



# LDSBus Isolated IO Controller Datasheet



## 1 Introduction

The LDSBus Isolated IO Controller offers 2 isolated channels of digital and analog inputs and a variety of associated power source options to achieve 3.3V, 5V, 10V, 12V referenced signals besides sourcing power from external voltage sources. Each channel (input and output) is isolated from the others.

Each digital output can switch between 0V and 3.3V, 5V, 12V or referenced to an external voltage source. Each digital input can be between 0V and 1.8V to 12V. A 5V voltage source is provided for common applications that switch between 0-5V.

Each analog output can produce a voltage between 0-10V, and each analog input supports voltage or current controlled input sources ranging between 0-10V.

The controller may be used in numerous and diverse applications such as simple IO control, or 0-10V dimmers, weather station, water level detector or sensor, etc.

## 1.1 Features

- 2 isolated digital output channels
- 2 isolated digital input channels
- 2 isolated analog output channels
- 2 isolated analog input channels
- Built-in power supply (3.3V/ 5V/ 10V/ 12V) and external power supply option
- Flexible combination of internal or external power supply
- Supports BRTSys's LDSBus protocol
- Low power consumption
- Operating temperature range: 0°C to +55°C
- Flush mount and DIN Rail mounting options
- Supported platforms: LDSBus Host, BRTSys's IoTPortal, and PanL Smart Living products. Visit <https://brtsys.com/resources> for more information



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## **2 Part Numbers/Ordering Information**

<b>Part#</b>	<b>Description</b>
LC060101A	LDSBus Isolated IO Controller
LA120101A	LDSBus DIN Rail Mount Set

**Table 1- Part Numbers / Ordering Information**

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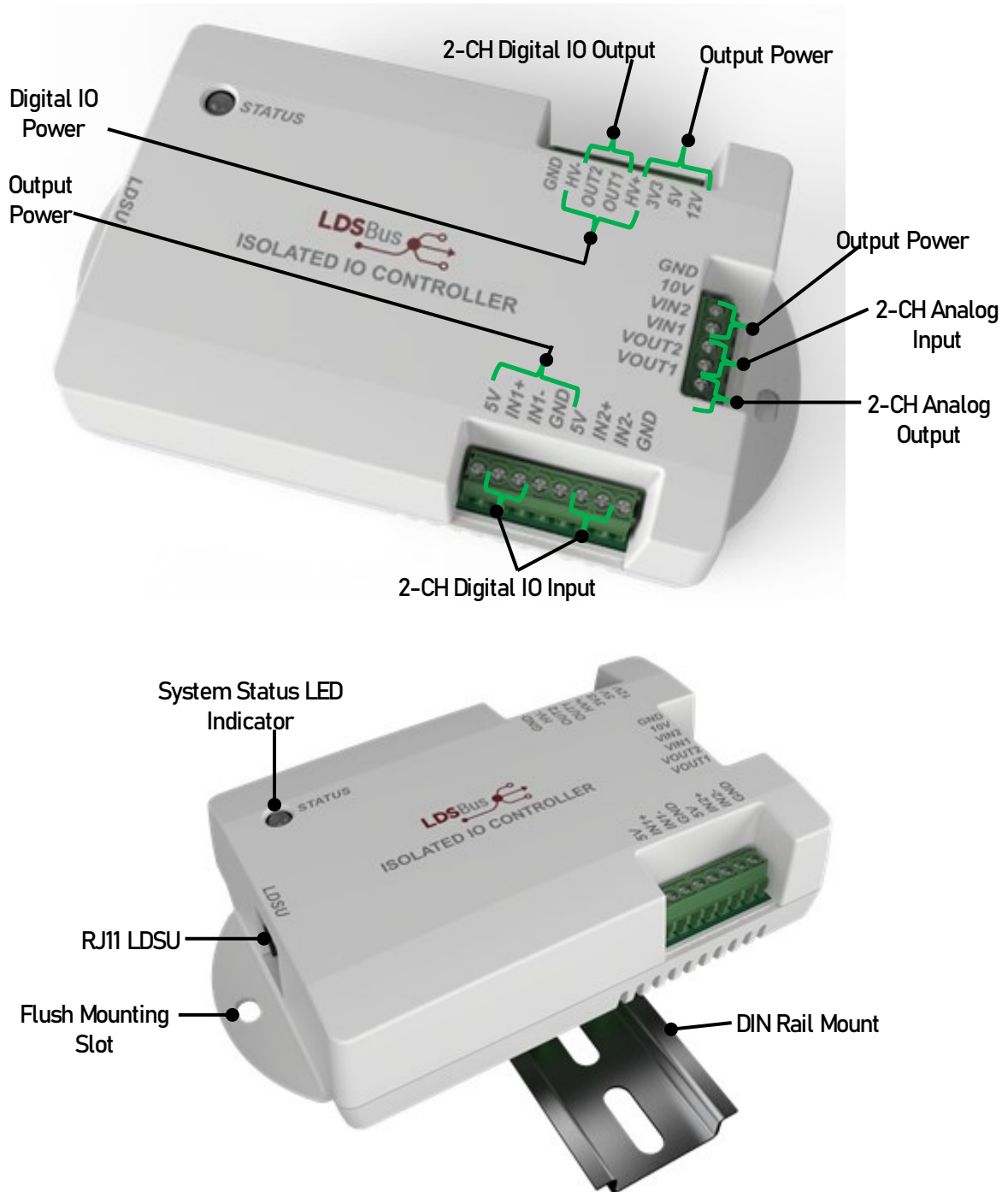
### 3 Specifications

