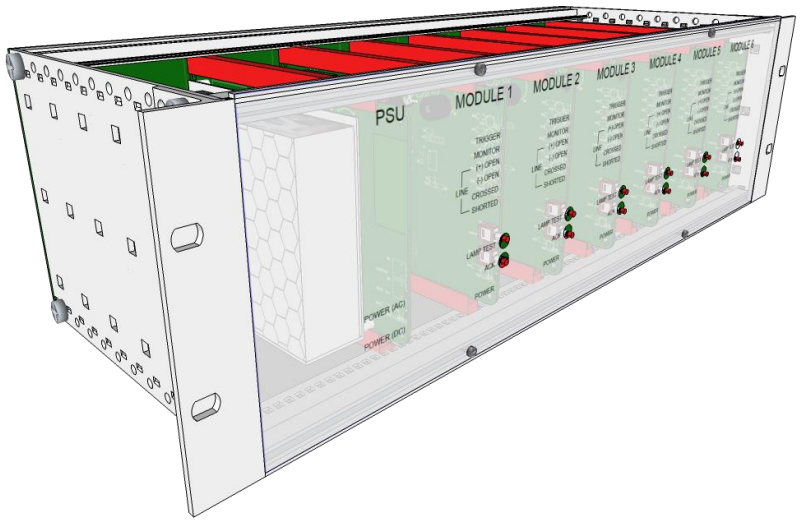
Strobe Lamp Line Monitoring System

Model: SEC-SLM-S1P1M6

User Manual



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Amendment Record			
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Version 1.1	05 Aug 2015	BT Lim	Update specification Added appendix
Version 1.2	11 Nov 2016	BT Lim	Update in section 4
Version 1.3	20 Oct 2020	BT Lim	Update in section 5

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1 Introduction

Strobe Lamp Line Monitoring System monitors the condition of power line to the strobe lamp. The ring wiring topology used is able to monitor open circuit, crossed circuit & short circuit in both the positive loop and negative loop of the power line.

This real-time active fault detection ensures the power line to the strobe lamp is always in working condition and also allows maintenance team to rectify problem occurs on the strobe lamp power line when fault condition occurs.

NOTICE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

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2 System Component

The System consists, mainly of three components, namely 3U Enclosure, Power Supply module and Monitoring module, respectively.

2.1 3U Enclosure

19 inch 3U Enclosure is the base for mounting Power Supply module and Strobe Lamp Line Monitoring module.

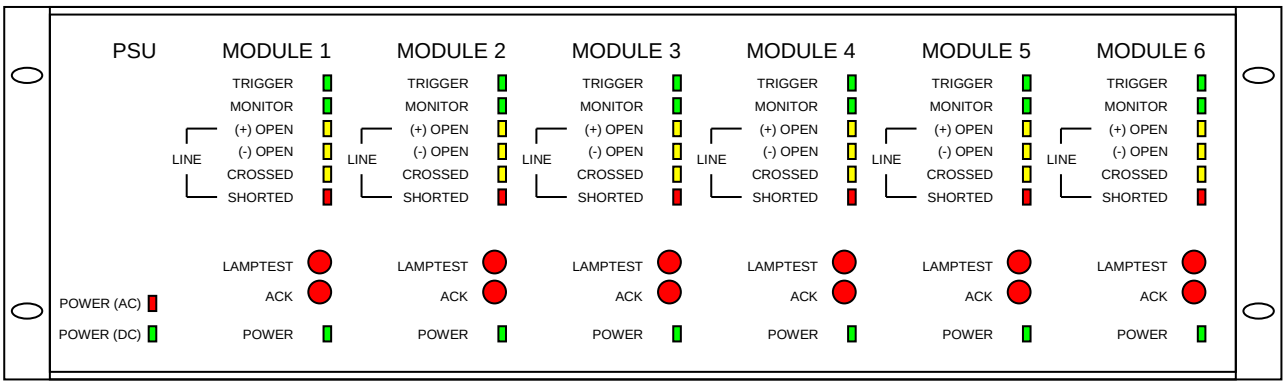

Figure 2-1 Front View of Strobe Lamp Line Monitoring System

One 19 inch 3U Enclosure is able to mount 1 x Power Supply Module and up to 6 x Monitoring Module. The number of Monitoring Modules depends on the number of strobe lamp circuit to be monitored.

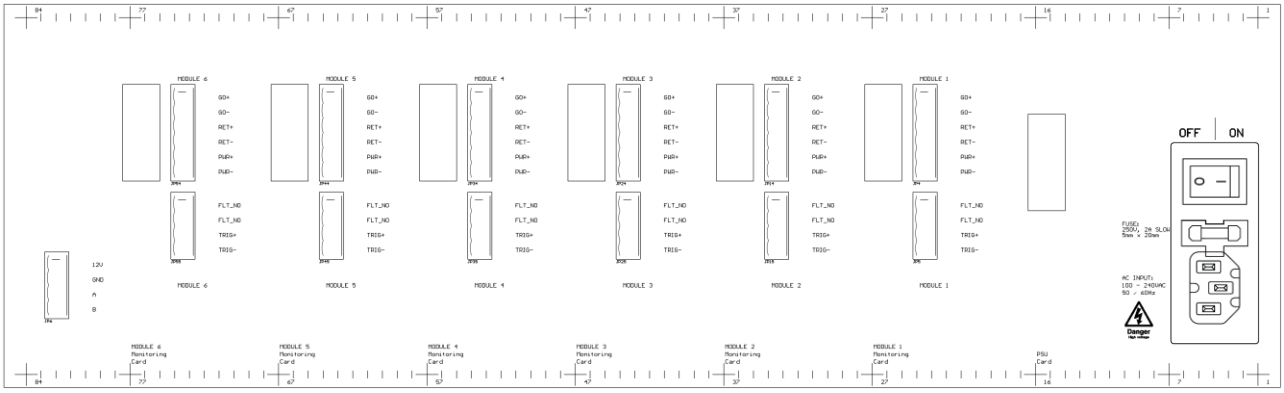

Figure 2-2 Back View of the Strobe Lamp Monitoring System

The back of the enclosure is where the cables to and from the strobe lamp and its power source is located. There is IEC connector with 2A fused located at the bottom left of the panel where the 100 to 240Vac power supply is connected to power the monitoring modules.

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2.2 Power Supply Module

The power supply module take AC power from the enclosure and output 12Vdc to power the monitoring module within the enclosure. One enclosure requires 1 x Power supply module to power up to 6 x monitoring modules.

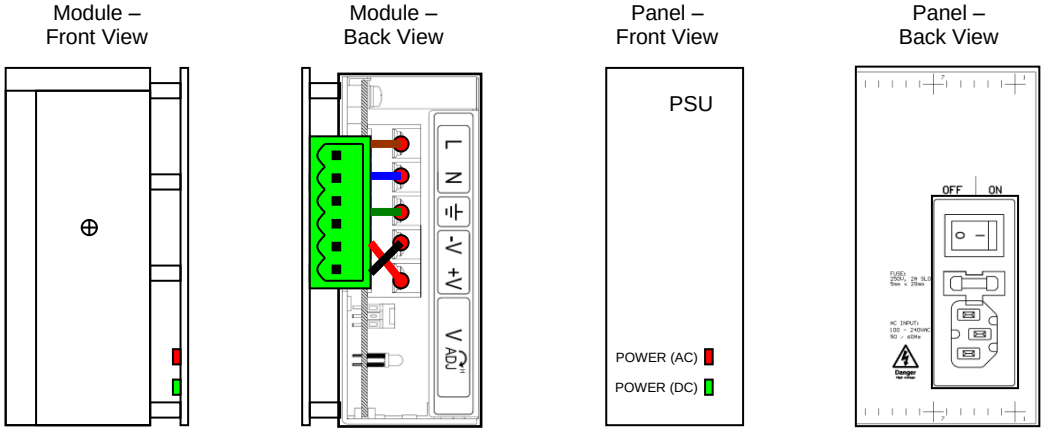

Figure 2-3 Power Supply Module

The above figure shows the module front view, module back view, panel front view and panel back view, respectively. The module front view and back view show what it look like when it is not installed into the 3U enclosure. From the back view of the module, the 6 pin connector is connected to the 3U enclosure when mounted. When the module is installed, the front panel of the enclosure will indicate whether there are AC power and DC power.

Item (front panel)	**Description**
Power (AC)	Indicator – Red Light up when there is incoming AC power
Power (DC)	Indicator – Green Light up when there is outgoing DC power

Item (Back panel)	**Description**
ON-OFF rocker switch	Switch On / off power to strobe lamp monitoring system
Fuse holder	5mm x 20mm fuse holder 250Vac, 2A slow Fuse protection to System
IEC socket	To connect AC power to the system

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2.3 Monitoring Module

The monitoring module is to monitor the strobe lamp line and also provide a means to turn on the strobe lamp when needed.

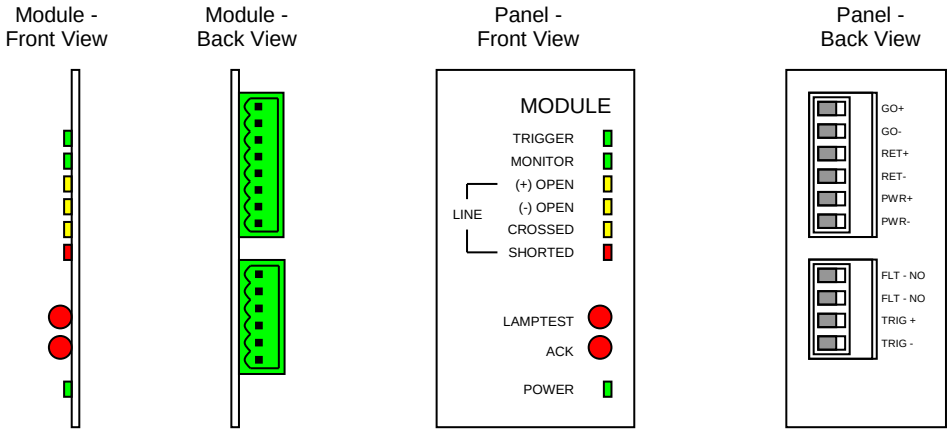

Figure 2-4 Monitoring Module

The above figure shows the module front view, module back view, panel front view and panel back view, respectively. The module front view and back view show what it look like when it is not installed into the 3U enclosure. From the back view of the module, the 6 pin connector and 8 pin connector is connected to the 3U enclosure when mounted. The back view of the panel is where the cable connecting to the strobe lamps, returning cable from the strobe lamp, the power supply cable for the strobe lamp, dry contact signal cable and fault signal cable should be terminated.

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Item (Front panel)	Description
Power	Indicator – Green Light up when there is incoming DC power
Trigger	Indicator – Green Light up when there is a trigger signal to turn on the strobe lamp
Monitor	Indicator – Green Light up when the module is monitoring the strobe lamp line for fault
(+) open	Indicator – Yellow Light up when GO+ and RET+ terminal is open
(-) open	Indicator – Yellow Light up when GO- and RET- terminal is open
Crossed	Indicator – Yellow Light up when GO+ and RET- is shorted OR/AND GO- and RET+ is shorted
Shorted	Indicator – Red Light up when GO+ and GO- is shorted OR/AND RET+ and RET- is shorted
Lamp Test	Push button Push to light up all indicators and buzzers
ACK	Push button Push to silence the buzzer when a fault occurred

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Item (back panel)	Description
GO+ terminal	Outgoing Terminal connector for Cable to strobe lamp + Will connect to “Power +” when triggered to turn on strobe lamp
GO- terminal	Outgoing Terminal connector for Cable to strobe lamp - Will connect to “Power -” when triggered to turn on strobe lamp
RET+ terminal	Return terminal connector for cable return loop of “GO+” For monitoring & will connect to “Power+” when there is open fault at (+) loop and trigger occurred
RET- terminal	Return terminal connector for cable return loop of “GO-” For monitoring & will connect to “Power-” when there is open fault at (-) loop and trigger occurred
PWR+ terminal	Terminal to connect power source (+) for strobe lamp (+) If strobe lamp is AC, connect “Live” here
PWR- terminal	Terminal to connect power source (-) for strobe lamp (-) If strobe lamp is AC, connect “Neutral” here
FLT-NO terminal	A pair of terminal that will be closed when fault occurred. Stay closed until the fault is cleared. Normally open when there is no fault detected
TRIG+ & TRIG- terminal	A pair of terminal that accept dry contact (voltage free) signal. When these terminals are shorted, it will turn on the strobe lamp.

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3 Wiring Connection

NOTICE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

All power sources should be OFF before any work can proceed.

