

# PanL Relay (PC0144) Datasheet



## 1 Introduction

The PanL Relay acts as a smart switch controlled by PanL Hub and can turn any normal appliance into a smart device. It consists of 4 on-board Relays (RL1-RL4) as well as 4 Solid State Relay (SSR) control channel ports which can be connected to external SSRs to switch higher power electrical devices. The PanL Relay also comes with 4 DC input channels designed to take in external DC inputs ranging from 3.3V to 24V. It can be used as a feedback channel to sense the RL1-RL4 and SSR activation.

### 1.1 Features

PanL Relay has the following features:

- Integrated FT903 32-bit RISC microcontroller (MCU) with 100MHz system clock
- Rotate ID switch configuration for RS485 device in daisy chain configuration
- 4 on-board Relays (RL1-RL4) support AC 250V/DC 28V/10A/Relay

- 4-Channel Output SSR Control to activate external SSR with DC 12V/25mA rating.
- 4-Channel Input port that can receive 3.3V to 24V DC from external devices.
- 8 X RGB LEDs for Status Indicator
- RJ45 Ports support RS485 Interface to PanL Hub, PanL Terminator, daisy chain to another PanL ML Controller or other PanL Devices
- Powered by PanL Hub at 24V DC Input through either P1/P2 RJ45 port
- Operating temperature range : 0°C to +55°C



## 2 Ordering Information

<b>Part No.</b>	<b>Description</b>
PC014400A	PanL Relay (RL1-RL4) + 4CH SSR Control +4CH DC Input

**Table 1 - PanL Relay Part Number**

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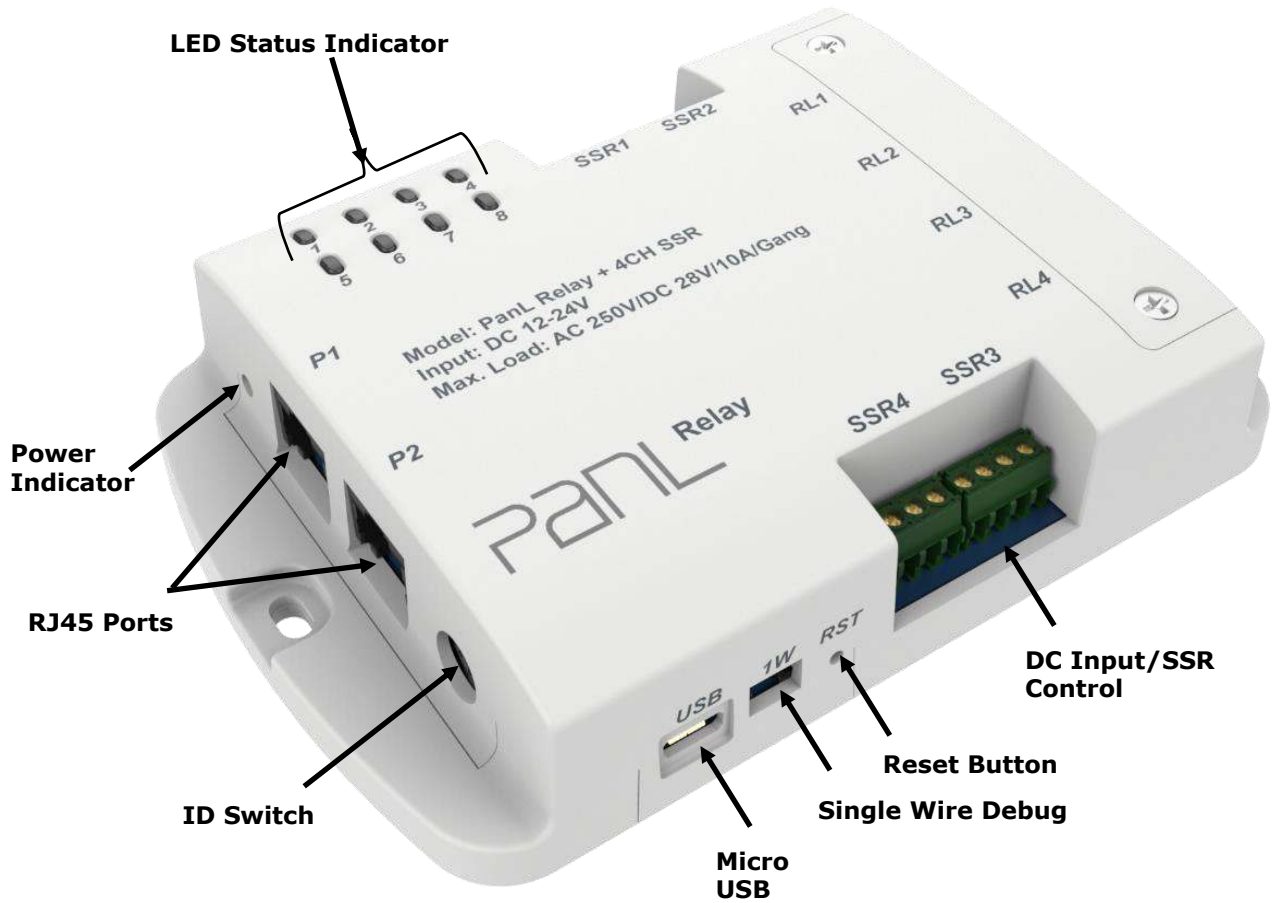
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## 3 Specifications

