Chapter 15 Setpoints and Logic Outputs (OPTION)

15.1 Introduction
(GSE Part #: 24550B-100A0)

The model 450 indicator has as a standard feature, two open drain outputs. The connections for these logic outputs are on the J6 connector of the main board and are labeled SP1 and SP2. The outputs act as a low (or open ground connection) when they are active and as an open circuit when they are in-active. They can be thought of as a switch that is either open or closed, with the closed connection being to ground. The component providing the output is an FET which in effect makes the output an open drain type. These two outputs work in cooperation with the standard programs already in the indicator. For instance the standard filling program is a good example. Once this program is selected, a sequence of target and preact entries must be made. The setpoint outputs are then engaged to respond to these values once the filling operation is invoked. The filling operation may be initiated by either a remote key, tare operation etc. The means by which the filling operation is started is selectable. Refer to chapter 14 titled Standard Programs Operations for more information about the selectable standard programs.

Note that the setpoint outputs will **only** work when one of the pre-programmed Standard Programs are selected and correctly setup. Also note that these outputs are capable of driving low voltage level logic circuits such as a relay module. The output drive capability of these modules is a maximum of 3 amps and various AC and DC voltage ranges. Refer to table 15-3 for available relays and maximum specifications.

15.2 Setpoint Setup Parameters

The Setpoint Setup parameters and their complete setup are defined in chapter 14 titled Standard Programs Operations. This chapter defines all hardware configurations, wiring and available options pertaining to setpoint outputs. To reach the setpoint setup (Standard Programs), enter the 450 access code to gain access to the setup parameters and then press **[5100] [SELECT]**. Then refer to chapter 14 titled Standard Programs Operations for setpoint parameter setup.

Important

Keep in mind that the instrument powers down or enters the Setup Mode during operation or when an overload or underload condition occurs, the setpoints will become de-activated. This is of importance when determining a setpoint installation in order to insure safe conditions.

15.2.1 Setpoint Operation

When a setpoint is inactive, only the conditions relating to the activation of the setpoint are checked and reacted to accordingly. Similarly, when a setpoint is active, only the conditions relating to the de-activation of the setpoint are checked and acted upon.

The status of each setpoint is checked and updated once every 1/10th of a second (10 updates per second), with several exceptions as listed below:

- After the execution of a command, the next update may be delayed slightly.
- During continuous transmits, the transmission may delay the setpoint update
- During an over-load or under-load condition, all enabled setpoints are de-activated
- When the Setup Mode is accessed, all enabled setpoints are de-activated
- Setpoints based on the Net or Gross Weights are based upon the weight after it is rounded off to the selected display increment (set in P111).

15.2.3 Setpoint Status Mode

Once one of the Standard Programs is selected for your application, the status of the two setpoints can be checked at the output connector (J6) on the main board. This can be accomplished with a digital volt meter, LED's or actual relay outputs. The auxiliary display can also be set to reflect the status of the setpoints. Parameter P5112 allows for this possibility. Refer to chapter 14 Standard Programs Operations.

15.2.4 Setpoint Inputs

There are no provisions for setpoint inputs. Refer to chapter 14 titled Standard Programs Operations for remote setpoint activation setup. Parameter P5107 allows for selecting a remote activation of the setpoints. The remote activation device could be a relay, momentary contact switch, photo-eye, etc.

15.3 Logic Output Operations

Your indicator includes two open collector type logic outputs. The outputs act as a low (or open ground connection) when they are active and as an open circuit when they are inactive. They can be thought of as a switch that is either open or closed, with the closed connection being to ground. The component providing the output is an FET which in effect makes the output an

Maximum Specifications	I&E
Maximum Applied Voltage	30 VDC
Maximum Current	30 mA
Maximum ON Voltage	0.4VDC

Table 15-1 Output Specifications

open drain type. See Table 15-1, Output Specifications for the related electrical specifications.

These outputs are ideally suited for use with solid state relay devices which have built-in optical isolation, such as the OPTO 22 OAC5 AC output module.

It is not intended that these outputs directly drive inductive loads because they are not protected against back-EMF switching generated voltages! If very light inductive loads are connected anyway, it is recommended that some protection be implemented, such as a diode across the load. Refer to the specifications of the device being connected for additional recommendations.