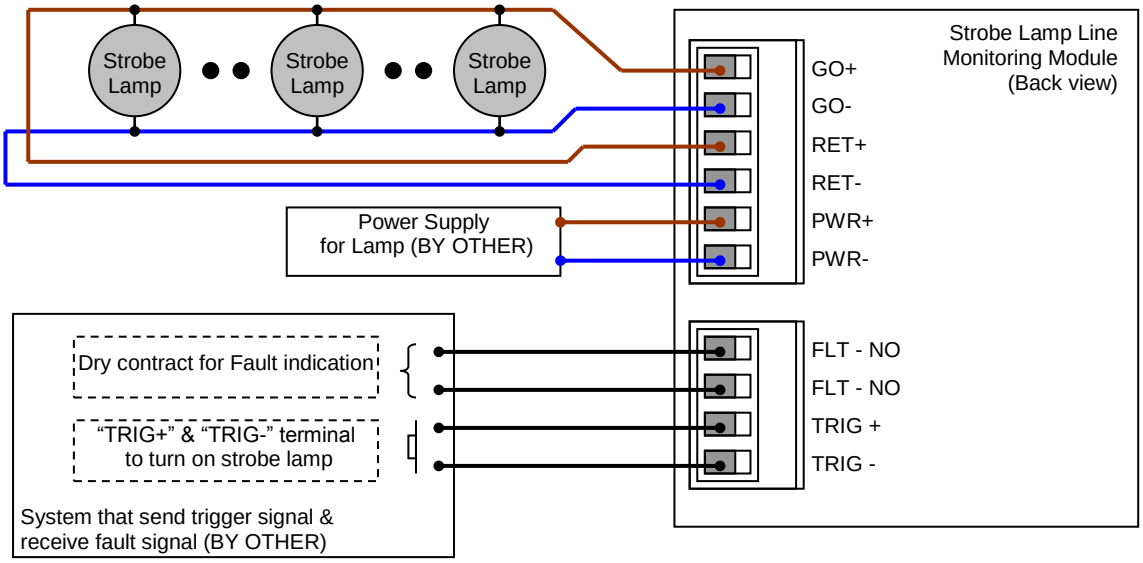

Figure 3-1 Connection for Strobe Lamp loop, strobe lamp power, control and status signal

The connection for strobe lamp loop is shown above. Note that cable going from GO+ should be terminated back to RET+. This is the positive loop. This stays true for GO- and RET- which is the negative loop. The power for the strobe lamp should terminate as shown above. When triggered, the PWR+ and PWR- will be connected to GO+ and GO- respectively.

The system that provides the trigger contact to turn on the strobe lamp and also take in fault dry contact should be connected as shown above.

The method for connection is the same for all 6 x monitoring module back panel.

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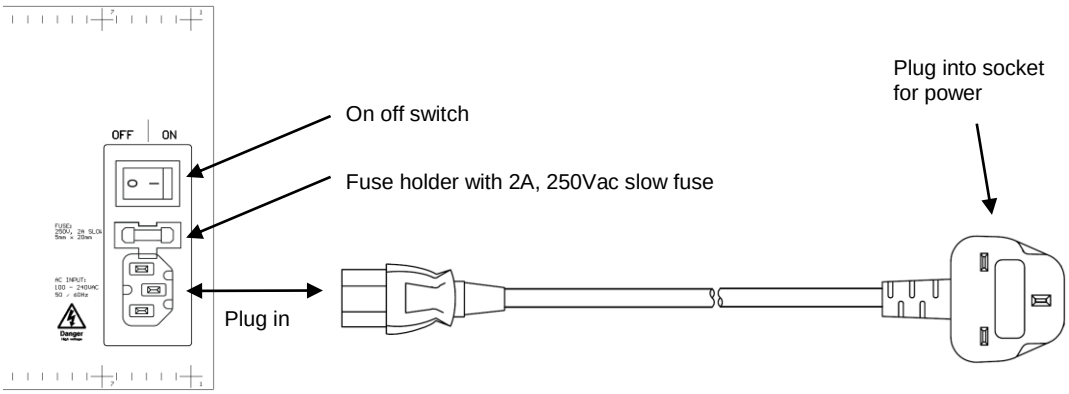

Figure 3-2 Connection for Power to Strobe lamp line monitoring System

The connection to power the strobe lamp monitoring system is shown above.

Ensure all the cable is connected correctly before turning on the power. Once the power switch is on, both “Power (AC)” and “Power (DC)” indicators should be on. If “Power (AC)” indicator is not on, check the connectivity between the UK plug and ensure there is power for the UK plug. If power is present and connectivity is correct, check whether the fuse at UK plug and the fuse in the fuse holder are ok.

If “Power (AC)” indicator is on but “Power (DC)” indicator is off, the Power Supply Module is fault. Disconnect all power and replace the faulty module and try again.

Once the system is powered up, wait for 10 minutes to ensure there is no fault in all the individual loop at their respective module.

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4 Operation

In normal operation, there are two modes namely, “Trigger” and “Monitor” respectively.

When “TRIG+” and “TRIG-” terminal is shorted, it will be in “Trigger” mode where it is turn on the strobe lamp. Otherwise it will be in “Monitor” mode to monitor for any fault occurs.

During “Trigger” mode, no fault detection can be performed. Only when the module is in “Monitor” mode then the module will start fault detection.

In certain type of faults detected during “Monitor” mode, strobe lamp cannot be turn on by shorting “TRIG+” and “TRIG-” terminal as it will cause a short circuit on lamp power supply. This section explains in detail on different type of faults and their effect.

4.1 “Trigger” mode – with no fault occurs

When “TRIG+” and “TRIG-” terminal is shorted, it will be in “Trigger” mode. In this mode, it will turn on the strobe lamp.

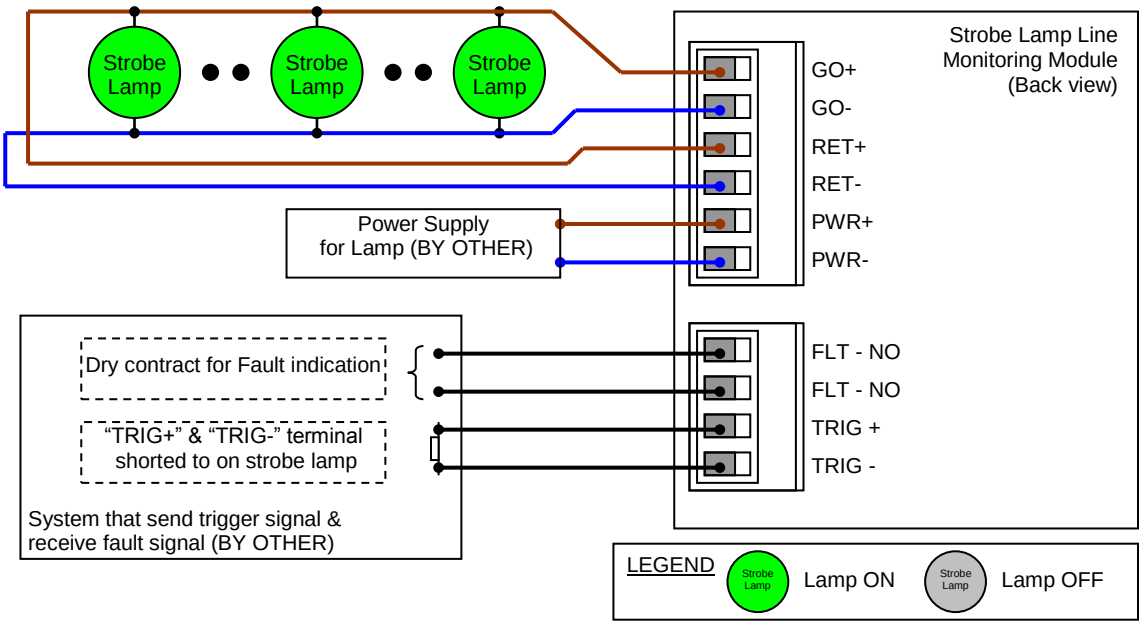

Figure 4-1 “TRIG+” & “TRIG-” shorted to turn on strobe lamp

At the front panel, the “Trigger” indicator will be on. Once the shorted to “TRIG+” & “TRIG-” is removed, the module will go back to “monitor” mode.

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4.2 "Monitor" mode – with no fault occurs

When "TRIG+" and "TRIG-" terminal is not shorted, it will be in "monitor" mode. In this mode, it will monitor the strobe lamp line and check for any fault occurs.

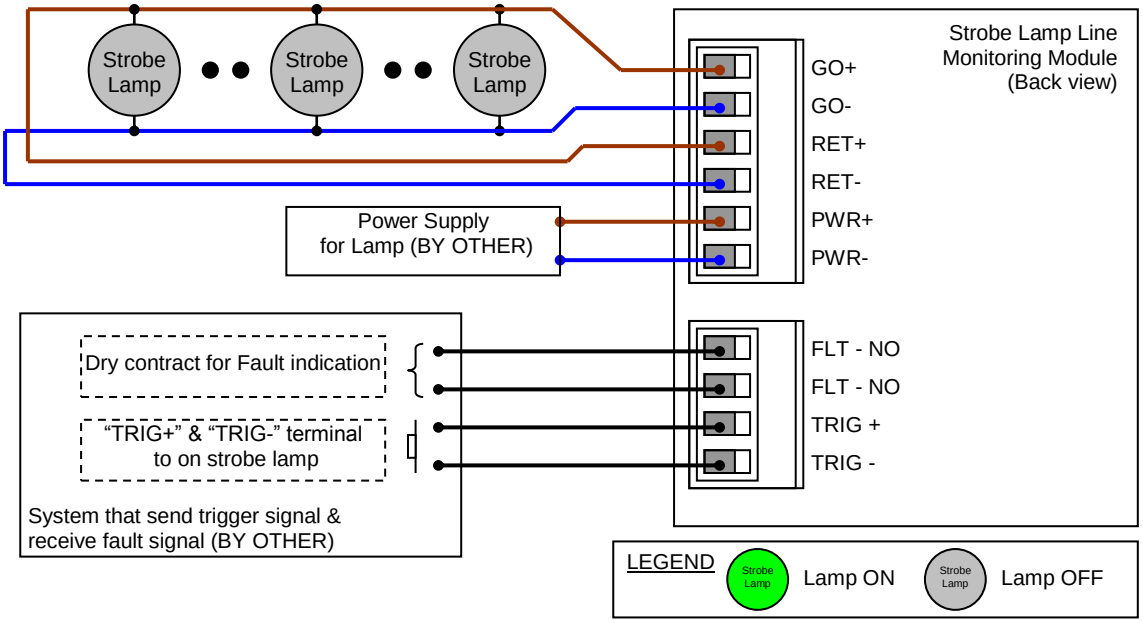

Figure 4-2 "Monitor" mode – no fault occurs

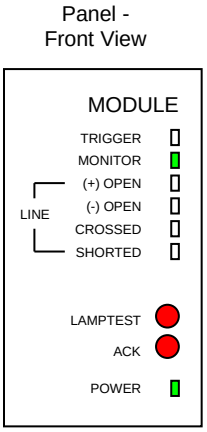

Figure 4-3 "Monitor" indicator on during "monitor" mode

At the front panel, the "monitor" indicator will on. As there is no fault detected, the "FLT-NO" terminal will be open.

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4.3 "Monitor" mode – with positive loop open fault occurs

When "GO+" and "RET+" is open, positive loop open fault occurred.

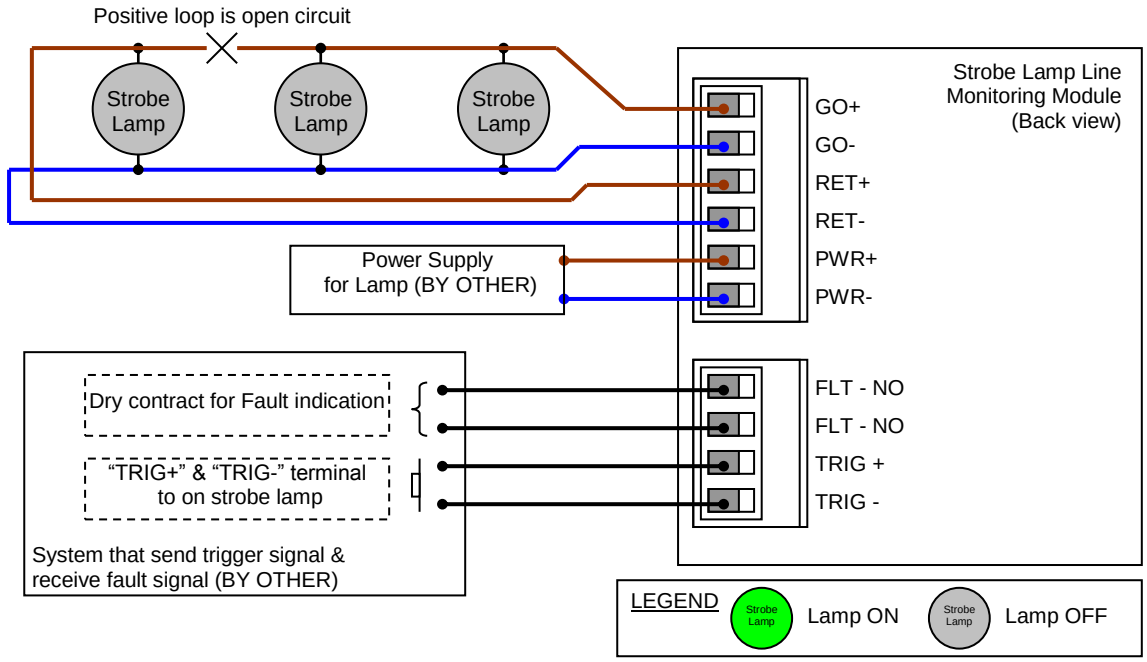

Figure 4-4 "Monitor" mode – positive loop open fault occurs

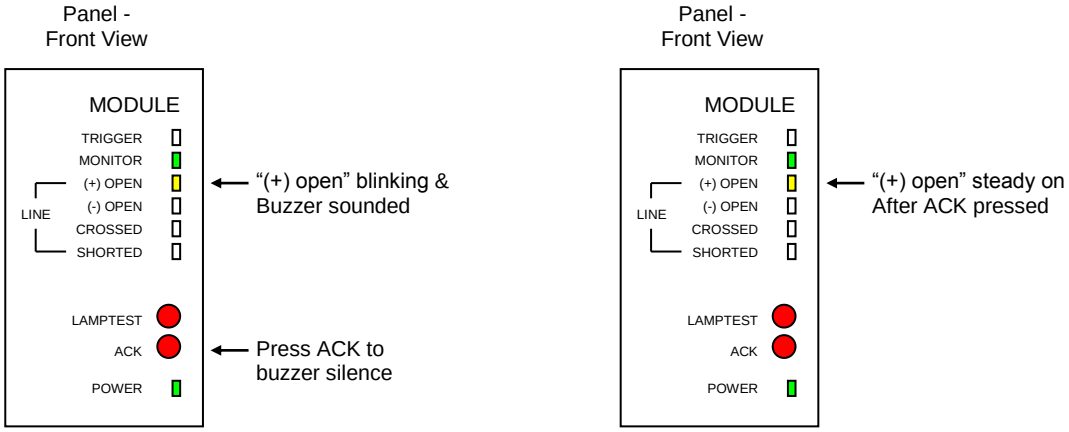

Figure 4-5 Front panel – positive loop open fault occurs

When the positive loop open fault first occurs, it will on the buzzer and the "(+) open" indicator will be blinking. The buzzer will silence and "(+) open" indicator will become steady on once the fault is cleared or "ACK" button pressed. The "FLT-NO" terminal will be shorted until the fault is cleared.

