

# **gridComm GC1310 Master Light Controller Hardware Installation Guide**

GC1310	Non LoRA option
GC1318	LoRA option



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## 2. Introduction of GC1310 3-phase PLC Master light controller



**Figure 1 – GC1310 3-phase PLC Master light controller**

The Gridcomm GC1310 is an industrial grade DIN Rail 3-phase Power Line Communication (PLC) master light controller (MLC) designed for Smart Street Light Control operations. It serves as a powerful concentrator and gateway connecting a network of streetlights, powered by gridComm's Digital Power Supply (DPS) or Smart Light Controller (SLC), to gridComm's cloud-based Street Light Management Software (SLMS) controlling and monitoring the operations of turning on/off, dimming, scheduling, alarm events and data-logging functions. The GC1310 MLC also integrates Digital I/Os that could be connected to an external anti-tamper or overload sensor for fail-safe measures and motion sensors or other sensors based on trigger events such as movements. *The Digital I/Os capabilities need to be tailored to users' definitions and enabled through firmware prior to use. Please contact gridComm for more information.* The benefits of using gridComm Smart Street Light solutions include:

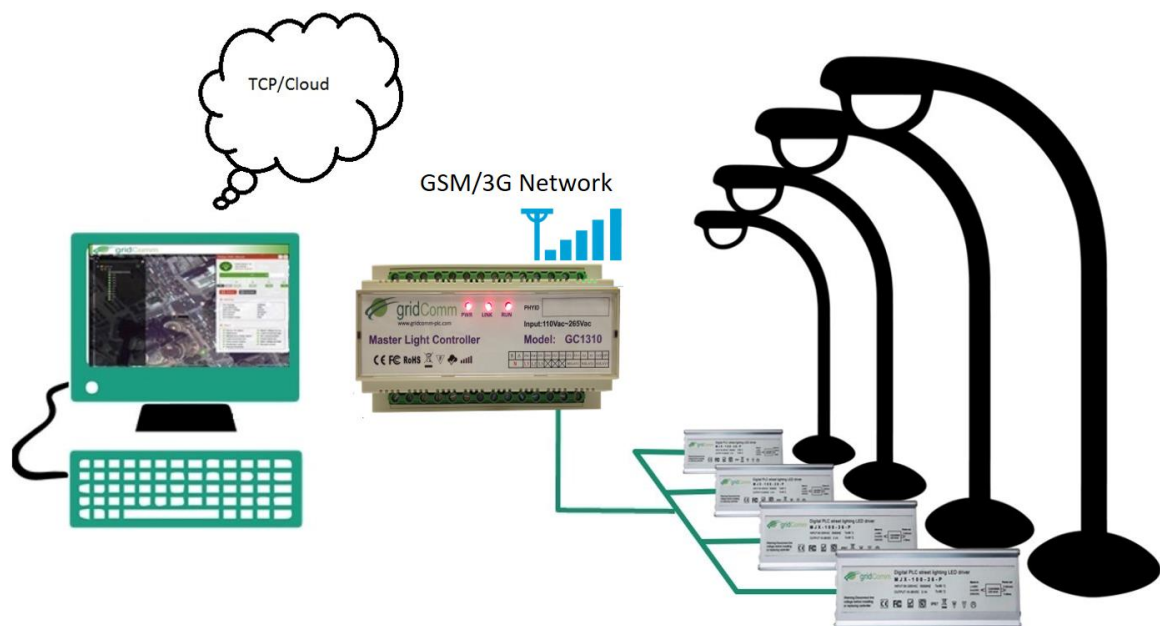
- Less energy usage by using automatic lighting schedules, hence reducing the carbon footprint
- Savings in operating and maintenance costs by monitoring the burned hours as well as the type of failures encountered all at the convenience through the SLMS
- Efficient remote monitoring system, thus doing away with using surveillance vehicles to check for faulty lights

The GC1310 MLC can automatically perform node discovery and establish suitable repeaters to set up a robust routing network based on a set of complex algorithms. When enabled with Ethernet or GPRS connection, the TCP/IP connectivity link established enables the SLMS to manage the GC1310 MLC which in turn controls the street lights.

This 3-phase PLC MLC utilizes the industry-leading GridComm GC2200, an OFDMA (Orthogonal Frequency Division Multiple Access) Power Line Communication Transceiver which has 18

independent channels capable of communicating up to 54 carrier frequencies in a wide frequency range from 5 KHz to 500 KHz. Powered with gridComm GC-Net software, its good performance and multiple features make it ideal for Smart Street Lighting Control.

GC1310 MLC has been tested to CE and FCC standards and found to comply within the limits of EN 50065-1, EN 55022, EN 55024, EN 61000-3-2, EN 610000-3-3, EN 61000-6-2 and EN 61000-6-4 FCC Part 15B for EMC and EN 60950 for safety. These limits are designed to provide reasonable protection against harmful interference. It also works in environments between -40°C to +60°C. Figure 2 shows the implementation of GC1310 MLC in gridComm's smart street light solution.



