User Manual

Omni8C/16C/Omni8P Series

Alarm Annunciators & Serial Displays

User Manual

Revision 24

BACKLIT

Omniflex

REMOTE MONITORING SPECIALISTS

Scope

This User Manual provides information necessary to install, configure and operate your Omni8s or Omni16Cs.

Date	Revision	Comments
Sep 1999	1	Initial revision
Feb 2000	2	Revised with corrections for product release
Mar 2000	3	Minor typographical errors corrected
July 2000	4	Updated Modbus Interface related content
July 2000	5	Updated with new timer operation
Sep 2000	6	Updated to reflect latest features of V5.xx software kernel
Oct 2000	7	Include Repeat Output functions and DIT Rev 3 changes.
Dec 2000	8	Various Amendments, Input connections for OV comm,
June 2001	9	Amended Softset DIP setting error. Drawing amendments
Oct 2001	10	Block Diag terminal no's corrected Sequence 14 Added
Aug 2003	11	Include Repeat as GA functions and DIT Rev 6 changes.
July 2006	12	Omni8P version added to the manual
Nov 2006	13	Modbus Addressing enhanced from V8.02 firmware.
Aug 2009	14	Non-Spark EXN annunciator added
Dec 2010	15	Updated to reflect changed operation of Repeat Relay boards
Feb 2013	16	Updated to correctly describe default operation of the Repeat Relays
Mar 2013	17	Updated Ex certification information to Ex ic
Feb 2014	18	Functional Safety Manual added
Apr 2016	19	Updated Figures 3-12 &13, sequence 18, corrected C1163 & added C1169 wiring details and Isolated High Voltage Input Cards, added humidity readings in specs
Aug 2016	20	LED Board insertion and removal images added.
Oct 2016	21	Missing consumptions for Omni8P and note 2 in Table 3-1, incorrect footer.
Oct 2017	22	Added block diagram for Omn16C Ex & IP65 Front Covers, updated both Scope of Displays and Product Feature Chart and updated to new style
Nov 2017	23	Updated front cover photo to Backlit only
Aug 2021	24	Reverse polarity with respect to the Omni16C Ex version clarified. Information for alternative input options included.

This manual covers the following product Model Numbers below but not all features described in this manual are necessarily available on the product you have purchased. See section 2.3 for details of these options.

Model	Description	Picture*
8 Point Remote Displays (with ribbon header inputs):		
C1496A	Omni8C Remote Display with Backlit Display (No lamps or LEDs)	Figure 1-2
C1497A/8A	Omni8C Remote Display with Sidebar Display	-
C1499A	Omni8C Remote Display with Backlit Display (with lamps)	Figure 1-2
16 Point Remote Displays (with ribbon header inputs):		
C1486A	Omni16C Remote Display with Backlit Display (No lamps or LEDs)	Figure 1-1
C1487A/8A	Omni16C Remote Display with Sidebar Display	-
C1489A	Omni16C Remote Display with Backlit Display (with lamps)	Figure 1-1
8 Point Remote Logic Units (separate display required):		
C1180	Omni8C Remote Logic Unit Ribbon Header O/P	Figure 1-3
C1181	Omni8C Remote Logic Unit Lamp Driver O/P	Figure 1-3
16 Point Remote Logic Units (separate display required):		
C1478	Omni16C Remote Logic annunciator with Lamp Driver Outputs	Figure 1-4
C1479	Omni16C Remote Logic annunciator with Ribbon Header Outputs	Figure 1-4
C1182	Omni16C Remote Logic Unit in compact housing	Figure 1-3
C1184	Omni16C Serial Input Remote Logic Unit Ribbon Header O/P	Figure 1-3
C1185	Omni16C Serial Input Remote Logic Unit Lamp Driver O/P	Figure 1-3
8 Point Panel Mount Integral Alarm Annunciators:		
C1490B	Omni8C annunciator with backlit LED display	Figure 1-1
C1491B	Omni8C annunciator with sidebar LED display	-
C1492B	Omni8C annunciator with incandescent lamp display	Figure 1-1
C1493B	Omni8C serial input annunciator with backlit LED display	Figure 1-1
C1494B	Omni8C serial input annunciator with sidebar LED display	-
C1495B	Omni8C serial input annunciator with incandescent lamp display	Figure 1-5
C1427A	Omni8P Backlit LED annunciator with integral pushbuttons & audible	Figure 1-5
C1428A	Omni8P Sidebar LED annunciator with integral pushbuttons & audible	-
C1429A	Omni8P Incandescent lamp annunciator with integral p/buttons & audible	Figure 1-5
16 Point Panel Mount Integral Alarm Annunciators:		
C1480B	Omni16C annunciator with backlit LED display	Figure 1-2
C1481B	Omni16C annunciator with sidebar LED display	-
C1482B	Omni16C annunciator with incandescent lamp display	Figure 1-2
C1483B	Omni16C serial input annunciator with backlit LED display	Figure 1-2
C1484B	Omni16C serial input annunciator with sidebar LED display	-
C1485B	Omni16C serial input annunciator with incandescent lamp display	Figure 1-2
16 Point Intrinsically-Safe Integral Alarm Annunciators Ex ic:		
C1480B-EX	Omni16C annunciator with backlit LED display	Figure 1-6

* Pictures are for reference only. Some details may change between models.

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Table of Figures

1 Introduction

The Omniflex Omni8/16C family is a range of compact, highly flexible, full function integral alarm Annunciators and displays designed to fulfil all the requirements of the modern industrial plant.

Alarm Annunciators are a key component in the safety of the plant, and these products have been designed with safety integrity in mind. Continuous advanced internal self-testing creates a product suitable for use in IEC61508 SIL1 applications.

All products in the range are available “off-the-shelf” with no factory customisation required. Because these units are not built to order, spares holding and maintenance are significantly enhanced. Standard 8 and 16 point modules allow integral systems from 8 to 256 points to be constructed by the user.

Panel mounted display options include long-life incandescent lamps, high-bright backlit LEDs and the unique “sidebar” LED system pioneered by OMNIFLEX.

Display legends for the backlit displays are created by the user on any standard laser/inkjet printer using software templates supplied with the product.

All popular configuration options are accomplished by switch settings on the rear of the unit. Software programming can be used to select more advanced options.

Available in a range of power supply options, these rugged products are designed to fit directly into local electrical panels without the need for external power conditioning or interfacing for the lowest cost system implementation.

Additional options include:

- Integral control pushbutton station to minimise installation space and cost.
- Fully isolated RS232/422/485 Modbus© compatible serial port to interface to PLC, DCS, or SCADA systems.
- Internal input repeat relays to minimise field wiring when also connecting inputs to other systems.
- A Software Configuration Utility for more advanced customisation.

Figure 1-1 – The Omni8C Panel Mount 8 point Alarm Annunciator/Display.

Figure 1-2 – The Omni16C 16 point Panel Mount Alarm Annunciator/Display.

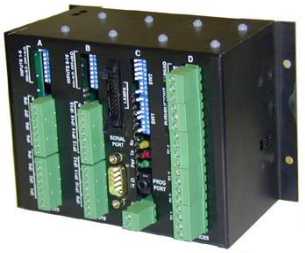

Figure 1-3 – The Omni8C Remote Logic Unit

Figure 1-4 – The Omni16C Remote Logic Unit

Figure 1-5 – The Omni8P Panel Mount 8 point Alarm Annunciator with integral controls

Figure 1-6 – The Omni16C Intrinsically-Safe Integral Annunciator (Ex ic, Zone 2)

2 General Description

2.1 Standard Features

Standard 8 and 16 point modules allow systems from 8 to 256 alarm points to be constructed by the user.

- Integral or Remote Alarm Logic for maximum flexibility.

8 points of alarm/display in 120mm high by 144mm wide size modules to minimise panel space. (16 point module is 120mm x 288mm wide)

- All products in the range are supplied off-the-shelf with no factory customisation required, minimising spares holding.
- Panel mounted display options include long-life incandescent lamps, high-bright back-lit LED's and the unique "side-bar" LED system pioneered by OMNIFLEX.
- User-created display legends on standard laser/inkjet printer using software templates supplied – no window engraving required.
- Relay outputs for common group alarm and external audible device control.
- Integral hardware watchdog relay for safety critical applications.
- Removable terminals for easy installation and maintenance.
- Wetting voltage supplied to the inputs to allow potential free input contacts to be directly connected.
- Switch selectable Normally Open or Normally Closed input contact sense selection while installed. No dismantling required.
- 27 switch selectable alarm sequences built in covering most alarm annunciator specifications and configurations.
- 24Volt dc powered (Some models also available in 85-264Vac options).

