

SugarCUBE™ LED Fiberoptic Illuminator

Operating and Owners Manual

This manual contains important information necessary for the safe and efficient operation of the LED Fiberoptic Illuminator. Please read the manual in its entirety and heed all safety warnings before operating the light source.

WARNING:	<i>The SugarCUBE™ LED Fiberoptic Illuminator contains ultra-intense LED emitters. DO NOT STARE AT THE LED SOURCE.</i>
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Special instructions are emphasized as follows:

NOTE:	<i>This contains important information regarding set-up and operation to facilitate ease of use and obtain effective results.</i>
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	<i>This contains critical information regarding safe handling and use of this system. Device malfunction or property damage could result if these instructions are not followed.</i>
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WARNING:	<i>This contains critical information by identifying conditions or practices that may result in injury or loss of life if these instructions are not followed.</i>
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1 Introduction and Intended Use

SugarCUBE™ LED Fiberoptic Illuminator is the world’s most powerful single LED light source for general scientific, industrial and machine lighting. It contains a single high-power Ultra Bright LED Emitter which is direct coupled to a variety of user interchangeable liquid or fiberoptic light guides. Models are available in high-power monochromatic red, green, blue, broad spectrum white and an ultra high power “QUAD” broad spectrum white.

The **SugarCUBE™** is the highest power output LED based illuminator currently on the market and is a direct replacement for existing 150W halogen fiberoptic illuminators.

Typical usage is for microscope stands, machine vision, automated inspection, etc. The unit is designed for continuous operation with minimal maintenance.

The illumination is directed to the target via a fiberoptic light guide or a liquid light guide (LLG). The light source supports fiberoptic light guides from .0625 inch core up to 1 inch nominal OD, and 3mm through 8mm core diameter liquid light guides.

Contact the factory for customized units built specifically to suit your needs.

The **SugarCUBE™** uses environmentally friendly manufacturing process components.

2 Safety

The **SugarCUBE™** uses a powerful LED (Light Emitting Diode) that produces extremely bright light. Proper care must be taken in the setup and operation to prevent damage to the unit.

	<i>The LED emitters are NOT accessible. Please return the unit to the factory for warranty repair.</i>
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	<i>The Illuminator unit requires adequate airflow to maintain proper cooling. Ensure the ventilation holes are unobstructed and adequate clearance is provided.</i>
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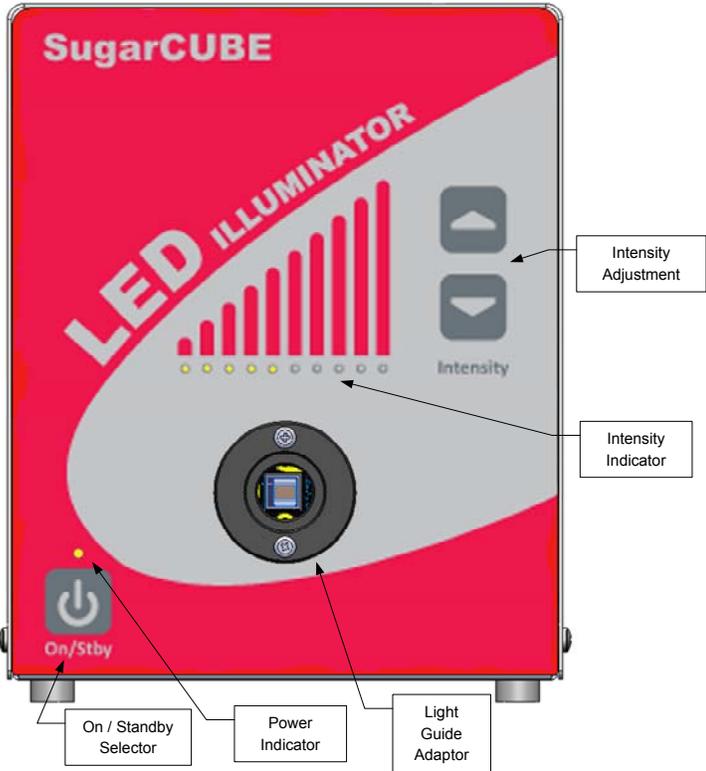
	<i>If the Illuminator is used in a manner not specified within this manual the protection provided by the equipment might be impaired.</i>
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	<i>Never open or remove the top cover while the unit is plugged in. Qualified personnel must perform all maintenance, including dust removal.</i>
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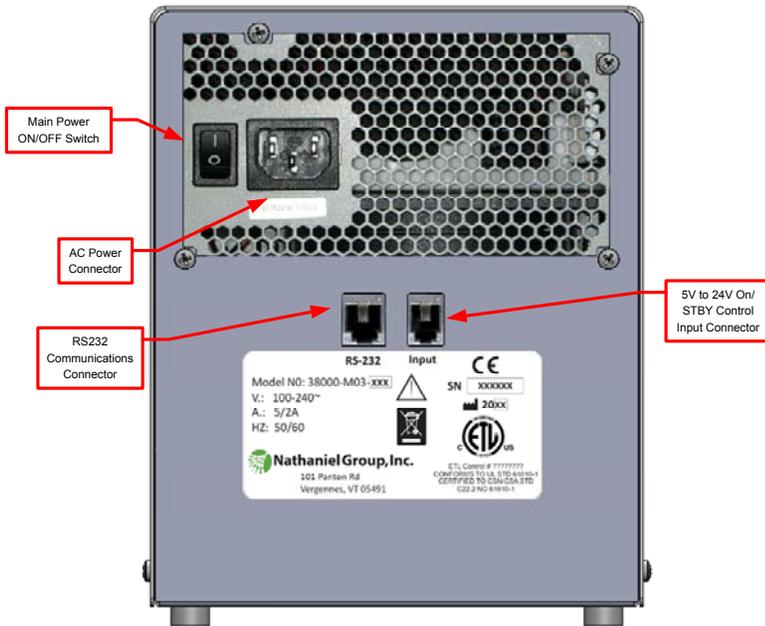
	<i>Do not operate the unit near any flammable materials including flammable gases or liquids.</i>
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3 System Overview