Disconnect all power from the system before performing any repair work!

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4.3.1 “Trigger” mode – with positive loop open fault occurs

During positive loop open fault, the strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

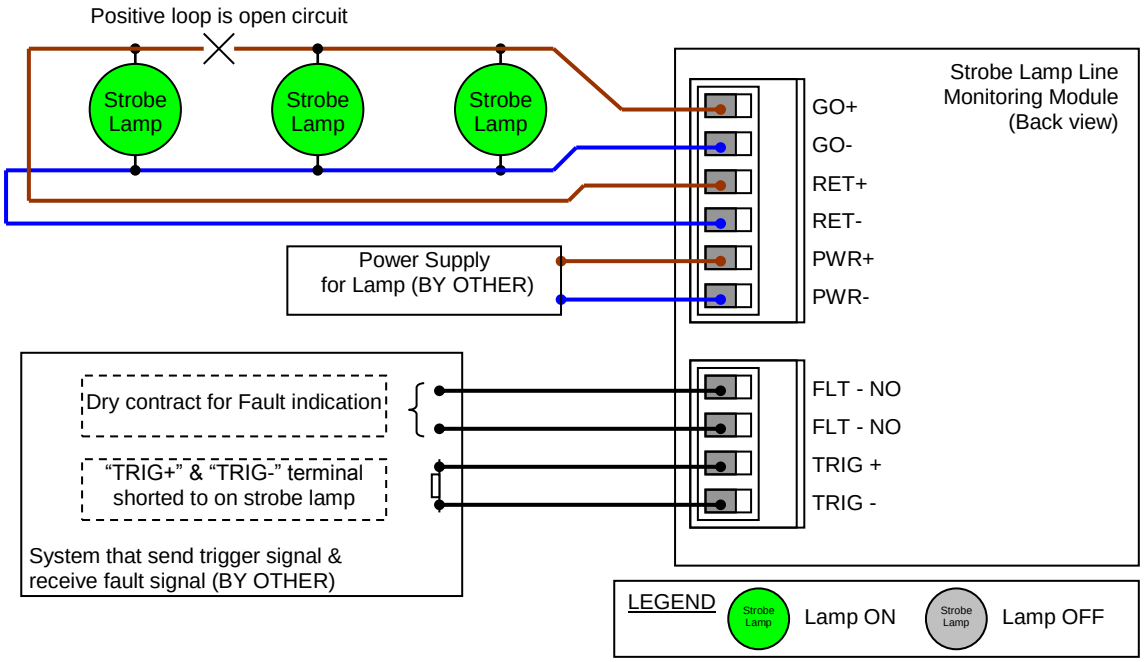

Figure 4-6 “Trigger” mode – positive loop open fault occurs

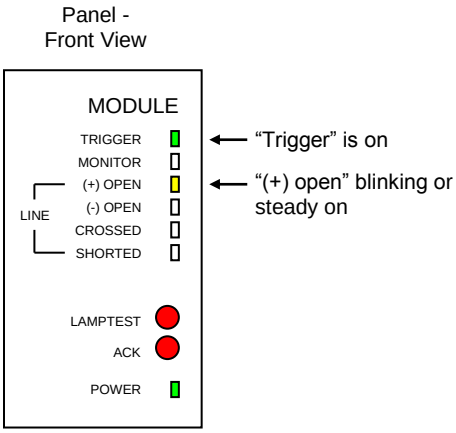

Figure 4-7 Front panel – positive loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. Note that all the strobe lamps are turn on even there is an open circuit on the positive loop.

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4.3.2 “Trigger” mode – with multiple point, positive loop open fault occurs

During multiple open circuits in the positive loop fault, the strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

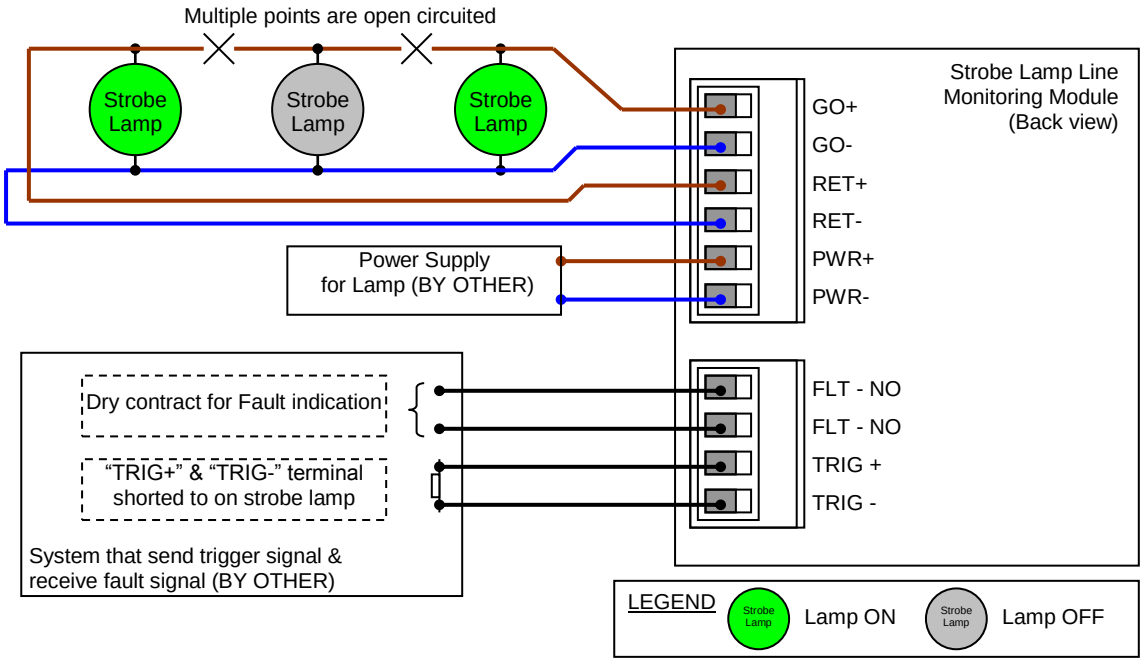

Figure 4-8 “Trigger” mode – multiple points, positive loop open fault occurs

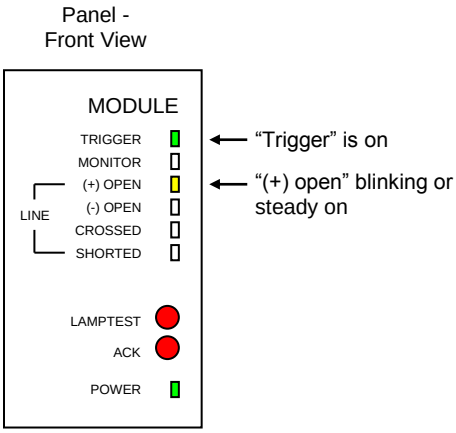

Figure 4-9 Front panel – positive loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. All but the middle strobe lamp cannot be turn on as it is not connected to either “GO” side or “RET” side.

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4.4 "Monitor" mode – with negative loop open fault occurs

When "GO-" and "RET-" is open, negative loop open fault occurred.

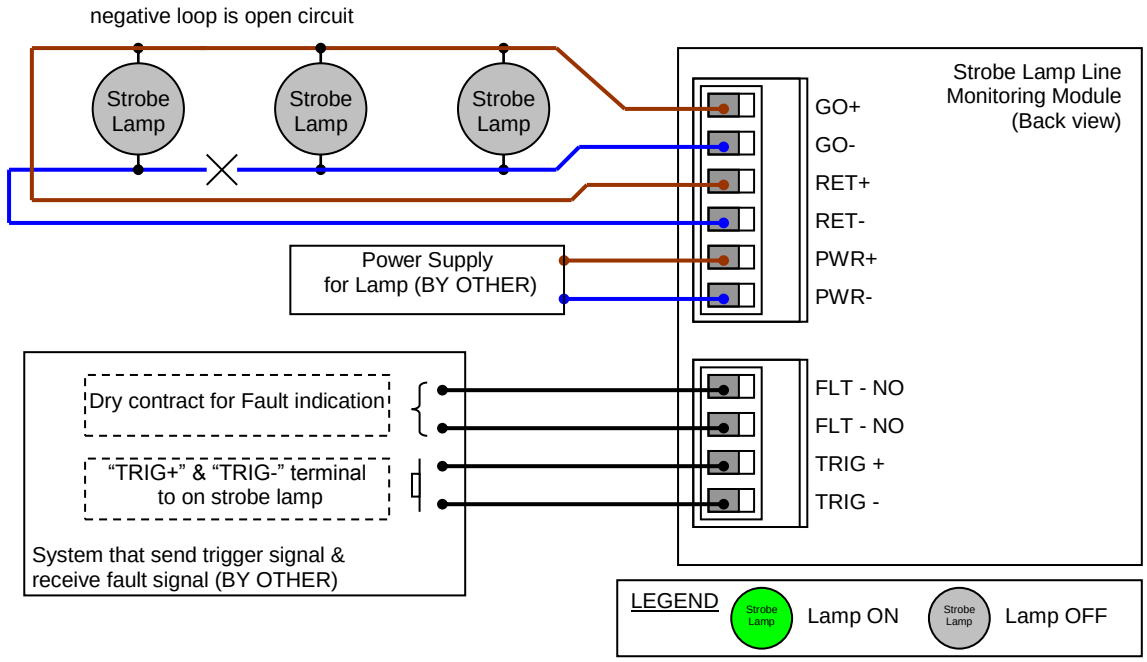

Figure 4-10 "Monitor" mode – negative loop open fault occurs

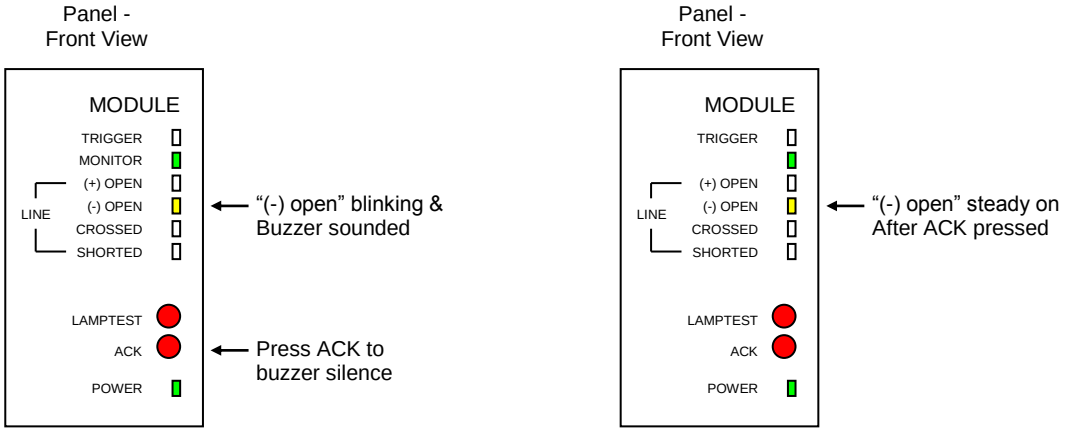

Figure 4-11 Front panel – negative loop open fault occurs

When the negative loop open fault first occurs, it will on the buzzer and the "(-) open" indicator will be blinking. The buzzer will silence and "(-) open" indicator will become steady on once the fault is cleared or "ACK" button pressed. The "FLT-NO" terminal will be shorted until the fault is cleared.