15.3.1 Connection

The two logic outputs are located on the bottom two connections of J6 on the right edge of the Main Board next to the power input connector (J7). They are labeled SP1 and SP2. The connector is a spring loaded lever connector and accepts 28-20 AWG stranded or solid wire. Press down on the lever, insert the wire into the hole, then release the lever. It is not necessary to tin the stripped wire, however, if tinning is done, be sure to apply only a minimal amount of solder so that the wire will still fit into the terminal block. Multiple wires will not fit into one position on the terminal block. Along with the two logic outputs on the same connector are +5 V and ground, labeled accordingly, in case either is needed in the connected circuit.

1. Strain relief J2 and J3 will normally be used for option inputs, strip back the cable's jacket far enough to accommodate routing the wires inside the indicator. Retain enough of the cable's shield or drain wire so that it may be terminated to the rear panel stud adjacent to the strain reliefs at both corners of the lower portion of the board.

2. Strip back the insulation of each wire about 1/4".

3. Twist the stranded wires together for ease of insertion into the connector. Smaller wire sizes may also be tinned if desired, but be sure to leave only a minimum amount of solder on the wire or it will not fit into the connector.

4. Refer to chapter 14 titled Standard Programs Operations, to determine the appropriate connections for use of the setpoint logic output connections. Effectively making sure that setpoint 1 is associated with the fast filling valve as one example.

5. Loosen the rear panel strain relief to be used, preferably J2 or J3 if J2 is already being used. Feed the cable into the enclosure through the strain relief.

6. Connect the wires into the appropriate positions of the J6 connector by pressing down on the white lever for that position while

inserting the stripped wire. Release the lever when the wire is completely inserted.

7. After all wires have been connected, tie-wrap the wires together as close to the connector as possible. This will restrict the movement of a wire in case it were to come loose from the connector, preventing it from coming into contact with hazardous voltages. Tie-wraps are an appropriate means of holding these wires together.

8. Secure the cable's shield to the rear panel stud adjacent to the chosen strain relief. The enclosure grounding studs are at either corner of the lower portion of the board.

9. Pull any excess cable back out of the instrument until there is no slack in the cable between the strain relief and the shield connection.

10. Retighten the strain relief securely so that even if the external cable is pulled or twisted the internal cable is unaffected.

15.4 Relay Module (OPTION)

The GSE Relay Module Option (GSE Part Number 24550B-100A0) is designed to accept control signals from the GSE Model 450 and 500 Series Weigh and Counting Indicators, and provide optically isolated solid state relay outputs. These outputs can be used for controlling external devices such as valves, lights, buzzers, or any other external electrical devices. The enclosure is made of a high temperature polycarbonate plastic and has a weather-tight seal with a DIN protection rating of IP 66, which is similar to a NEMA 4X rating. Refer to figure 15-3 Relay Module for outline and electrical schematic views of the Relay Module.

Caution

All electrical Connections and access to the inside of the indicator and the GSE Relay Module enclosures should be performed by qualified service personnel only!

15.4.1 Mounting

In many applications it is desirable to attach the GSE Relay Module to a vertical or horizontal or surface. There are two mounting methods provided for the enclosure. Refer to figure 15-2 Relay Module mounting dimensions.

When the enclosure cover is removed notice that the cover screw holes go all the way through the enclosure. The mounting screws may use these holes, as long as they don't interfere with the cover screws. Since these holes are outside of the enclosure seal, this does not reduce the enclosure's seal. Two screws with nuts are included for this purpose. Additional screws are available as GSE part number 38-24-3200, the nuts are GSE part number 38-24-1650. The screws used should have a small head diameter no larger than 0.242 inches in diameter, such as a 6-32 fillister head.

A second mounting method involves using the knockouts provided in the back wall of the enclosure. This requires removing the sub-chassis and relay board. It will also compromise the enclosure seal integrity.

15.4.2 Control Connections

Color	Indicator J6 Pin Number	Indicator J6 Pin Name	Relay Board SIGNAL Pin Number
Red	7	+5V	2&4
Black	6	GND	1
White	8	SP1	3
Green	9	SP2	5

Table 15-2 Relay Module Control Connections

GSE Part Number	WRC/Allen Bradley Part#	Type	Nominal Voltage	Minimum Voltage	Maximum Voltage	Amps Max
19-30-0310	1781-OA5S	AC	120	12	140	3
19-30-0320	1781-OM5S	AC	240	24	280	3
19-30-0510	1781-OC5S	DC	120	5	200	1
19-30-0520	1781-OB5S	DC	24	3	60	3

Table15-3 Relay Module, Available Output Modules

Caution

All electrical Connections and access to the inside of the indicator and the GSE Relay Module enclosures should be performed by qualified service personnel only!