**Figure 2 – gridComm Smart Street Light Solutions**

The following describes how to install, mount, and wire the GC1310 MLC to work with the typical Digital Power Supply or Smart Light Controller.

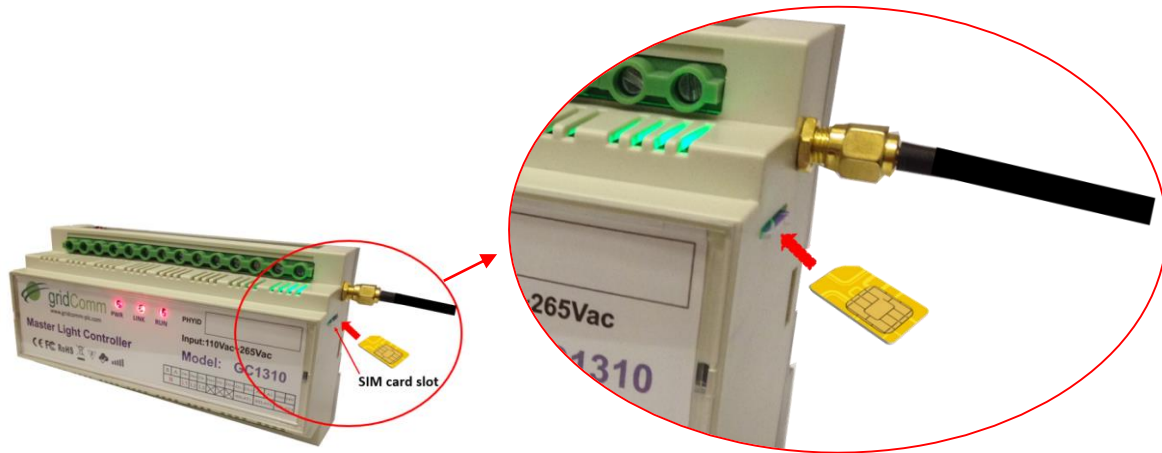
### 3. Installation and Set Up of GC1310 MLC

This section describes the general steps required to install and connect the GC1310 MLC. These steps are then detailed in the referenced sections. Prior to commissioning the GC1310 MLC(s), you may need to register to obtain a passkey from gridComm which is to be validated by the Street Light Management Software (SLMS) in your server before you can begin using the GC1310 MLC(s). Please contact gridComm to obtain the passkey.

#### 3.1 Inserting SIM Card into GC1310 MLC

GC1310 comes with a SIM card slot to allow insertion of the SIM Card for GSM/ 3Gconnectivity. The SIM card has to be inserted before mounting of the MLC. The position of the SIM card slot

and the way to insert the SIM card is shown in Figure 3. Only standard size SIM card can be used.