2.2 Options Available

- Integral power supply for direct connection to 48Vdc or 85-264Vac or dc.
- Internal input repeat relays to minimise field wiring when also connecting inputs to other systems.
- Fully isolated RS232/422/485 Modbus compatible serial port to interface to PLC, DCS, or SCADA systems.
- Advanced Software Configuration Utility to configure the Omni8/16C in "SOFT-SET" mode for more specialised applications.

2.3 Product Feature Chart

The following feature chart describes the features available in the product you have purchased. Refer to the product descriptions in the SCOPE section at the front of this manual if necessary.

Model	Integral Display	Wall mount	Panel Mount	No. of Alarm/ display Points	Backlit Incand. Display	Backlit LED Display	Sidebar LED Display	No. of Input Contacts	Common Services	Serial Port	Input Repeat Relays	Rem Display/ I/P Repeats	Integral Alarm Logic
C1479	N	Y	N	16	N(1)	N	N	16	Y	O	N(3)	Y(2)	Y
C1480	Y	N	Y	16	N	Y	N	16	Y	O	O	O(3)	Y
C1480-Ex	Y	N	Y	16	N	Y	N	16	Y	N	N	O(3)	Y
C1481	Y	N	Y	16	N	N	Y	16	Y	O	O	O(3)	Y
C1482	Y	N	Y	16	Y	N	N	16	Y	O	O	O(3)	Y
C1483	Y	N	Y	16	N	Y	N	0	O	Y	O	O(3)	Y
C1484	Y	N	Y	16	N	N	Y	0	O	Y	O	O(3)	Y
C1485	Y	N	Y	16	Y	N	N	0	O	Y	O	O(3)	Y
C1486	N	N	Y	16	N	Y	N	0	N	N	N	N/A	N
C1487	N	N	Y	16	N	N	Y	0	N	N	N	N/A	N
C1488	N	N	Y	16	N	N	Y	0	N	N	N	N/A	N
C1489	N	N	Y	16	N	Y	N	0	N	N	N	N/A	N
C1490	Y	N	Y	8	N	Y	N	8	Y	O	O	O(3)	Y
C1491	Y	N	Y	8	N	N	Y	8	Y	O	O	O(3)	Y
C1492	Y	N	Y	8	Y	N	N	8	Y	O	O	O(3)	Y
C1493	Y	N	Y	8	N	Y	N	0	O	Y	O	O(3)	Y
C1494	Y	N	Y	8	N	N	Y	0	O	Y	O	O(3)	Y
C1495	Y	N	Y	8	Y	N	N	0	O	Y	O	O(3)	Y
C1496	N	N	Y	8	N	Y	N	0	N	N	N	N/A	N
C1497	N	N	Y	8	N	N	Y	0	N	N	N	N/A	N
C1498	N	N	Y	8	N	N	Y	0	N	N	N	N/A	N
C1499	N	N	Y	8	N	Y	N	0	N	N	N	N/A	N

NOTES

1. Y = Provided as standard; N = Not available; O = Option ordered separately. [Do not confuse with 0 (zero) in “No. of Input Contacts” column]
2. The Remote Display/Input Repeat Option provides two 20 way ribbon header connectors. One connector provides 16 open collector transistor outputs from the lamp drivers, and the other provides 16 open-collector transistor outputs as input repeat signals. This option should be installed to provide compatibility with the previous Omni16A and Omni16B product ranges.
3. Input Repeat Relays cannot be installed together with the Remote Display/Input Repeat option, which is equipped with open-collector transistor input repeat outputs. These may be connected to an external relay module.

