



COD-210 Call Operating Device

1. Intent & Scope

This document describes the installation procedure for the COD-210 Call Operating Device.

2. Description

The COD-210 Call Operating Device consists of a vandal resistant switch mounted on a heavy-duty single gang stainless steel faceplate. The unit is designed to mount on a standard electrical box. The COD-210 can be ordered with several different types of switches including a vandal resistant or a piezo-electric switch, with or without an LED and with or without terminations for line supervision.

An optional choice for the COD-210 allows for jumper selectable line terminations. Positioning jumpers on a printed circuit board header allows the switch to act as switch type A or switch type B for DIO inputs, or as an unsupervised switch. By inserting a jumper in the appropriate position the LED can operate with or without a current limiting resistor. The factory configures the jumper positions for an unsupervised switch as well as current limiting for the LED.

The COD-210 without the optional jumper selectable terminations comes with pigtail leads that can be connected to the field wiring with standard twist connectors. Section 3 discusses the installation procedures for the COD-210 with a vandal resistant switch and jumper selectable terminations; Section 4 discusses the installation procedures for COD-210 with pigtail terminations while Section 5 discusses the installation procedures for the COD-210 with other types of switches.

2.1 Supervised and Unsupervised Switch

The COD-210 can be ordered with jumper selectable terminations that allow the switch to be configured as a type A or type B switch with line supervision, or as an unsupervised switch. With supervised terminations the DXI system can detect open or shorted line faults. With an unsupervised switch line faults cannot be detected. The following diagrams show the three equivalent circuits of a MicroComm supervised switch.

2.1.1 Switch A

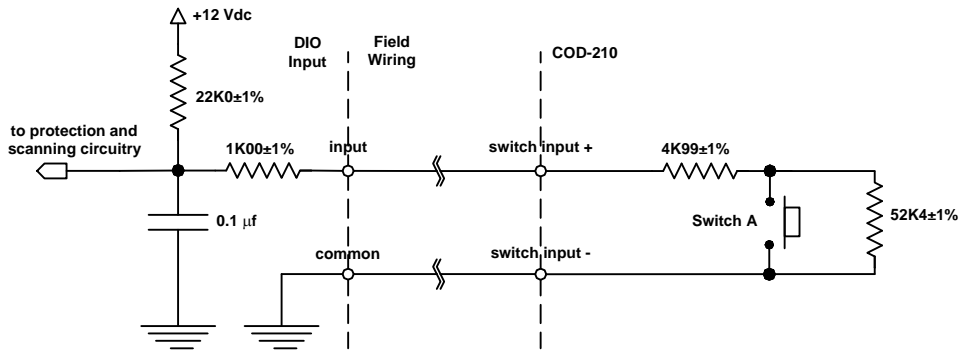


Figure 1 Equivalent Circuit when configured as SWA

When configured as switch A the voltage at the DIO inputs should be 8.6 volts normally and change to 2.1 volts when the switch is pressed.

2.1.2 Switch B

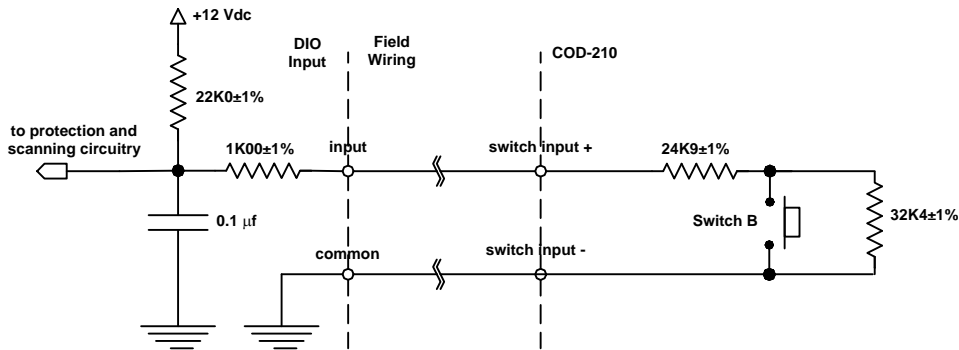


Figure 2 Equivalent Circuit when Configured as SWB

When configured as switch B the voltage at the DIO inputs should be 8.6 volts normally and change to 6.3 volts when the switch is pressed.