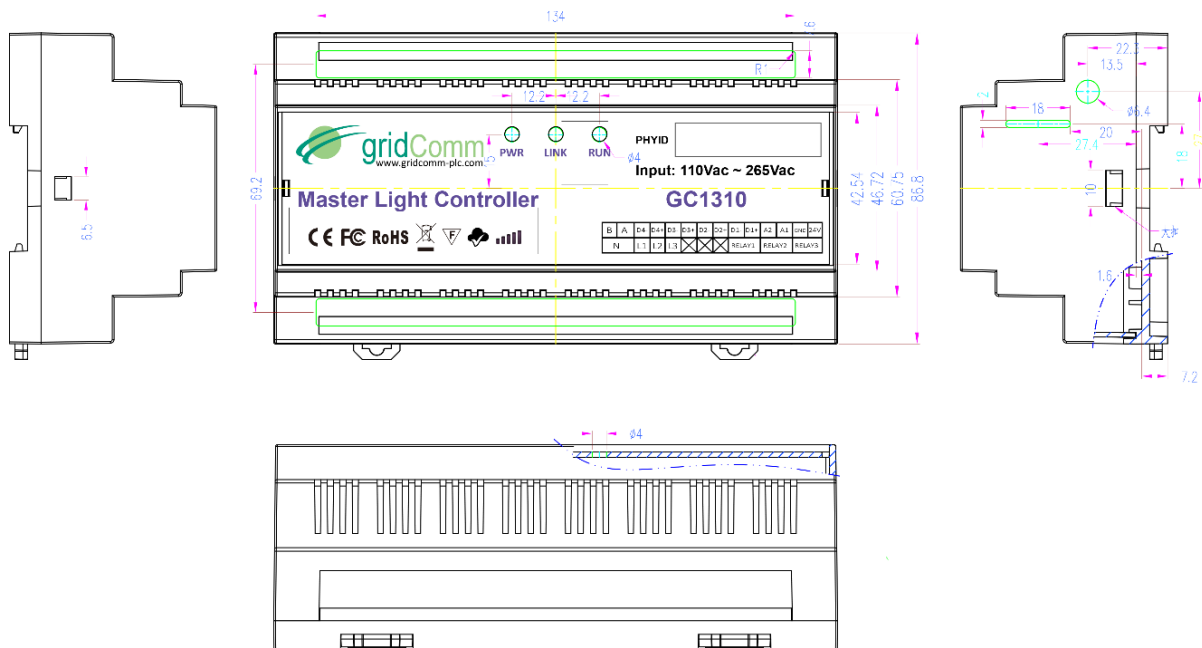


**Figure 3 – Location of SIM card slot and inserting SIM Card**

For a network of 80 nodes, the average data rate is 1.7MB per day. The monthly data rate consumption will be less than 60MB.

### 3.2 Mounting of GC1310 MLC

Figure 4 – displays the dimensions of the GC1310 MLC and the space required for the various connections. All units are in millimeters.



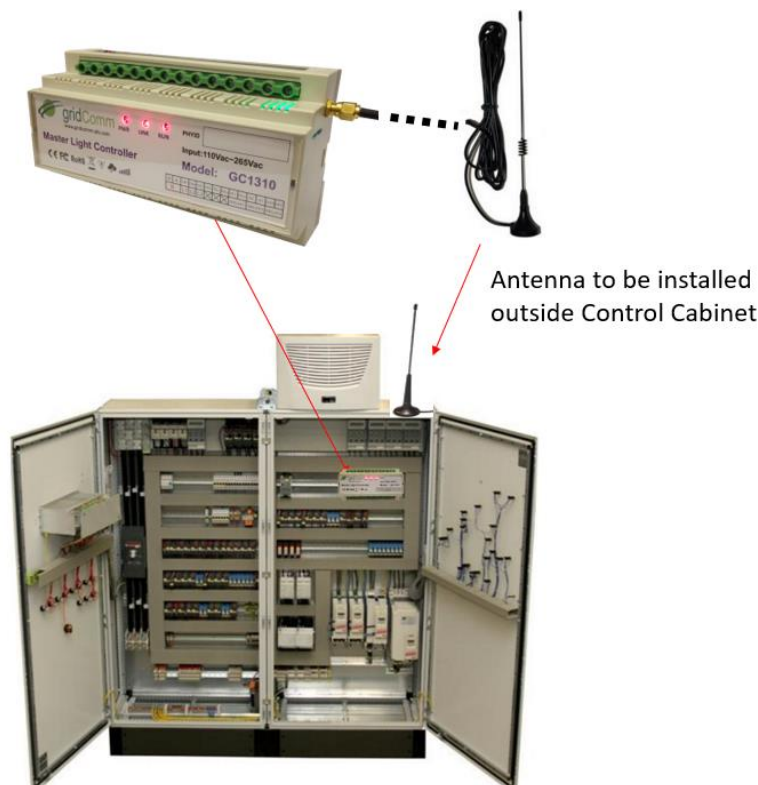
**Figure 4 – GC1310 MLC Dimensions**

The GC1310 MLC mounts to a 35mm x 7.5mm or 35mm x 15mm DIN Rail. The rear of the GC1310 MLC enclosure contains a spring-loaded DIN Rail lock, which securely grabs the DIN Rail on which the enclosure is mounted. To release the enclosure from the DIN Rail, insert a flathead screwdriver into the DIN Rail locking tab and gently pull the tab upwards and away from the enclosure. Figure 5 shows the mounting of GC1310 MLC onto the DIN Rail.



**Figure 5– Mounting of GC1310 MLC onto DIN Rail**

### 3.3 Installation of Antenna



**Figure 6 – Antenna Attached to MLC Installed On Top of Control Cabinet**

There is an external socket at the side of the MLC to install the antenna as shown in Figure 6. Please observe the following:



- ⚠ It is highly recommended that the antenna be installed at open space.
- ⚠ Antenna must not be installed in enclosed environment especially within a metallic or concrete enclosure as this will block signal reception.
- ⚠ Extra length of cable on antenna should be coiled properly avoiding sharp corners.
- ⚠ Should there be signal coverage issue, please contact the Telco operator for assistance.

