Modbus Trailing Edge Light Dimmer Datasheet

1 Introduction

Modbus Trailing Edge Light Dimmer can be integrated with dimmable LED lamps for adjusting the percentage of light dimming. Our trailing edge technology uses a current that is turned off when the AC waveform ends. The operation is smoother, soft starting and silent. It can control up to 550W@240VAC or 230W@100VAC for single channel loading.

The Modbus Trailing Edge Light Dimmer has a 2-digit display to show the percentage of dimming.

Zero crossing detection determines whether the AC input frequency is 50Hz or 60Hz before enabling dimming.

Additionally, an external dimmer controller can be used to control light dimming.

1.1 Features

- Suitable for dimmable LEDs and lamps with single channel AC inputs and loading
- Trailing edge AC control to provide smooth dimming control
- Detects zero crossings and produces symmetrical pulses around them
- Implements Modbus protocol
- LED indicators indicate 50Hz or 60Hz AC
- 2 Digit dimming percentage display
- UP/DOWN push buttons for manual override of dimming
- Support for external dimmer control with UP/DOWN connectors
- Low power consumption
- Operating temperature range: 0°C to +55°C
- Flush mount and DIN Rail Mount options

Visit https://brtsys.com/resources/ for more information.

2 Part Numbers / Ordering Information

Part#	Description
MC-0301-01A	Modbus Trailing Edge Light Dimmer
MA-0102-01A	Modbus RS485-RJ11 Cable (30cm)
LA-1201-01A	LDSBus DIN Rail Mount Set

Table 1- Part Numbers / Ordering Information

Table of Contents

3 Specifications

Features	Interface	RS485 Modbus RTU
	50Hz indicator	Red LED
	60Hz indicator	Red LED
	Dimming Indicator	2 digit 7-segment LED display
	Buttons	UP / DOWN
	Mounting	Flush Mount
		DIN-Rail Mount
Power	Modbus Voltage	9-24V DC Bus Power
	Device Input Voltage	5V DC
	Typical Power	390mW
	Max. Power	625mW
AC Input	Input Voltage	100VAC - 240VAC
	Frequency	50Hz/ 60Hz, +/- 3Hz
AC Output	Max. Load	550W@240VAC
	Max. Current	2.30A
Dimming Range	Percentage	0% - 99% and FULL
Physical Characteristics	Color	White
	Housing	Polycarbonate
	Dimension	L138.2mm x W76mm x H41.7mm
Environmental Limits	Operating Temperature	0 to 55°C
	Storage Temperature	-20 to 85°C
	Ambient Relative Humidity	5 to 95% (non-condensing)
Package Contents	Device	1x Modbus Trailing Edge Light Dimmer
	Wire Assembly	1x Modbus RS485-RJ11 Cable(30cm)
Optional	Mounting Accessories	1x LDSBus DIN Rail Mount set

Table 2 - Modbus Trailing Edge Light Dimmer Specifications

4 FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) These devices may not cause harmful interference, and

(2) These devices must accept any interference received, including interference that may cause undesired operation.

NOTE: The equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF exposure guidelines, at least 20cm of separation distance between the device and the user's body must be always maintained.

FCC Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and it also complies with Part 15 of the FCC RF Rules. This equipment must be installed and operated in accordance with the instructions provided, and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and consider removing the no-collocation statement.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