2.1.3 Unsupervised

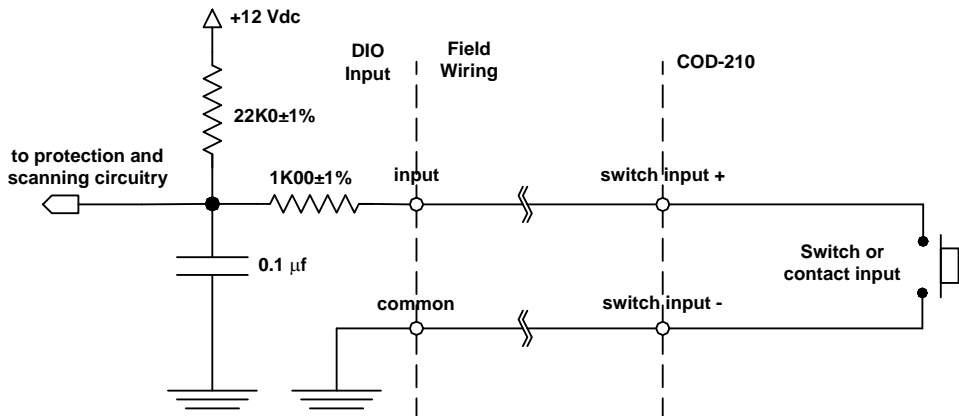


Figure 3 Equivalent Circuit when configured as Unsupervised Switch

2.2 LED Terminations

The COD-210 can be ordered with an optional LED that can be turned on by a DIO. A current limiting resistor is included with the diode but the resistor can be bypassed if the DIO already has a current limiting resistor

Use of the LED with the three possible DIO outputs is given in the following diagrams.

2.2.1 Source Output

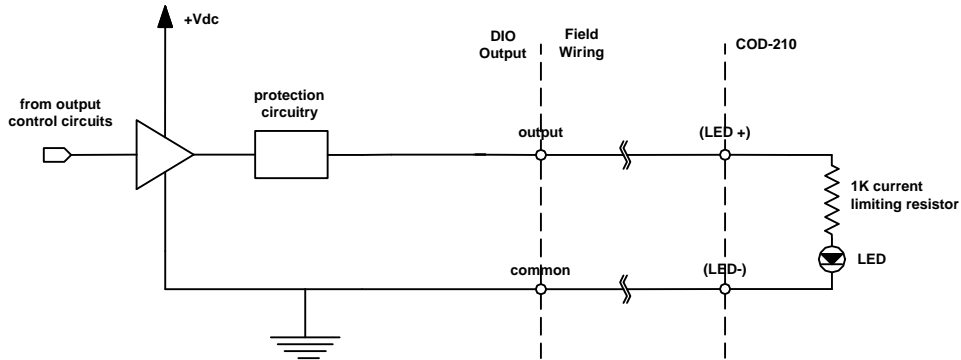


Figure 4 Equivalent Circuit with DIO Source Output

If the DIO has a source output the current limiting resistor should be used with the LED. The current limiting resistor is 1K for 12 Vdc but can be changed via jumper selection to 2K for 24 Vdc operation.