### 3.4 Overview of Interface

The GC1310 MLC has two rows of screw terminals located on the top and bottom edge of the enclosure, providing the following interface as shown in Figure 7:

- RS-485 (A, B)- Serial Comms port with default setting:
  - Baud Rate: 115200
  - Data Bits: 8
  - Stop Bit: 1
  - Parity: None
- N, L1, L2, L3 (Neutral, Phase A, Phase B, Phase C) - 3-Phase Power Supply
- Digital Inputs (D1+ and D1-, D2+ and D2-, D3+ and D3-, D4+ and D4-) *for future use*
- Relays (12VDC OUT, RELAY 1, RELAY 2 and RELAY 3) *for future use*
- Analog Inputs (A1 and A2) *for future use*

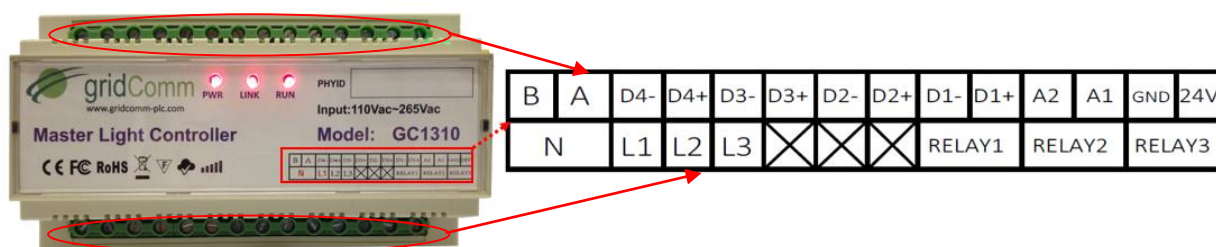


Figure 7- GC1310 MLC Interface

There are three LEDs on the GC1310 MLC: POWER, LINK, RUN. The functions are described in below table.





LED	Indications
<b>Power</b>	Constant Red when powered up
<b>Link</b>	Blinking Red when communication link established. MLC blinks once every 10 seconds when all slave nodes in the network are not fully discovered. MLC blinks once every 0.2 second incessantly when all slave nodes in network are discovered. Refer to gridComm “GC1310 PLC Networking User Guide” for settings. Slave node refers to the Digital Power Supply or Smart Light Controller in the street light.
<b>Run</b>	Blinking Red when there are GPRS activities

### 3.5 Powering Up GC1310 MLC



#### **Safety Warning**

The MTC-000-UP0100 Master Light Controller is intended to be mounted inside a suitable, safety-agency approved enclosure that is mounted in a restricted access area. High-voltage wiring must be performed only by a qualified service person.

The MTC-000-UP0100 Master Light Controller is not equipped with power disconnect device. When the device is installed and mounted, the installer must provide a means to safely remove power, such as a power switch or circuit breaker.

The high-voltage terminal block has a plastic cover protecting the screw terminals used to connect the high-voltage inputs. This cover **MUST** be closed after the power wires are connected and before the power is activated.

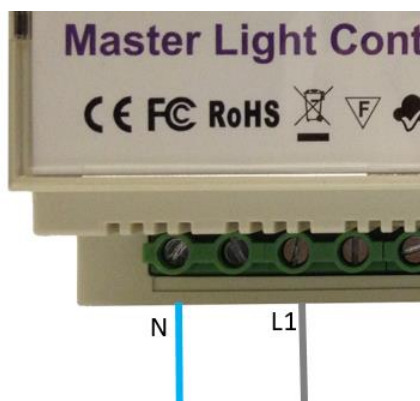
When connected with an AC power supply, the GC1310 becomes a smart device which can automatically configure and self-adapt to the varying conditions on power lines, resulting in

extremely reliable and robust communications in a Low-Voltage power network. Note that for Single-Phase power supply (100V~240VAC at 50/60Hz with 100mA), connect Live and Neutral to “L1” and “N” input connectors respectively. For 3-Phase power supply, connect “L1”, “L2” and “L3” to the “Live” ends and “N” to Neutral accordingly. The “L1”, “L2” and “L3” and “N” are isolated internally. Figure 8 shows the Single Phase and 3-Phase power supply connections. *When dealing with high voltage power, ensure power lines are always connected securely under the screw terminals with the plastic cover closed before power is applied.*

**⚠ DO NOT apply power to the GC1310 MLC until you have checked all wiring connections and you are instructed to apply power.**