5 Hardware Features

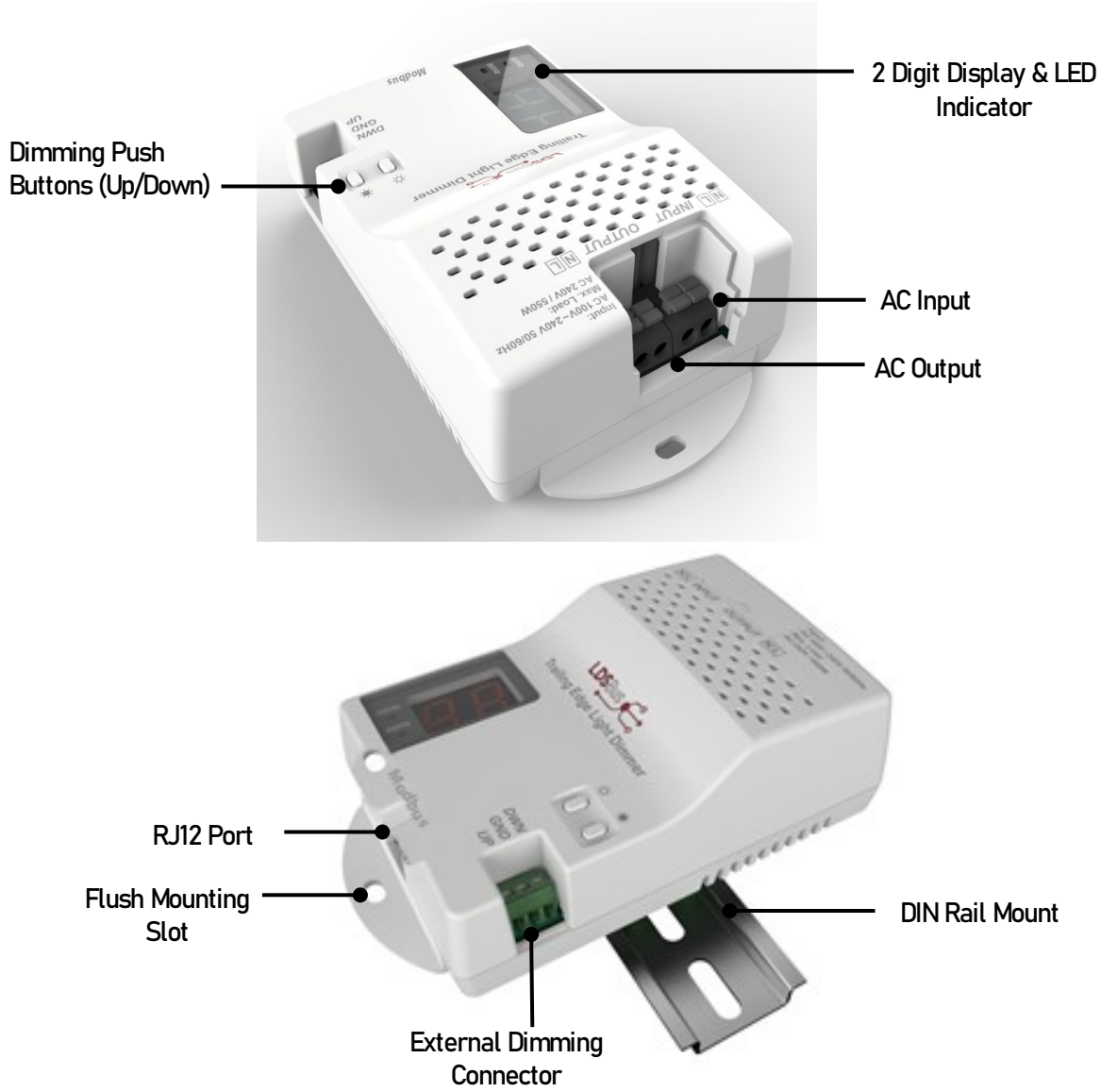


Figure 1 - Modbus Trailing Edge Light Dimmer Controller

Function	Labels	Description
AC Input	Input (N,L)	Input Voltage to use for the load (100VAC – 240VAC / Frequency – 50Hz/ 60Hz, +/- 3Hz)
AC Output	Output (N,L)	Output Voltage to the load (Max. Load – 550W@240VAC / Max. Current – 2.30A)
Dimming Push Buttons	☀	To increase brightness
	☼	To reduce brightness
External Dimming Connector	Down/GND/Up	To control the brightness using external buttons
RJ12 Port	Modbus	Modbus data and power interface port