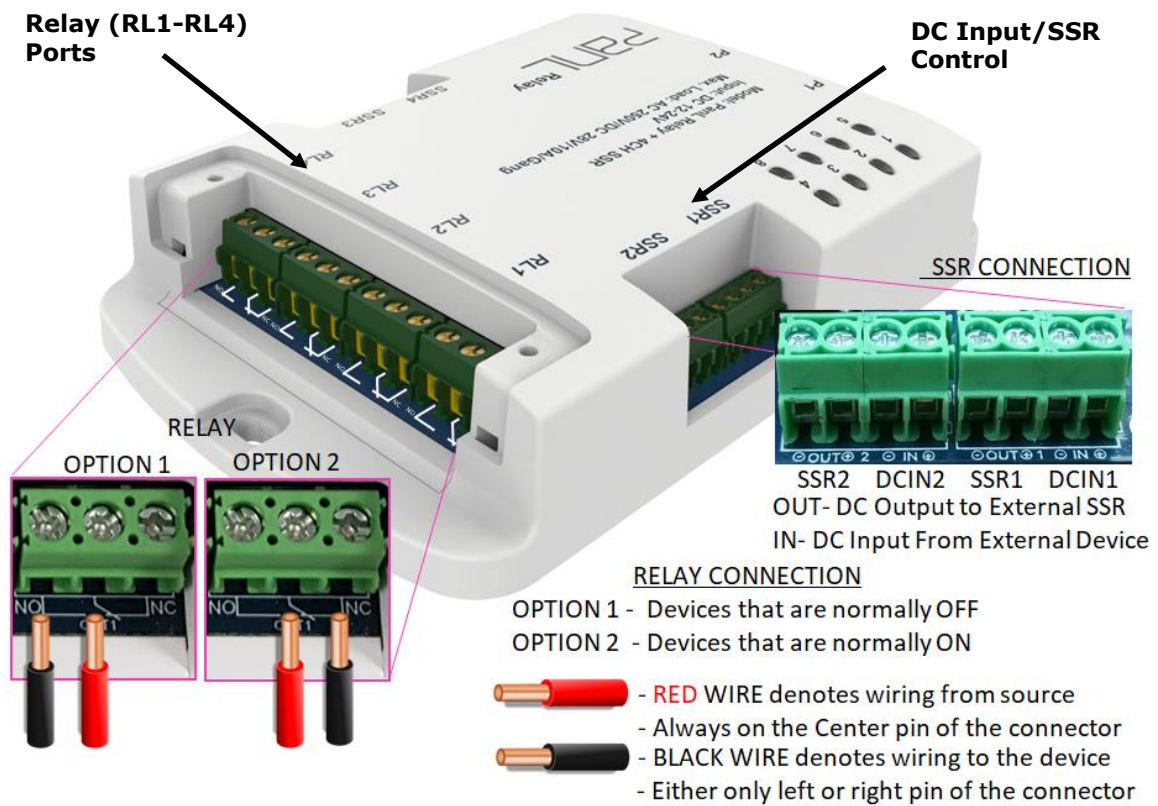
<b>PLATFORM</b>	Microcontroller	FT903Q
<b>FEATURES</b>	Relay (RL1-RL4)	4 X DC 28V/10A, AC 250V/10A
	Output Channel for SSR	4 X DC 12V, 25mA
	Input Channel	4 X DC 3.3V to 24V
	Reset Button	Push Switch
	Status Indicator	8x RGB LEDs
	Power Indicator	Red LED
	Single Wire Debug (1W)	Reserved for factory use only
<b>POWER</b>	Input Voltage	+16V to +24V DC (P1/P2 RJ45 in Parallel)
	Micro USB	Reserved for factory use only
<b>PHYSICAL CHARACTERISTICS</b>	Color	White
	Housing	Polycarbonates
	Dimensions	145.70 x 96.70 x 29.50 mm
	Weight	205g
<b>ENVIRONMENTAL LIMITS</b>	Operating Temperature	0 to +55°C
	Storage Temperature	0 to +70°C
	Ambient Relative Humidity	20 to 85% (non-condensing)
<b>STANDARDS &amp; CERTIFICATIONS</b>	EMC (FCC/CE)	EN 55032:2015+AC:2016 Class B CISPR 32:2015+C1: 2016 Class B EN 55035:2017 FCC PART 15, Subpart B
<b>PACKAGE CONTENTS</b>	Device	1x PanL Relay
	Documentation	1x Quick Start Guide