The GSE Relay Module includes a captive 6 foot cable which connects to the Indicator to provide the control signals for the module.

A longer cable may be used, but it must be a shielded cable of a type similar to the cable provided. Tests with 200 feet of cable have shown no detrimental effects to the operation of the scale or relay module.

Route the cable into the indicator through the rear panel strain relief marked J2. The shield connection must be secured with the hex nut on the adjacent stud which secures the main printed circuit board.

Inside the indicator, the cable's individual wires connect to J6 which is located toward the left side of the board near the power connector (J7) of the circuit board. Inside the GSE Relay Module they connect to the terminal block marked SIGNAL. Table 15-2, Relay Module Control Connections details each wire termination.

15.4.3 Setpoint Output Connections

Included in the indicator are two open collector type outputs (effectively open drain type) which are controlled by the setups for setpoints one and two. These can be used to control external devices such as low power LED lights or to drive solid state relays such as those provided by the GSE Relay Module Option.

Four connections are provided to make use of the logic outputs. These are the bottom four connections of J6: +5 V, GND, SP1 and SP2.

The +5 V is capable of supplying current of approximately 100 mA. This should be sufficient for most applications. The outputs are not intended to directly drive significant loads!

Normally the +5 V supply would be connected to some value of current limiting resistor (depending on the device being connected), the resistor would connect to the plus side of the device, and the SP1 or SP2 output would be connected to the other side of the device. When the setpoint is not active, the SP1 or SP2 output is an open circuit. When the setpoint is active the indicator output becomes a connection to ground, thus turning on the connected device (Sink Output).

Externally supplied voltages can also be switched by the logic outputs. In this case the ground connection of the supply must be connected to the indicator common which is provided on the J6 setpoint connector. Be sure that the connected circuitry's ground does not have an earth ground connection or an alternate ground path will be established and the accuracy and stability of the

Output	Positive	Negative
Setpoint 1	2	3
Setpoint 2	4	5

Table 15-4 Relay Module Power Terminal Block

Color	Indicator J6 Pin Number	Indicator J6 Pin Name	Relay Board SIGNAL Pin Number
Red	7	+5V	6&8
Black	6	GND	—
White	8	SP1	7
Green	9	SP2	9

Table 15-5 Relay Module Control Connections for a Second Indicator

weight reading may be degraded.

Each of the two setpoint outputs is rated to sink up to 30 mA when the output is active. Leakage current into the setpoint output when it is de-active will not exceed 0.01 mA. The voltage applied to the output should not exceed 30 V. When the output is active and sinking up to 30 mA the output voltage will not exceed 0.4 V.

The GSE Relay Module Option accepts the J6 setpoint output signals from the indicator and provides optically isolated solid state relay outputs.

15.4.4 Power Connections

The output wiring of the solid state relays is connected to the upper terminal block inside the GSE Relay Module labeled POWER.

The output wiring enters the enclosure through one of the knock-outs in the enclosure. The relay board prevents the use of the knock-outs on the sides. This leaves 2 available on the top and one on the bottom. They may be pried out with a screwdriver.

One strain relief is provided for the power connections. Additional cable strain reliefs are available from GSE under part# 26-20-1878. These accommodate cables with outside diameters of 0.236 to 0.512 inches.

Each knock-out can be opened to 2 sizes, (0.91" diameter) which accommodate 1/2" conduit fittings, and (1.14" diameter) which accommodate 3/4" conduit fittings. Since these holes are slightly oversized for these fittings, some fittings may require a gasket or washer for a proper fit. GSE part# 31-20-0156 is a recommended gasket for 1/2" conduit fittings.
The output wiring should be connected as shown in Table 15-4, Relay Module Power Terminal Block Connections. If DC modules are being used, correct polarity must be observed.

15.4.5 Output Modules

The output modules are supplied separately and must be installed in the proper position on the relay board. Although the relay board is designed to accept 4 output modules, the Indicator only directly supports two hardware setpoint outputs.