Table 3 - Modbus Trailing Edge Light Dimmer Hardware Features

6 Light Dimmer Configuration and Installation

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

6.1 Connection Diagram

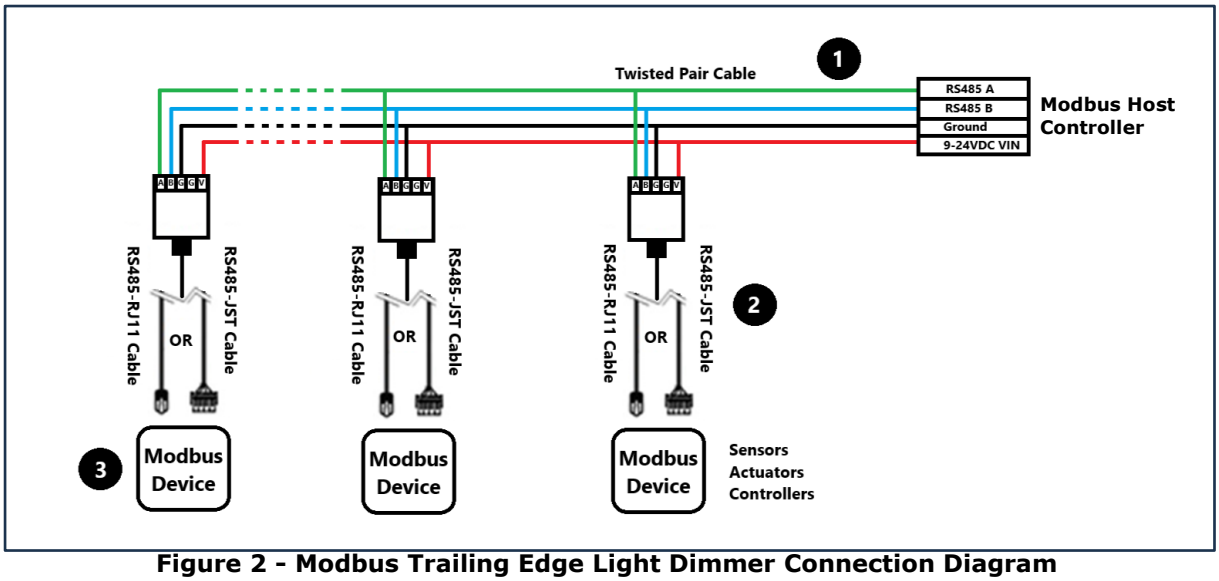


Figure 2 - Modbus Trailing Edge Light Dimmer Connection Diagram

Setup Instructions:

1. Use a Cat5e/Cat6e RJ45 Twisted Pair Cable to connect the Modbus controller (Host) to the network for RS485 communication and power.

2. Connect each Modbus device to the network using either an RS485-JST cable or an RS485-RJ11 cable, as provided with the device.

3. BRTSYS Modbus devices have built-in bus termination resistors. These resistors can be enabled or disabled by using the BRTSYS Modbus Configuration Utility. When installing the device as the last device on the bus, these terminations may be used to terminate the bus.

6.2 RS485-RJ11 Cable(30cm)

Figure 3 – RS485-RJ11 Cable(30cm)

PIN Legend	Function
VIN	Modbus Input Voltage 9-24VDC
GND	Ground
GND	Ground
B	RS485-B
A	RS485-A

Table 4 - RS485-RJ11 Cable(30cm) Pin Configuration

7 Mounting Instructions

7.1 Flush Mount

The Modbus Trailing Edge Light Dimmer can be flush mounted directly on a wall or any flat surface using 2 M3.5*16mm (thread) screws.