2.2.2 LED Driver Output

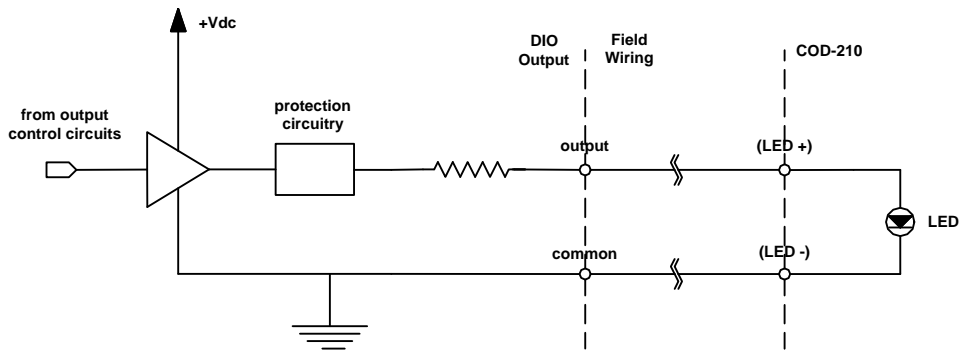


Figure 5 DIO with LED Driver Output

If the DIO is has an LED Driver Output then the current limiting resistor can be bypassed.

2.2.3 Sink Outputs

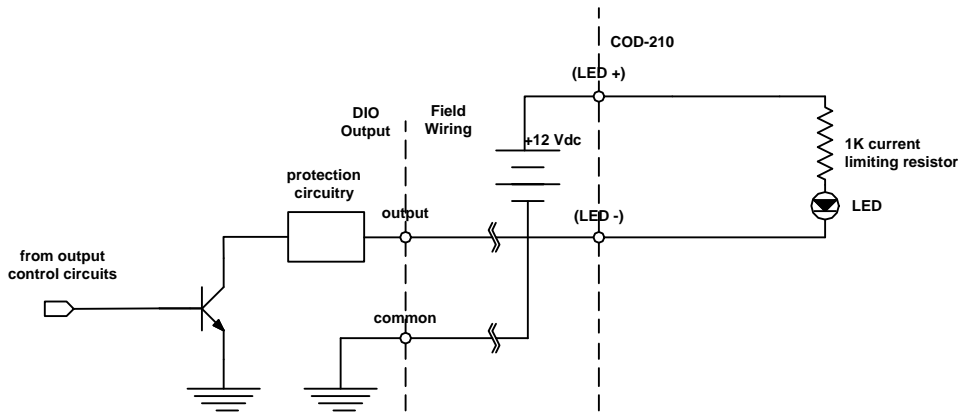


Figure 6 DIO with Current Sinking Output

If the DIO has an open collector transistor output the LED can be wired to indicate an output. In this case the current limiting resistor should be used. A +12 Vdc supply must be wired back to the LED + input on the COD.

If the available power supply is +24 Vdc rather than +12 Vdc the 2K resistor on the PC board can be selected rather than a 1K. The resistor value should be selected to set the LED current to approximately 10 mA.

2.3 Field Connections

The switch contact signals and LED control mate to the circuit board via a 4-pin female MTA-100-04 connector that plugs into the 4-pin header. The LED pair should connect to the two pins labeled LED+ and LED-, and the switch pair connects to the other pair labeled "Sw". To make these connections you should use an AMP Handle Assy 58074-1 tool with a 58246-1 head. The cable should be cut to length and the outer jacket should be trimmed back about a 1/2 inch.

To insert the signal wires you remove the white cover from the connector, insert the connector into the tool from the left side (it will travel through the tool in the direction indicated by the arrow), pull the trigger once to load the connector. Then insert the signal wire for pin 1 (do not strip the wire) into the hole on the top of the tool and pull the trigger to insert the wire into the connector. Then repeat to install the other signal wire. Finally, remove the connector from the tool, replace the cover, and then slide the connector onto the pins on the COD.

3. Installation of COD with LED and Jumper Selectable Terminations

A simplified diagram of the COD-210 used with a vandal resistant switch and jumper selectable terminations is shown in Figure 7. (These include CODs with part numbers COD-210-2x7-y2 where x=1or 2 and y=0, 1 or 2) The board is designed to accommodate either a vandal resistant switch and a separate LED or a vandal resistant switch with a built LED. The printed circuit board has four headers labeled CN7/CN8, CN6/CN5, CN4/CN3 and CN2/CN1. Field connections are made to CN8/CN7 with a 4-pin female MTA-100-04 connector. The switch connections are made to pins 2 and 3 while the LED connections are made to pins 1 and 4. Note that a full wave bridge rectifier makes the LED connections polarity insensitive and the supervisor network for the switch is also polarity insensitive.