2.4 Front View of 16 point Panel Mount Units showing Display Layout and numbering

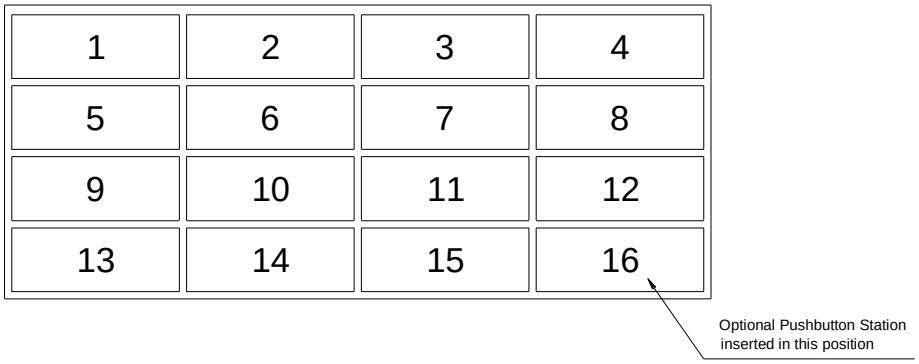

Figure 2-1 – Panel Mount Omni16C Front View showing Window Numbers

2.5 Front View of Omni8C Panel Mount Units showing Display Layout and numbering

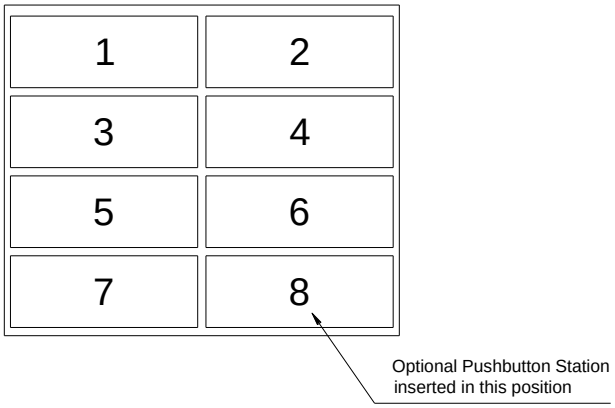

Figure 2-2 – Panel Mount Omni8C Front View showing Window Numbers

2.6 Front View of Omni8P Panel Mount Unit showing Display Layout and numbering

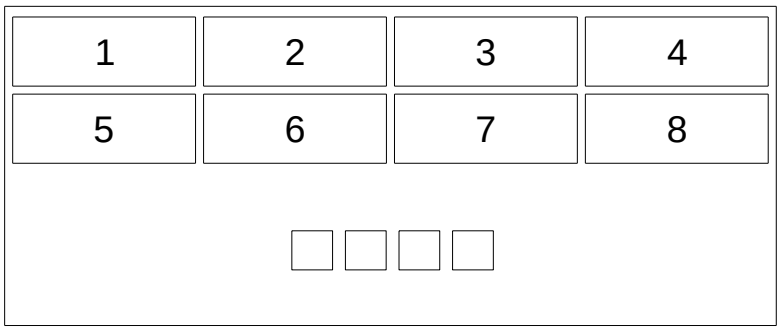

Figure 2-3 – Panel Mount Omni8P Front View showing Window Numbers

2.7 Rear View of Omni16C 16 point units showing Terminal Layout

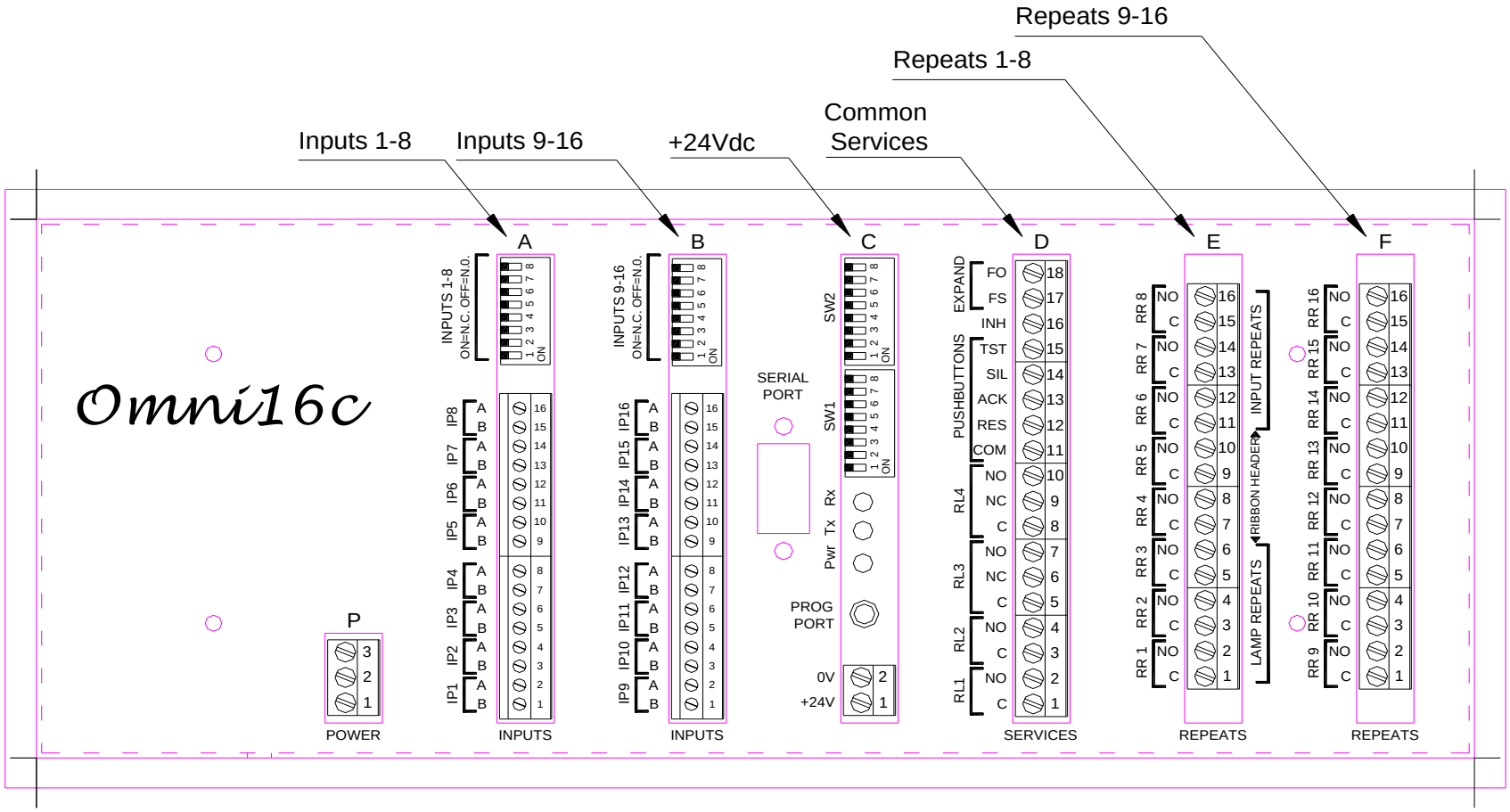

Figure 2-4 – Omni16C Rear View

2.8 Rear View of Omni8C 8 point units showing Terminal Layout

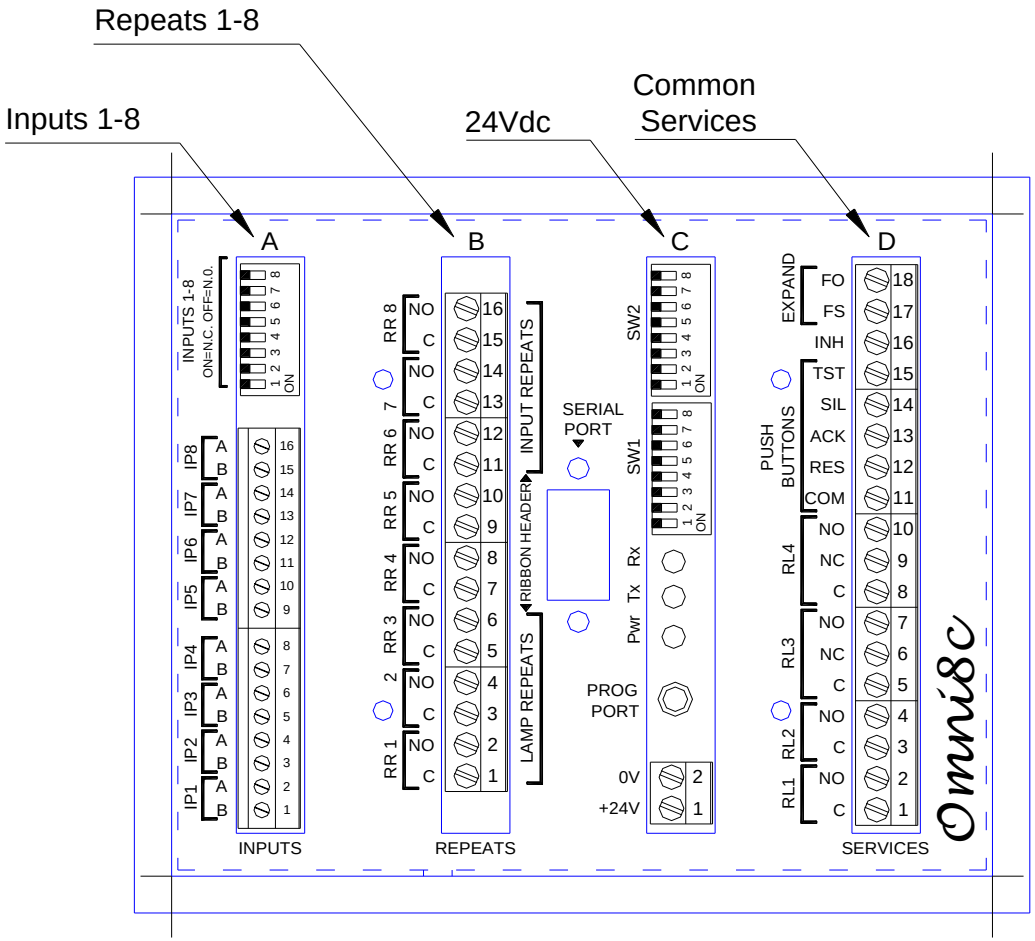

Figure 2-5 – Omni8C Rear View

2.9 Rear View of Omni8P 8 point units showing Terminal Layout

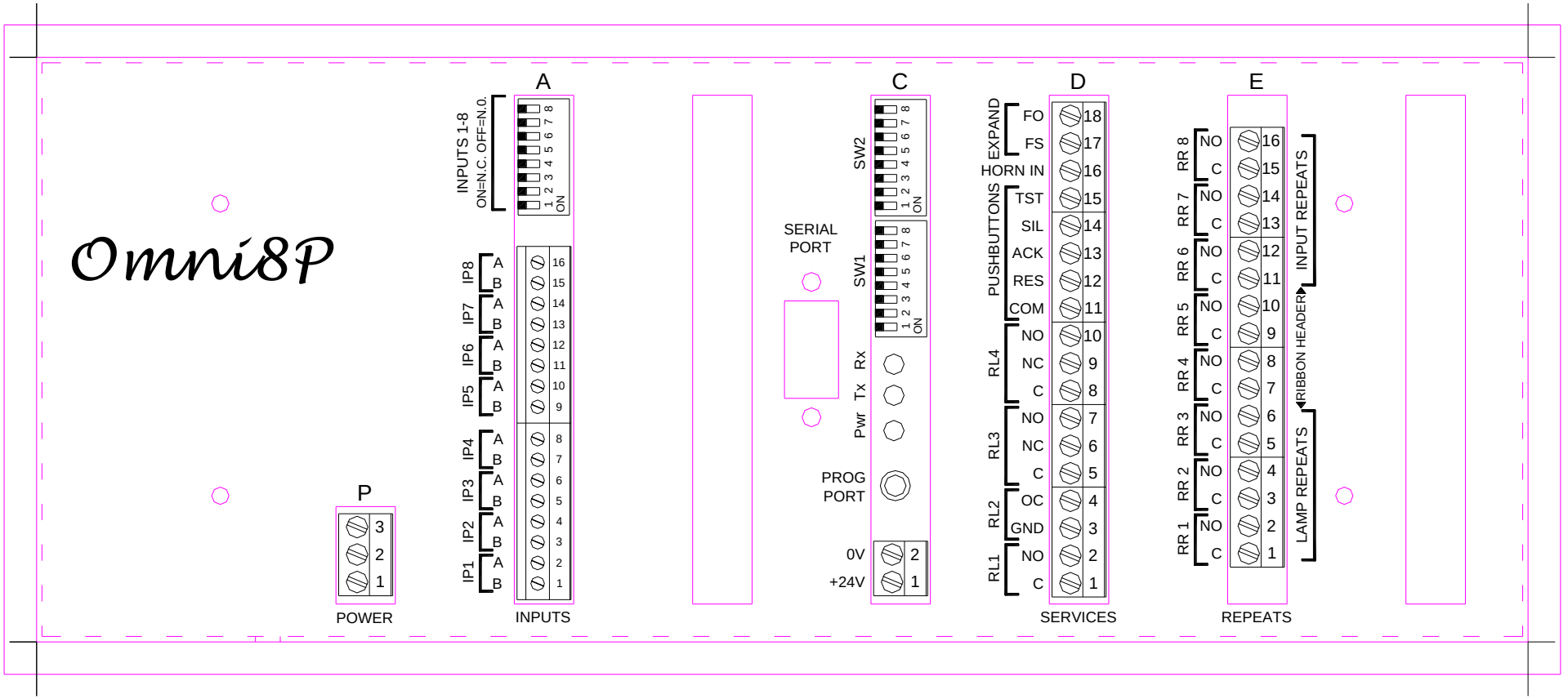