**Table 2 - PanL Relay Specifications**

## 4 Hardware Features



**Figure 1 - PanL Relay Front View**



**Figure 2 - PanL Relay Side View**

### 4.1 Power Supply

The PanL Relay receives power externally from PanL Hub through the P1/P2 RJ45 ports. Input supply voltage is 16V DC to 24V DC (nominally 24V, 500mA from Hub).

### 4.2 Micro-Controller






















The [FT903Q](#) 100-pin QFN microcontroller which is provided on the board belongs to the [32-bit FT90X Super Bridging Microcontroller](#) family from [Bridgetek](#).






















### 4.3 Power Indicator

A red colour LED indicator to indicate the power status (ON/OFF) of the PanL Relay.

## 4.4 LED Status Indicator

Eight RGB LED indicator that indicates the functioning status of the PanL Relay. Refer to the table given below –

Normal Function Status	System/RL1 Status (LED 1)		Communications/RL2 Status (LED 2)		RL3-4/SSR1-4 Status (LED 3-8)	
	Color	Icon	Color	Icon	Color	Icon
Power On Status	Red		Red		Red	
Boot Success	Green		Red		Off	
No Communication	Green		Red		Off	
Unconfigured	Green		Green		Off	
Configuring	Yellow*		Green		Off	
Ready/Relay Operating State	Green		Green		Green	
Ready/Relay Relaxed State	Blue		Blue		Blue	

Failsafe Status	System/RL1 Status (LED 1)		Communications/RL2 Status (LED 2)		RL3-4/SSR1-4 Status (LED 3-8)	
	Color	Icon	Color	Icon	Color	Icon
Power On Status	Red**		Off		Off	
Boot Success	Red**		Off		Off	
No Communication	Red**		Red		Off	
Communication	Off		Green*		Off	
Waiting for Recovery	Red<-> Green**		Green*		Off	
Recovery in Progress	Red<-> Yellow**		Green*		Off	
Recovery Done	Green**		Green**		Off	

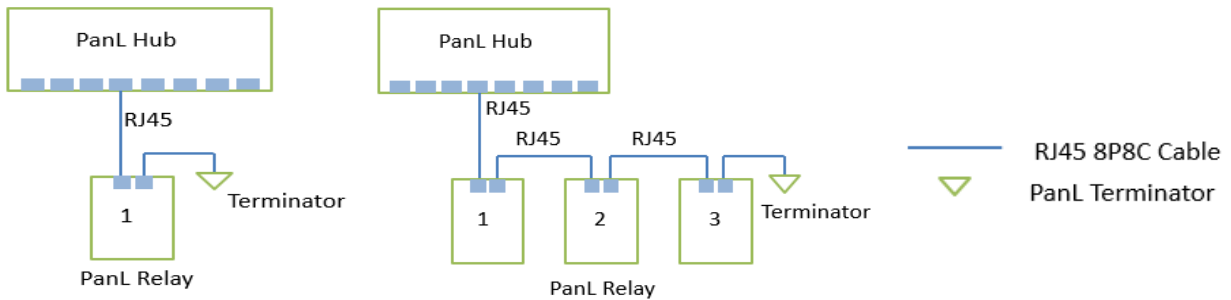
\* - LED blinks during data transfer

\*\* - LED blinks twice a second (2Hz rate)

**Table 3 – LED Status Indicator**

## 4.5 P1/P2 (RJ45) Port

P1/P2 (RJ45) ports are used either as an input or output terminal that is connected to the Hub, other PanL Devices or another PanL Relay as illustrated below. When a single PanL Relay is connected to a PanL Hub port, the maximum length of the RJ45 8P8C cable shall not exceed 100 meters. For multiple PanL Relay connections to a single PanL Hub port, the first connection to PanL Hub and the subsequent connections in between the PanL Relay devices must not exceed 50 meters in cable length each. A single PanL Hub port can support up to three PanL Relays. The total combined cable lengths must not exceed 100 meters. Connect the PanL terminator provided in PanL Hub box to the last unconnected PanL Relay P1 or P2 port.