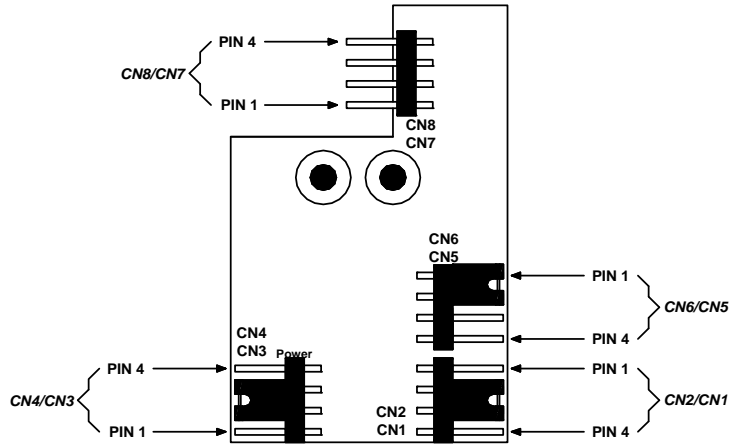


Figure 7 Printed Circuit Board Showing Headers and Initial Position of Jumpers

MTA Pin	Signal
1	LED
2	Switch
3	Switch
4	LED

Table 1 MTA Pin Signals on CN8/CN7

3.1 Switch Configuration

The switch is connected to the DXI/DXL system through pins 3 and 4 of header CN8/CN7. The header CN2/CN1 is shipped from the factory with a jumper that shorts pins 2 and 3 and a jumper on CN6/CN5 that shorts pins 1 and 2. This configures the switch as an unsupervised switch. The following positions of the jumpers provide three possibilities.

Switch Type	CN2/CN1 Jumper Position	CN6/CN5 Jumper Position
SWA Supervised	1-2	3-4
SWB Supervised	3-4	3-4
Unsupervised	2-3	1-2

Table 2 Jumper Positions to Configure Switch

When configured as an unsupervised switch the voltage at the DIO terminals should normally be 12 volts and change to 0 volts when the switch is pressed.

3.2 LED configuration

By inserting a jumper on header CN4/CN3 the LED current limiting resistor can be bypassed, set to 1K or set to 2K. Bypassing the current limiting resistor would be used if the DIO already has a current limiting resistor. To bypass the resistor a jumper should be moved to short out pins 1 and 2 on CN4/CN3. The LED current should be approximately 10 mA, a resistor of 2K will limit the current to that value with an applied voltage of 24 Vdc, and a resistor of 1K will limit an applied voltage of 12 Vdc to 10 mA. The following table shows the LED operation corresponding to the three jumper positions.

LED Operation	Resistor Value	Jumper Position
LED Current Limit Bypass	0	1-2
LED 12 V or 24 V high brightness	1 K	3-4
LED 24 V	2 K	2-3

Table 3 LED Operation

3.3 Mounting the COD

The COD-210 Call Operating Device is designed to mount in a standard single gang electrical box. (It is compatible with standard #6-32 mounting hardware). The box for the COD-210 with jumper selectable terminations must have a minimum depth of 1.575 inches.