Figure 2-6 – Omni8P Rear View

3 Mechanical Installation

3.1 Panel-mount Mechanical Dimensions

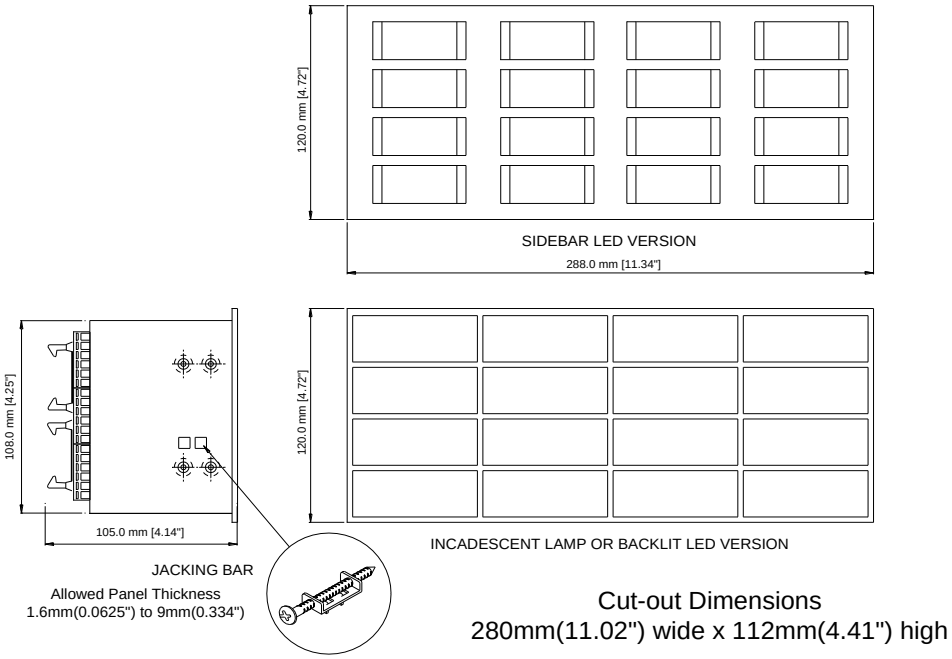

Figure 3-1 – Panel Mount Omni16C and Omni8P Mechanical Dimensions

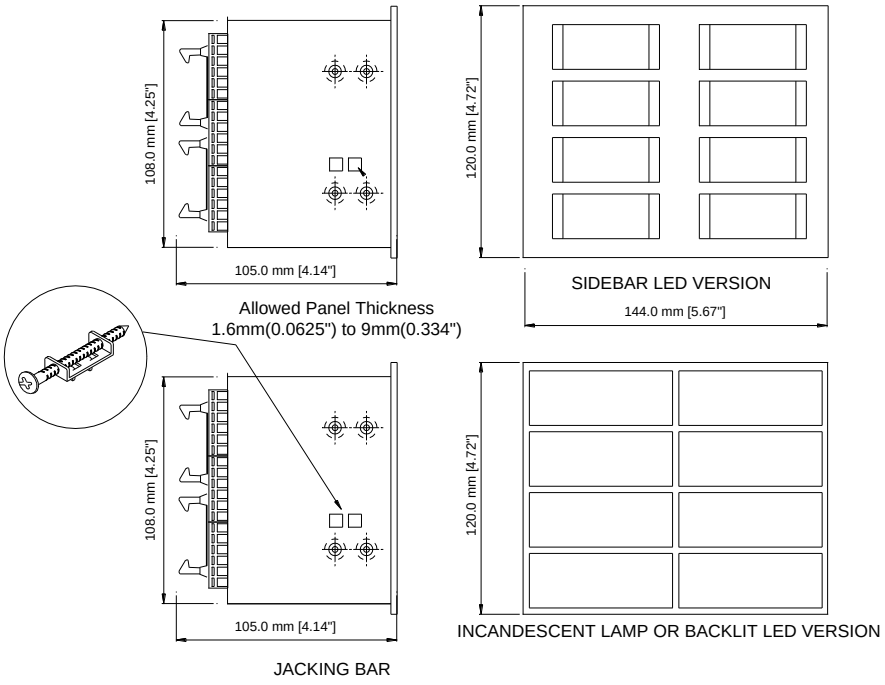

Figure 3-2 – Panel-mount Omni8C Mechanical Dimensions

3.2 Wall-mount Mechanical Dimensions

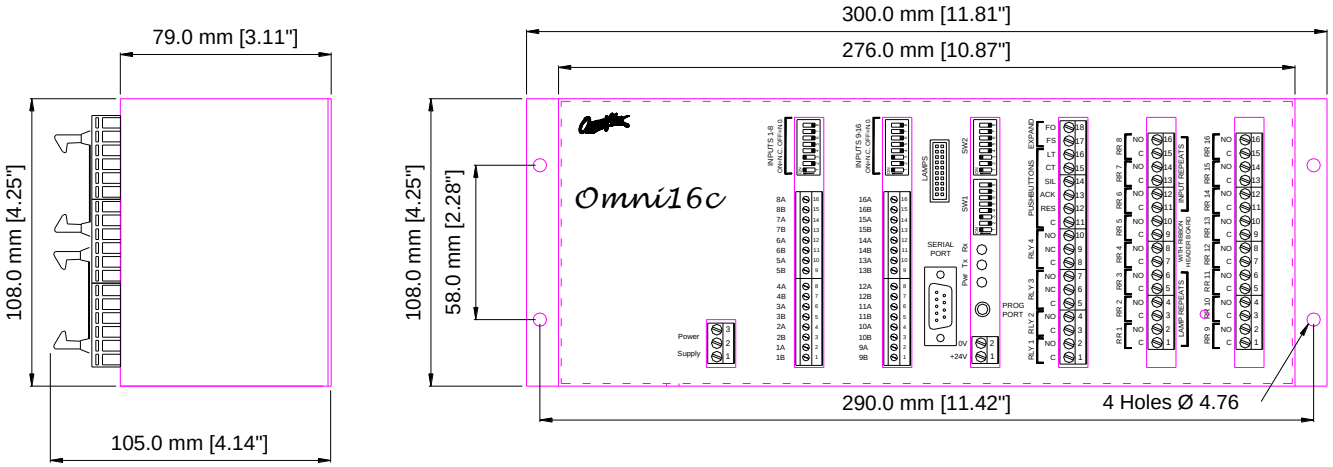

Figure 3-3 – Wall-mount Omni16C Standard housing (Models C1478, C1479)

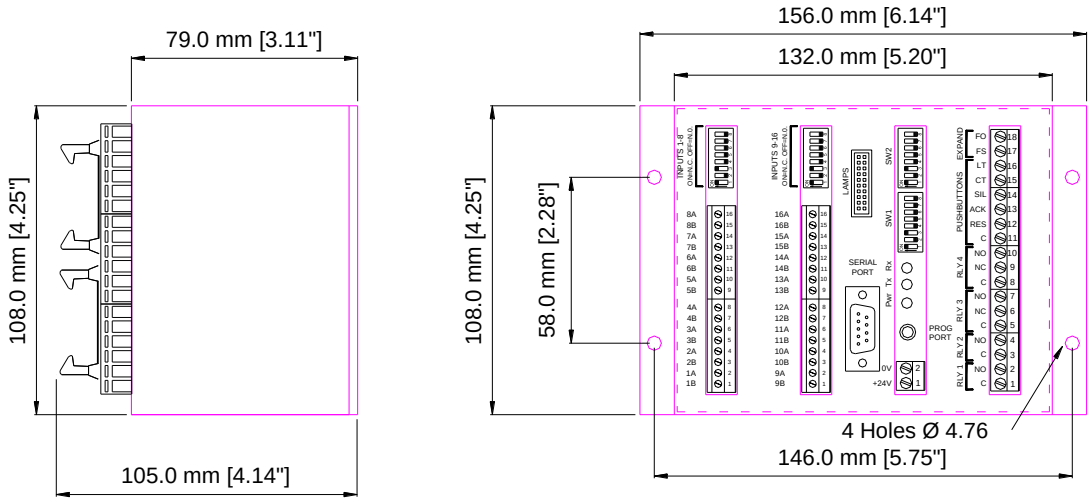

Figure 3-4 – Wall-mount Omni8C/16C Compact housing (Models C1180/1/2/3/4/5)

3.3 Introduction to Panel Mounting

The panel mount Omni8/16C may be mounted either as a single unit, or as one of a combination of multiple units stacked together in a single panel cut-out.

In both single and multiple mounting of units, the securing of the Omni16C's to the user's panel is effected by using "jacking bars" supplied with the Omni16C.