3.1 Front Panel



3.2 Rear Panel



4 Initial Setup

4.1 System Components

The **SugarCUBE™** Fiberoptic Illuminator system is comprised of:

- Light Source
- Electrical Power Cord
- Light Guide Adapter (sold separately) to match optional light guide.
- Liquid or Fiberoptic Light Guide (sold separately)

Carefully unpack all components, giving particular attention to the optional light guide and taking care not to touch or contaminate the ends or to exceed its bend radius. Consult the light guide manual for handling and cleaning instructions.

4.2 Picking a Location

Set the **SugarCUBE™** on a flat surface in a place that allows for adequate air ventilation on all sides. Do not position the unit so that the back or sides of the unit are obstructed.

NOTE:	<i>For adequate ventilation maintain at least 4" of clearance around all sides of the light source in an unenclosed space.</i>
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4.3 Light Guide Connection

Insert the appropriate end of the light guide into the light guide adapter until it is fully seated. Do not force the light guide.

Use the thumbscrew(s), to lock the light guide in place.

	<p><i>The light guide adapter provides for the correct position of the light guide end relative to the LED emitter, therefore no adjustments are necessary. Ensure the correct adapter is used.</i></p>
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4.4 Connecting the Power Cord

Insert the power cord receptacle-end into the AC receptacle in the back of the unit. Insert the power cord plug into a standard AC outlet. See section 11 in this manual for power requirements.

<p>NOTE:</p>	<p><i>The unit utilizes a universal voltage power supply. Refer to section 11 for acceptable power requirements.</i></p>
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4.5 Turning the Unit “ON”

1. Turn the main power On/Off (1/0) switch, located on the back of the unit, to the on (1) position.
2. The front panel Power indicator will flash approximately, once per second to indicate the Illuminator is in Standby mode.
3. The front panel LED intensity bar graph will indicate the current LED intensity level.
4. Adjust the LED intensity to the desired level using the Up or Down buttons located on the front panel.
5. Press the On/Stby selector button located on the front panel to enable the LED output.
6. The Power indicator LED will be on continuously.