B	A	D4-	D4+	D3-	D3+	D2-	D2+	D1-	D1+	A2	A1	GND	24V
N	L1	L2	L3	⊗	⊗	⊗	RELAY1	RELAY2	RELAY3				

Single-Phase Connection



3-Phase Connection

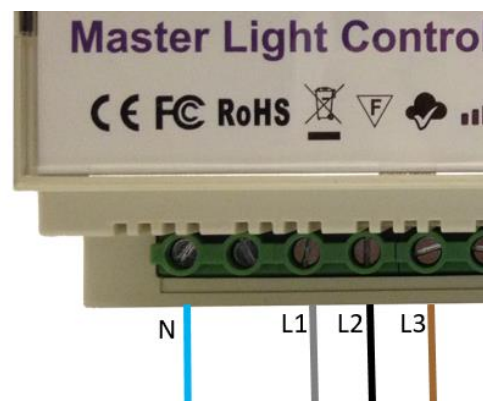
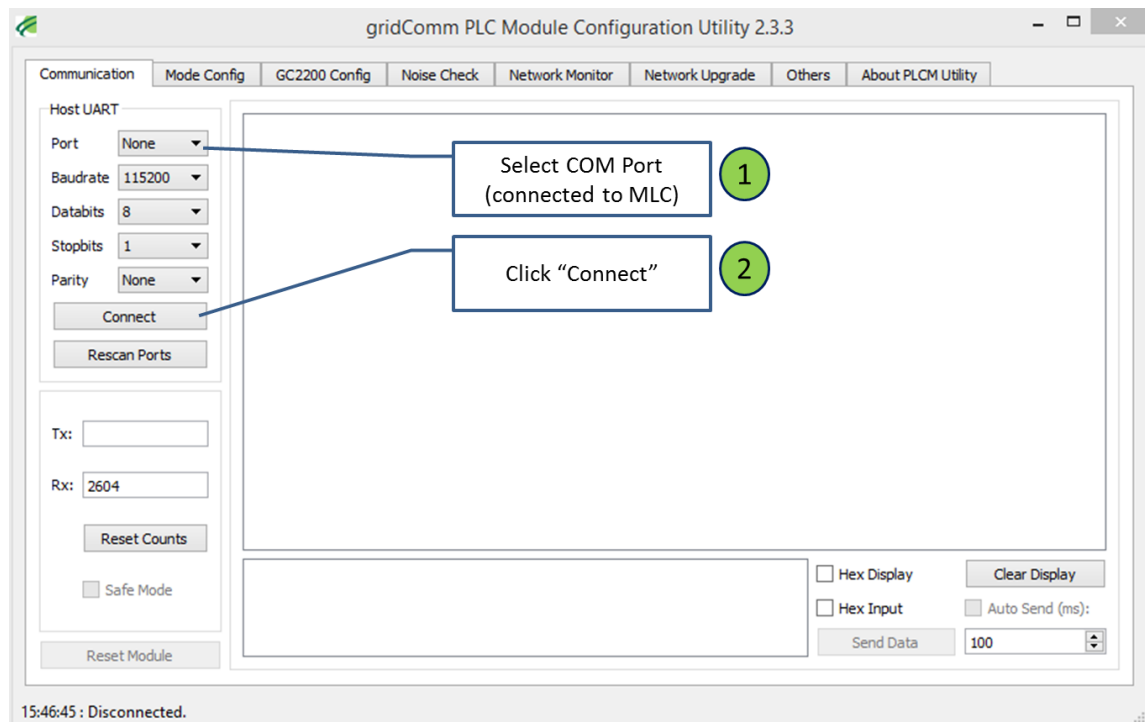


Figure 8 – Connecting Power Supply to GC1310 MLC

### 3.6 Configuring the GC1310 MLC Settings

The GC1310 MLC is designed to work with minimum or no settings required. The RS-485 COM port is preconfigured to 115200 Baud Rate, 8 Data Bits, 1 Stop Bit and None Parity. In order to connect to MLC, do the steps shown in Figure 9.



**Figure 9 – gridComm PLC Module Configuration Utilities tool**

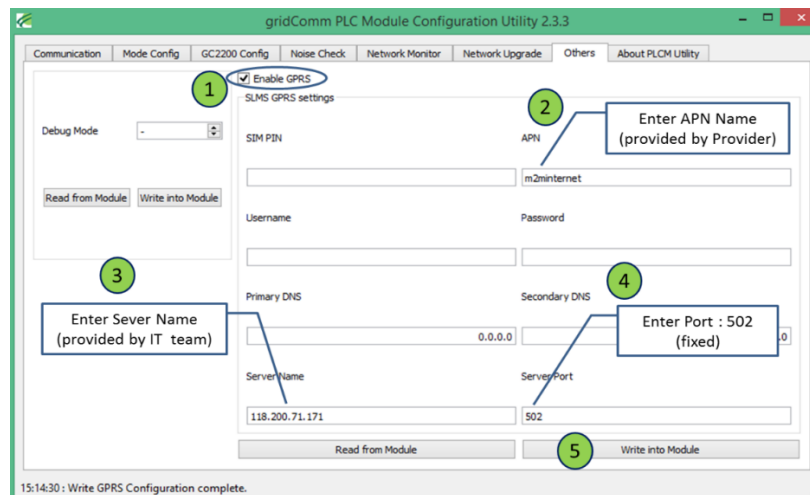
GC1310 MLC supports only “Auto-Routing” operation mode. Changes to the configurations such as the “Expected Number of Slave Nodes” (optional) can be done. The “Expected Number of Slave Nodes” provides a means to tell the GC1310 MLC the number of slave nodes (street lights as in the case here) it can expect to control in the network. When the GC1310 MLC determines that the total number of slave nodes registered during network discovery phase matches this Expected Number of Slave Nodes, the LINK LED will start flashing every 0.4 sec from the usual 10 sec interval. This enables the user to quickly know if the GC1310 MLC has managed to find all the street lights under its control. For all details of configuration, please refer to gridComm “UG30001503\_04 PLCM Utility tool GC-Net User Guide”.