These jacking bars fit into slots set in the top, bottom and sides of the Omni8/16C. The location of these slots is shown in Figure 3-5 – Jacking Bar location slots.

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Generally the use of 2 jacking bars on the top and two jacking bars on the bottom is sufficient securing for unit in the panel, but this may vary from panel to panel.

To ensure secure operation of the jacking bars, the user's panel thickness should fall between 1,6 mm (0,0625") and 9,0 mm (0,354").

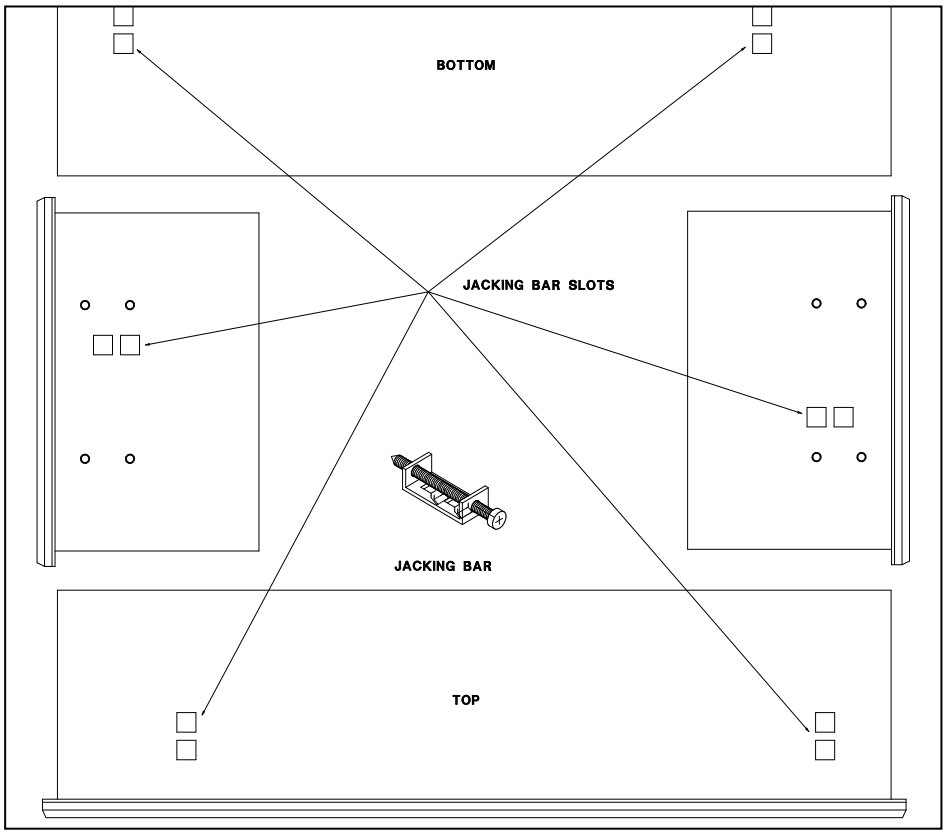


Figure 3-5 – Jacking Bar location slots

3.4 Panel Mounting Multiple Units in a single cut-out

3.4.1 Mounting Procedure

Up to 16 Omni8/16C units may be electrically connected together to form a display/annunciator system of up to 256 points. These units may be mounted in the same panel cut-out as follows:

1. Fasten together the multiple units into individual columns of the required height using the optional Mounting Bar Kits (available separately – see section 3.4.4).

   Up to 4 Omni8C's or Omni16C's may be stacked together into a single column, as shown in Figure 3-6.Figure 3-6 – Vertical Stacking Arrangement. *Omni8Cs and Omni16Cs may not be mixed in the same vertical stack.*

2. Mount the pre-assembled vertical stacks of Omni8/16Cs side-by-side in the panel cut-out by using 4 jacking bars per stack, as shown in Figure 3-6.

   (Apart from the panel itself, there is no mechanical connection between these vertical stacks).

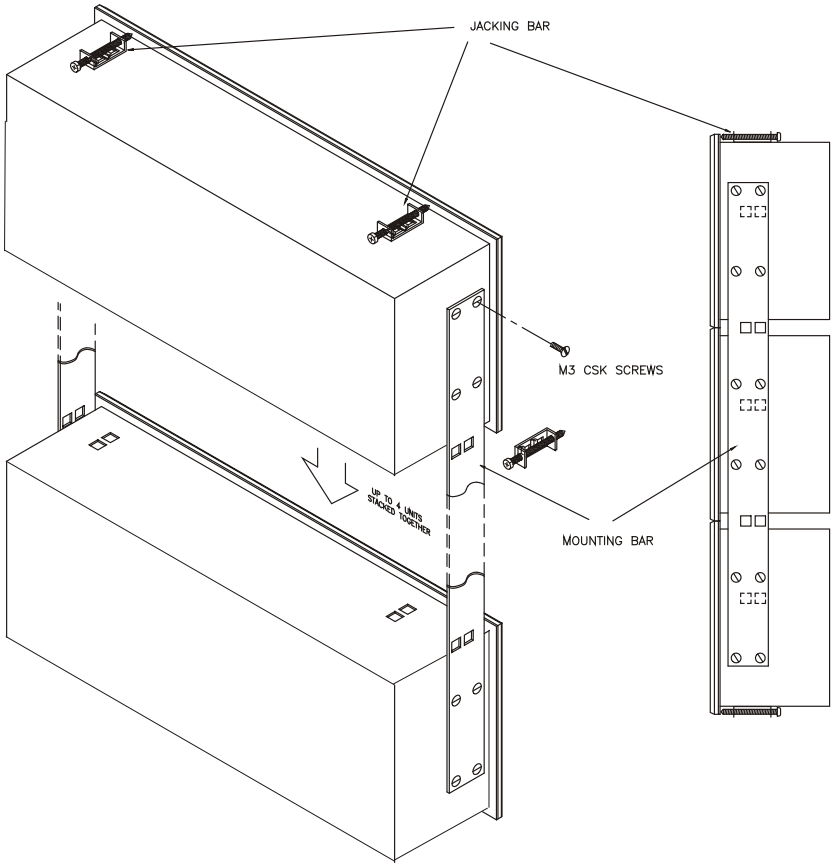


Figure 3-6 – Vertical Stacking Arrangement.

3.4.2 Multiple Unit Cut-Out Size

For multiple units mounted in a single cut-out, the following formula can be used to calculate the cut-out size:

Cut-out Height = (N x 120) – 8 (mm)

N = number of units high

Cut-out Width = (N_8 x 144) + (N_{16} x 288) – 6 (mm)

N_8 = Number of Omni8C stacks wide

N_{16} = Number of Omni16C stacks wide (including Omni8P)

3.4.3 Example Cut-out Size Calculation

For example, to make a single system of 48 points – 8 windows high by 6 windows wide, requires two Omni8C's (mounted vertically in a two high stack) and two Omni16C's (mounted vertically in a two high stack). The two stacks of two annunciators are mounted side by side in the same panel cut-out.

The cut-out height would be 2 x 120 – 8 = 232 mm

The cut-out width would be (1 x 144) + (1 x 288) – 6 = 426 mm

3.4.4 Mounting Bar Kits

A range of Mounting Bar Kits is available for constructing vertical stacks of 2, 3 or 4 units in height. Each kit consists of 2 mounting bars of the appropriate size, complete with all the necessary screws and washers to form a single column of Omni8/16C's. These kits may be ordered using the following Order Code numbers:

Table 3-1 – Mounting Bar Kit Ordering Information

Column Size	Order Code
2 High Mounting Bar Kit	C1431-01
3 High Mounting Bar Kit	C1431-02
4 High Mounting Bar Kit	C1431-03

3.5 Mounting a single Omni8/16C in a panel cut-out

The panel cut-out required to mount a single Omni8/16C is given in the following table:

Table 3-2 – Single Unit Mounting Cut-out Dimensions

	Height	Width
Omni16C	112mm(4.41")	280mm(11.02")
Omni8C	112mm(4.41")	136mm(5.35")

3.6 Intrinsically-Safe Annunciator Mechanical Mounting

3.6.1 Installation Requirements

The Omni16C EX should be installed within the enclosure supplied, which provides impact and ingress protection for windows and terminals.

All external connections must comply with the requirements of IEC60079-0 and IEC60079-11.

Cable entries though the cable glands provided in the enclosure must comply with the requirements of IEC60079-0.

If one of the cable glands is unused, the blanking plate should be left in place.