The unit will turn on the LED to the set intensity level. Adjust using the Intensity Adjustment membrane buttons if necessary.

5 Adapters and Light Guides

	<p><i>Use only factory supplied light guide adapters. Use of non-authorized light guide adapters may damage the LED and/or light guide and void the warranty. Consult the factory before attempting to use non-standard light guides or adapters.</i></p>
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The **SugarCUBE™** LED Illuminator can accept a variety of light guides using standard adapters specifically designed for optimum performance of the system using liquid and fiberoptic light guides.

5.1 Light Guide Adapter installation / change

1. Turn off main power and remove power cord from the unit.
2. Using a #1 apex (Phillips) screwdriver, remove the two 4-40 x 7/16 inch long pan head Phillips screws.
3. Remove Light Guide Adapter.
4. Position new Adapter to align the mounting holes at 12 and 6 o'clock.
5. Insert and tighten two 4-40 x 7/16 inch long pan head Phillips screws securely.
6. Connect power to unit and turn main power on.

6 Maintenance

	<i>All maintenance is to be performed by qualified personnel only. Ensure electrical power is disconnected prior to performing maintenance.</i>
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	<i>Wear OSHA approved safety glasses when handling and using compressed air or cleaning chemicals.</i>
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	<i>Use only OSHA approved compressed air nozzle set at 29psi or less or electronics grade dust-off canned compressed air.</i>
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6.1 Cleaning the Cooling Fans

The unit contains two cooling fans. One is used to cool the LED and one is used for electronics and power supply cooling. For optimum performance, both fans must be kept clean from dust and debris.

1. Turn off main power and remove power cord from the unit.
2. Remove (4) screws holding top cover and remove top cover.
3. Check for accumulated dust or debris.
4. Using a soft brush or cloth, wipe dust from LED assembly heat sink, fans, vent holes and finger guards.
5. Using clean, dry compressed air, blow remaining dust from heat sink fins and vent holes.
6. Replace top cover and secure using the (4) screws removed in step 2.
7. Connect power cord to unit and turn main power on.

6.2 Cleaning the LED output port

NOTE:	<i>The light guide adapters for selected light guides are designed to position selected light guides extremely closely to the face of the LED and debris must not be allowed to accumulate or damage to the LED and/or light guide may occur.</i>
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	<i>Use Isopropyl Alcohol sparingly. Excess Isopropyl Alcohol may cause damage to the LED.</i>
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1. Turn off main power and remove power cord from the unit.
2. To clean the light guide adapter and LED, use a clean cotton swab lightly dampened in Isopropyl Alcohol.
3. Gently swab the face of the LED glass to remove debris.
4. Clean around the light guide adapter using a cotton swab lightly dampened with Isopropyl Alcohol.
5. Ensure the light guide end is clean and free from debris. Clean using manufacturers recommended cleaning procedure.
6. Allow alcohol to completely dry prior to using unit.
7. Connect power to the unit and turn the main power on.

7 Remote Operation

7.1 Using the Relay Control input to toggle the On/Standby function

NOTE:

The "On/Standby Control input" terminals are logically "OR"ed with the front panel On/Stby selector switch. The On/Stby switch must be in the Stby mode for proper external control operation.

1. Turn off main power and remove power cord from the unit.
2. Connect an external 5 – 24V DC control voltage (from a PLC or Computer I/O device or equivalent) to the "Standby Control Input terminal" RJ10 connector (Labeled "Input") using the optional accessory cable – refer to **Figure 1** for connections.