<b>Features</b>	Interface	RS485
	System Status Indicator	1x RGB LED
	Mounting	Flush Mount DIN-Rail Mount
<b>Power</b>	Input Voltage	5V DC Bus Power
	Power (Typ)	1.15W
	Power (Max)	1.20W
	Output Power*	3.3V/30mW
		5V/50mW
10V/400mW 12V/240mW		
<b>Analog Input</b>	Number of Channels	2
	Analog Input range	0V - 10V
	Analog Input resolution	10mV
	Analog Input Accuracy	Typical: +/- 3%; For 0V - 1V, Accuracy: +/- 10mV (typical)
<b>Analog Output</b>	Number of Channels	2
	Analog Output range	0V - 10V
	Analog Output resolution	10mV
	Analog Output Accuracy	Typical: +/- 3%; For 0V - 1V, Accuracy: +/- 10mV (typical)
<b>Digital IO Input</b>	Number of Channels	2
	Digital Input Voltage	1.8VDC - 12VDC (refer to external power voltage)
<b>Digital IO Output</b>	Number of Channels	2
	Digital Output Voltage	1.8VDC - 12VDC (refer to external power voltage)
<b>Physical Characteristics</b>	Color	White
	Housing	Polycarbonate
	Dimension	L138.2mm x W76.0mm x H31.9mm
<b>Environmental Limits</b>	Operating Temperature	0 to 55°C
	Storage Temperature	-20 to 85°C
	Ambient Relative Humidity	5 to 95% (non-condensing)
<b>Package Contents</b>	Device	1x LDSBus Isolated IO Controller
	Wire Assembly	1X 5m RJ11 Cable
<b>Optional</b>	Mounting Accessories	1x LDSBus DIN Rail Mount set (LA120101A)

\* Output power current output up to 60mA.