**Figure 3 - Daisy Chain Network**

## 4.6 ID Switch

For multiple PanL Relay or mixed PanL Device daisy chain connection to a single PanL Hub port, the ID switch must be configured to be unique. Using a Philip head screw driver, set a unique number for each device between 0-7 (8-9 are reserved). For example, if connecting 3 PanL Relays to a PanL Hub port, users may set it as 0, 1, 2. PanL Relay connected to different PanL Hub ports can share the same unique number. A maximum of 2 PanL devices are allowed for daisy chain if there are more than one PD70, PD70PLUS or PD50 device or any combination of these present. Any other combinations will have a maximum limit of three devices.

## 4.7 Reset Button

This button is used to reset the PanL Relay.

## 4.8 USB Interface

This is reserved for factory use only.

## 4.9 Single Wire (1W) Debug

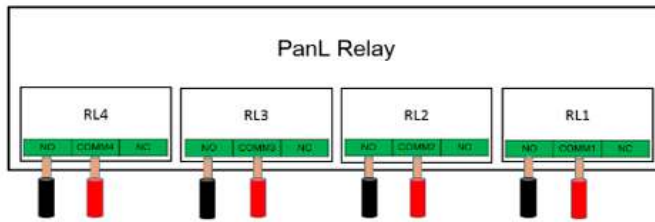
This is reserved for factory use only.

## 4.10 Relay (RL1-RL4) Ports

The Relay (RL1-RL4) supports both AC and DC Loads and is rated at AC250V/DC28V/10A max per relay. Figure 4 depicts 2 connection options:



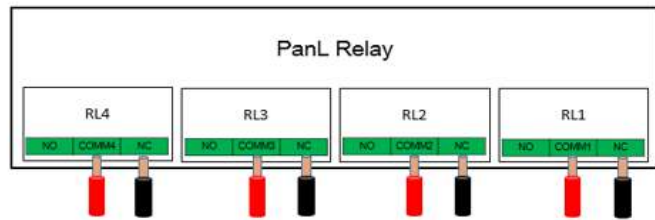
### DEVICES NORMALLY OFF (NO)



Use AWG 16; **RED** denotes wire coming from AC/DC Source  
→ Connect to the Center PIN

Use AWG 16; **BLACK** denotes wire coming from Electrical Device  
→ Connect to NO PIN

### DEVICES NORMALLY ON (NC)



Use AWG 16; **RED** denotes wire coming from AC/DC Source  
→ Connect to the Center PIN

Use AWG 16; **BLACK** denotes wire coming from Electrical Device  
→ Connect to NC PIN



**WARNING: ALWAYS SWITCH OFF POWER SUPPLY WHEN WIRING**

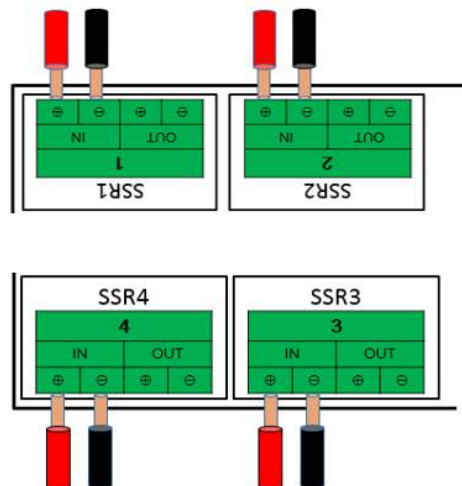
**Figure 4 – PanL Relay (RL1-RL4) Ports**

## 4.11 DC Input/SSR

There are four Solid State Relay (SSR1-SSR4) channels which have dual functions. They can act as an Output channel to activate external SSR or Input channel for sensing from external devices.