OPTIONAL RJ10-Blank Control Cable P/N 38000-M03-022

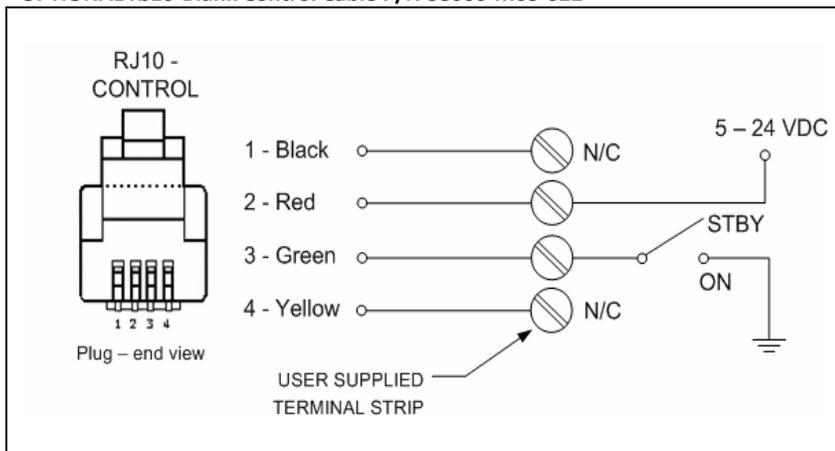


FIG. 1

NOTE:

The "Relay Control" terminals are NOT polarity sensitive.

3. Turn the main power On/Off (1/0) switch, located on the back of the unit, to the on (1) position.
4. The front panel Power indicator will flash approximately, once per second to indicate the Illuminator is in Standby mode.
5. The front panel LED intensity bar graph will indicate the current LED intensity level.
6. Adjust the LED intensity to the desired level using the Up or Down buttons located on the front panel.
7. Apply the control voltage to enable the LED output (5 -24V DC).
8. Remove the control voltage to place the unit in Standby mode.

NOTE:

The "Relay CNTL" input is not intended for pulse operation of the LED but can be used to power down the unit when it is not in use for an extended period of time.

7.2 Using the RS232 Communication port to control the Illuminator

The RS232 Communication port can be utilized to control all functions of the **SugarCUBE™** LED Illuminator. These functions include setting the LED intensity level and placing the unit in On/Stby mode. The user can also query the status of the unit.

NOTE: *The RS232 On/Stby commands are logically equivalent to On/Stby button presses. If the On/Stby switch is on, sending an RS232 off command will turn the LED off. If the On/Stby switch is in standby, sending an RS232 on command will turn the LED on.*

7.2.1 Communications Connection Option 1

OPTIONAL RJ11 – Blank Communication Cable P/N 38000-M03-021

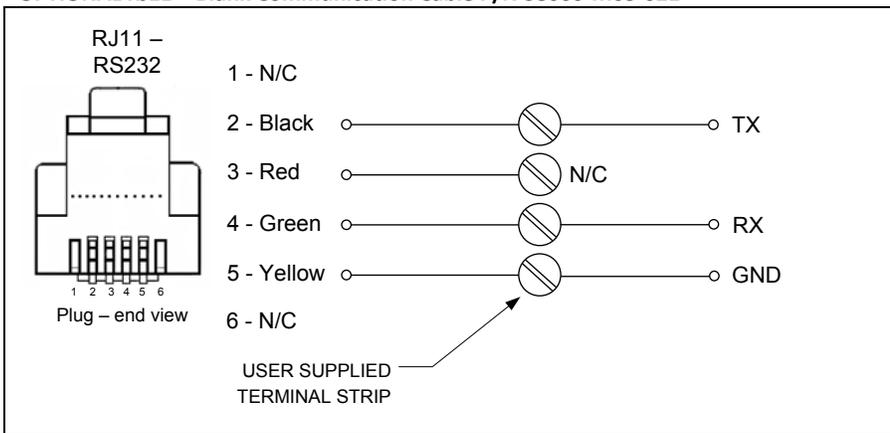


FIG. 2

1. Turn the unit off using the main ON/OFF switch located on the rear of the unit.
2. Connect the host computer RS232 to the “RS232” communications port RJ11 connector using the optional accessory cable – refer to **Figure 2**.
3. Turn the main power On/Off (1/0) switch, located on the back of the unit, to the on (1) position.
4. The front panel Power indicator will flash approximately, once per second to indicate the Illuminator is in Standby mode.
5. The front panel LED intensity bar graph will indicate the current LED intensity level.
6. Computer commands can be transmitted to control the unit and query status. Communication protocol can be found in **Appendix A**.