**Table 2 - LDSBus Isolated IO Controller Specifications**

## 4 Hardware Features



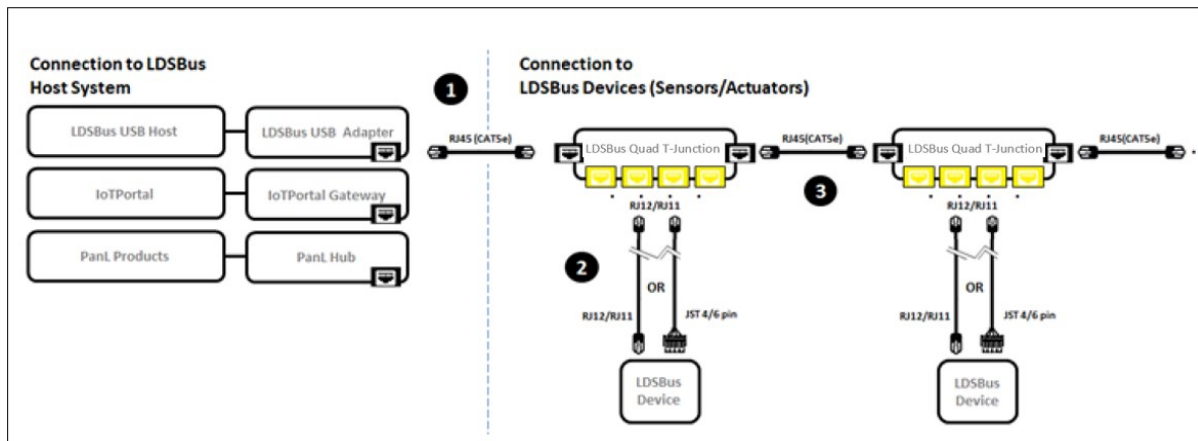
**Figure 1 - LDSBus Isolated IO Controller**

## 5 Isolated IO Controller Configuration and Installation

Please visit <https://brtsys.com/resources> to access the LDSBus Configuration Utility guide on how to configure the device name, device address and termination settings before using it in your application.

### 5.1 Connection Diagram

Figure 2 illustrates the connection of the LDSBus Isolated IO Controller (LDSBus Device) to the LDSBus. Please visit <https://brtsys.com/resources> to view the full device application, setup and installation guides.



**Figure 2 - LDSBus Isolated IO controller - Connection Diagram**

#### **Setup Instructions:**

1. Connect the first LDSBus Quad T-Junction to any of the LDSBus Host Systems using a RJ45(CAT5e) cable.
2. Connect the configured LDSBus Isolated IO controller to the LDSBus Quad T-Junction as shown in Figure 2.
3. If there is more than one LDSBus Quad T-Junction, chain them together as shown in Figure 2.
4. Enable terminator on the last device in LDSBus.

## 6 Mounting Options

### 6.1 Flush Mount

The LDSBus Isolated IO Controller can be flush mounted directly on a wall or any flat surface using 2 M3.5\*16mm (thread) screws.



**Figure 3 - LDSBus Isolated IO Controller Flush Mount**

### 6.2 DIN Rail Mount

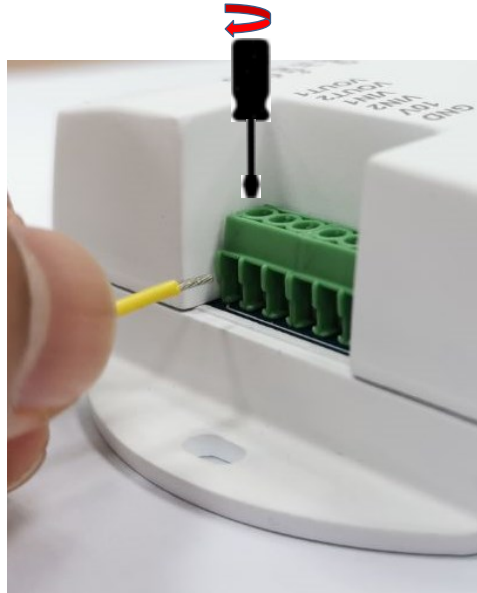
The LDSBus Isolated IO Controller can be mounted on a DIN Rail using the LDSBus DIN Rail Mount set. This set is optional and includes the bracket and mounting screws.



**Figure 4 - LDSBus Isolated IO Controller DIN Rail Mount**

## 7 Terminal Wiring Instructions

Terminal blocks are connected with screws. To clamp the wire to the terminal block, insert a 0.4mm x 2.5mm slotted screwdriver and rotate in a clockwise direction. To release the wire, turn the handle in an anticlockwise direction.