### 4.11.1 DC Input

The four DC input channels are designed to take in external DC inputs ranging from 3.3V to 24V. They can be used as a feedback channel to sense the RL1-RL4 and SSR activation. Setup connections are illustrated in Figure 5:



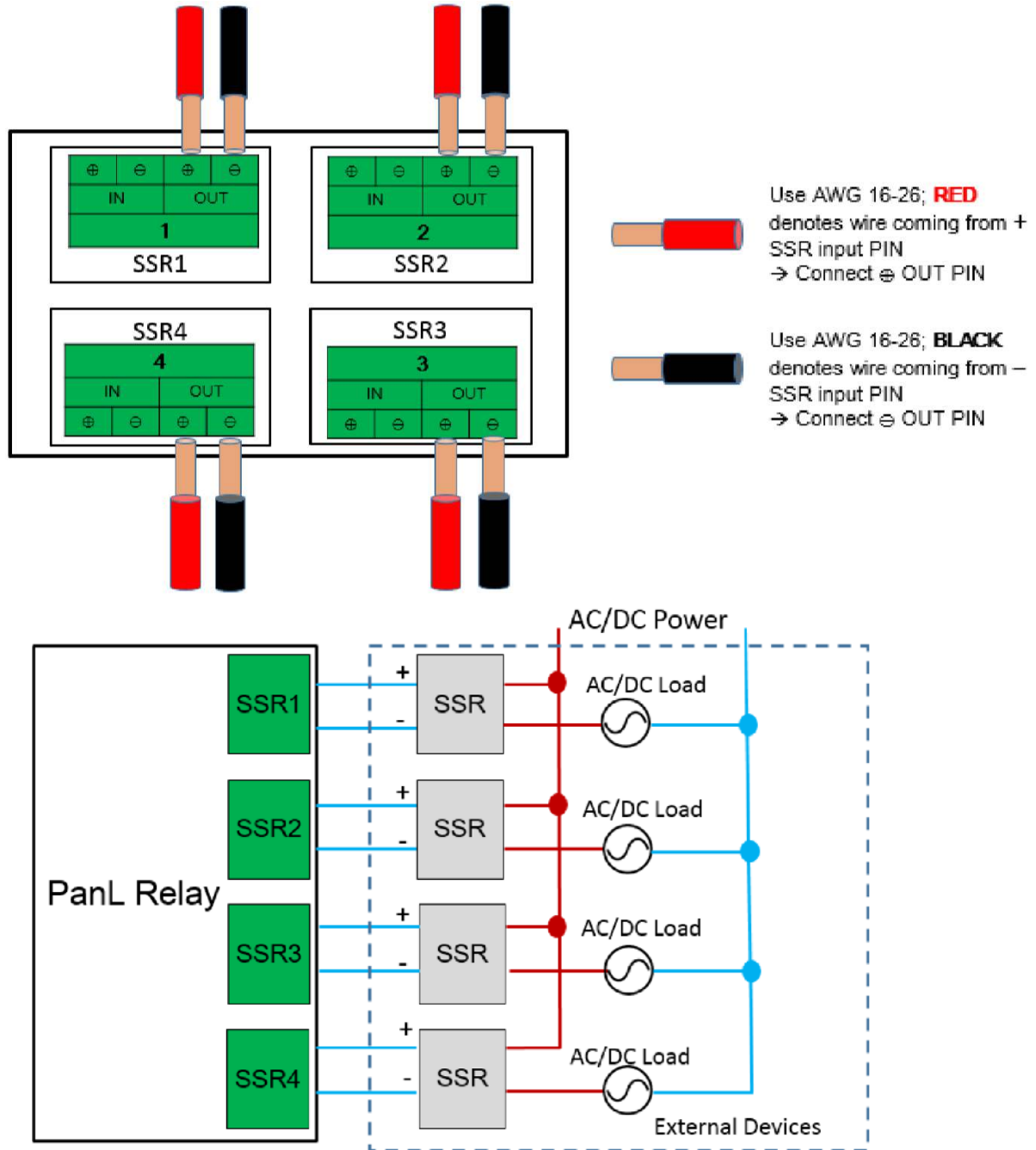
Use AWG 16-26; **RED** denotes wire coming from + Device output PIN  
→ Connect ⊕ IN PIN

Use AWG 16-26; **BLACK** denotes wire coming from – Device output PIN  
→ Connect ⊖ IN PIN