7.2.2 Communications Connection Option 2

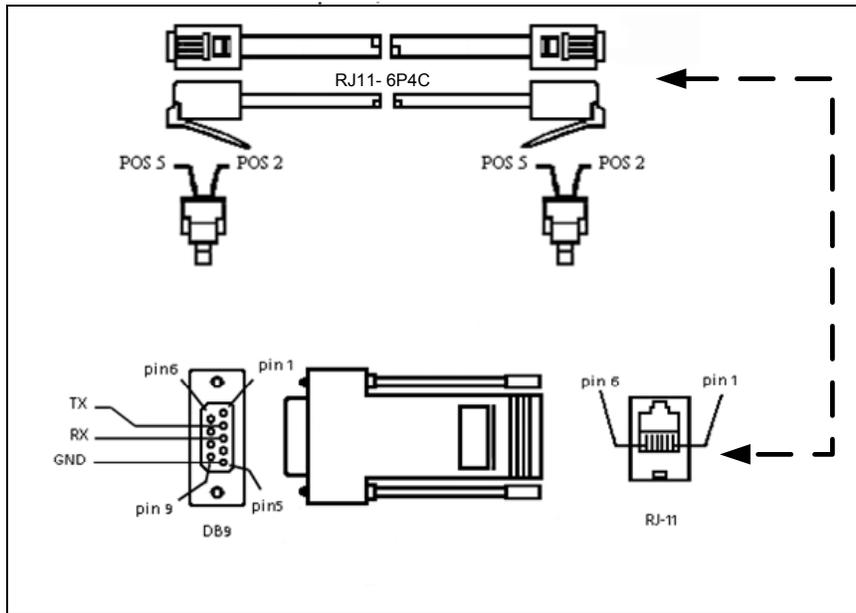


FIG. 3

1. Turn the unit off using the main ON/OFF switch located on the rear of the unit.
2. Using the optional RJ-11 to RJ-11 cable, connect one end of the cable to the SugarCUBE™ LED Illuminator RS232 receptacle. Connect the opposite end to the optional RJ-11 to DB9 adaptor.
3. Connect the host computer RS232 (user supplied) to the DB9 connector of the RJ-11 to DB9 adaptor. Refer to **Figure 3**.
4. Turn the main power On/Off (1/0) switch, located on the back of the unit, to the on (1) position.
5. The front panel Power indicator will flash approximately, once per second to indicate the Illuminator is in Standby mode.
6. The front panel LED intensity bar graph will indicate the current LED intensity level.
7. Computer commands can now be transmitted to control the unit and query status. Communication protocol can be found in **Appendix A**.

8 Troubleshooting

Indicator/Function	Operation
STBY AND Overlay buttons enabled	<ul style="list-style-type: none"> Intensity bar graph remains active. On/Stby indicator LED pulses once per second with 100ms pulse width. Fans will be OFF
STBY AND Overlay buttons disabled	<ul style="list-style-type: none"> Intensity bar graph remains active. On/Stby indicator LED twice per second with 100ms pulse width. Fans will be OFF
ON	<ul style="list-style-type: none"> Intensity bar graph remains active On/Stby indicator on steady LED cooling fan will be ON PS cooling fan may be on or off
OVERHEAT	<ul style="list-style-type: none"> Intensity bar graph remains active On/Stby indicator LED pulses 100mS ON / 100mS OFF continuously User must toggle On/Stby switch off/on to clear. Alternately, user must toggle main power off/on to clear All cooling fans will be off
RELAY CONTACT (Input LOW) AND (On/Stby in STBY state) AND RS232 (Command OFF)	<ul style="list-style-type: none"> Intensity bar graph remains active On/Stby indicator LED pulses 1 Hz with 100ms pulse width Fans will be OFF LED is OFF
LED is OFF AND (RELAY CONTACT is changed HIGH OR On/Stby is pressed OR RS232 is commanded ON)	<ul style="list-style-type: none"> Intensity bar graph remains active On/Stby indicator on steady LED cooling fan will be ON PS cooling fan may be on or off LED changes to ON

Fault	Operation
Illuminator won't power up (On/Stby LED not illuminated)	<p>Check AC power cord is plugged in.</p> <p>Check Main power switch located on rear of unit is ON.</p> <p>Check AC power is available</p> <p>Contact Customer service for further instructions.</p>
No LED Light Output (On/Stby led flashes approx. once per second and at least one bar graph LED is on)	<p>Unit is in standby mode.</p> <p>Press On/Stby button.</p> <p>Contact Customer service</p>