Disconnect all power from the system before performing any repair work!

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4.4.1 “Trigger” mode – with negative loop open fault occurs

During negative loop open fault, the strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

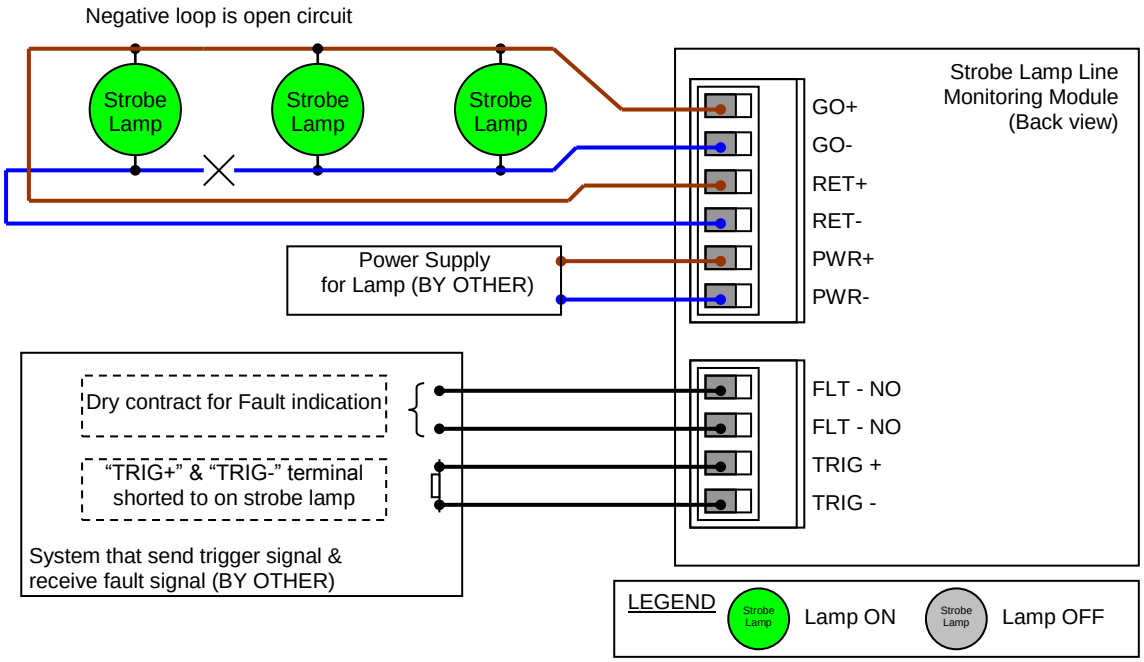

Figure 4-12 “Trigger” mode – negative loop open fault occurs

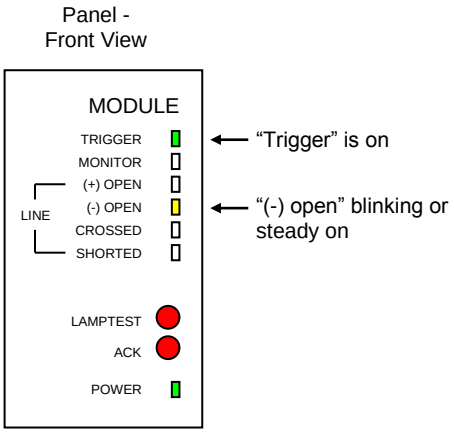

Figure 4-13 Front panel – negative loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. Note that all the strobe lamps are turn on even there is an open circuit on the negative loop.

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4.4.2 “Trigger” mode – with multiple point, negative loop open fault occurs

During multiple open circuits in the negative loop fault, the strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

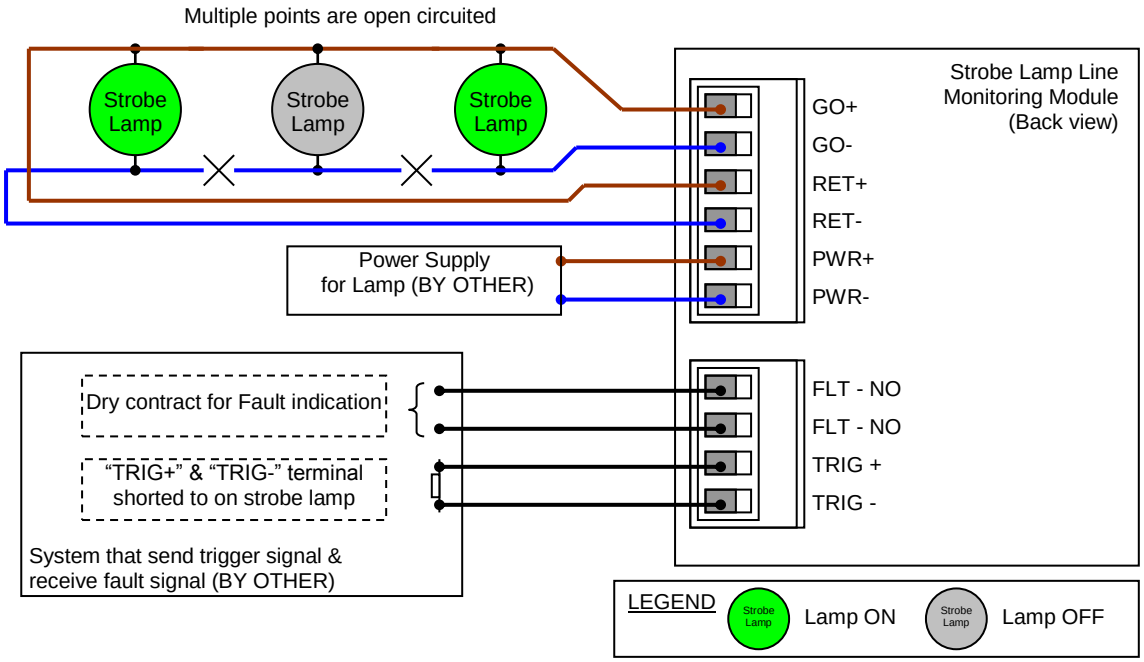

Figure 4-14 “Trigger” mode – multiple points, negative loop open fault occurs

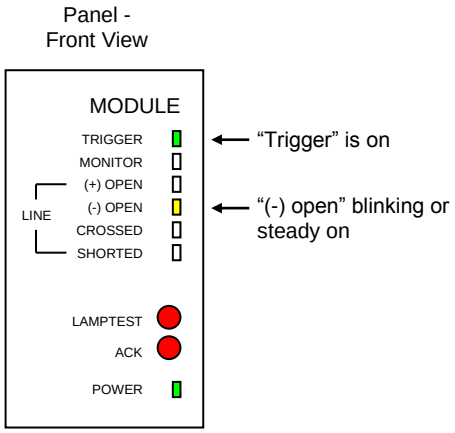

Figure 4-15 Front panel – negative loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. All but the middle strobe lamp cannot be turn on as it is not connected to either “GO” side or “RET” side.

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4.5 "Monitor" mode – with crossed fault occurs

When "GO+" and "RET-" is connected or "GO-" and "RET+" is connected, crossed fault occurred.

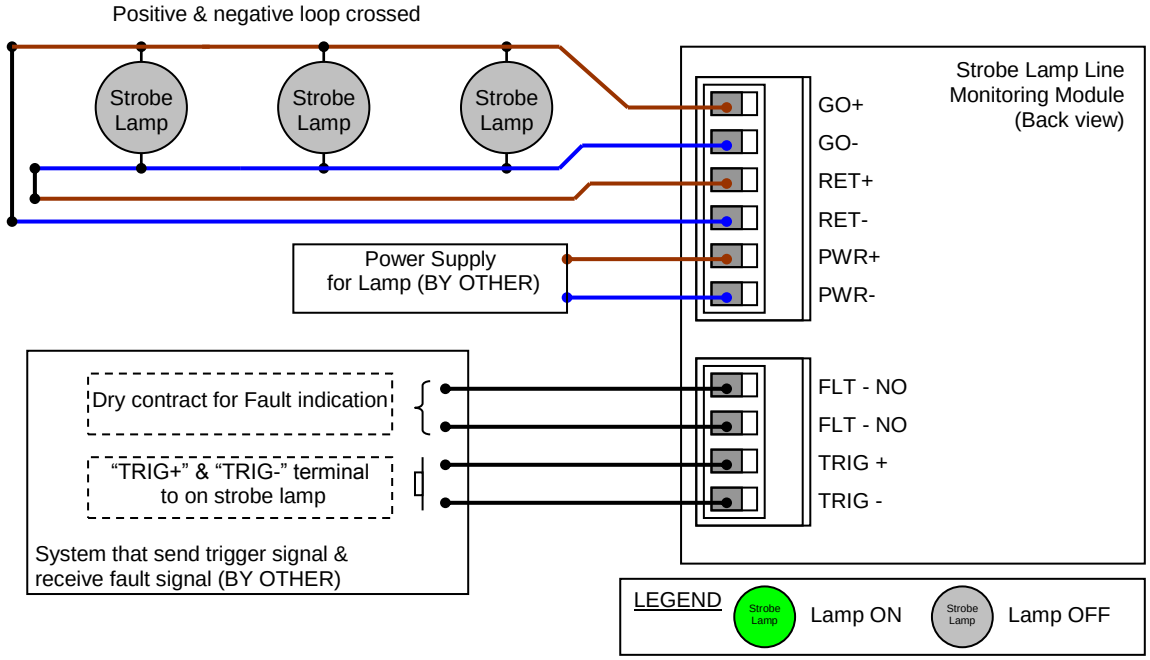

Figure 4-16 "Monitor" mode – crossed fault occurs

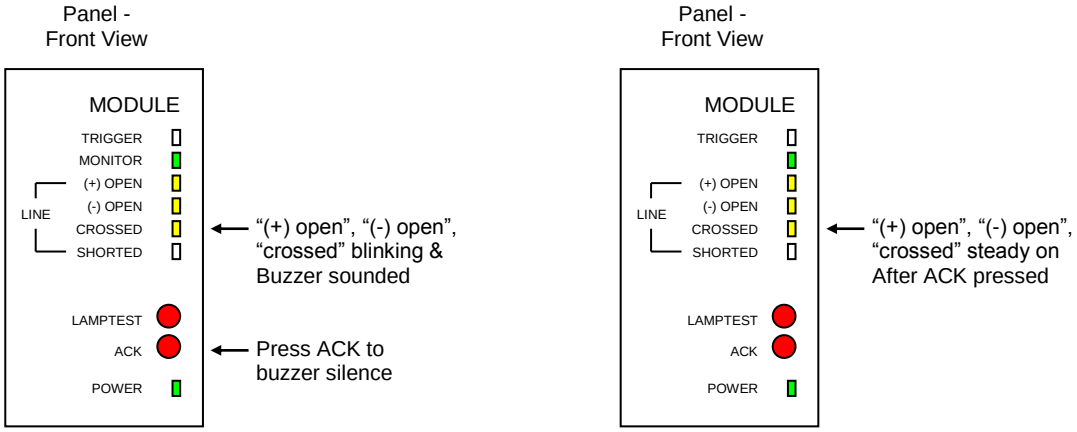

Figure 4-17 Front panel – crossed fault occurs

When the crossed fault first occurs, it will on the buzzer and "(+) open", "(-) open", "crossed" indicator will be blinking. The buzzer will silence and "(+) open", "(-) open", "crossed" indicator will become steady on once the fault is cleared or "ACK" button pressed. The "FLT-NO" terminal will be shorted until the fault is cleared.

Disconnect all power from the system before performing any repair work!

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4.5.1 “Trigger” mode – with crossed fault occurs

During crossed fault, the strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

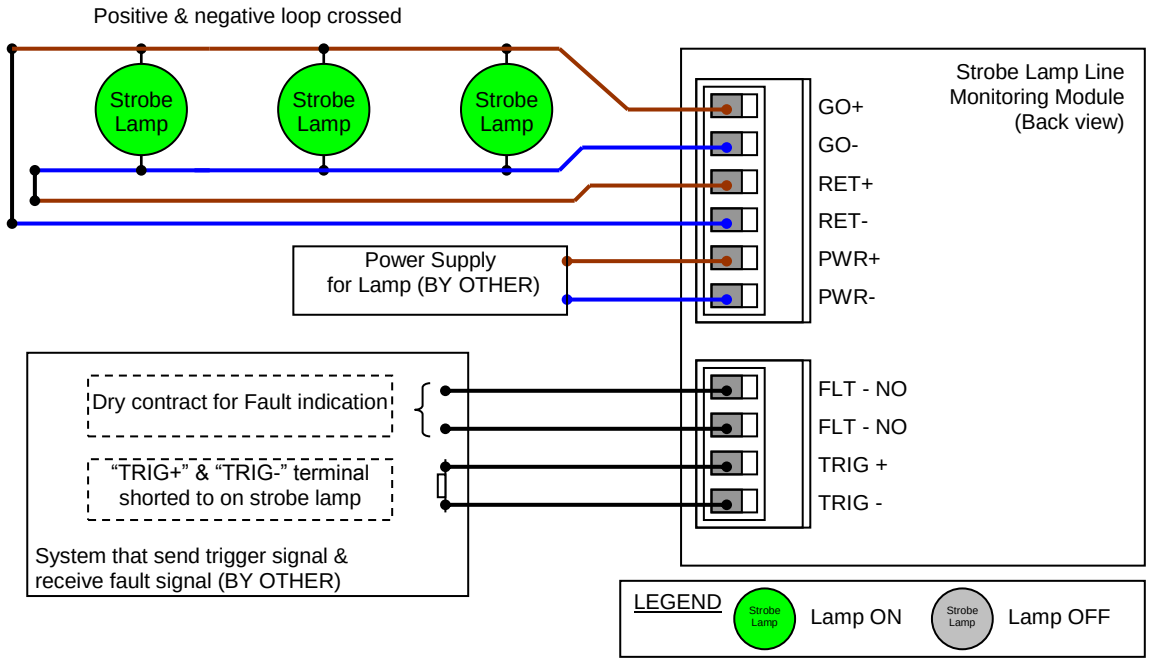

Figure 4-18 “Trigger” mode – positive & negative loop crossed fault occurs

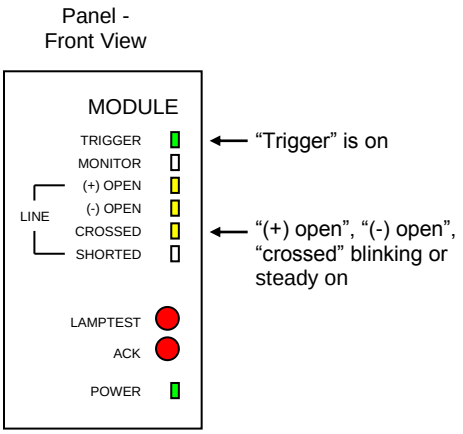

Figure 4-19 Front panel – crossed fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted.