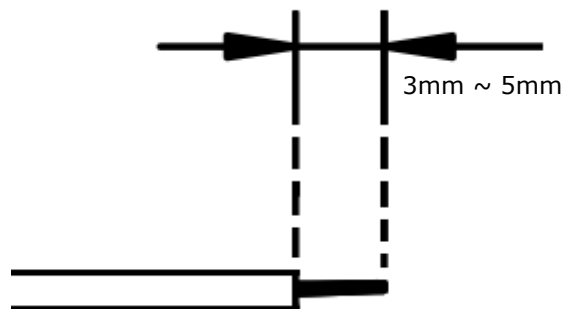
**Figure 5 - Clamping wire with screwdriver in clockwise direction**

Table 3 provides a list of American Wire Gauges (AWGs) that can be used in Terminal Blocks.

Conductor Type	Wire diameter/AWG
Solid conductor	0.2~1.5mm <sup>2</sup> /26~16 AWG
Stranded conductor	0.2~1.5mm <sup>2</sup> /26~16 AWG
Stranded conductor; with insulated ferrule	0.25~0.75mm <sup>2</sup>

**Table 3 - AWG to use in terminal block**

As shown in Figure 6, the wire strip is 3mm to 5mm long.



**Figure 6 - 3mm to 5mm wire strip**

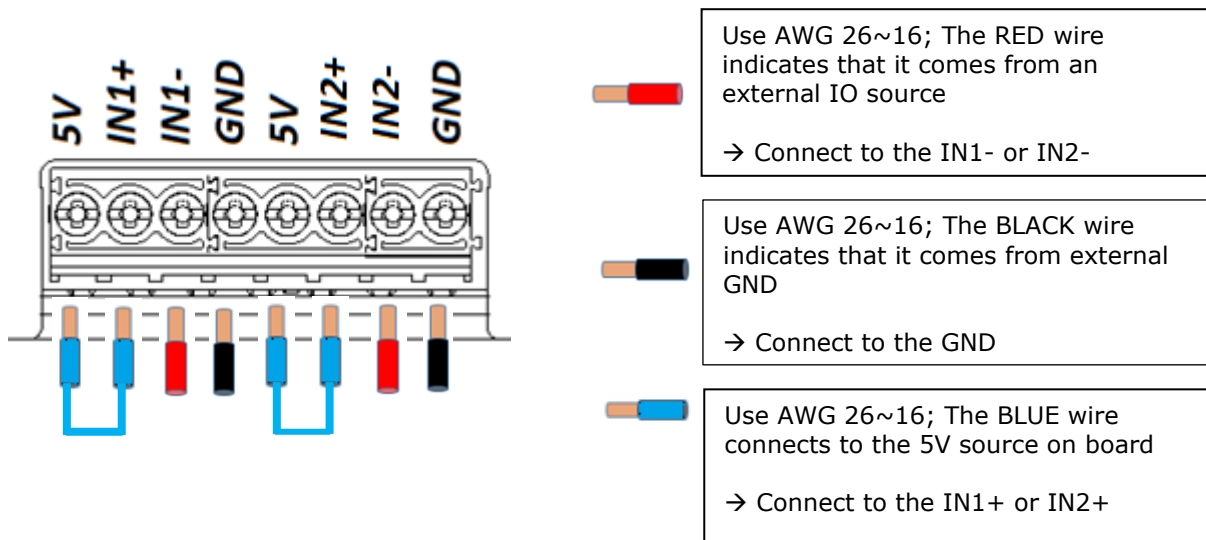


## 7.1 Isolated IO Digital INPUT Setup

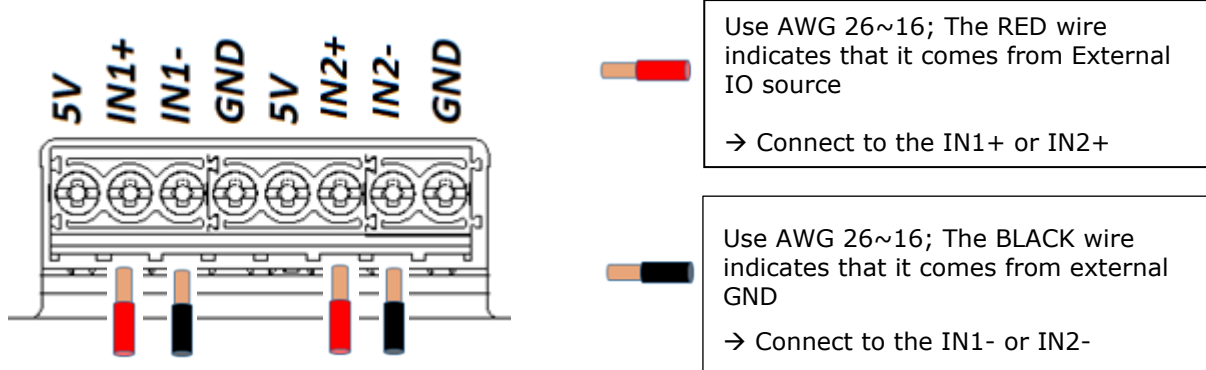
The 2CH isolated digital input supports external digital signals ranging from 1.8 to 12V. The two options for connecting are as follows:

**Note:** As each channel is independent, Channel 1 and Channel 2 can use different configurations.

### IO Digital Input with 5V Application



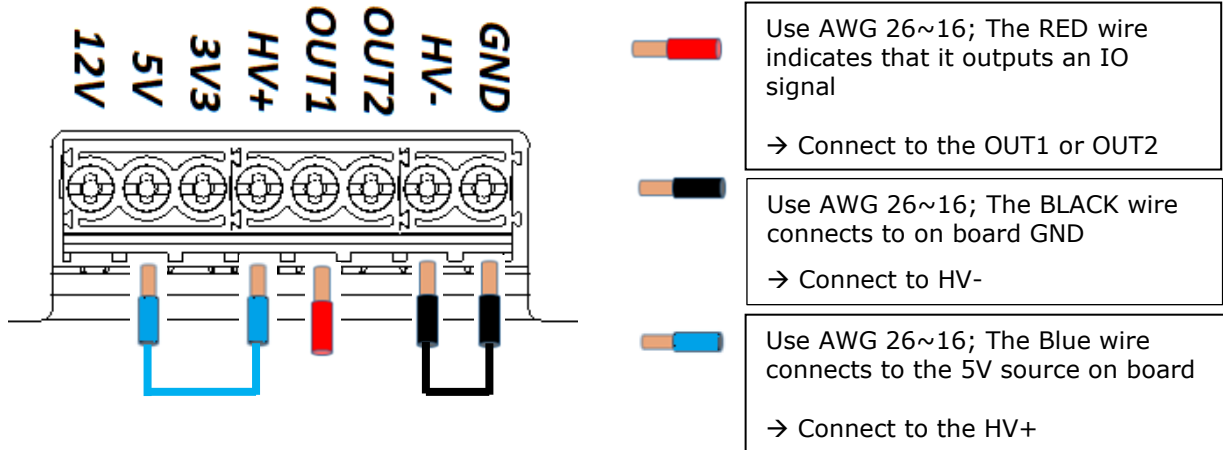
### IO Digital Input with External Pull-up