**Figure 5 – DC Input**

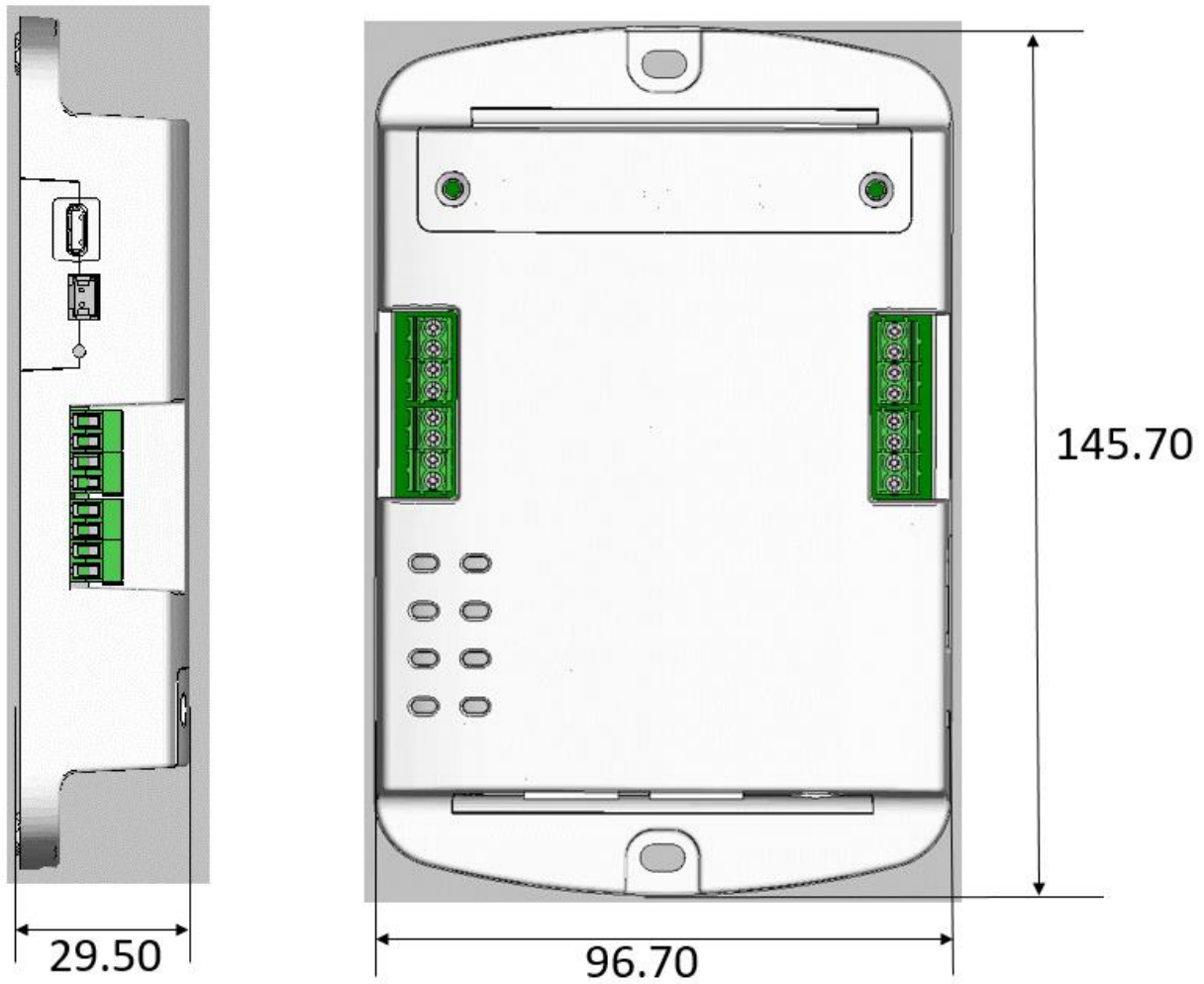
### 4.11.2 SSR Control

The four Solid State Relay (SSR) Controls are designed to be able to drive low to high loads through an external SSR. The output channels are rated at 12V/25mA max for each channel. Setup connections are illustrated in figure 6. Actual load rating is dependent on external SSR specifications.



**Figure 6 – SSR Control**

## 5 Mechanical Dimensions



**Figure 7 – PanL Relay Dimensions**

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## Appendix A - References

### Document References

NA

### Acronyms and Abbreviations

Terms	Description
LED	Light Emitting Diode
MCU	Micro Controller Unit
QFN	Quad-Flat-No Leads
RGB	Red Green Blue
RISC	Reduced Instruction Set Computer
SSR	Solid State Relay
USB	Universal Serial Bus

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## Appendix C – Revision History

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Version 1.0	Initial Release	2019-12-31