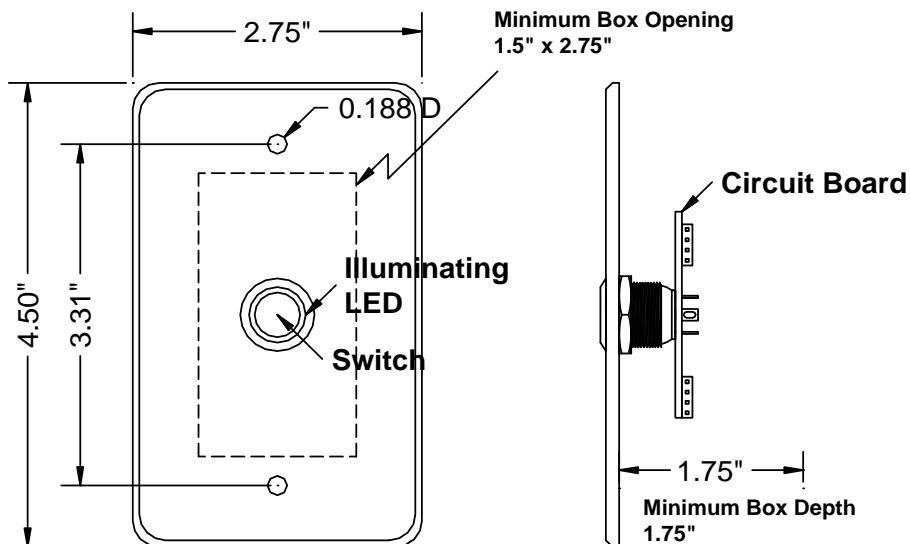


Figure 8 COD 210 with Jumper Selectable Terminations

4. Installation of COD with Pigtail Leads

The COD-210 without jumper selectable terminations will have 9" pigtail wires available with 1/2" tinned leads for connection to the field wiring. A twist type connector should be used to make the connection. A supervised COD switch with termination resistors will act as a type A switch for DIO inputs. If the switch has a LED included then a 1K-ohm current limiting resistor is included to protect the LED. The following table gives the wire colors for the various configurations for a COD.

Wire function	Unsupervised switch – No LED	Unsupervised Switch – With LED	Supervised Switch - No LED	Supervised Switch - With LED
Switch Input +	red	red	red	red
Switch Input -	red	red	green	green ¹
LED +		yellow		yellow
LED -		blue		green ¹

¹LED - and Switch input - are connected together and brought out on a single green pigtail

Table 4 Wire colors for COD-210 with pigtail terminations

4.1 Switch Configurations

The two possible switch configurations for the COD-210 with pigtail terminations are either as a supervised switch (acts as a DIO type A switch) or as an unsupervised switch. The two switch configurations when connected to a DIO are given in the following diagrams.

4.1.1 Switch A

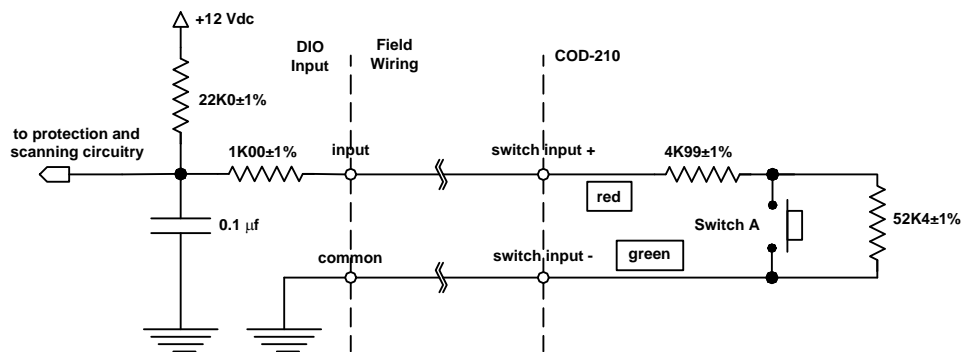


Figure 9 Equivalent Circuit with Supervised Switch

With the supervised switch the voltage at the DIO inputs should normally be 8.6 volts and change to 2.1volts when the switch is pressed