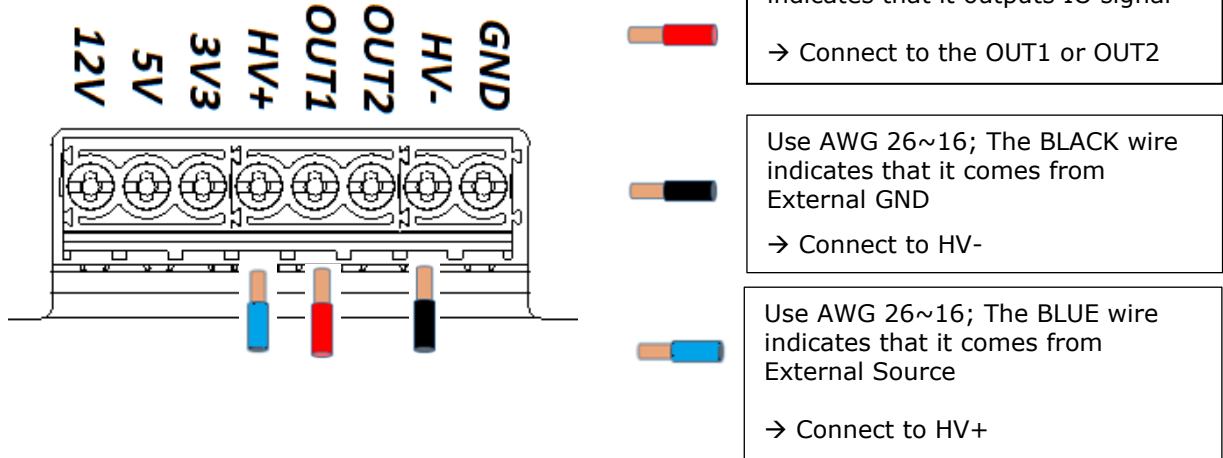
## 7.2 Isolated IO Digital OUTPUT Setup

The 2CH isolated digital output supports external digital signals ranging from 1.8 to 12V. The two options for connecting are as follows:

### Digital Output with 5V Application



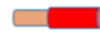
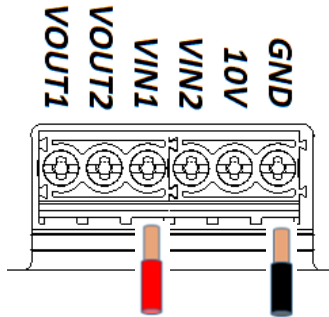
### Digital Output with External Source



### 7.3 Isolated Analog INPUT Setup

The 2CH isolated analog input supports external analog signals ranging from 0 to 10V. The two options for connecting are as follows:

#### Analog Input with External Voltage Source

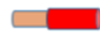
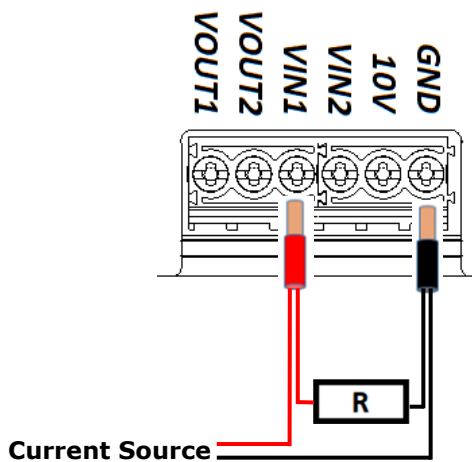


Use AWG 26~16; The RED wire indicates that it comes from external voltage source  
→ Connect to VIN1 or VIN2



Use AWG 26~16; The BLACK wire indicates that it comes from external GND  
→ Connect to GND

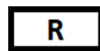
#### Analog Input with External Current Source



Use AWG 26~16; The RED wire indicates that it comes from external current source  
→ Connect to VIN1 or VIN2



Use AWG 26~16; The BLACK wire indicates that it comes from external GND  
→ Connect to GND