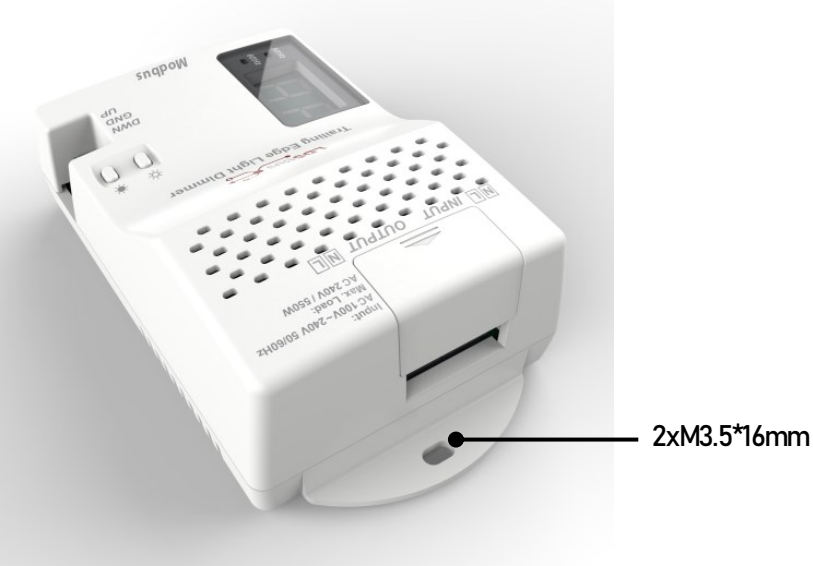


Figure 4 - Modbus Trailing Edge Light Dimmer Flush Mount

7.2 DIN Rail Mount

The DIN Rail Mount can be fixed using a DIN Rail bracket that has two mounting holes. The package includes mounting screws and a backplate. (The DIN Rail Bracket is not included in the package).

Figure 5 - Modbus Trailing Edge Light Dimmer DIN Rail Mount

8 Terminal Wiring Instructions on AC Input & Output

The connections are made with Push-in CAGE CLAMP technology. When using solid conductor wire or stranded wire insulation ferrule, the stripped conductor can simply be inserted into the clamp until it hits the backstop without requiring a screwdriver. Figure 6 shows how to do wiring and remove the cable from the connector using a flat head screwdriver to push the push buttons and pull out the wire.

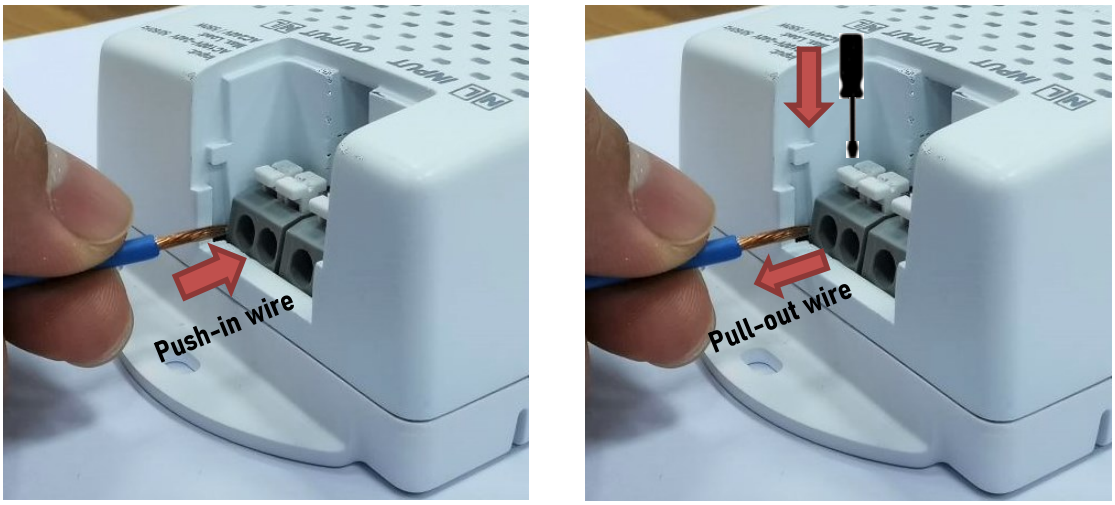


Figure 6 - Push-in Wire and Pull-out Wire

Table 5 provides a list of American Wire Gauges (AWGs) that can be used in the Terminal Blocks on AC Input and Output load.