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4.5.2 “Trigger” mode – with crossed & positive loop open fault occurs

During crossed and positive loop open fault occurs, the strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

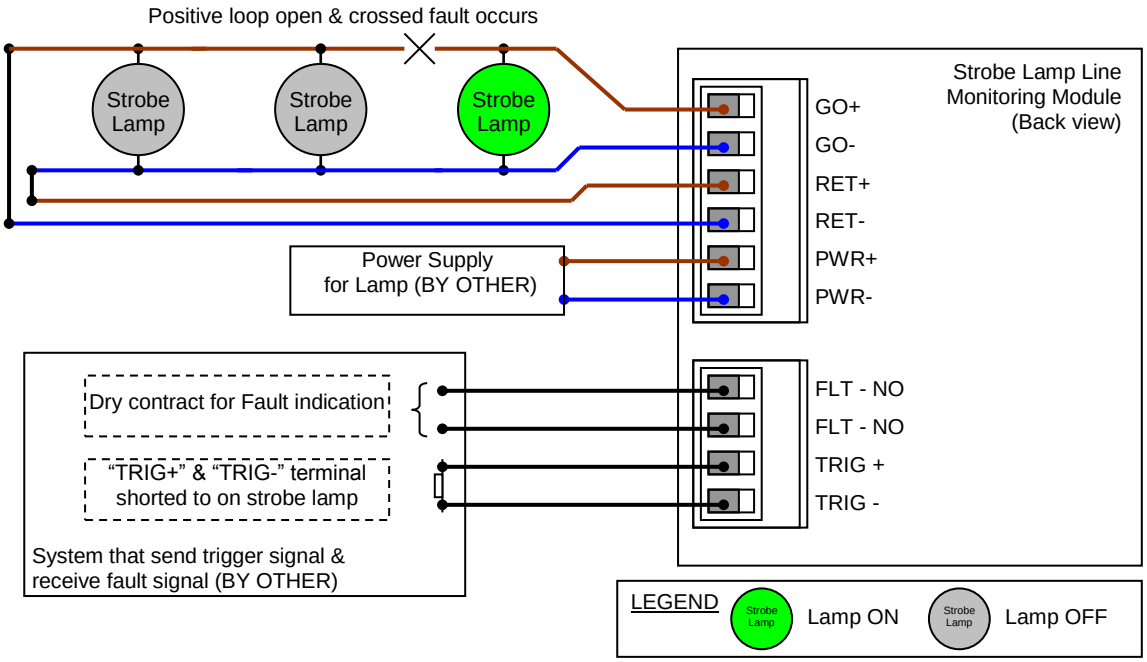

Figure 4-20 “Trigger” mode – crossed & positive loop open fault occurs

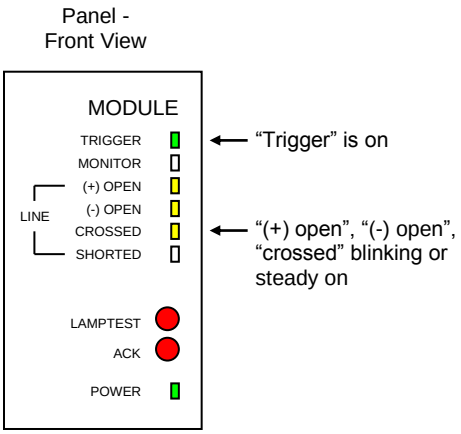

Figure 4-21 Front panel – crossed & positive loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. The two left most strobe lamp cannot be on as there is crossed fault occurred. This is to protect the system from shorting the “Pwr+” & “Pwr-” terminals together.

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4.6 "Monitor" mode – with shorted fault occurs

When positive loop & negative loop is shorted together, shorted fault occurred.

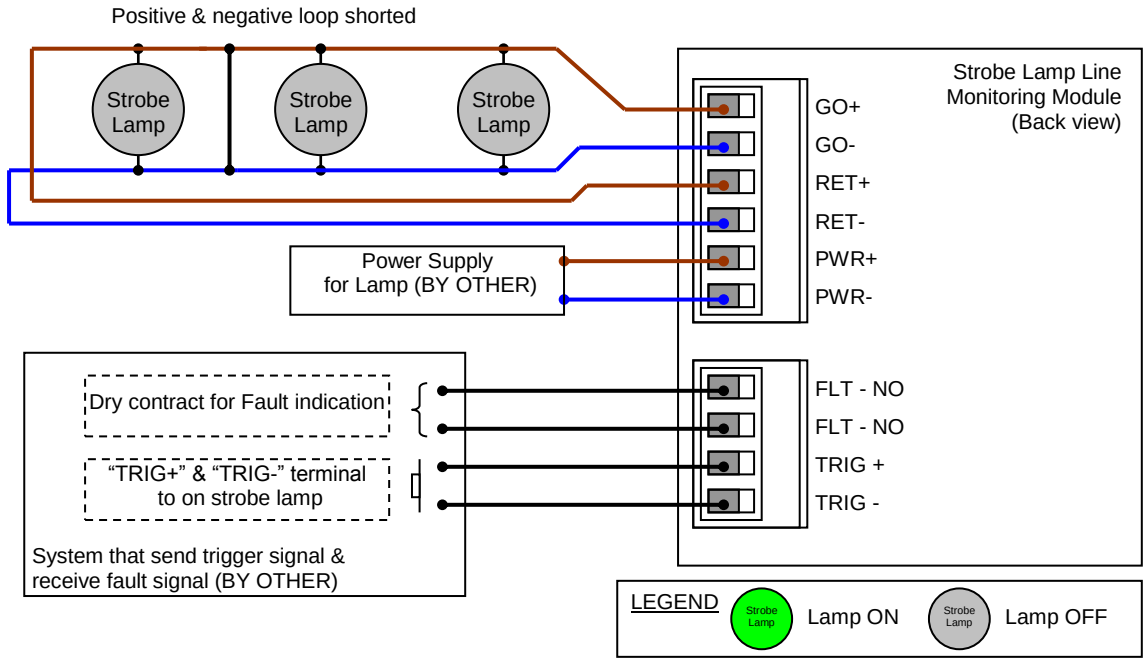

Figure 4-22 "Monitor" mode – shorted fault occurs

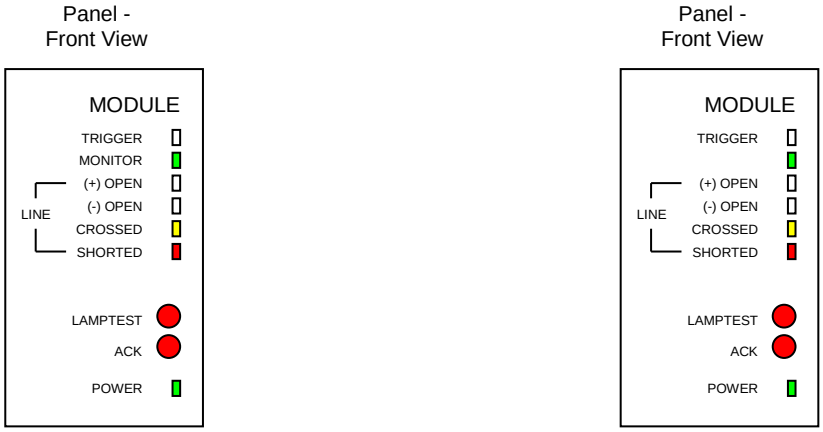

Figure 4-23 Front panel – shorted fault occurs

When the shorted fault first occurs, it will on the buzzer and "crossed", "shorted" indicator will be blinking. The buzzer will silence and "crossed", "shorted" indicator will become steady on once the fault is cleared or "ACK" button pressed. The "FLT-NO" terminal will be shorted until the fault is cleared.

Disconnect all power from the system before performing any repair work!

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4.6.1 “Trigger” mode – with shorted fault occurs

During shorted fault, the strobe lamp CANNOT be turn on by shorting “TRIG+” and “TRIG-” terminal together.

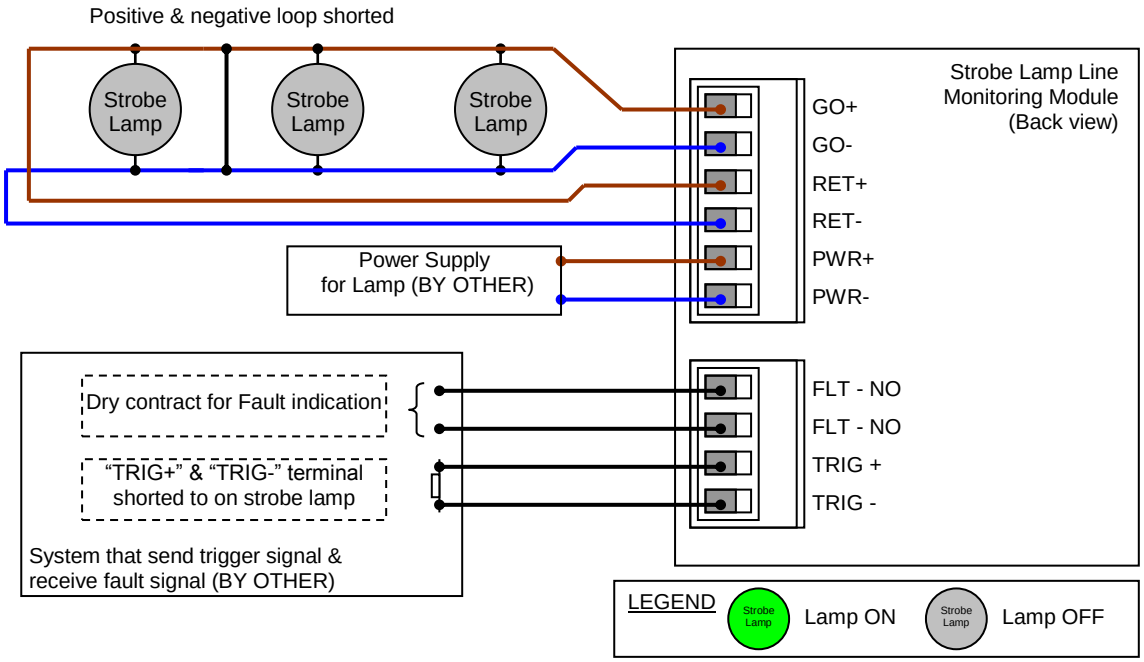

Figure 4-24 “Trigger” mode – positive & negative loop shorted fault occurs

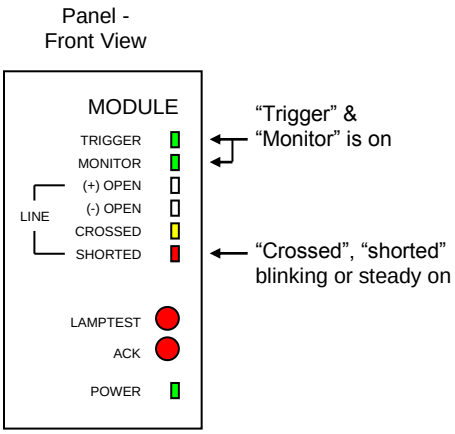

Figure 4-25 Front panel – shorted fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. “Monitor” indicator is also on to indicate that it is still monitoring the line as turning on the strobe lamp is not possible in this situation.

