.	Description
Corrosion Inhibitor		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	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		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)		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)		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	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	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.
Electro-magnetic Compatibility	EMC	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.
Fan		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		The higher the flow through the fan the lower is the pressure the fan can deliver.
Fan stalled		The fan appears to be working, delivering pressure but the flow, due to the fan characteristic, is not high enough.

Term	Abbr.	Description
Harmonics		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	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		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	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.
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	IRCSS	Special cassette designed to reflect, rather than absorb, infrared energy. Maximises the drying effect of infrared arc lamps.
Lamp arc		The intensely hot plasma held within the lamp body and from which UV is emitted at high intensity.
Lamp body		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.

Term	Abbr.	Description
Lamp cable		Cable connecting the power supply to the lamphead.
Lamp cassette	CSS	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		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		Situated at each lamp end, the electrodes are connected to the power supply. They are made from tungsten metal.
Lamp lead		PTFE coated high voltage cable which connects the UV lamp to the electrical power supply.
Lamp life		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	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		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.
LED module		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	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		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		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.

Term	Abbr.	Description
PCB control card (Lamphead)	PCB	Provides control of solenoids, micro switches, PT100 and connection to lamphead connector. Eliminates individual lamphead wiring.
Pneumatic actuator drive system		Powerful rotary actuator to drive the shutter mechanism, driven by integrated solenoid valves, one for opening and one for closing.
Positive purge		The method of using positive forced air cooling, usually ducting air in and out of the building.
Power Tower	PT	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	Plain quartz material to seal the lamp and reflector from the web slot, prevents any disturbance of web and reduces IR output.
Quick change lamp system	QCL	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 shutters will open and the lamps will enter the printing state.
Reflector	RFC	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	Aluminium support designed to hold reflector material in place whilst in operation. May form part of the moving shutter.
RHINO PSU	RPSU	RHINO power supply unit, developed to provide the lowest energy consumption possible. High efficiency low loss electronics with class leading EMC performance. Currently three power ranges available, 9, 18 and 27kW.

Term	Abbr.	Description
RHINO rack	RR	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	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		A moving part designed to obscure the emitted UV radiation from the lamp when the printing press is at stand still.
Shutter mechanism	SHM	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.
Standby power		The power at which the UV lamp is run when the shutters are closed.
Terminal plug		Insulating plug which allows quick connection of the lamp to the cassette, they are heat resistant.
UV lamp	UVL	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.

NOTES: