Greengage
Enlightened Farming

Agricultural Lighting Induction System (ALIS)

Installation Manual

Protocols and Instructions for Nest, 8W & 11W Lamps

CE

CONTENTS:

This manual contains six chapters.

Please read all chapters of this manual prior to installing the ALIS system.

Please note the return of the verified installation documents (Pages 15 and 16) validates the products two-year warranty.

TOOLS.

Basic tools requirements necessary for carrying out the installation are:

• Various screw drivers (including electrical terminal driver)
• Set of pliers
• Wire stripper (capable for stripping 1.5mm² double insulated wire)
• Wire cutter

Other tools may be required depending on the exact suspension, mounting method used and the composition of the surface mounting material.

Disclaimer

These instructions are provided for information purposes only.

Installation must be carried out by experienced/qualified professionals.

All electrical installation work must conform to all local and international electrical wiring and safety regulations such as those published by CENELEC member organisations or those covered by IEC60364.

Greengage Lighting Ltd is not responsible for safety on site and installers should contact Greengage Lighting Ltd technical support with any queries they may have (support@greengage.global).

Please follow these instructions carefully. Deviation from them should not take place without prior written authorisation from Greengage Lighting Ltd. To do so may invalidate the product warranty.

1.0 System Description

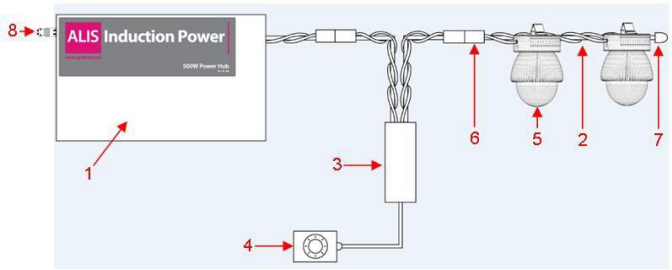
The Greengage Induction System (ALIS) is a 'CONTACTLESS' power technology that allows LED fixtures (ALIS-Lamps) to be clipped onto the cable (ALIS-Bus) without an actual physical electrical connection.

It works on the principle of distributing a highly regulated alternating current at 50 KHz along the ALIS-Bus to the ALIS-Lamps.

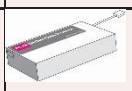
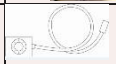
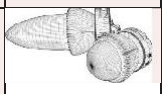
This document serves as guidance for an 'ALIS' installation within an intensive livestock rearing building. Installers must also follow all applicable local electrical installation standards and wiring regulations when carrying out the installation.

1.1 ALIS Packing List

ALIS can be shipped as component parts or mounted within a Power Hub control panel ready for direct install. Upon receipt, verify that all parts are present by checking them against the parts shown below and the delivery note.



SYSTEM FOR USE ONLY WITH PARTS AS INDICATED

Part		Model Number
1 Power Hub (PH500 or PH200		IPH500230 or IPH200230
2 ALIS-Bus (available in 500m or 1000m lengths)		IPC230
3 ALIS-Dimmer		IPDI230
4 ALIS-Dimmer Pot		IPP
5 ALIS-Lamp 8W, 11W (Standard lens or 8W Tulip lens) or Nest Lamp		IP8230/IPT8230 IP11230. ALS0004
6 ALIS-Bus Connector		IBUS
7 ALIS-Bus End Termination Module & Enclosure		ETM
8 P2M Supply Connector		P2M

(Items 1, 3, 4, 6, & 8 are either supplied as components or ready mounted within a power hub control panel).

2.0 Installation Procedures

Introduction.
This installation procedures section is divided in two parts, Mechanical and Electrical, each requiring a different level of technical competency and experience. We have therefore classified the Mechanical Section level as Semi-Skilled, i.e., suitable for the majority of agricultural mechanical fitters, whilst the Electrical Section level as Skilled, i.e., only suitable for competent and qualified electrical engineers and fitters with experience and knowledge of local electrical wiring standards and regulations.

2.1 Mechanical Installation Section

General Guidance.

In this section you will find all the necessary information for the 'Mechanical installation'. This is the process of physically fitting the components within the livestock building construction. During this process no electrical connections are made. This will be handled in the next section. Each of the components of the system will be handled in a separate paragraph.

IMPORTANT: The importance of correct mechanical fitting from the start should not be underestimated as it can be very difficult, costly and at times impossible to correct afterwards. It is therefore worthwhile discussing the mechanical fitting at an early stage with either the house builder or architect to ensure that correct placement of the ALIS lamps within the house is possible. If not a redesign of the lighting plan may be required.

2.11. ALIS-Bus Cable Suspension

Reference the lamp positioning information found within the lighting design plan. It is recommended that the ALIS-Bus cable is supported by cable ties to a catenary wire, or other carrier type, which is in its self-supported every three to four metres and tensioned by use of a turnbuckle also ensuring that the supporting infrastructure is sufficient to support lamps and suspension.

2.12. ALIS-Hub Mounting.

The ALIS-Hub must be mounted vertically on a metal base plate within a suitable enclosure in close proximity to the ALIS-Dimmer, away from all combustible materials, sources of heat and out of direct sunlight. Clearances of 100mm from the top and bottom of the ALIS-Hub and 75mm from the sides must be allowed for. Please contact support@greengage.global if this is not possible.

2.13. Dimmer Mounting.

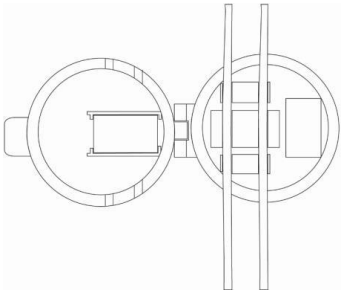
The ALIS-Dimmer must be mounted within the same enclosure as the ALIS-Hub, either horizontally or vertically and in close proximity to the ALIS-Hub. If this is not possible then the ALIS-Dimmer enclosure must be used, mounted away from all combustible materials, sources of heat and out of direct sunlight. The ALIS Dimmer enclosure must be bonded to an earth point by a qualified electrician without disturbing existing bonding. The earth continuity must be measured, and the reading recorded internally on a suitable label for future reference.



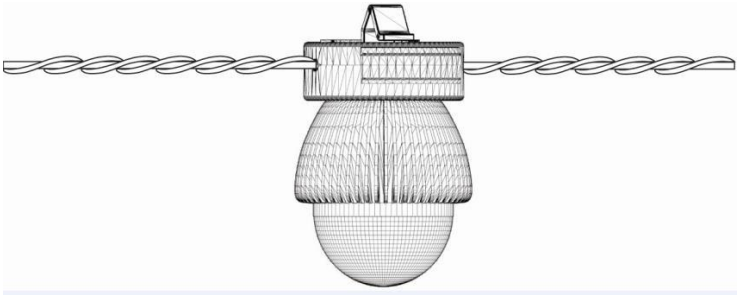
N.B. Both the ALIS-Hub enclosure and ALIS-Dimmer enclosure must be mounted within a dry and dust free location acceptable to local wiring regulations. If this is not possible then they must be housed within a suitably sealed enclosure that also meets local wiring regulations. Due to the heat generated by the ALIS-Hub please contact support@greengage.global for further advice if required.

2.14. 8W & 11W Lamp Connection.

Reference the lamp positioning information, found within the lighting design plan in conjunction with section 5.0 of this manual. If there is not any positioning information available, then contact your supplier for further advice. **Note:** If this information places the lamp in the vicinity of an obstruction such as a roof truss, ensure the lamp is placed 15cm from this point to allow movement during washout. Take note of the lamp position and place the first lamp as follows. At the desired lamp position un-twist, the ALIS-Bus by approximately 20cm by inserting your thumbs in the twist and sliding left and right equally. Fully open the ALIS-Lamp and place the ALIS-Bus into the Coupler housing as shown below, ensuring the ALIS-Bus is clean and free from grit. Press the ALIS-Bus firmly within the guide clip channels.



Once positioned within the Coupler Housing, bring the two lid sections together and close. **Caution:** ensure that the ALIS-Bus is not trapped when closing the Coupler and the ALIS-Lamp ferrite surfaces are clean and free from grit. **Note:** Ensure a minimum 3cm of ALIS-Bus remains untwisted at the Coupler entry holes. Too tight a twist at this point can cause a lift in the Coupler lid resulting in a broken seal.



Attach all the remaining ALIS-Lamps to the desired position along the ALIS-Bus. Once completed cable tie the ALIS-Bus to the catenary wire. **Note:** Place the first two cable ties a minimum of 20 cm each side of the ALIS Coupler ensuring the catenary wire supports the ALIS-Lamp on its clip. Add the remainder of the cable ties between 30cm to 40cm apart to ensure the ALIS-Bus does not droop at any point.

2.15. Nest Lamp Connection.

Reference sections 2.1 and 5.0 of this manual and the lamp positioning information, found within the lighting design plan. If there is not any positioning information available, then fit to achieve the required lighting level within the nest box. Take note of the lamp position and place the first lamp as follows. At the desired lamp position un-twist, the ALIS-Bus by no more than 5cm. Place one wire from the ALIS-Bus into the lamp coupler slot, as shown below, ensuring the ALIS-Bus is clean and free from grit.

Without untwisting the ALIS-Bus any further, as the cable twist tension is used to hold the lamp in place, slide the second wire over the lamp housing as shown below, locating and pressing the ALIS-Bus wire firmly within the guide clip channel.

Ensure the first wire has remained fully inserted within the coupler lamp slot.

Attach all the remaining ALIS-Lamps to the desired position along the ALIS-Bus.

2.2 ELECTRICAL INSTALLATION SECTION

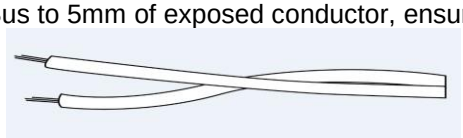
General Guidance.

In this section you will find all the necessary information for the 'Electrical installation'. This is the process of physically connecting the components within the livestock building construction. Each of the components of the system will be handled in a separate paragraph. Please also reference section 5.0 of this manual.

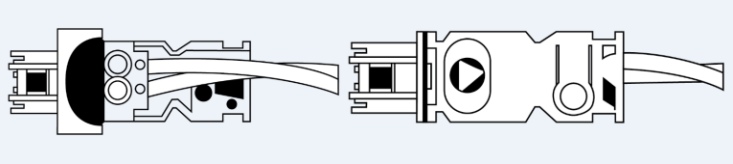
2.21. ALIS-Bus Termination.

1. Route the ALIS-Bus to the ALIS-hub location, paying particular attention to the General Points section of this manual on page 11.

2. Strip the ends of the ALIS-Bus to 5mm of exposed conductor, ensuring there is not any conductor loss.

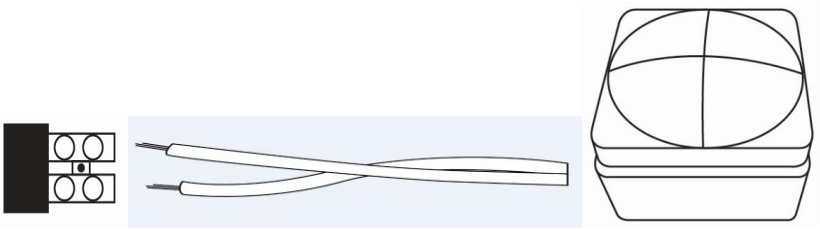


3. Attach the ALIS-Bus to the Bus Connector as shown below, into the screw terminals provided. Ensure there are no frayed copper strands.

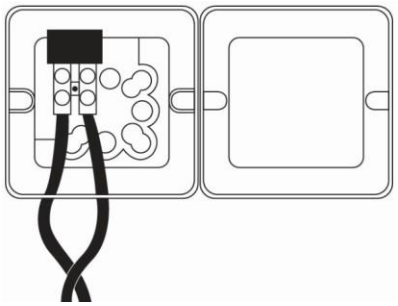


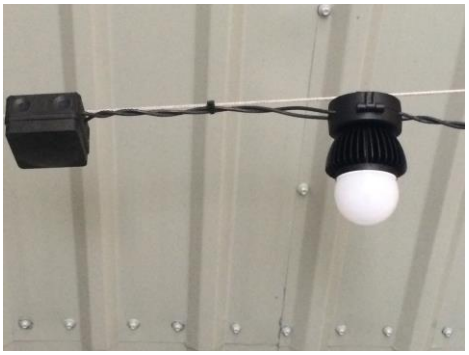
4. Connect the ALIS 'End Termination Module' (ETM) to the far open end of the ALIS-Bus. The correct termination the ALIS-BUS is critical to the overall system performance. The ALIS-bus insulation must be properly stripped to ensure there is no to damage the cable conductors.

Strip the ends of the ALIS-Bus to 5mm of exposed conductor, ensuring there is not any conductor loss as shown below. Twist the exposed copper cable strands.



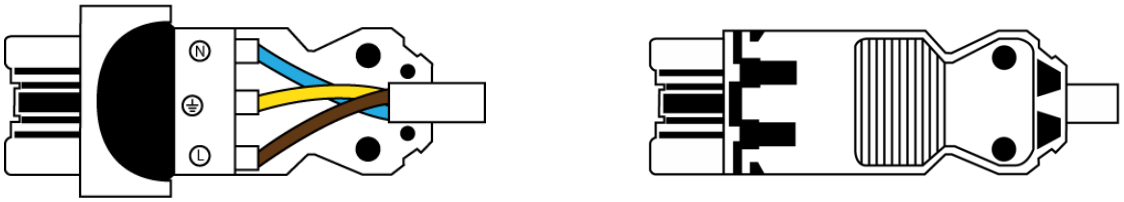
Insert the cable into the terminator fully, ensuring no bare cable can be seen as shown and tighten connections. This must be a perfect connection with no frayed copper strands. The ETM must be housed within an IP66 terminal enclosure, example below.





2.22 Hub Supply Cable Termination.

Connect the P2M Connector to a 3-core adequately rated mains supply cable by inserting into the screw terminals as shown below. Ensure there are no frayed copper strands and the supply is adequately protected to meet all local wiring regulations. Not applicable if installing the Greengage Power Hub control panel.



2.23 Dimmer Cable Termination.

Further terminations are not required for this component.

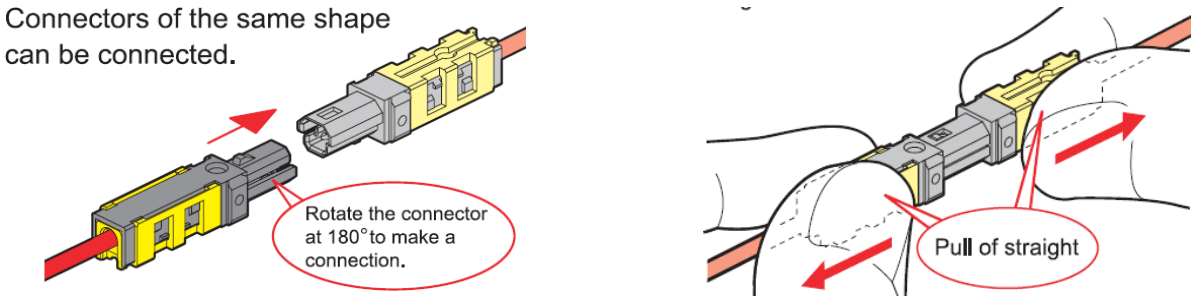
2.24 System Connection

a. Connect the ALIS-Bus to the ALIS-Dimmer as shown on page 3.

b. Connect the ALIS-Dimmer to the ALIS-Hub as shown on page 3.

c. Connect the selected dimming control method to the ALIS-Dimmer. Dimming is possible via either an ALIS-Dimmer Pot, shown on page 3 or a 0-10VDC control signal, ensuring polarity is maintained.

2.25 Connecting ALIS-Dimmer to ALIS-Pot/0-10VDC
(Not applicable if installing the Greengage Power Hub control panel).



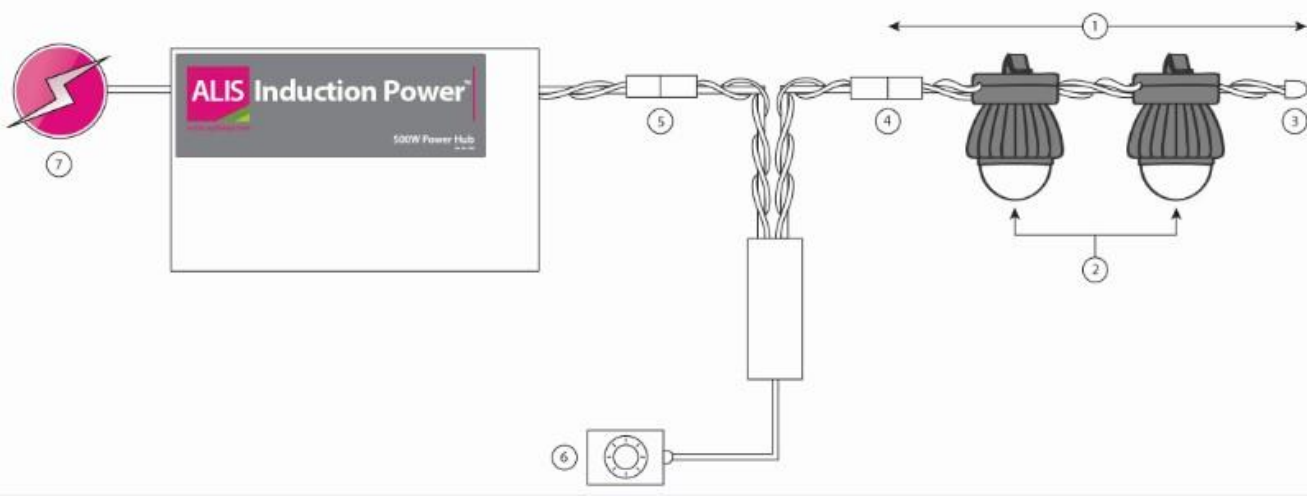
Note: Multiple ALIS-Dimmers can be controlled with a single ALIS-Pot, Greengage lighting controllers or another 0-10VDC supply.

The potentiometer connection to the hub can also be used to extinguish the lamps via the use of a timer switch or on/off switch, which avoids the necessity of disconnecting the mains supply.

Please contact support@greengage.global for additional information as required.

3. Installation Checklist & System Test

After the successful installation of the ALIS system onsite, the following checks **MUST** be carried out by a qualified electrician, adhering to local standards and regulations, prior to applying power to the system.



- ☐ 1. Double check the Bus cable length connected to the Power hub. This should ideally not exceed 150 metres, if in doubt contact support@greengage.global.
- ☐ 2. Count the number of ALIS-Lamps per ALIS-Bus per Power hub. This should ideally not exceed 55 x 8W or 40 x 11W ALIS-Lamps, if in doubt contact support@greengage.global.
- ☐ 3. Check the ALIS-ETM termination. Ensure the Bus cable is properly terminated.
- ☐ 4. Ensure the ALIS-Dimmer is properly connected to the ALIS-Bus.
- ☐ 5. Ensure the ALIS-Dimmer is properly connected to the Power hub.
- ☐ 6. Ensure the control cable (ALIS-Dimmer Pot or Independent 0-10VDc screened analogue voltage cable) is properly connected to the ALIS-Dimmer.
- ☐ 7. Connect mains power cable to the Power hub

Once these points have been positively verified, power can then be applied to the ALIS system.

Please ensure that there are no open circuits within the ALIS-Bus cable installation. This can be achieved by ensuring all the connections of the Bus cable are correctly terminated.

If a problem is encountered, then we suggest a multi-meter is used to check continuity between the two cables at the hub end. Please remove the ETM and join ALIS-Bus to test. Ensure the ETM is reconnected after completing the continuity test.

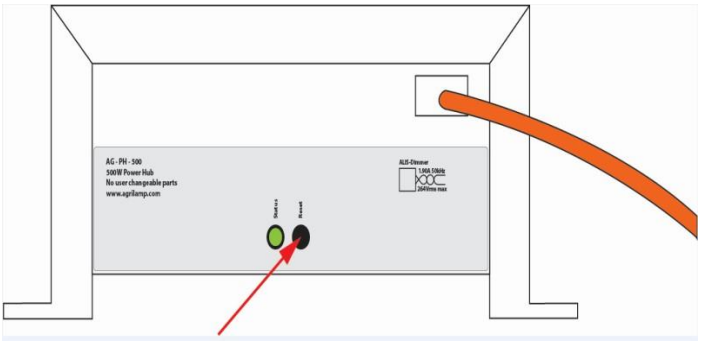
The 230VAC supply must be disconnected before continuity testing is attempted.

4.0 Fault Finding

If the ALIS-Lamps flash ON and OFF, this means you have too much load on the system. Start unclipping the ALIS-Lamps one at a time until the flashing stops.

Led Status Indicator & Reset Button.

To facilitate fault diagnosis, the PH500/200 has a bi-colour (red & green) status indicator.
When the Power Hub is performing normally the status indicator is solid GREEN. If another indication is observed, please see the chart below for an indication. To remove the fault, press the reset button as shown below by the red arrow.



LED Status Indicator	Operating Mode	Description	Action
Steady Amber	Input voltage too low.	Automatic lockout when input supply drops below 160 Vac	The ALIS-Hub resets when supply returns to normal.
Flashing amber, 1 Flash per second, 50% Duty cycle	Input voltage too high.	Automatic lockout when input supply exceeds 270 Vac	The ALIS-Hub resets when supply returns to normal.
Flashing alternate red And green, 2 flashes per second 50% duty cycle.	Power required exceeds power available.	Too much load fitted to the ALIS-Bus	Remove excess load. The system automatically resumes normal mode of operation
Solid red (with system OFF)	Output voltage too high.	ALIS-Bus is open circuit.	Repair fault in the ALIS-Bus. Reset the system by pressing the reset button.
Solid red (with system OFF)	ALIS-Hub only. Ground fault protection.	ALIS-Hub has detected a power imbalance in the output current (residual current) >80mA rms	Disconnect from AC supply until LED is extinguished. Examine the ALIS-Bus for possible earth leakage. Reset button will not allow re-start.
Flashes red, 1 flash per second, 50% duty cycle	Temperature too high.	ALIS-Hub case temperature exceeds 90˚C (+/-5˚C), shutting itself down.	The ALIS-Hub resets when temperature returns to normal. This may take several minutes.

WARNING!
The reset button on the power hub can only be pressed 3 times. Thereafter the power hub must be reset by disconnecting it from the AC mains supply, waiting until the status indicator has extinguished and then reconnecting it.

4.1 Fault Finding Guide

1. Firstly, ascertain what is or isn't happening with the system. There are commonly two scenarios.

   i. ALIS Lamp(s) are completely extinguished.

   ii. ALIS Lamp(s) are flashing or flickering.

2. Once i or ii has been ascertained the next step is to find the reason.

3. ALIS Lamp(s) are completely extinguished. If there is just one or more, but not all, ALIS Lamps extinguished open and remove it from the ALIS Bus at the same time inspecting the cable for damage. Check the ALIS Lamp is free of contaminates and if required clean with a soft cloth. If the ALIS Bus is ok refit the lamp. If the problem has not been resolved replace the lamp.

4. If all ALIS Lamps are extinguished continue as follows.

   i. Check the ALIS Hub status LED as described on page 9 and attempt to resolve the problem by carrying out the listed actions.

   ii. If the ALIS Hub status LED is showing a steady green light, and a competent person is present, bypass the ALIS dimmer by first disconnecting the 230VAC supply to the ALIS Hub, disconnect the ALIS Dimmer from the ALIS Hub and ALIS Bus and connect the ALIS Hub directly to the ALIS Bus, reconnect the 230VAC supply to the ALIS Hub. This will confirm whether or not the ALIS Dimmer has a problem.

   iii. If the status LED is completely extinguished check there is an adequate mains supply present. Once the correct supply voltage level is ascertained attempt a power up reset. If this does not resolve the fault replace the power hub, firstly carrying out the check list on page 8.

5. ALIS Lamp(s) flashing or flickering. If this is the observed fault, then in all probability the ALIS hub is not the problem. Firstly, ascertain whether it is a few lamps or all the lamps on the ALIS Bus, if it is continuous or only occurs at certain times of day. Has it only just started to happen?

   i. If there are only a few of the ALIS Lamps showing fault systems, then in all likelihood it is a local problem to those lamps. Open the ALIS Lamp and remove it from the cable at the same time inspecting for cable damage. Check the lamps for contaminates and if required clean with a soft cloth. If the cable is ok refit the lamp. If the problem has not been resolved replace the lamp.

   ii. If it is all the lamps on the ALIS Bus and the ALIS Hub shows no signs of fault, then it is most probably an external issue such as electrical noise which can be very difficult to pin point. Firstly, try to ascertain if there have been any changes in the immediate area such as new equipment installed or any cable rerouting. As a process of elimination try to locate the problem item by switching off other equipment. As this is a process of elimination a considerably amount of time may be required, but in the end it should be easily remedied.

6. If any problems or faults occur that are outside any of the above or you are having difficulties, please do not hesitate to contact support@greengage.global further guidance.

5.0 General Points & Good Practices

1. All electrical installation work must be carried out in accordance with all applicable local wiring regulations such as those published by CENELEC member organisations or those covered by IEC60364. Failure to do so will invalidate any associated product warranty.

2. The ALIS-Hub or Power Hub control panel **Must Be Earthed** via a sound **wired** electrical connection. It is not sufficient to rely solely on the bonded chassis alone.

3. Ensure that all external cables are of a suitable cross-sectional diameter for the intended use. All external signals carrying cable for uses such as 0/10v must be of a suitably screened/shielded type, with the screen/shield connected to earth at the supply end only, never both ends.

4. For the connection of external wires always use insulated 'bootlace' terminals, which provide a safe and good connection, and which are well suited for the purpose.

5. Splices and cable joints must be housed within a junction box, which has an IP rating suitable for the environment. All cables must pass through suitable glands to maintain the rating.

6. Never use solid communication style wires such as telephone cable, even if making low voltage/current connections, it is not suitable for any of the connectors within the ALIS range and will in time fail.

7. Cable trunking and conduit. In certain instances, ALIS Bus cable may have to be routed through lidded electrical wire carriers. Should this situation arise please ensure that all ends are sealed, and lids correctly fitted in order to stop fauna (rodent) ingress.

8. Installations should use no more than the required length of ALIS-Bus for each hub Remove any excess end of line ALIS-Bus cable at approx. 30cm past final lamp.

9. Please note that poorly made electrical connections are often the main cause of equipment failure which in turn leads to livestock fatalities

10. If the ALIS-Bus passes through a hole or aperture (metal or otherwise) a suitable insulating grommet must be fitted.

11. ALIS Bus cable should never be un-twisted, apart from through the lamp coupler

12. Under no circumstances must the ALIS-Bus be switched by any means, be that Relay, Contactor, Isolator or Circuit Breaker. If this is attempted the subsequent damage caused to the ALIS-Hub will be irreparable and not be covered by any product warranty.

13. Disconnecting the main electrical supply to the ALIS-Hub as a means of regularly extinguishing the ALIS-Lamps must always be avoided.

14. If switching the 0/10V control signal the selection of the switching component is extremely important, please therefore adhere to the instructions on the relevant circuit diagram, obtainable from support@greengage.global. Due to the composition of the contact material and type of switching action, all electrical switch contacts will oxidise, all be it at different rates and will require a minimum level of current, dependant on the contact material, to clean that oxidisation. This is called Wetting Current. After a period of time without sufficient current the switching device will still appear to operate mechanically but will in fact be electrically open circuit causing the ALIS lamps to remain at full brilliance.

6.0 Specifications

ALIS-Hub Electrical

Input Specifications

Parameter	Description	Min	Nom	Max
VAC RMS	Input Supply	198	230	264
Frequency	AC RMS (Hz)	47	50	60
AC Start Up	Input Start Volt	178	180	182
AC Shut Down	Input Stop Volt	157	159	161
Current	Current RMS A			3.7

Output Specifications

Parameter	Description	Min	Nom	Max
Power Rating	Max Power			500W
Load Regulation	0-500W Output	+/- 0.95%	+/- 1.45%	+/- 1.95%
O/P Frequency	ALIS-Bus	49 KHz	50 KHz	51 KHz
O/P Current	ALIS-Bus	1.805A	1.9A	1.995A
Start Time	Turn On Time	460mS	480mS	500mS