Conductor Type	**Wire dimeter/AWG**
Solid conductor	0.25~2.5mm^2/20~12 AWG
Stranded conductor	0.25~2.5mm^2/20~12 AWG
Stranded conductor; with insulated ferrule	0.25~1.5mm^2

Table 5 - AWG to use in terminal block on AC Input and Output load

As shown in Figure 7, the wire strip is 8mm to 12mm long.

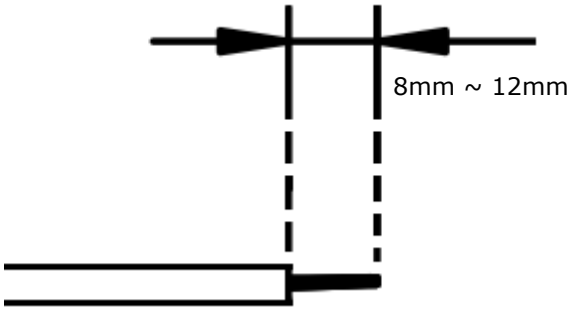
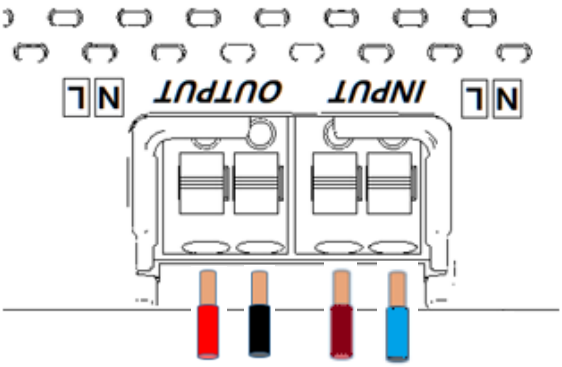


Figure 7 - Wire Strip Length

8.1 AC Input and Output Setup

The AC terminals support AC 100VAC – 240VAC input and dimmable lights and LEDs on the output. The connection is illustrated below:

Note: Ensure that the dimmable light/LED is compatible with the AC voltage connected to the input terminal when selecting it.



Use AWG 20~12; The BROWN wire indicates that it comes from AC Live

→ Connect to the Input Live

Use AWG 20~12; The BLUE wire indicates that it comes from AC Neutral

→ Connect to the Input Neutral

Use AWG 20~12; The RED wire indicates that it connects to dimmable Light / LED Live

→ Connect to the Output Live

Use AWG 20~12; The BLACK wire indicates that it connects to dimmable Light/ LED Neutral

→ Connect to the Output Neutral

WARNING! Turn off power to the unit and electrical circuit before attaching the wires.

9 Terminal Wiring Instructions on External Dim Up/Down

The terminal block is connected by screws. Figure 8 shows how to clamp the wire using a 0.4mm x 2.5mm slotted screwdriver and rotate in a clockwise direction. To release the wire, turn anticlockwise.

Figure 8 - Clamping wire with screwdriver in clockwise direction

Table 6 provides a list of American Wire Gauges (AWGs) that can be used in Terminal Blocks on External Dim Up / down.

Conductor Type	**Wire dimeter/AWG**
Solid conductor	0.2~1.5mm^2/26~16 AWG
Stranded conductor	0.2~1.5mm^2/26~16 AWG
Stranded conductor; with insulated ferrule	0.25~0.75mm^2

Table 6 - AWG to use in terminal blocks on external Dim up/down

As shown in Figure 9, the wire strip is 3mm to 5mm long.