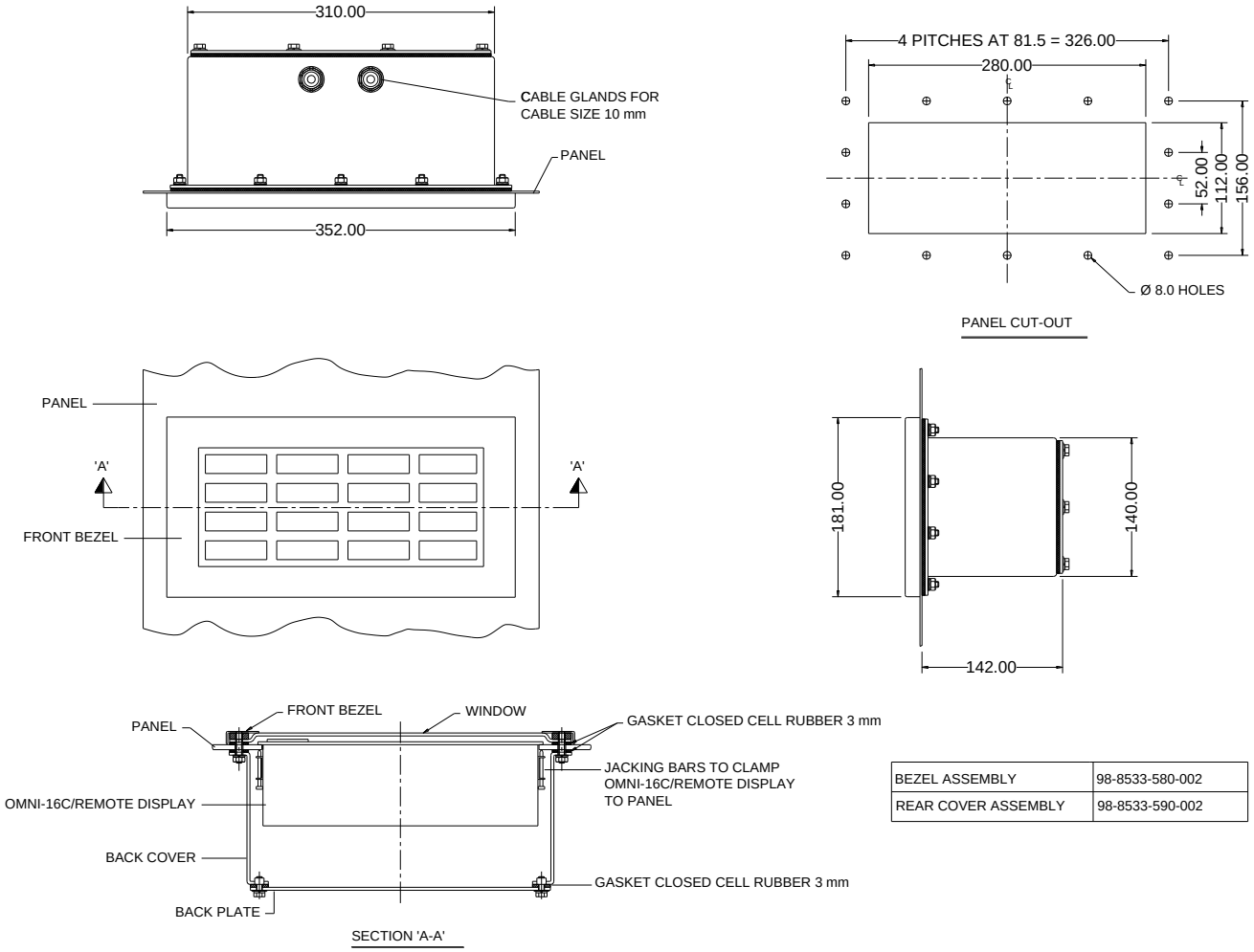


Figure 3-7 – Omni16C Ex ic Version in protective housing.

3.7 IP65 Front Cover Mechanical Mounting

The Omni8/16 IP65 front covers are designed as an environmental protective cover for Omni8/16's used in harsh conditions where the front may be exposed to conditions which would otherwise damage the front of the annunciator. The front cover mounts directly over the Omni8/16 which is mounted in its usual panel cut out. It can therefore be retro fitted to existing Omni8/16s mounted into panel by drilling the required mounting holes through the panel around the Omni16. The front cover is then tightened against the panel with the gasket supplied providing a good seal against the panel surface. The gasket is made of closed cell rubber to ensure the best dust tight seal.

3.7.1 Omni16 IP65 Front Cover Mounting Detail (C1433)

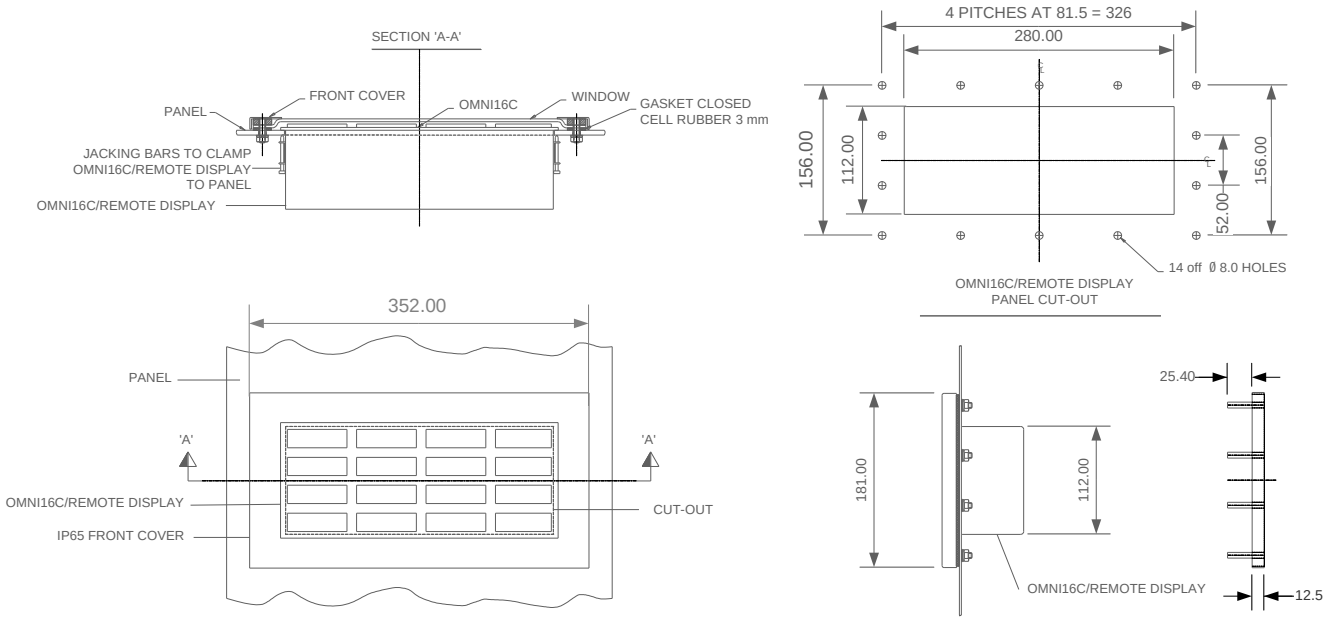


Figure 3-8 – Omni16C IP65 Front Cover Mechanical Mounting.

3.7.2 Omni8 IP65 Front Cover Mounting Detail (C1434)

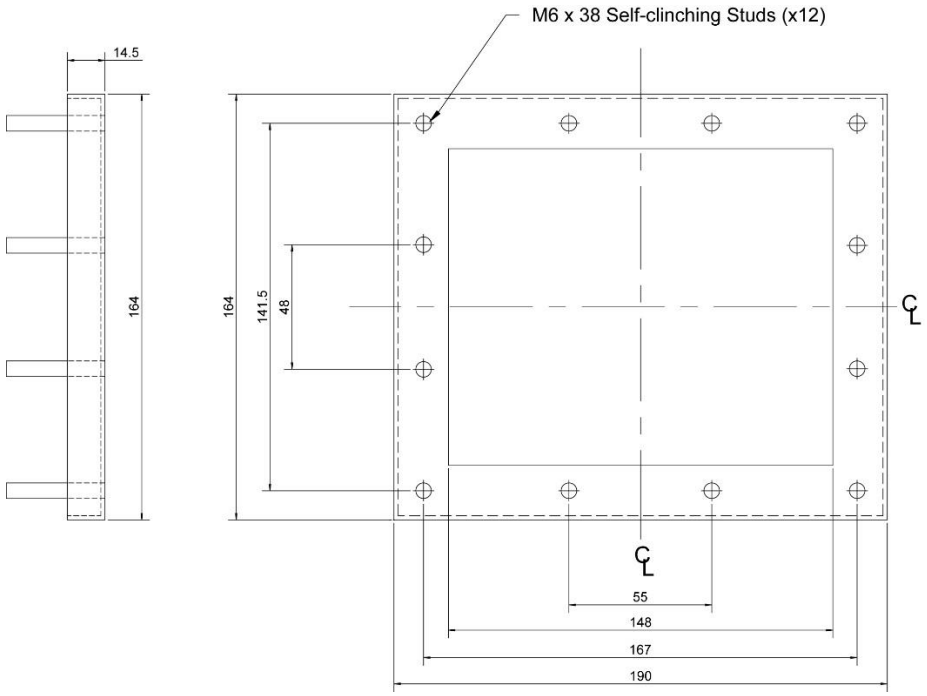


Figure 3-9 – Omni8 IP65 Front Cover Mechanical Mounting.