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4.6.2 “Trigger” mode – with shorted “RET” & positive loop open fault occurs

During shorted at “RET” terminal side and positive loop open fault occurs, some strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

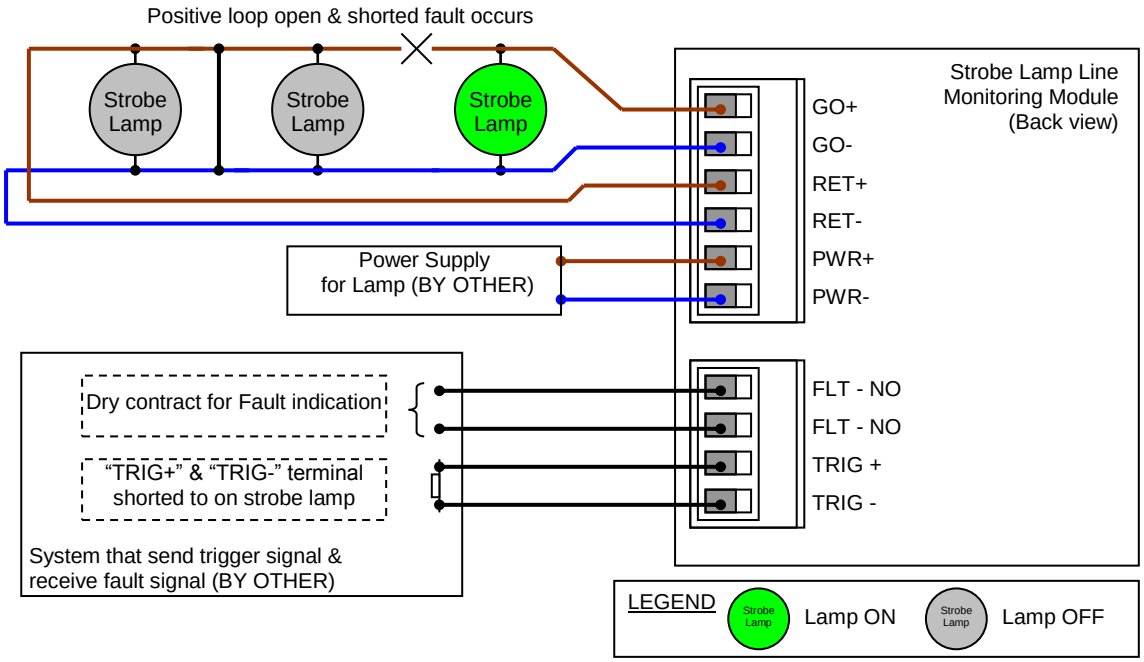

Figure 4-26 “Trigger” mode – shorted & positive loop open fault occurs

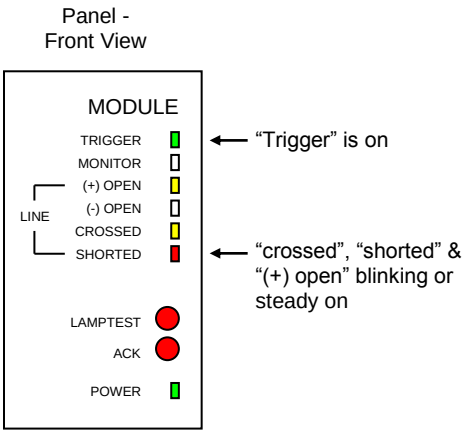

Figure 4-27 Front panel – shorted & positive loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. The two left most strobe lamps cannot be on as there is a shorted fault occurred at the “RET” terminal side. This is to protect the system from shorting the “Pwr+” & “Pwr-” terminals together.

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4.6.3 “Trigger” mode – with shorted “GO” & positive loop open fault occurs

During shorted at “GO” terminal side and positive loop open fault occurs, some strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

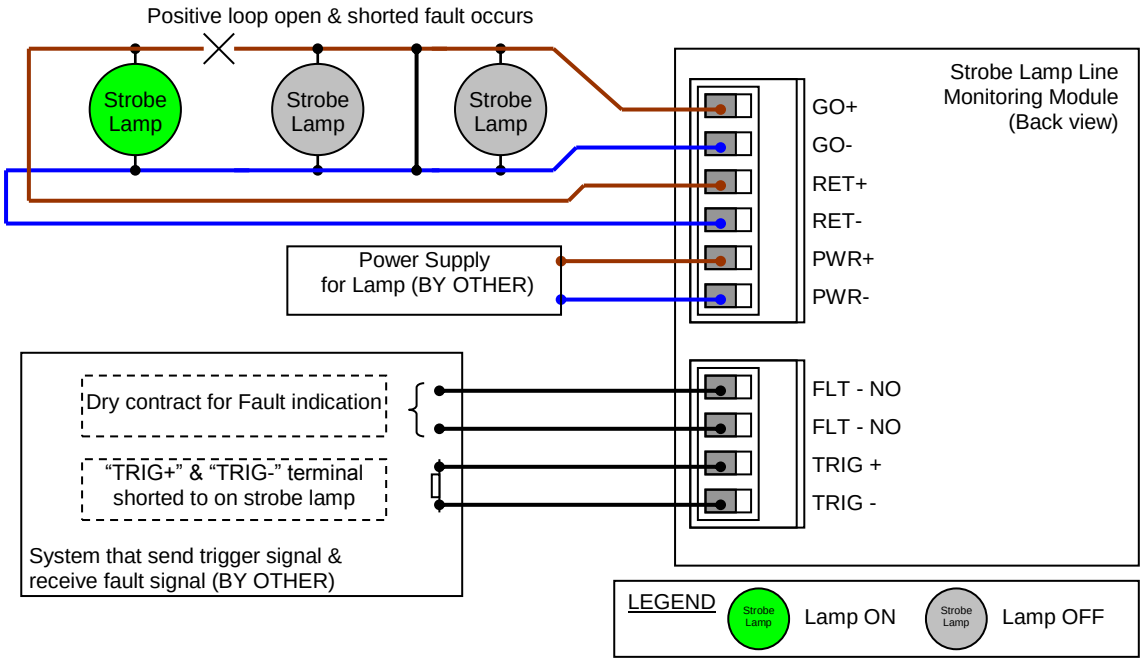

Figure 4-28 “Trigger” mode – shorted & positive loop open fault occurs

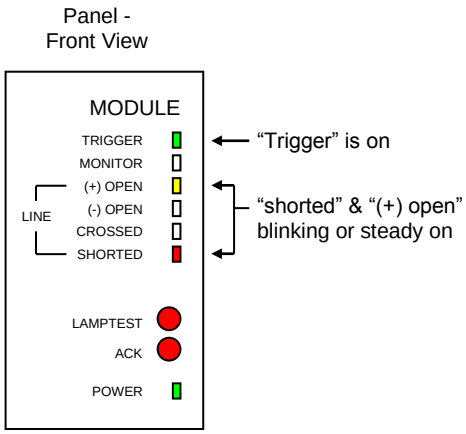

Figure 4-29 Front panel – shorted & positive loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. The two right most strobe lamps cannot be on as there is a shorted fault occurred at the “GO” terminal side. This is to protect the system from shorting the “Pwr+” & “Pwr-” terminals together.

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4.6.4 “Trigger” mode – with shorted “RET” & negative loop open fault occurs

During shorted at “RET” terminal side and negative loop open fault occurs, some strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

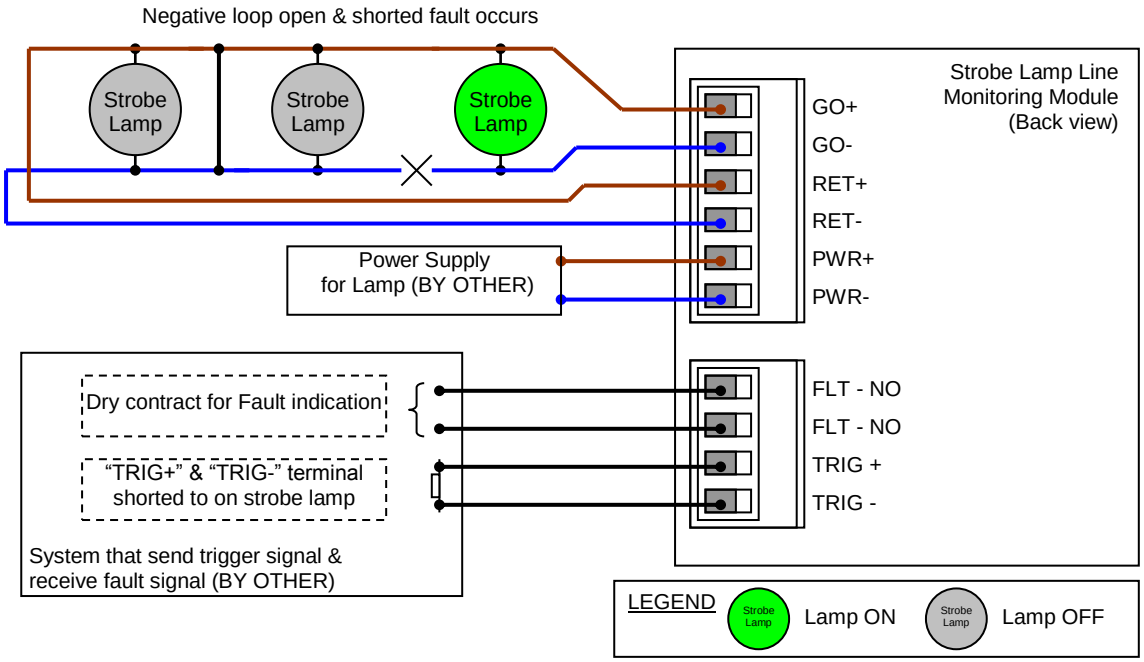

Figure 4-30 “Trigger” mode – shorted & negative loop open fault occurs

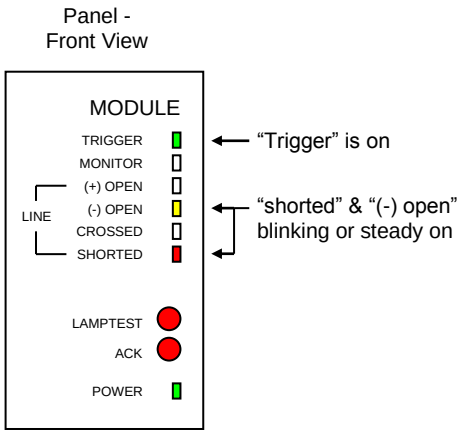

Figure 4-31 Front panel – shorted & negative loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. The two left most strobe lamps cannot be on as there is a shorted fault occurred at the “RET” terminal side. This is to protect the system from shorting the “Pwr+” & “Pwr-” terminals together.

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4.6.5 “Trigger” mode – with shorted “GO” & negative loop open fault occurs

During shorted at “GO” terminal side and negative loop open fault occurs, some strobe lamp can still be turn on by shorting “TRIG+” and “TRIG-” terminal together.

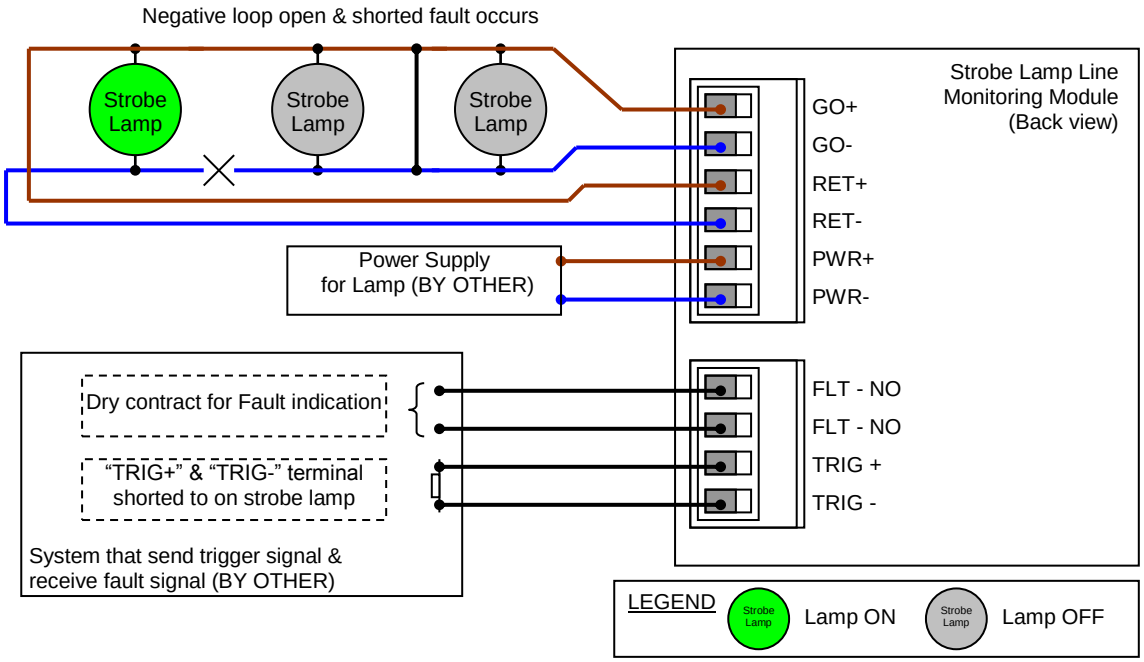

Figure 4-32 “Trigger” mode – shorted & negative loop open fault occurs

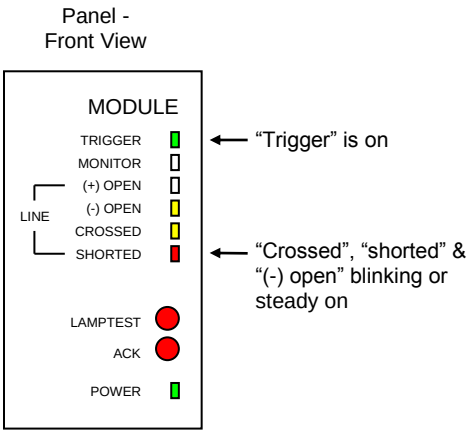

Figure 4-33 Front panel – shorted & positive loop open fault occurs and in “Trigger” mode

The “Trigger” indicator is on until the “TRIG+” & “TRIG-” terminal is not shorted. The two right most strobe lamps cannot be on as there is a shorted fault occurred at the “GO” terminal side. This is to protect the system from shorting the “Pwr+” & “Pwr-” terminals together.