ALIS-Hub Environmental

Environmental

Parameter	Description	Min	Nom	Max
Operating Temp	Thermal Environment	-10˚C	25˚C	40˚C
Non-operating Temp	Thermal Environment	-40˚C		70˚C
Storage Temp	ALIS-Bus	-40˚C		100˚C
Operating Humidity	Non-condensing.	0%		85%
Non-operating Humidity	Non-condensing. See note	0%		95%
Altitude Operating	10’000 Feet			
Altitude Non-operating	50’000 Feet			
Enclosure rating. Indoor use only	PH200=IP40 or NEMA Type 1.	PH500=IP10 or NEMA Type 1		

Note. 95% RH is achieved with a dry bulb temperature of 55˚C and a wet bulb temperature of 54˚C.

ALIS-Hub Compliance

This equipment complies with the EMC Directive 2004/108/EC. Conformity was demonstrated by meeting the following standards: EN 55015 (2006), A2 (2009), EN61000-6-1 (2007), EN61000-6-3 (2007), A1 (2011), EN 61000-3-2 (2006), EN 61000-3-3 (2008)

Parameter	Standard
Class 1 electrical device	EN60598-1, EN61347-2-13
CE compliant	EN60598-1, EN61347-2-13
Flicker	EN61000-3-3 (2008)
Harmonic Emissions	EN61000-3-2 (2006)
Radiated Emissions	EN55016-2-3 (2010) & A1 (2010)
Conducted Emissions	EN55016-2 (2009) & A1 (2011)
Magnetic Field Immunity	EN61000-4-8 (2010)
Conducted Immunity	EN61000-4-6 (2009)
Radiated Immunity	EN61000-4-3 (2006)
Surge	EN61000-4-5 (2006)
EFT	EN61000-4-4 (2004) & A1 (2010)
ESD	EN61000-4-2 (2009)
	EN61000-4-11 (2004)
Mains Dip	EN61347-2-13 (2006)
Isolation. See note below.	Output galvanically isolated from input. Control output galvanically isolated from input and output.

The device shall be Class I type insulation, with a metal chassis, assumed to be connected to protective earth. Equipment classification: Domestic and Light industrial.

ALIS-Lamp Specifications

Light Source	0.3W High Power LED (1W ALIS-Lamp) 7.7W High Power LED (8W ALIS-Lamp) 11.0W High Power LED (11W ALIS-Lamp)
Luminous Flux	30 lumens (1W ALIS-Lamp) 597 lumens (8W ALIS-Lamp) 1124 lumens (11W ALIS-Lamp)
Optics	8W and 11W, Optical grade milky white polycarbonate lens. 1W, Clear polycarbonate lens.
Connection Type	Clip on
Dimmer Option	100K potentiometer or 0-10V
Rating	IP69K (1W). IP65 (8W & 11W)
Rated Life	+60,000 Hours
Ambient Temperature	-20 to +55˚C
Humidity Range	0 to 95% humidity

The specifications contained herein are believed to be correct at the time of publication and are subject to change without notice.

Warranty validation

To validate the two-year's warranty of the ALIS system, please complete the form below and send to warranty@greengage.global or/and

Warranty Registration
Greengage Lighting Limited
Sir Alexander Robertson Building,
University of Edinburgh
Easter Bush Campus,
Midlothian,
EH25 9RG,
United Kingdom

Date of Installation:

Site Information

Client	
Address	
Country	
Post Code	

Telephone	
Mobile	
E-mail	

Installer Information

Name	
Address	
Country	
Post Code	

Telephone	
Mobile	
E-mail	

Barn Type

Poultry ☐ Pig ☐ Other ☐ Type of barn:

Install Information

ALIS Power Hub Serial Number	ALIS-Dimmer Serial Number	Length of Cable	Number of ALIS Bulbs	Dimming Facility	
				ALIS-Pot	0-10VDc

Pictures

Please send pictures of the following

- ***The installed Power hubs and ALIS-Dimmers***
- ***The ALIS-Bus end termination***

Notes