Fault	Operation
<p>No LED Light Output (On/Stby led flashes rapidly)</p>	<p>Temperature High or exceeded</p> <p>Check Unit venting has minimum of 4" clearance on all sides.</p> <p>Check Vent holes are not blocked</p> <p>Check Heat sink is not blocked by dust or debris</p> <p>Check LED cooling fan is running</p> <p>Check Power supply cooling fan is running</p> <p>Check Ambient air temperature is below 102°F (40C) and/or improve air circulation</p> <p>Try Let unit cool to room temperature</p> <p>Contact Call customer service for further instructions</p>

9 Replacing the Fuses

No user-changeable fuses are included. Consult factory.

11 Technical Data

SugarCUBE™ 38000-M03-XXX

- Width: 16.0 cm (6.3 inches)
- Height: 20.3 cm (8 inches)
- Depth: 18.0 cm (7.1 inches) w/o light guide adapter
19.1 cm (7.5 inches) with Light guide adapter
- Weight: 3.72 kg (8.2 lbs)
- Operating mode: Continuous
- Main cable: 10 A/250 V
- Power cord jack: IEC 320/C13
- Power supply: 100-240V, 50/60 Hz, 5/2A Full Range
- Fuse: Internal, no access
- LED Life: ≥60,000 hours w/ ≥ 70% lumen maintenance
- Cleaning: Surface cleaning with mild detergent

RJ11 Communications Connection Computer interface via RS232 protocol

Ambient conditions for operation

- Temperature: 10° to 40°C (50° to 102°F)
- Rel. humidity: 30% to 95% non-condensing
- Air pressure: 700 hPa to 1060 hPa

Ambient conditions for storage (in shipping packaging)

- Temperature: -20° to +50°C (-4° to 122°F)
- Rel. humidity: 0% to 100%, non-condensing

12 Regulatory Compliance

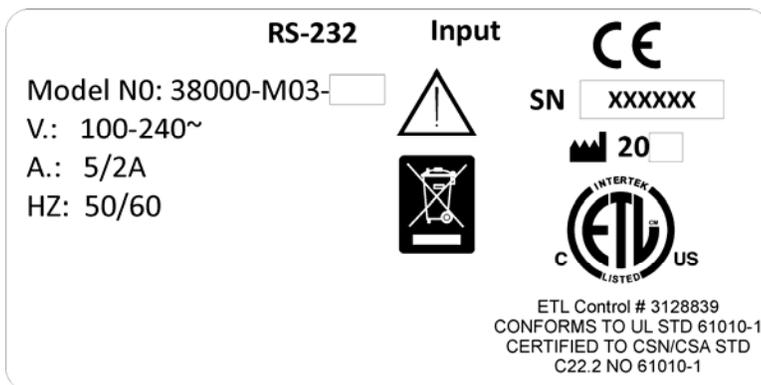


Fig. 4

Fig. 4 shows the label that is attached to the rear panel of the SugarCUBE™ unit and indicates compliance with the regulatory standards listed.

Complies with Risk Group 1 – Low Risk Category IEC 62471 Photobiological Safety of Lamps and Lamp Systems Table 5.4 and Table 5.5. Intertek Report No. 3180522XRT-007

13 Appendix A - Communications

Command	Response	Description
###[cr]	None	Change the configured LED intensity Enter an LED intensity from 0 – 100 with a trailing carriage return.
S	###xyz	Status of LED illuminator ### - LED intensity (with leading 0's if necessary) x: + if LED is on - if LED is off y: u - overlay buttons are unlocked l - overlay buttons are locked z: unit type... 1 - White LED 2 - Red LED 3 - Green LED 4 - Blue LED 5 - Quad White LED
+	None	Turn the LED on
-	None	Turn the LED off
lock[cr]	None	Disable overlay buttons
unlock[cr]	None	Enable overlay buttons [default]
^	None	Increase intensity to next 10% level
v	None	Decrease intensity to next 10% level