4.1.2 Unsupervised Switch

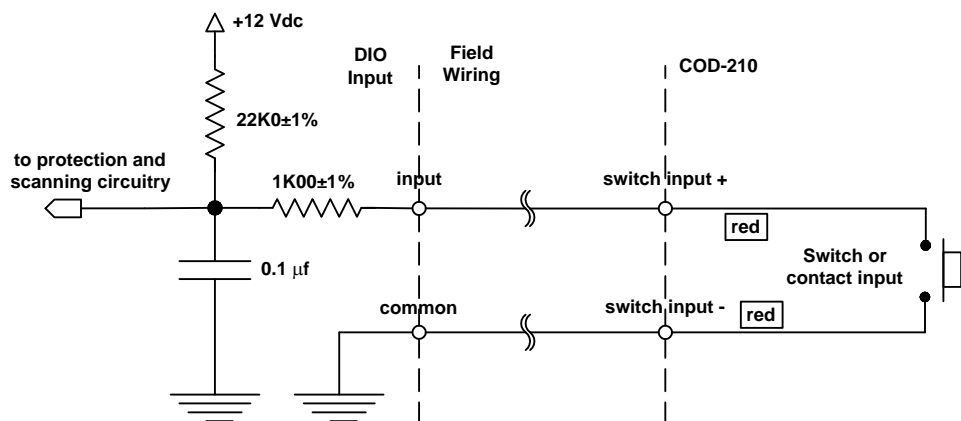


Figure 10 Equivalent Circuit with Unsupervised Switch

With an unsupervised switch the DIO inputs should be 12 volts normally and change to 0 volts when the switch is pressed

4.2 LED Configuration

A 1 K ohm resistor is wired into the circuit to limit the current through the LED. With the current limiting resistor a DIO source output can be used to drive the LED.

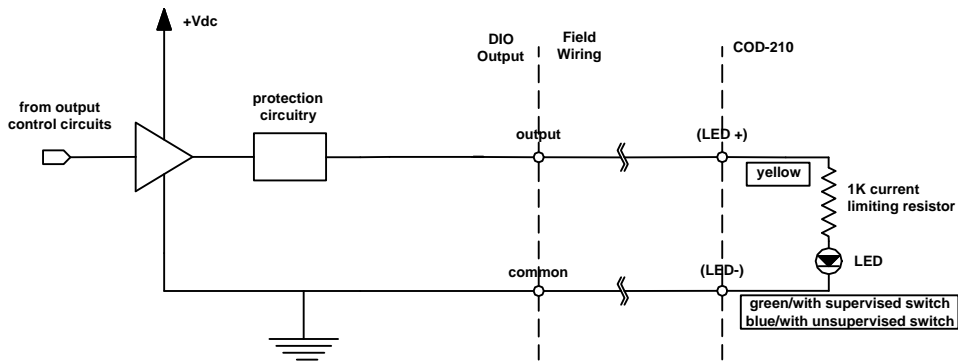


Figure 11 DIO with Source Output

Note: If the DIO you are using has an LED driver output or a current sinking output you should contact Harding Instruments and either special order the COD-210 or make field modifications to the termination network

4.3 Mounting the COD

The COD-210 Call Operating Device is designed to mount in a standard single gang electrical box. (It is compatible with standard #6-32 mounting hardware). The box for the COD-210 with pigtail terminations must have a minimum depth of 1.75 inches.