The positions on the relay board are numbered 0 through 3. Position 0 corresponds to setpoint output 1 and position 1 corresponds to setpoint output 2. Once the modules are installed, they are fastened to the relay board by their own hold-down screw.

Refer to Table 15-3 Relay Module Available Output Modules for details on modules which are suitable for use in the 24550B-100A0 GSE Relay Module.

Refer to the manufacturers data sheets for further information regarding the holding current, surge current, and other related parameters for each module.

15.4.6 Operation

During operation, when an output is activated, it's corresponding LED will light. An output module must be installed for the LED to function correctly.

Each output module is protected by it's own fuse. The standard fuse is a 5 AMP miniature type that looks very much like a resistor. They are plugged into sockets on the relay board.

If there is a problem, the fuse may blow. Note that the LED will still operate even with a blown fuse. If the fuse does blow, always remove power and fix the problem before applying power to the circuit again. The relay board provides space for a spare fuse in addition to the two unused relay positions' fuses. Replacement fuses are available through GSE (Part# 13-10-4500), or use Littlefuse PICO II part# 251005 or BUSS Tinitron Part# A5 or AC5.

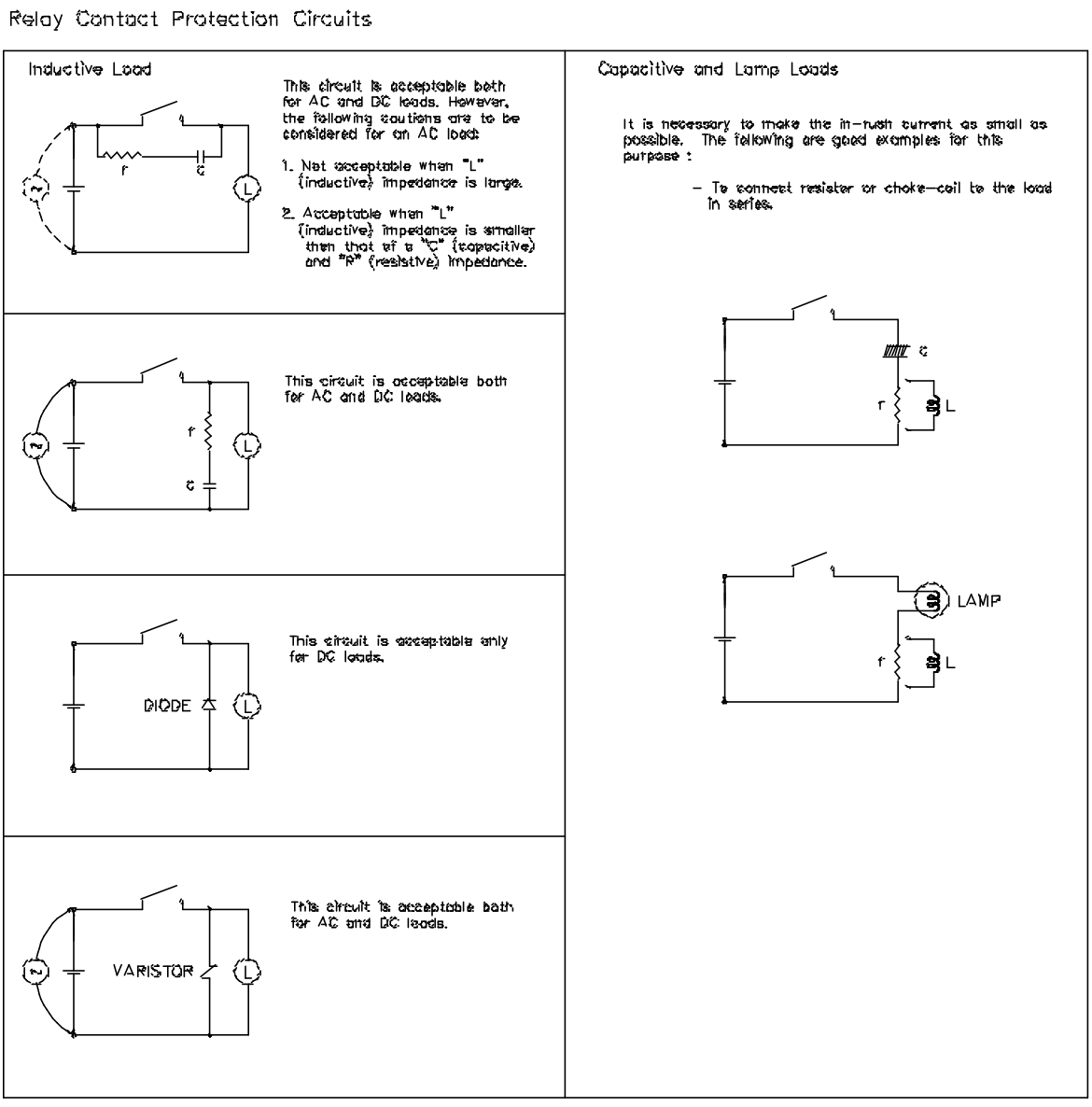