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5 Specification

5.1 3U Enclosure

Model:	SEC-SLM-BAS-3U
General:	Able to mount 1 x Power Supply Module and up to 6 x Monitoring Module
Fuse:	250Vac 2A slow, size 5 x 20 mm
Interface:	IEC 320-C14 male connector for incoming power for Strobe Lamp System
	Termination point for field cable for up to 6 x :
	- 1 pair cable for strobe lamp power input
	- 1 pair GO cable for strobe lamp loop
	- 1 pair RETURN cable for strobe lamp loop
	- 1 pair incoming dry contact cable to trigger lamp on
	- 1 pair outgoing dry contact cable for fault indication (30Vdc @ 1A max.)
Size:	approx. 483 mm (L) x 202 mm (W) x 133 mm (H)
Weight:	Approx. 2.2 kg (without power supply module and monitoring module)

5.2 Power Supply Module

Model:	SEC-SLM-PWR-75W
General:	Input 100Vac to 240Vac, output 12Vdc ± 10% @ 6A max.
	Efficiency 84% (typ.)
Interface:	Mount directly into 3U Enclosure (termination – see 3U enclosure)
Indicator:	1 x red LED for AC power in present
	1 x green LED for DC power out present
Size:	Approx. 163 mm (L) x 51 mm (W) x 101 mm (H)
Weight:	Approx. 410 g

5.3 Monitoring Module

Model:	SEC-SLM-MON-001
General:	Able to monitor / trigger 1 x strobe lamp loop
	Strobe lamp load up to 2A max. and up to 48Vdc or 230Vac
	Minimum Strode lamp load when not triggered – 10k ohm
	Maximum GO+ to RET+ resistance – 1k ohm
	Maximum GO- to RET- resistance – 1k ohm
	Power in: 12Vdc ± 10% @ 300mA max. (75mA typ.)
	Approx. 120 sec Monitoring cycle during “monitor” mode
Interface:	Mount directly into 3U Enclosure (termination – see 3U enclosure)
	2 x push button for lamp test and ACK
Indicator:	1 x green LED for DC power in present
	2 x green LED for trigger mode and monitor mode
	3 x yellow LED for (+) open fault, (-) open fault and crossed fault
	1 x red LED for shorted fault
Size:	Approx. 173 mm (L) x 35 mm (W) x 101 mm (H)
Weight:	Approx. 170 g

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Appendix

NOTICE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

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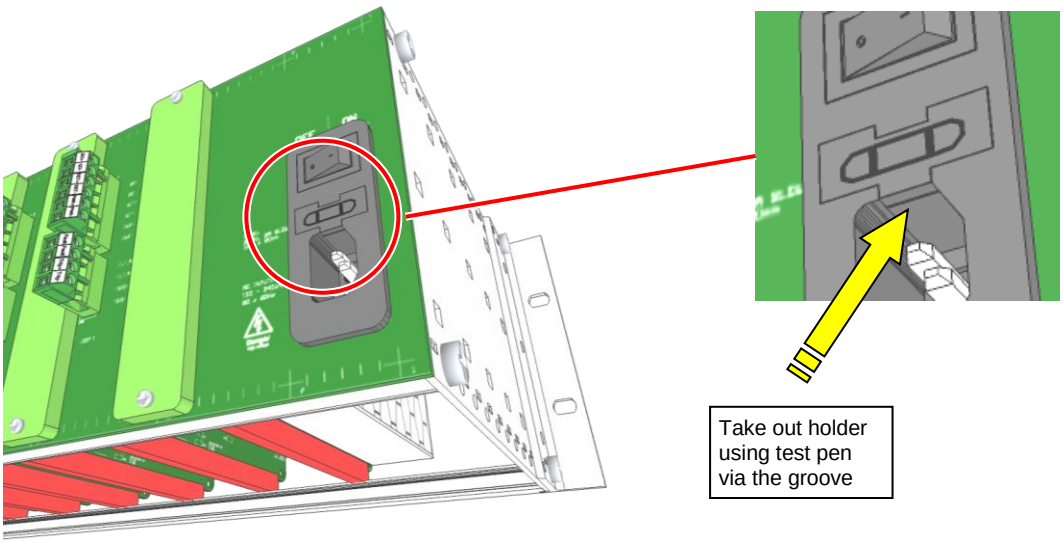
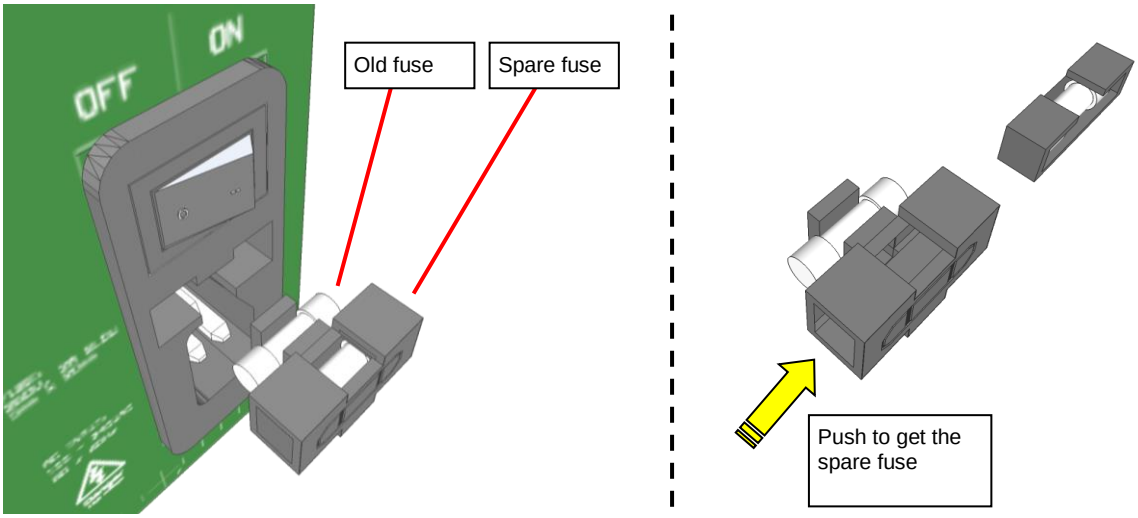
Replacement of AC fuse in 3U Enclosure

1. All power sources should be OFF and unplugged before any work can proceed.

2. At IEC connector location, remove the AC fuse holder (use a test pen to take it out).



3. Replace the old fuse with a new fuse. If a new fuse is not available, use the fuse from the spare compartment (Always refill the spare fuse in case of emergency).



4. Put back the fuse holder at the IEC connector location.

5. Ensure all the cable is connected correctly before turning on the power. Once the system is powered, wait for 10 minutes to ensure there is no fault in all the individual loops at their respective monitoring module.

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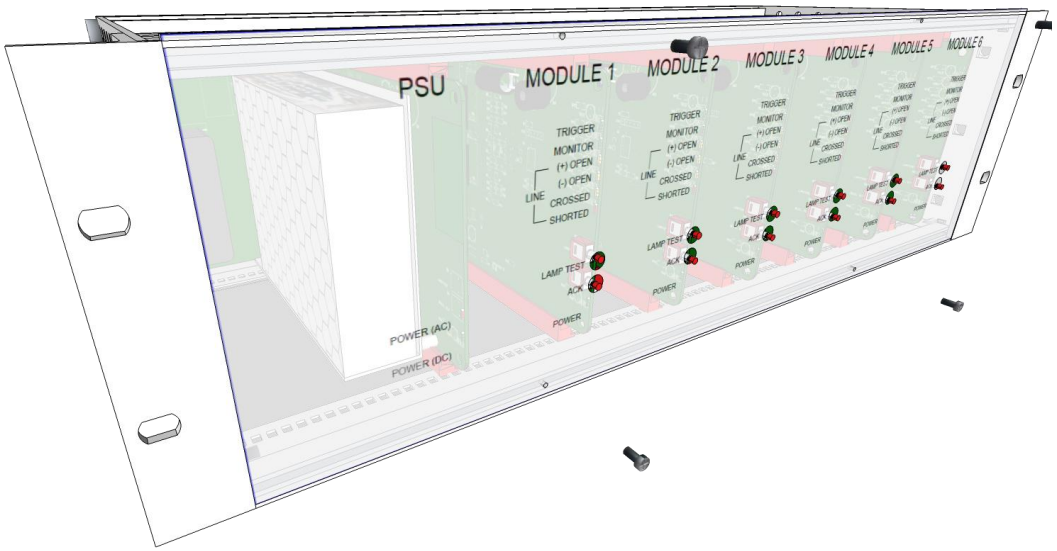
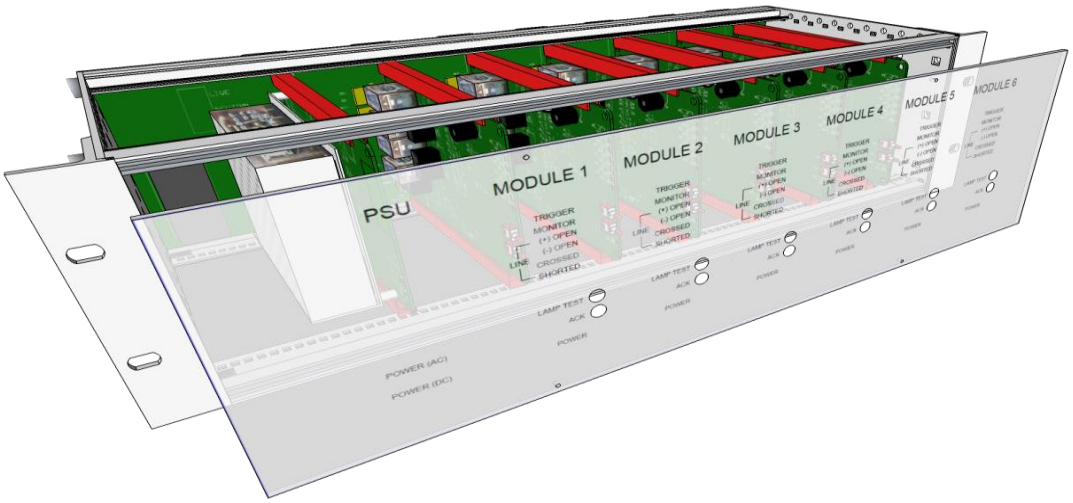
Replacement and installation of Power Supply Module

1. All power sources should be OFF and unplugged before any work can proceed.

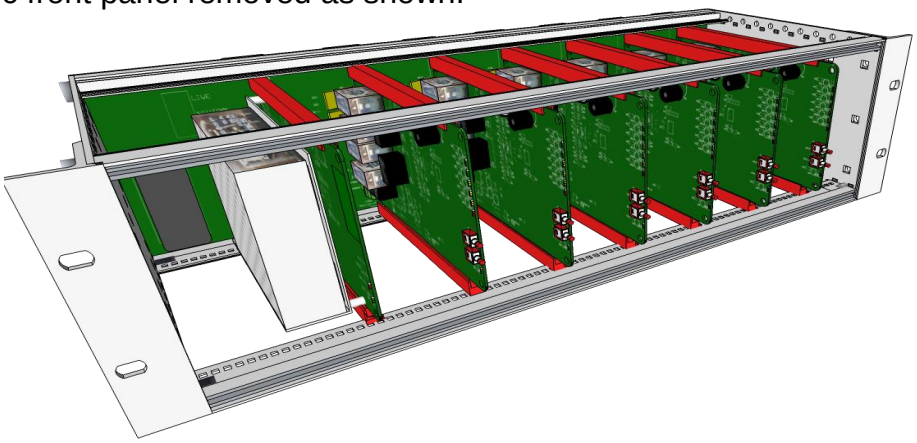
2. Remove the 4 screws at the front of the panel.



3. Carefully remove the acrylic front panel.



Acrylic front panel removed as shown.