Serial Resistor value depends on current source

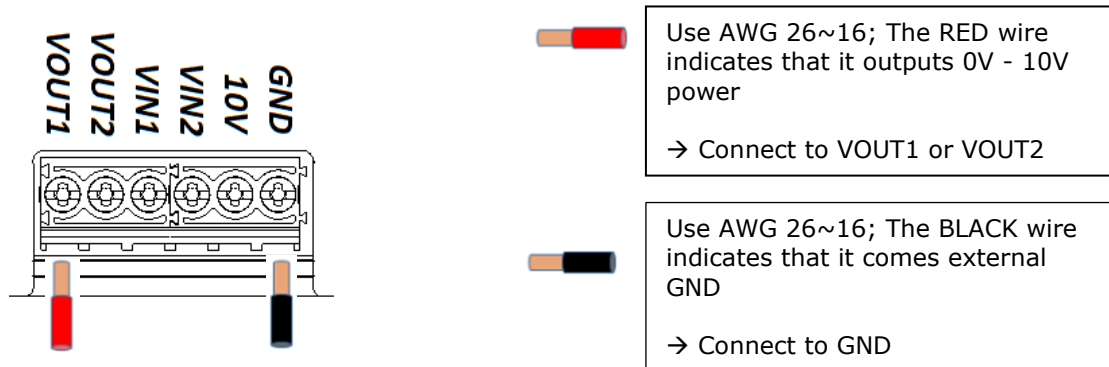
→ Connect in between VIN1/VIN2 and GND

For example: Application current source 4mA to 20mA, recommend using 450ohm resistor

## 7.4 Isolated Analog OUTPUT Setup

The 2CH isolated analog output supports external analog signals ranging from 0 to 10V. The two options for connecting are as follows:

### Analog Voltage Output













## 8 System Status LED Indicators

LDSU devices come with a tri-color LED, and LED status are mentioned in the table below.

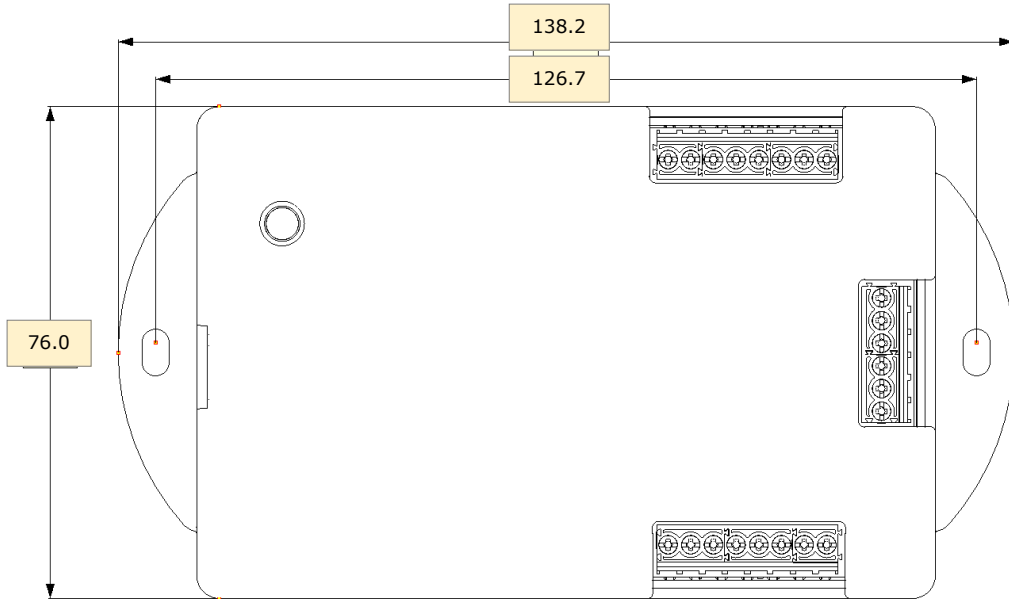
Status display colors

1. RED - Device in error conditions
2. YELLOW - Unconfigured device
3. GREEN - Device in normal state (Device termination is OFF)
4. BLUE - Device in normal state (Device termination is ON)