3.8 Installing the Internal Pushbutton Station

The control pushbuttons required to manage the alarm sequences selected in the Omni8/16C may be located internal or external to the Omni8/16C.

If mounted externally, then they must be wired to the terminals on the rear of the unit. See Section 4.12 for further details.

The control pushbuttons may be mounted internal to the Omni8/16C using the optional Integral Pushbutton Station (Model Number C1420).

This Internal Pushbutton Station is installed in window position 8 in the Omni8C and In window position 16 in the Omni16C (the right hand bottom corner in each case.)

This window position is then no longer available as a display point (although the internal logic remains fully operational).

To install the Internal Pushbutton Station, follow this procedure:

1. Snap out the right hand bottom window.
2. Plug in the Integral Pushbutton Station into the connector visible through the window.
3. Snap the Integral Pushbutton Station into position.

Plugging in PBS

After plugging in

Complete

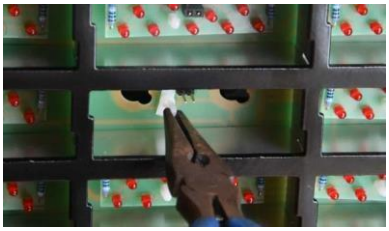
3.9 Installing Back-lit LED boards

- Caution: It is recommended that power to the unit be SWITCHED OFF before insertion/removal of LED boards to prevent damage.

To install Back-lit LED Boards, follow this procedure:

1. Snap out the relevant clear plastic window.
2. Remove any lamps that may already be installed. (Backlit LED boards can be installed in units that have incandescent lamp holders installed, but only after the bulbs have been removed.)
3. Using a pair of long-nose pliers, grip the backlit LED board by the central connector, and carefully insert on to the gold pins located in the centre of the window.
4. Press the board firmly into position so that the white locating spacer clips into the locating hole in the back of the window.

Markings on the LED board indicate the correct insertion orientation. If an LED board is inserted the wrong way around, it will not work, but no damage will be done.



1. Insert the retaining clip

2. Press the LED board gently over the pins

3. Press the LED Board on to the retaining clip

3.10 Removing Back-lit LED boards

- Caution: It is recommended that power to the unit be SWITCHED OFF before insertion/removal of LED boards to prevent damage.

To remove Back-lit LED Boards, follow this procedure:

1. Snap out the relevant clear plastic window.
2. Grip the LED board on its edges. An ideal tool to do this is an IC extractor (see the pictures).
3. Remove any lamps that may already be installed. (Backlit LED boards can be installed in units that have incandescent lamp holders installed, but only after the bulbs have been removed.)
4. Be careful NOT to pull on the black connector, as tempting as it seems. You will break the connector and not remove the LED board.

Markings on the LED board indicate the correct insertion orientation. If an LED board is inserted the wrong way around, it will not work, but no damage will be done.

1. Grab the LED board by its edges while squeezing the barb on the retaining clip

2. Pull the board out by its edges

3. Do NOT attempt to pull the LED board out by its central connector.

3.11 Creating Window Legends for Back-lit Display Windows

3.11.1 Overview

Legends are created for the Omni8/16C on a laser or inkjet printer using the software templates provided with the product.

Templates for popular programs are supplied on a 3,5" 'stiffy' diskette with your panel-mount Omni8/16C. There are templates for Microsoft Word and Microsoft PowerPoint to run on an IBM compatible computer running the Windows95, Windows 98 or Windows NT operating systems. There is also a README.TXT file on this disk. Read this first to see which versions of program are compatible with these templates.

3.11.2 Creating the Legend Film

To create the legend film, follow this procedure:

1. Start the application program you wish to use.
2. Open the appropriate template from the 'stiffy diskette' supplied.
3. Fill in your legend details in this template.
4. Print the legends created onto overhead transparency film (the type used for overhead presentations). A sheet is included with the product.
5. Cut along the cut marks which will print onto the film to produce the number of individual legends required.
6. Insert them into the Omni8/16C as described in section 3.12

Please note that the supplied templates have been tested on a wide range of printers. Your particular printer may scale the image slightly differently. While the front grid markings should accommodate this tolerance, in exceptional circumstances you may have to alter the grid spacing on the template supplied. This needs to be done once only and will then be set for your printer.

The correct size for each legend film insert is 21.5mm high x 60mm wide.

3.12 Inserting Legends and Colour Filters into Back-lit Display Windows

3.12.1 Colour of Windows

If Back-lit LED lamps are used, then the colour of the window is set by the choice of LED lamps, and no additional colour filters are required.

If incandescent lamps are used, then these always give a white light and if a coloured window is required, a colour filter needs to be inserted into the window.

These coloured filters are provided in a kit of assorted colours supplied with the product.

Each kit of coloured filters contains the following:

C1163 Colour Filter Kit Contents
16 Red Filters
16 Yellow Filters
16 Green Filters
4 Blue Filters

Additional Colour Filter Kits may be ordered as desired by quoting Model Number C1163.

3.12.2 Assembling Backlit Display Windows

Assemble backlit windows into the Omni8/16C as follows:

1. Assemble each window as shown in Figure 3-10 – Backlit Window Order of Assembly.
2. Snap the assembled window into position in Omni8/16C.

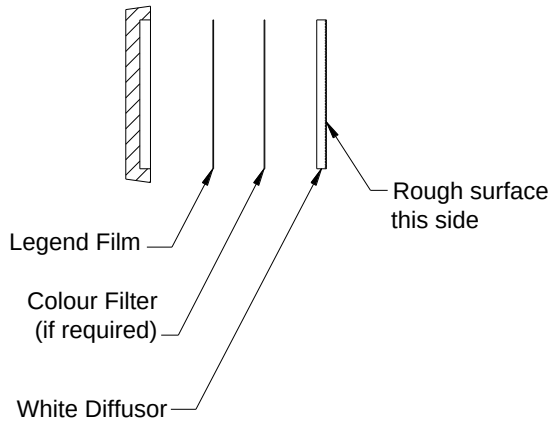
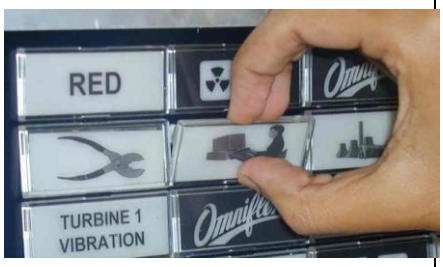
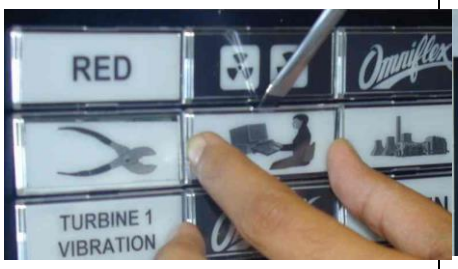
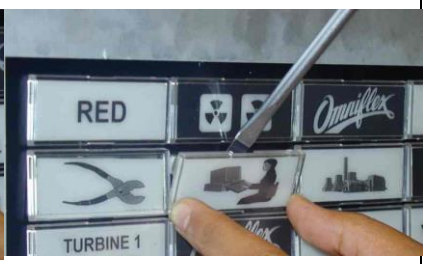


Figure 3-10 – Backlit Window Order of Assembly

3.12.3 To remove a Window

Windows may be removed by inserting a screw-driver in the slot provided on the top or bottom of the clear window to lever it gently out.

Step 1	Step 2	Step 3
		
Using a finger nail in the notch at the top or bottom of the display will remove the window from the display	*A Flatblade screwdriver may also be used if finger access is difficult..*	*Gently lever and twist the screw driver to pop the window from the display supporting both sides of the window*

3.12.4 To refit a window

Step 1	Step 2	Step 3
		
Line up the window with the display cutout notch. *Note the window is perfectly symmetrical and can be fitted any way round.*	*Insert one side of the window ensuring the window clip is located in the cutout notch.*	*Once located press firmly on the edge of the un-located side of the window with your thumb. Directing your force at an angle along the edge of the window. The window clip will slip into the notch on the metal work easily*

3.13 Creating Window Legends for Sidebar Display Windows.

Sidebar LED versions of the panel-mount Omni8/16C's use engraved coloured plastic windows.