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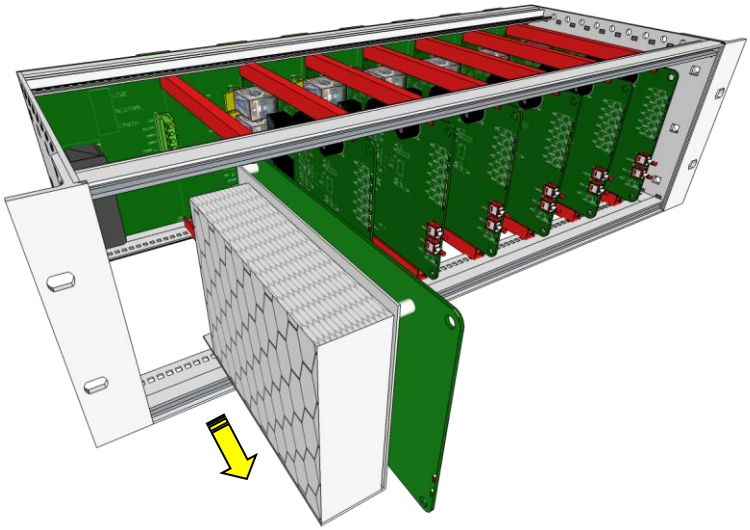
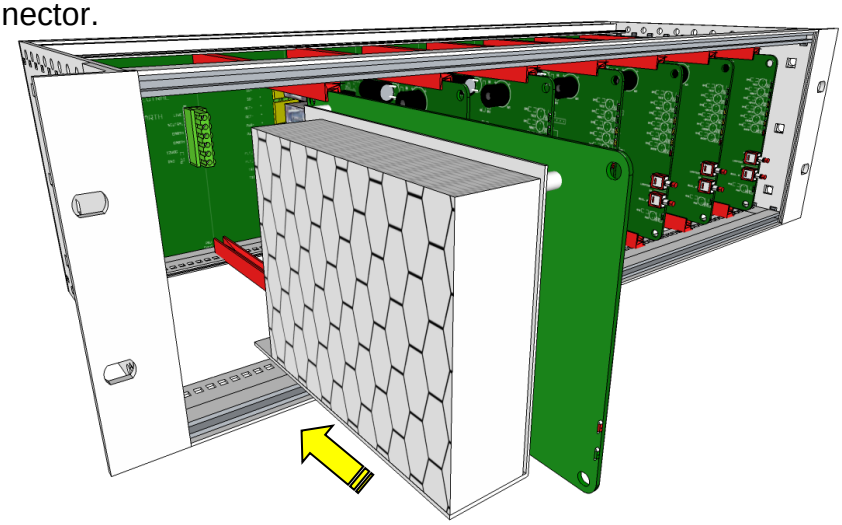
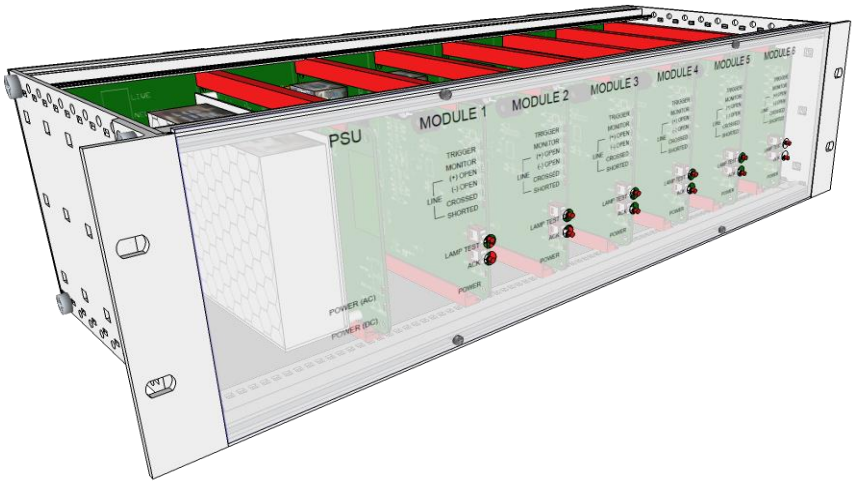
4. Remove the faulty power supply module from the guide rail.



5. Insert the new power supply module via the guide rail and push it firmly into the back connector.



6. Put back the acrylic front panel and the 4 screws.



7. Ensure all the cable is connected correctly before turning on the power. Once the system is powered, wait for 10 minutes to ensure there is no fault in all the individual loops at their respective monitoring module.

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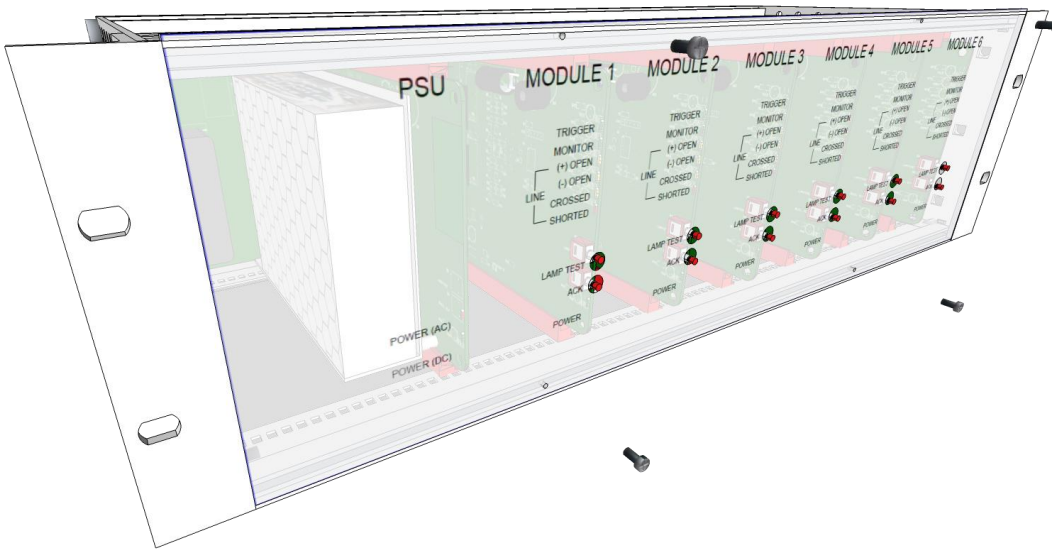
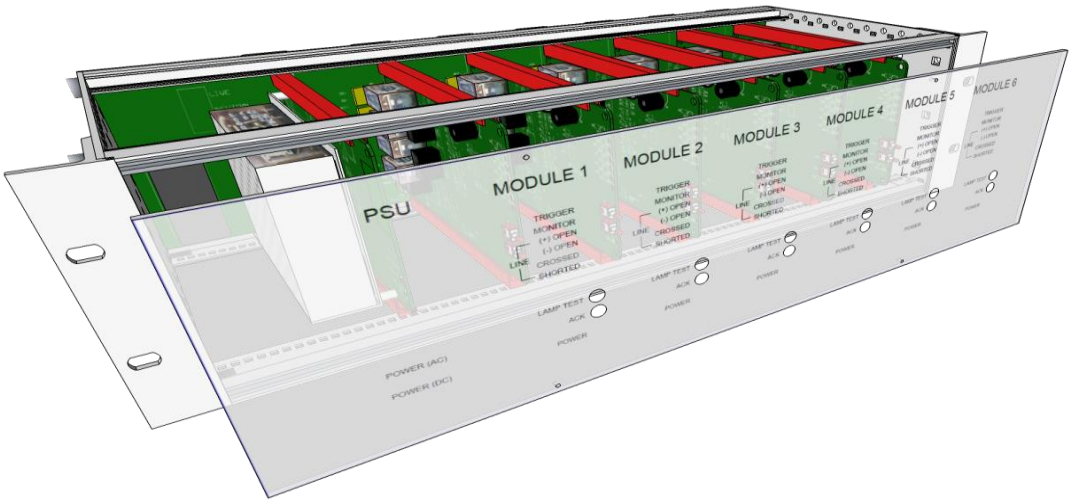
Replacement and Installation of Monitoring Module

1. All power sources should be OFF and unplugged before any work can proceed.

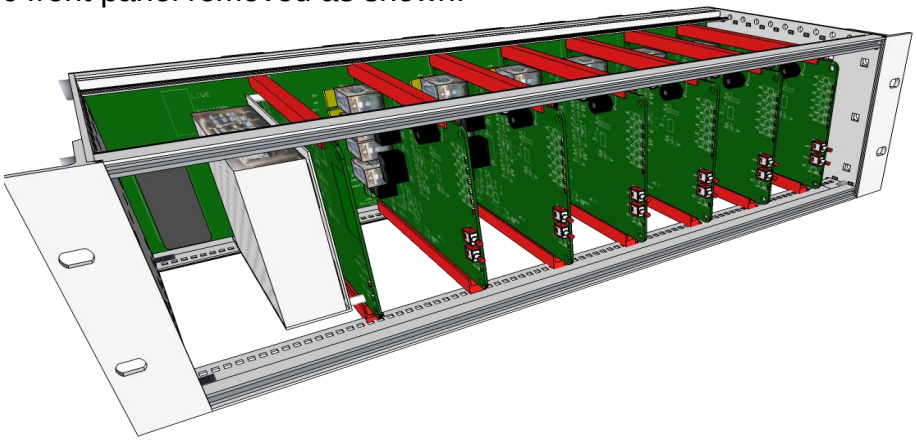
2. Remove the 4 screws at the front of the panel.



3. Carefully remove the acrylic front panel.



Acrylic front panel removed as shown.



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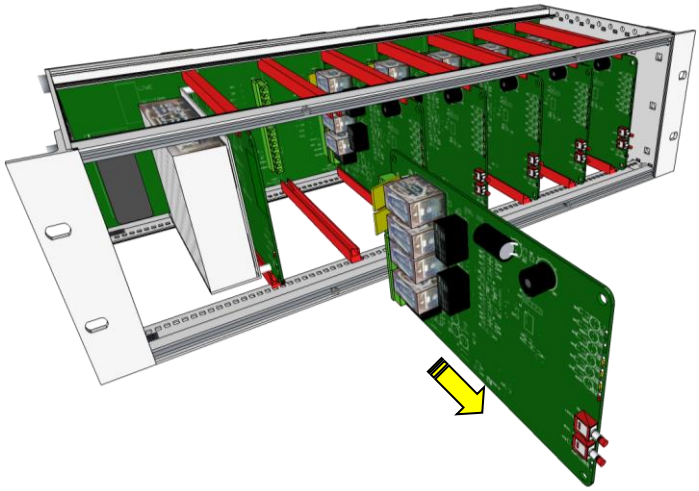
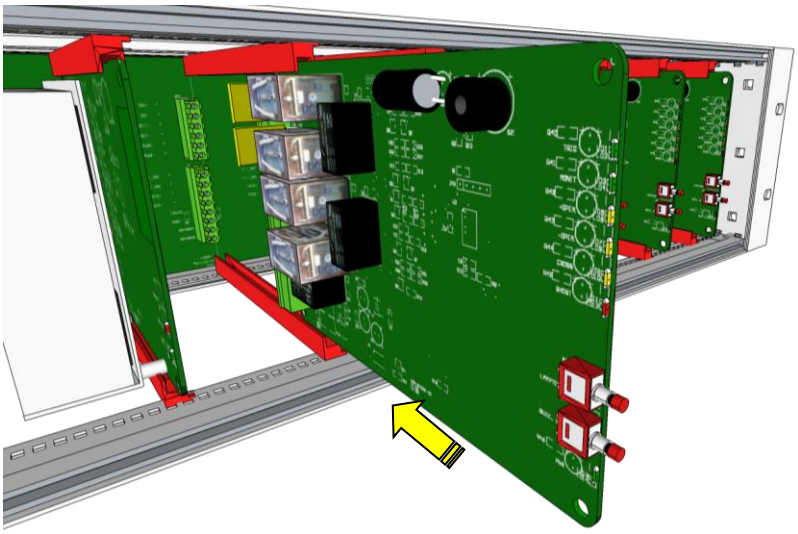
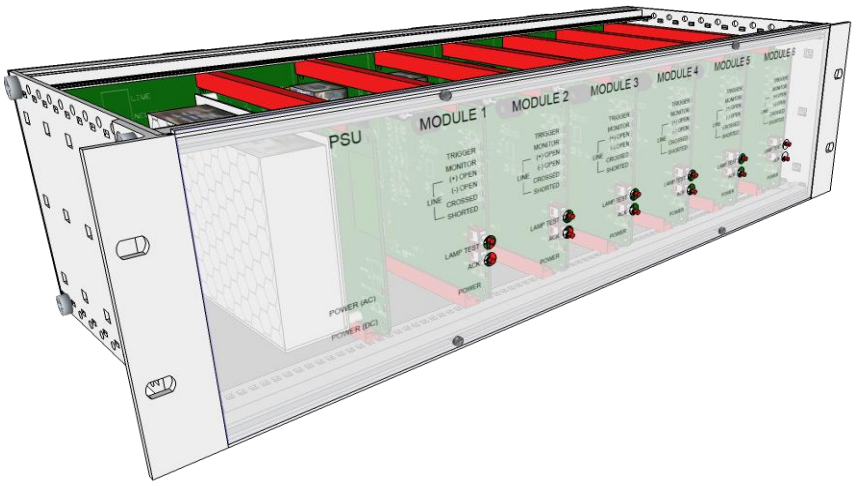
4. If it is a replacement, remove the faulty monitoring module from the guide rail.



5. Insert the new monitoring module via the guide rail and push it firmly into the back connector.



6. Put back the acrylic front panel and the 4 screws.



7. Ensure all the cable is connected correctly before turning on the power. Once the system is powered, wait for 10 minutes to ensure there is no fault in all the individual loops at their respective monitoring module.

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