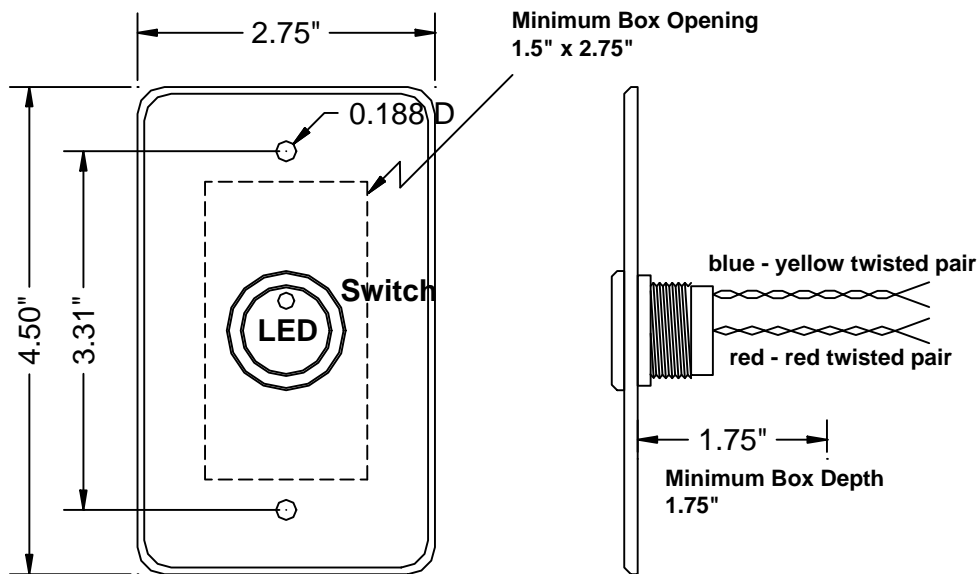


Figure 12 COD 210 with Everswitch

A COD with a either a piezo-electric switch or mechanical switch that has pigtail type terminations must have a box opening of 1.5" x 275" and a minimum depth of 1.75".

5. Installation of COD with LED and Jumper Selectable Terminations

For CODs without vandal resistant switches a simplified diagram of the jumper selectable terminations for this printed circuit board is shown in Figure 13. The printed circuit board has two headers labeled CN1 and CN3. Field connections are made to CN1 with a four pin MTA-100-04 connector. The LED connections are made to pins 1 and 2 while the switch connections are made to pins 3 and 4. Note that the polarity of the LED inputs must be maintained. The polarity of the switch inputs is not critical.

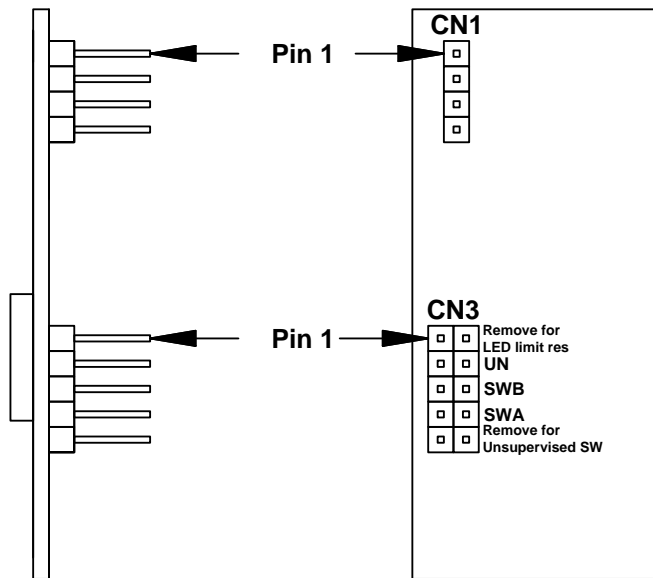


Figure 13 Printed Circuit Board Showing Locations of CN1 and CN3

MTA Pin	Signal
1	LED +
2	LED -
3	Switch input +
4	Switch input -

Table 5 MTA-100 Pin Signals

5.1 Switch Configuration

The header CN3 is shipped with three jumpers. The position of the jumpers, when shipped from the factory, is shown in the following figure. The initial position of jumpers B and C configure the switch to act to as a type A switch. Jumper A is 'parked' and is included to short out the LED current limiting resistor if necessary.