Figure 15-1 Relay Contact Protection Circuits

Output	Positive	Negative
Setpoint 1	6	7
Setpoint 2	8	9

Table 15-6 Relay Module Setpoint Outputs for a Second Indicator

15.5 Using the GSE RELAY MODULE with Two Indicators

Since there are two unused positions in the GSE Relay Module, it is possible to use those relays for the setpoint
outputs of a second indicator. Certainly other combinations are also possible. Since each relay may be used independently of the others, four Indicators could share one GSE Relay Module, with each instrument having one setpoint output relay. For the purposes of this example, we will assume two Indicators with 2 setpoint output relays each.

Refer to Table 15-5 Relay Module Control Connections for a second indicator for the control connections to the second instrument. The first instrument is connected as shown in Tables 15-2 and 15-4.

Refer to Table 15-5, Relay Module Setpoint Outputs, for a *second* indicator details the POWER connections for the second indicators setpoint outputs.

The following parts are available separately from GSE, for connection to the second instrument:

Unfinished control cable

(specify length) part# 22-10-6675

Cable strain relief part# 26-20-1878

Cable anchor part# 31-80-0140

15.6 Relay Contact Protection Circuits

Brief Explanation

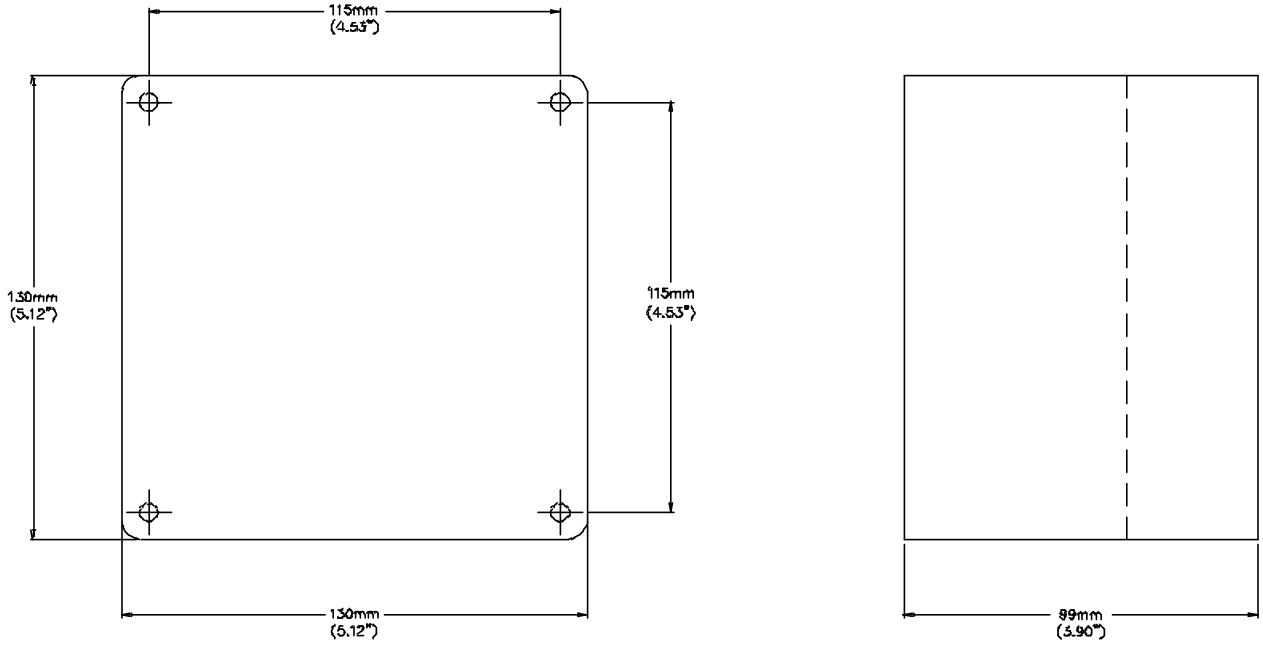
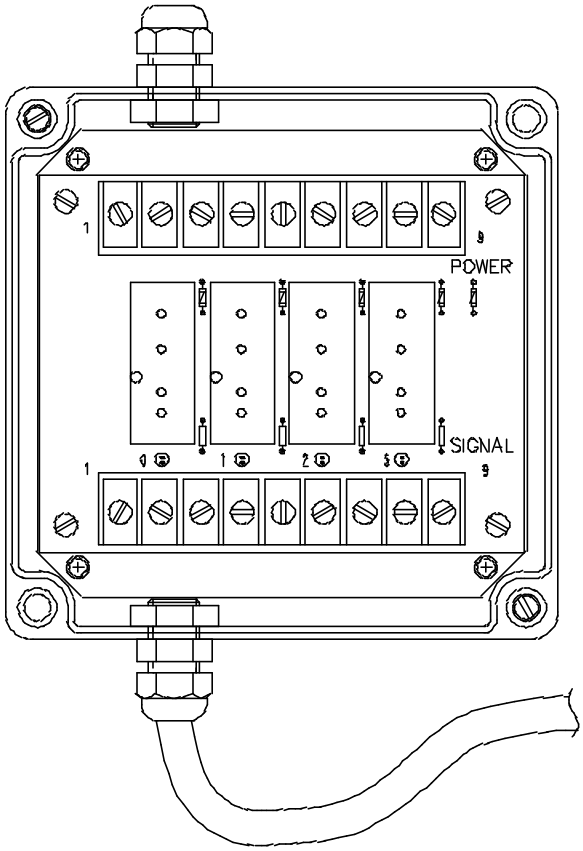