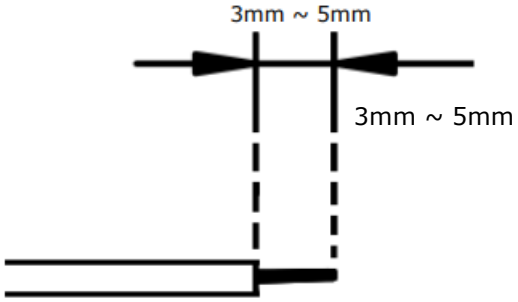
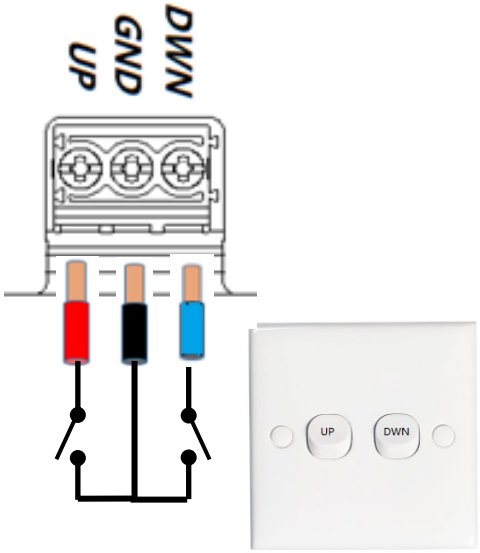


Figure 9 - 3mm to 5mm Wire Strip

9.1 External Dimming Up/Down Setup

A dimmable external connector supports UP / DOWN dimming. The connection is illustrated below:



Use AWG 26~16; The RED wire indicates that it comes from dimmer button

→ Connect to the UP switch

Use AWG 26~16; The BLUE wire indicates that it comes from dimmer button

→ Connect to the DWN switch

Use AWG 26~16; The BLACK wire indicates that it comes from dimmer button

→ Connect to the GND

10 LED Display

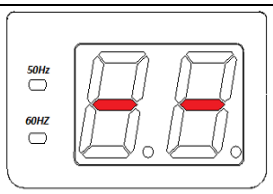
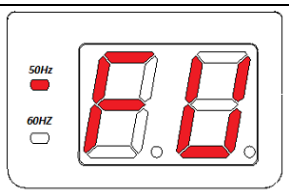
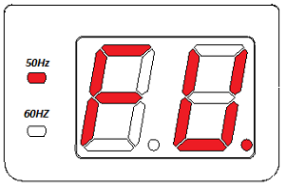
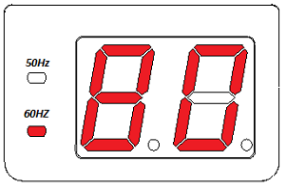
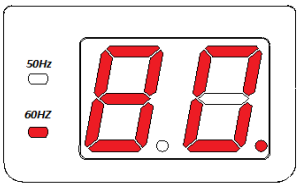
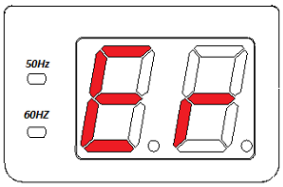
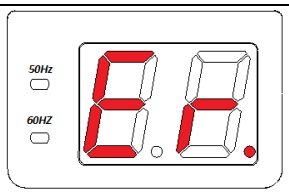
Device Status	LED	Description
No AC Input Voltage		AC input voltage no power ON Display "- -"
50Hz AC Frequency FULL dimming		AC input frequency is 50Hz AC input voltage power ON Brightness Mode 100% Display "FU"
		AC input frequency is 50Hz AC input voltage power ON PWM Mode 100% Display "FU."
60Hz AC Frequency 80% dimming		AC input frequency is 60Hz AC input voltage power ON Brightness Mode 80% Display "80"
		AC input frequency is 60Hz AC input voltage power ON PWM Mode 80% Display "80."
Error		AC input frequency is unknown AC input voltage power ON Brightness Mode stop Display " Er"
		AC input frequency is unknown AC input voltage power ON PWM Mode stop Display "Er."