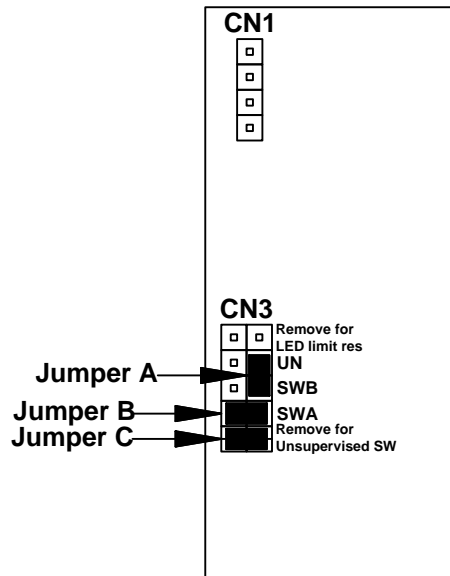


Figure 14 Initial Positions of Jumpers A, B and C

The switch is connected to the DXI system through pins 3 and 4 of header CN1. Positioning two jumpers on CN3 can configure the switch to operate in three different modes. The jumper locations for the three configurations are summarized in the following table.

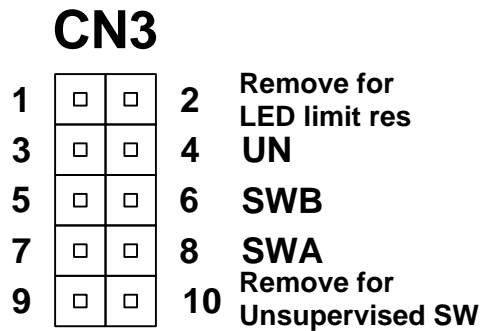


Figure 15 Pin Numbering for CN3

Switch Type	Jumper B	Jumper C
SWA	7-8	9-10
SWB	5-6	9-10
Unsupervised	3-4	Removed

Table 6 Jumper Positions to Configure the Switch

The three switch configurations and the DIO connection are given in Section 2.1. When configured as an unsupervised switch the voltage at the DIO terminals should normally be 12 volts and change to 0 volts when the switch is pressed.

5.2 LED configuration

By inserting a jumper on header CN3 the LED current limiting 1K resistor can be bypassed. This would be used if the DIO already has a current limiting resistor. To bypass the resistor jumper A should be moved to short out pins 1-2 on CN3.

5.3 Mounting the COD

The COD-210 Call Operating Device is designed to mount in a standard single gang electrical box. (It is compatible with standard #6-32 mounting hardware). The box for the COD-210 with jumper selectable terminations must have a minimum depth of 1.75 inches.

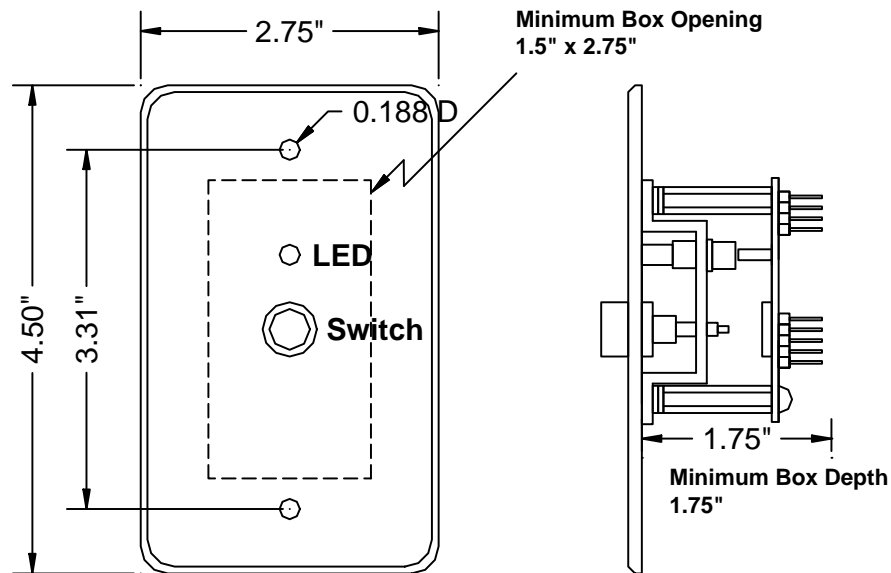


Figure 16 COD 210 with Jumper Selectable Terminations