While other parameters, such as carrier frequencies and channels, are preset to default factory settings, they can be configured if necessary (optional). Should you need to change the carrier frequencies, ensure that all the slave nodes are also changed to the same set of settings that are being configured onto the GC1310 MLC. Failure to do so could result in communications failure. Additional tools might be needed to carry out these configurations. *Please contact gridComm for the additional tools required.*

### 3.7 Enabling 3G modem for GC1310 MLC

The GC1310 MLC is designed with built-in 3Gmodem to connect with the cloud-based Street Light Management Software (SLMS) residing in the server at the control station. It supports Dual Band 900/2100MHz and Quad Band 850/900/1800/1900 MHz.. It is recommended that standard size data-only SIM card dedicated for M2M be used for the MLC operations. Ordinary

Voice/Data SIM card might not be optimized for MLC operations and might cause interruptions to data communications. In order to enable the feature, the following steps have to be done on PLCM Configuration Utility under “Others” Tab as shown in Figure 10 below.



**Figure 10 - Utilities tool to enable GPRS modem**

### 3.8 Setting Up of Digital Inputs and Relays

The GC1310 MLC hardware supports Digital Inputs and Outputs which can be enabled with future firmware upgrades based on customers' needs.

- **Digital Inputs:**

As in Figure 11, the GC1310 provides four groups of Digital Inputs, D1+, D1-, D2+, D2-, D3+, D3- and D4+, D4- (currently only D1 and D2 are enabled through firmware). These are a pair of optically isolated, polarity-sensitive digital inputs that you can use to monitor switch and sensor devices. The digital inputs and a 24VDC Out can be used in conjunction with a sensor with FET or BIPOLAR output for active devices. The 24VDC Out supplies a DC 24V@350mA for the sensor while D+ and D-- are connected to the sensor output of the FET or BIPOLAR transistors. These Digital Inputs can be configured to enable an event to be triggered based on the conditions set. *(Please contact gridComm, for future use only)*

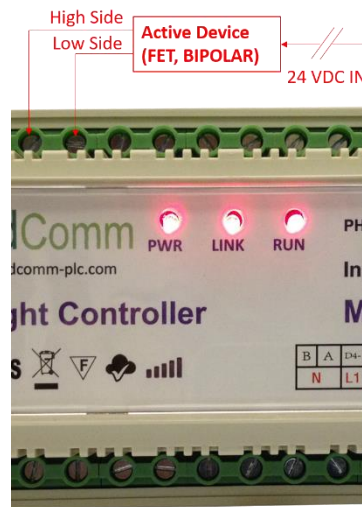


Figure 11 - Digital Inputs of GC1310

- Dry-Contact Relays**

RELAY 1, RELAY 2 and RELAY 3 are three pairs of high-voltage, high-current, single pole single throw (SPST) Dry-Contact Relay outputs rated at 240VAC@10A or 24V DC@10A. The SPST relay contacts are polarity-insensitive, and they can be used to switch both AC and DC loads. It can be used to perform on/off controls on loads such as motors and lamps etc. as in . It can be configured to open the dry contacts based on a schedule and/or when a combination of input conditions occur, thus cutting off the power supply to the load. *(Please contact gridComm, for future use only).*

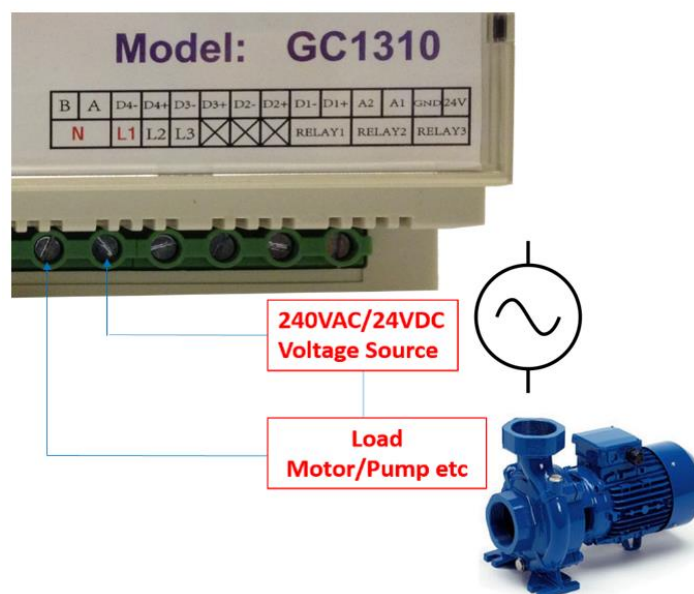
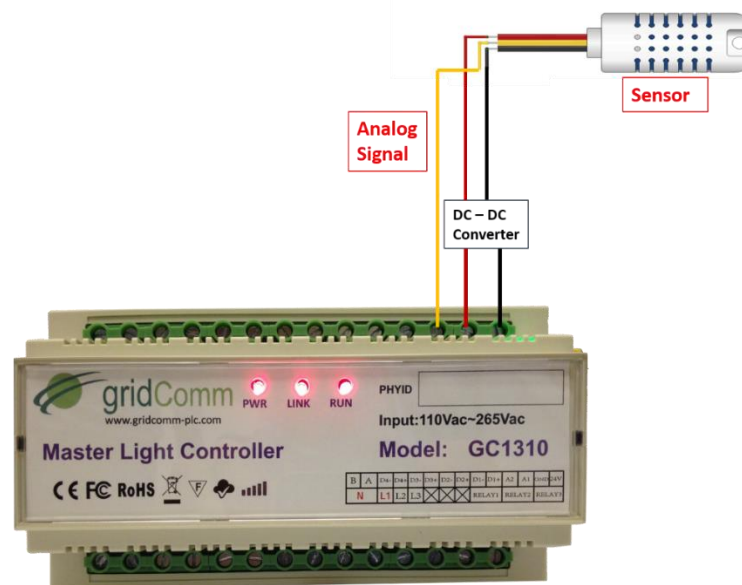