Figure 15-2 Option Mounting Dimensions



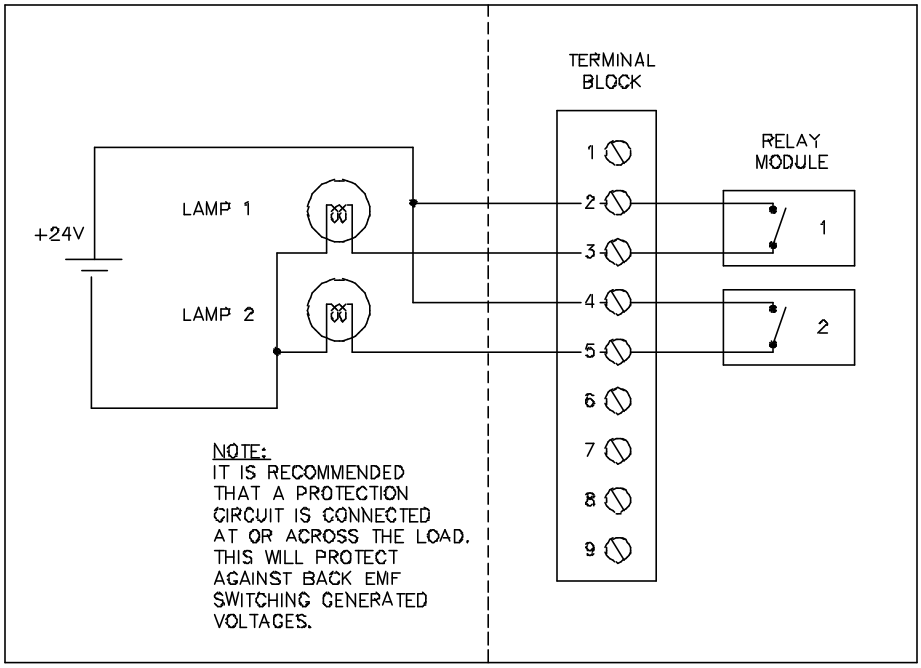


Figure 15-3 Relay Module