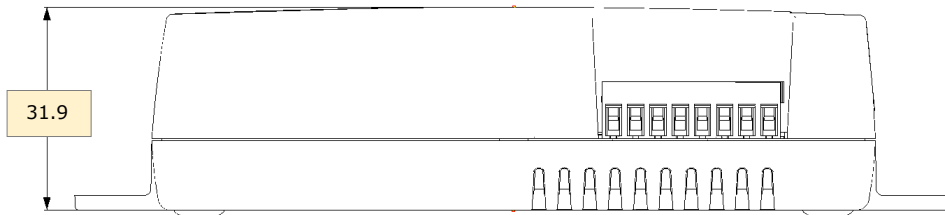
Device Status	LED Color		Flashing Frequency	Description
Unconfigured device	YELLOW		LED flashing @1Hz	Unconfigured device with factory default address (126)
Configured device	GREEN		Steady – non-flashing	Configured device (Device ID 1-125) and device is idle
	BLUE			
Addressed device	GREEN		LED flashing @5Hz	Device is busy communicating
	BLUE			
Identified device	GREEN		LED flashing @1Hz	Device in identify state
	BLUE			
Device error	RED		Steady – non-flashing	Device error has occurred
Firmware update	YELLOW		Steady – non-flashing	Device firmware update

**Table 4 - LDSBus Isolated IO Controller – System Status LED Indicator**

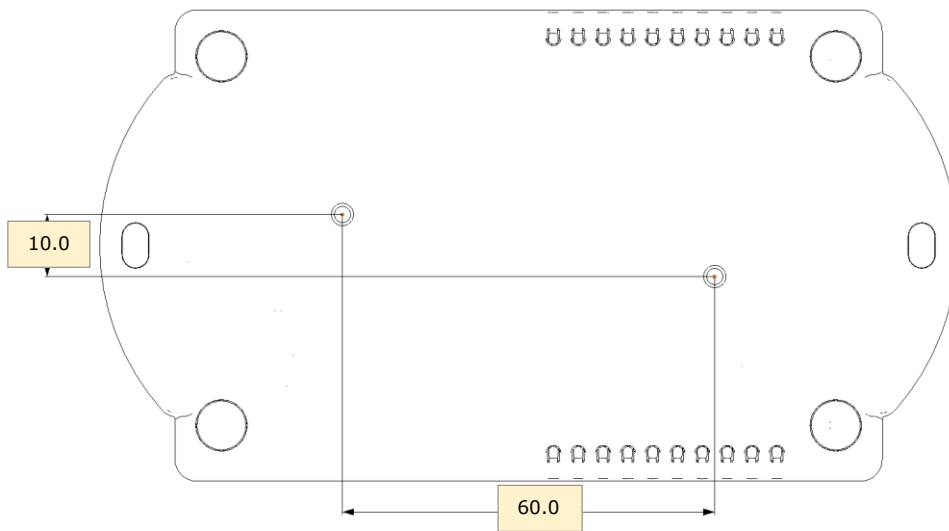
## 9 Mechanical Dimension



**Figure 7 - LDSBus Isolated IO Controller Dimension – Top View**



**Figure 8 - LDSBus Isolated IO Controller Dimension – Side View**



**Figure 9 - LDSBus Isolated IO Controller Dimension – Bottom View**

## 10 Contact Information

Refer to <https://brtsys.com/contact-us/> for contact information.

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## **Appendix A – References**

### **Document References**

[BRTSYS\\_AN\\_001\\_LDSBus\\_Configuration\\_UTILITY\\_Guide](#)

### **Acronyms and Abbreviations**

<b>Terms</b>	<b>Description</b>
AC	Alternating Current
AWG	American Wire Gauges
DC	Direct Current
IoT	Internet of Things
LED	Light Emitting Diode
LDSBus	Long Distance Sensor Bus



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## Appendix C – Revision History

Document Title: LDSBus Isolated IO Controller Datasheet

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Clearance No.: BRTSYS#005

Product Page: <https://brtsys.com/ldsbus/>

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Revision	Changes	Date
Version 1.0	Initial Release	15-02-2022
Version 1.1	Updated release under BRT Systems	15-09-2022
Version 1.2	Updated the specifications table (RJ12 -> RJ11)	24-03-2023
Version 1.3	Updated the following: HVT references to Quad T-Junction; Singapore address	11-09-2023
Version 1.4	Updated Section 3. Specifications	04-09-2024