Table 7 - Modbus Trailing Edge Light Dimmer – LED Display

A 7-segment LED in the controller indicates the brightness percentage when used with an external host application e.g., Modbus Python SDK or PanL Smart Living. The LED displays the internal PWM percentage when using the on-board buttons or external dimming interface. When an application sets the brightness, the display returns to brightness percentage.

11 Modbus Registers

Parameter	Starting Address	Quantity of Registers	Supported Function Code	Parameter Range and Description	Default
Address(1)	0000H	1	0x03/0x10	1 to 126	126
RS485 Termination(1)	0001H	1	0x03/0x10	0 - Termination OFF 1 – Termination ON	Termination OFF
Baud Rate(1)	0002H	1	0x03/0x10	0 - 1200 bps 1 - 2400 bps 2 - 4800 bps 3 - 9600 bps 4 -19200 bps 5 - 38400 bps 6 -115200 bps	9600 bps
Parity(1)	0003H	1	0x03/0x10	0 – None 1 – Odd 2 - Even	Even
Status LED Enable(1)	0004H	1	0x03/0x10	0 - LED OFF 1 - LED ON	LED ON
Reserved	0005H - 001FH	26	N/A	N/A	N/A
Brightness	0020H	1	0x03/0x10	Light brightness	0 - 100%
Light Control	0021H	1	0x03/0x10	0 - OFF 1 - ON	Turn on with last stored brightness
Reserved	0022H - 0025H	4	N/A	N/A	N/A
Device UUID	0026H	8	0x03	MCxxxxxxxxxxxxyy where x is ASCII character and yy is 16-bit running number	N/A
Device Firmware Version	002EH	1	0x03	0xXXMN XX – Not concerned M – Major N - Minor	N/A
Device Part Number	002FH	1	0x03	Device ID	0x4000
Reserved	0030H	N/A	N/A	N/A	N/A
Status	0031H	1	0x03	2b'00 - The device cannot detect AC Input Frequency 2b'01 - 50 Hz 2b'10 - 60Hz 2b'11 - Unknown frequency	N/A
Reset	0150H	1	0x06	Write 1 to reset	N/A
Reserved	0151H	N/A	N/A	Reserved	N/A
Identify	0152H	1	0x06	Write 1 to start blinking the device @1Hz for 10 seconds	N/A

Table 8 - Modbus Registers

(1)This indicates that any updates to these communication/status register(s) will only take effect after the device has been rebooted.