Figure 12 – Dry Contact Relay Control of Motor or Pump

- **Analog Inputs**

A1 and A2 are terminals for analog signals input. These terminals can be used for analog signals acquired from sensors such as temperature sensors, humidity sensors, etc for further processing. The reference for A1 and A2 is GND. Figure 13 shows a typical connection for a sensor.



### Figure 13 – Analog signal input from sensors

**Applying Power to the GC1310 MLC-** Once you have safely mounted the GC1310 MLC, connected all the wiring, and closed the enclosure, you can apply power to the GC1310 MLC. When the LINK LED starts to blink, it indicates network link establishment.

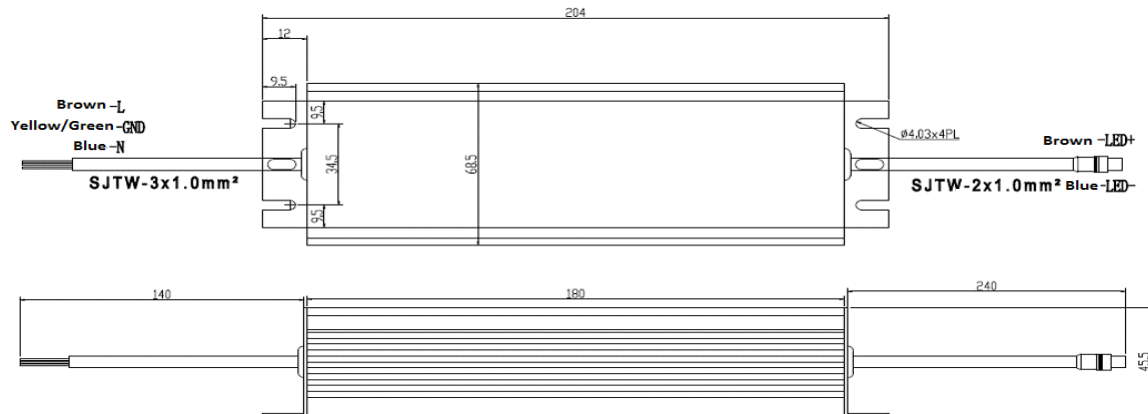
## 4. Operating the Street Light Controls

The GC1310 MLC can work with different types of gridComm Digital Power Supply (DPS) or Smart Light Controller (SLC). Below shows the typical types of LED and Sodium Vapor/HID DPS and SLC. *Details of each device with respect to the different type of luminaries are available through the respective product briefs available at gridComm's website <http://www.gridcomm-plc.com/products>.*

#### 4.1 LED DPS

Figure 14 shows a typical LED DPS. There is a cable coming out of each end of the DPS. One end feeds the power supply input with three strands of inner wires (Live, Neutral and Ground). The other end which is the output has the Brown and Blue wires that drive the +ve and the -ve

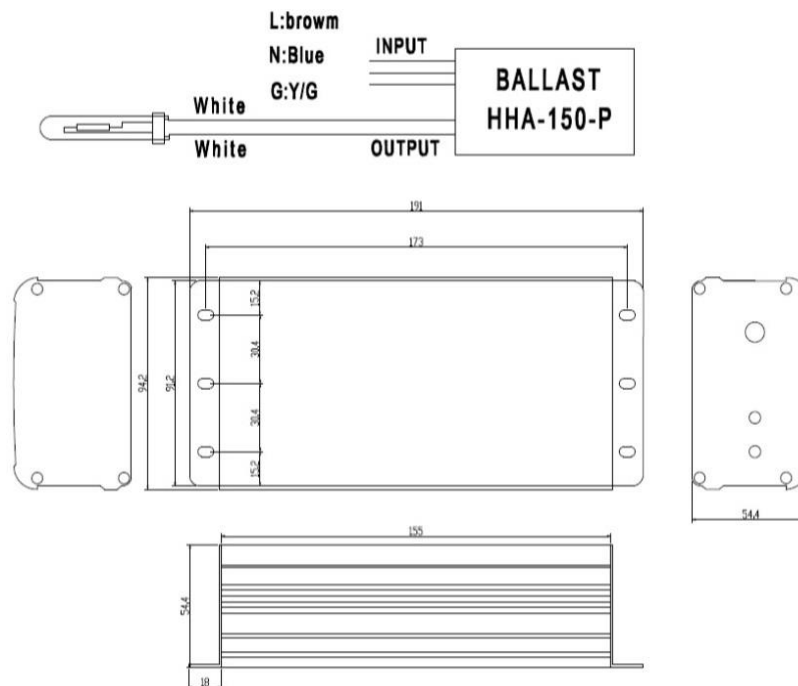
polarity of the LED array. As there are different types of LED arrays available in the market, customization of the DPS with knowledge of LED array layout, voltage and current inputs are required. Alternatively, gridComm can support the entire LED implementation including the LED lamps, hood and LED DPS. *For enquiries, please contact gridComm.*



**Figure 14 – Typical gridComm LED Digital Power Supply**

## 4.2 Sodium Vapor/HID DPS

Figure 15 shows the typical Sodium Vapor/HID DPS. The DPS has the usual Live, Neutral and Ground power cable feeding to the input. The other end which is the output has two polarity-insensitive cables driving the light bulb which can be either a Sodium Vapor bulb or a HID bulb.



**Figure 15 – Typical gridComm Sodium Vapor/HID Digital Power Supply**



### 4.3 Smart Light Controller (SLC)

Where existing infrastructure is to be kept, the SLC can become useful to retrofit existing street light power driver already installed to enable real-time control and automatic scheduling of switching on and off, and dimming levels of individual lights provided that the light driver attached is able to accept PWM or 0~10V input. The same SLC is also able to read back the power driver's electrical statistics including the dim status. Figure 16 shows the SLC which has both input and output power cables capable of supplying up to 500W of power.

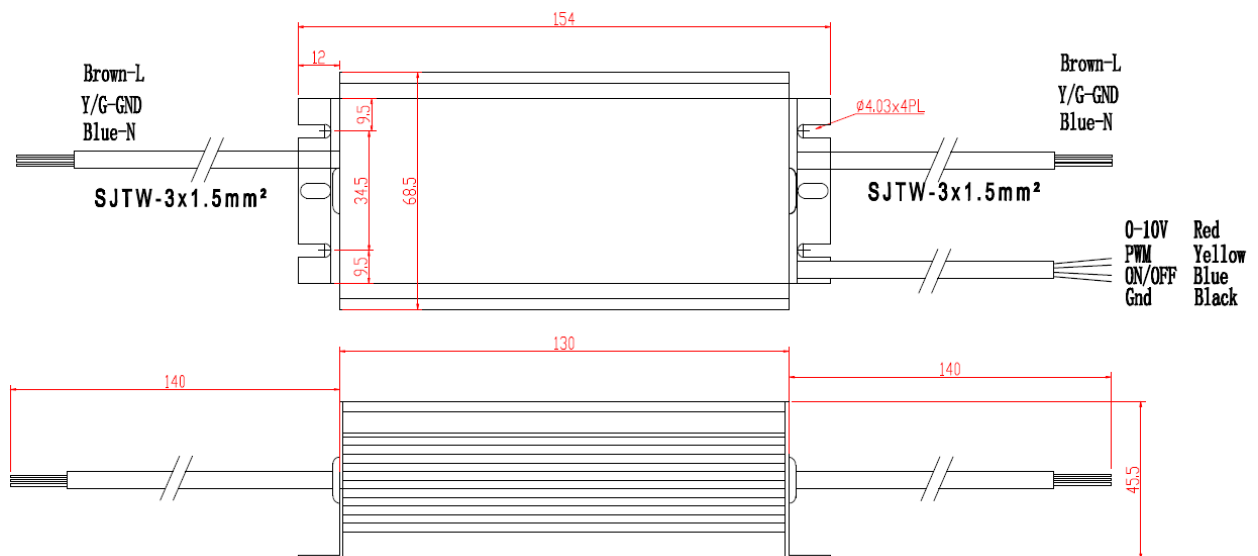


Figure 16 - Typical gridComm Smart Light Controller

## 5. Contact Information

For more information regarding the GC1310 Master Light Controller including pricing and ordering, please contact:

[sales@gridComm-plc.com](mailto:sales@gridComm-plc.com)

GridComm Pte Ltd [www.gridComm-plc.com](http://www.gridComm-plc.com)

## 6. Revision

Version	Description	Date
1.0	Initial release	01/06/2016