12 Mechanical Dimensions

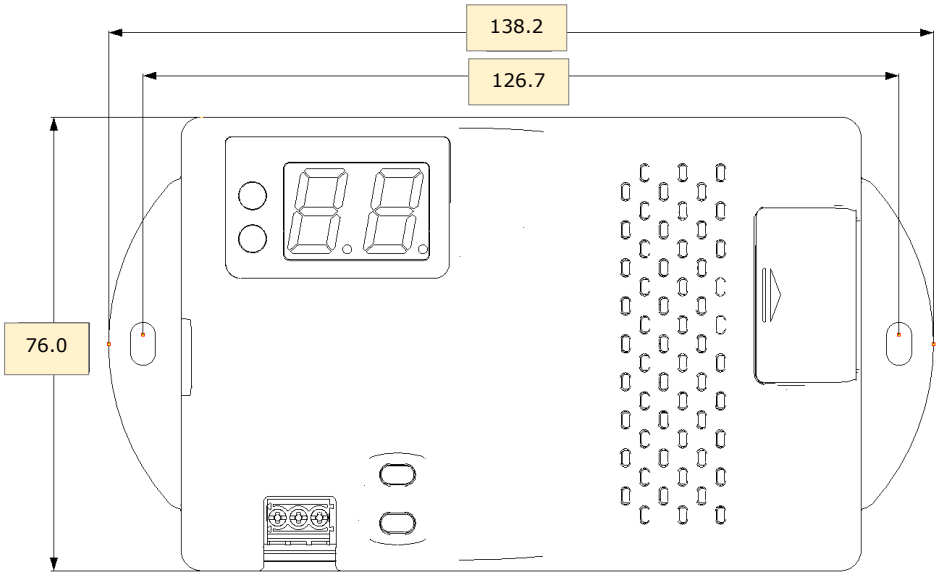


Figure 10 - Modbus Trailing Edge Light Dimmer Dimension – Top View

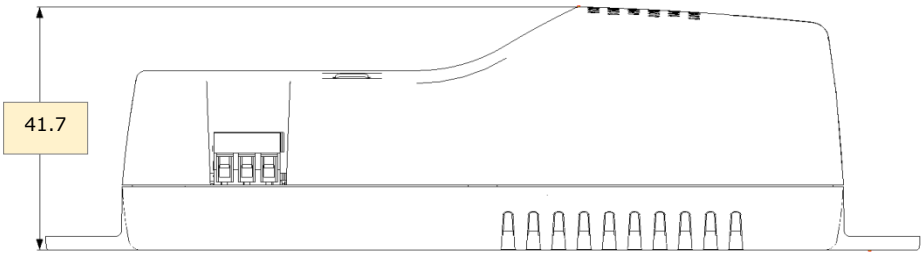


Figure 11 - Modbus Trailing Edge Light Dimmer Dimension – Side View

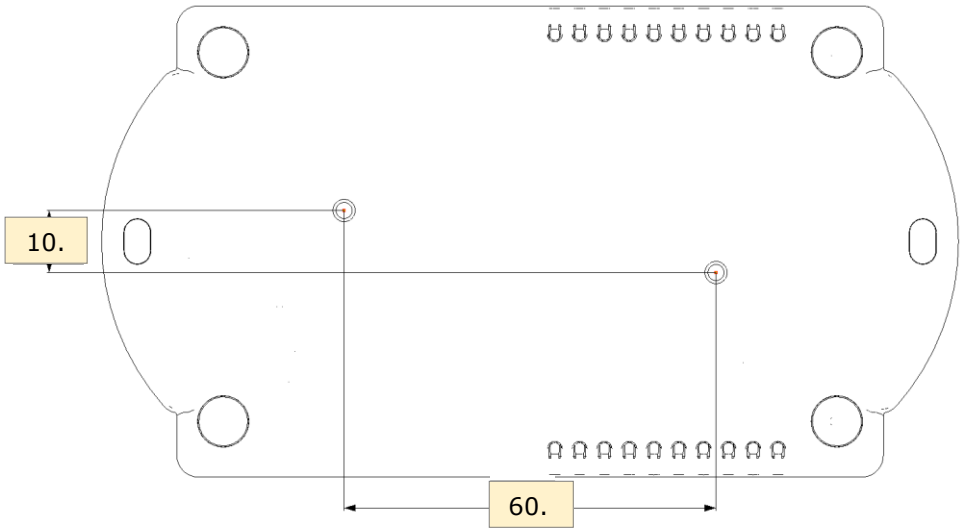


Figure 12 – Modbus Trailing Edge Light Dimmer Dimension – Bottom View

Note: All dimensions are in millimetres.

13 Contact Information

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

Appendix A – References

Document References

Modbus Configuration Utility User Guide

Modbus Device Configuration Application Note

Acronyms and Abbreviations

Terms	Description
AC	Alternating Current
AWG	American Wire Gauges
DC	Direct Current
IoT	Internet of Things
LED	Light Emitting Diode

Appendix B – List of Figures and Tables

List of Figures

List of Tables

Appendix C – Revision History

Document Title: Modbus Trailing Edge Light Dimmer Datasheet

Document Reference No.: BRTSYS_000189

Clearance No.: BRTSYS#123

Product Page: https://brtsys.com/product/trailing-edge-light-dimmer/

Document Feedback: Send Feedback

Revision	Changes	Date
Version 1.0	Initial Release	31-07-2025