White windows are supplied as standard with the annunciator.

Other colours may be ordered separately.

4 ELECTRICAL INSTALLATION

4.1 Introduction

All electrical connections to the Omni8/16C are made on the rear of the unit on plug-in terminals provided (refer to Figure 2-4 and Figure 2-6).

The following general block diagrams provide an overview of the connections required.

Not all products in the range have all the facilities shown. These connections are described individually in more detail later in this section.

4.2 Omni8C Block Diagram

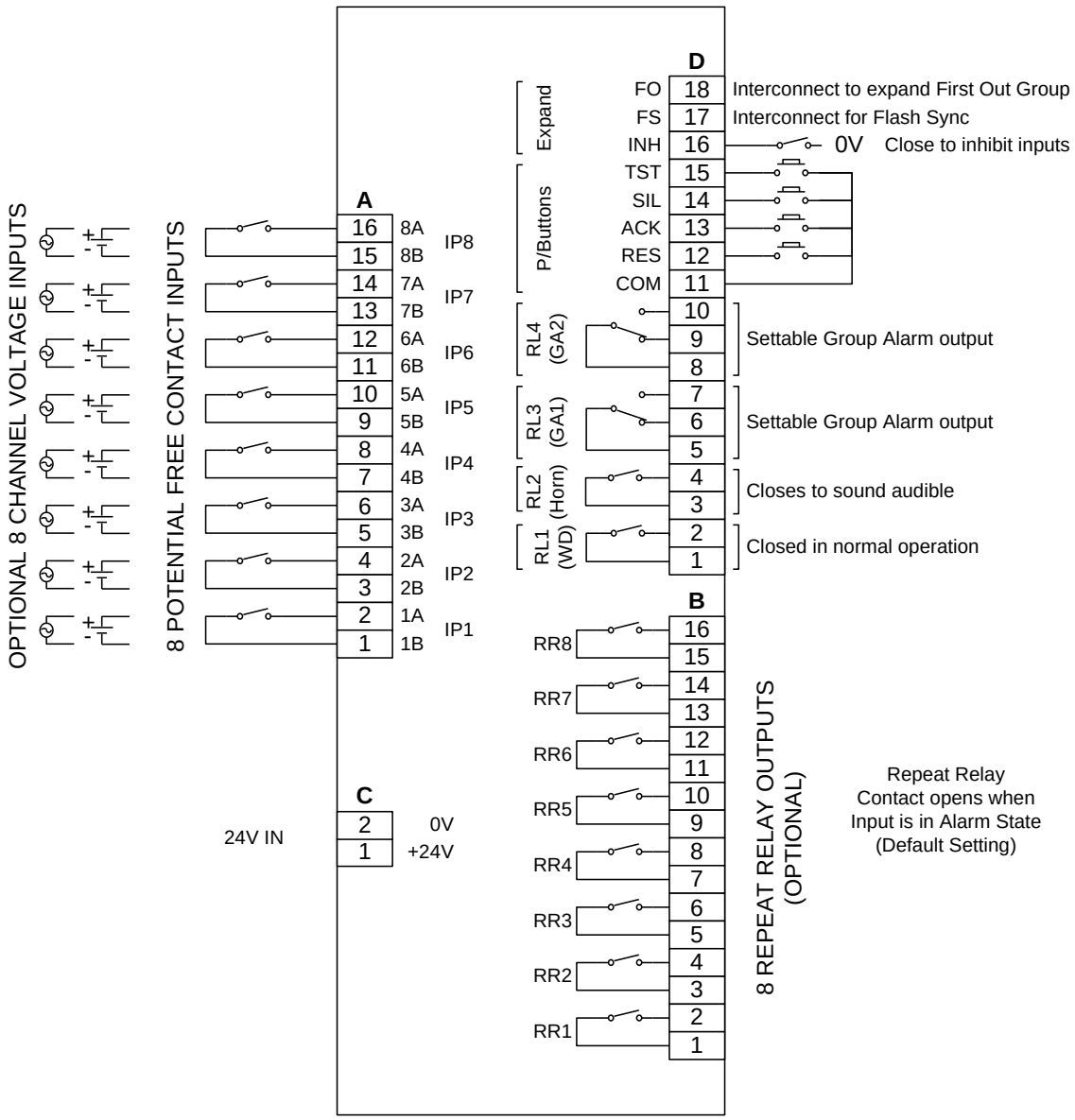


Figure 4-1 – Omni8C Annunciator Block Diagram showing Terminal Numbers

4.3 Omni8P Block Diagram

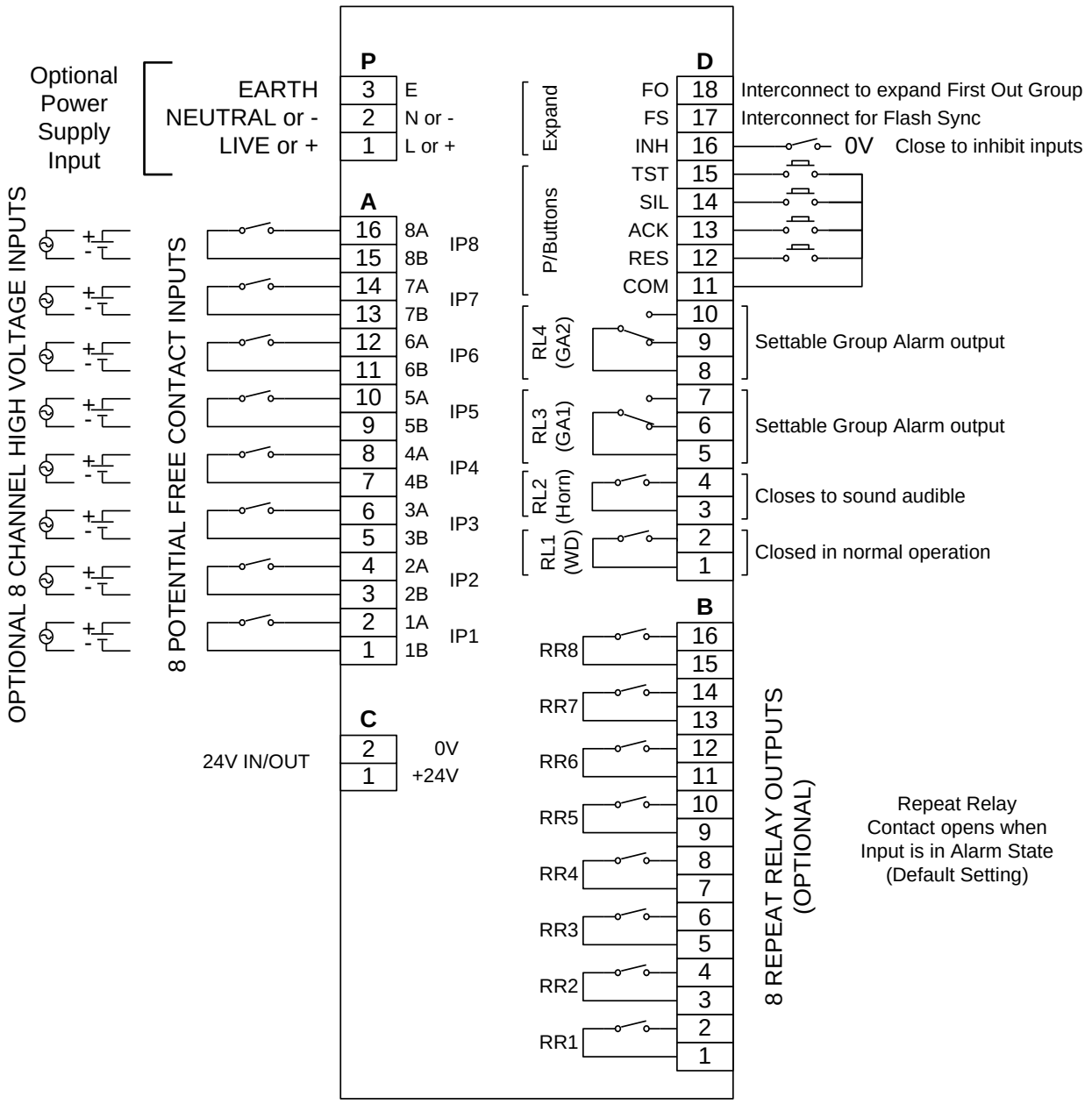


Figure 4-2 – Omni8P Annunciator Block Diagram showing Terminal Numbers

4.4 Omni16C Block Diagram

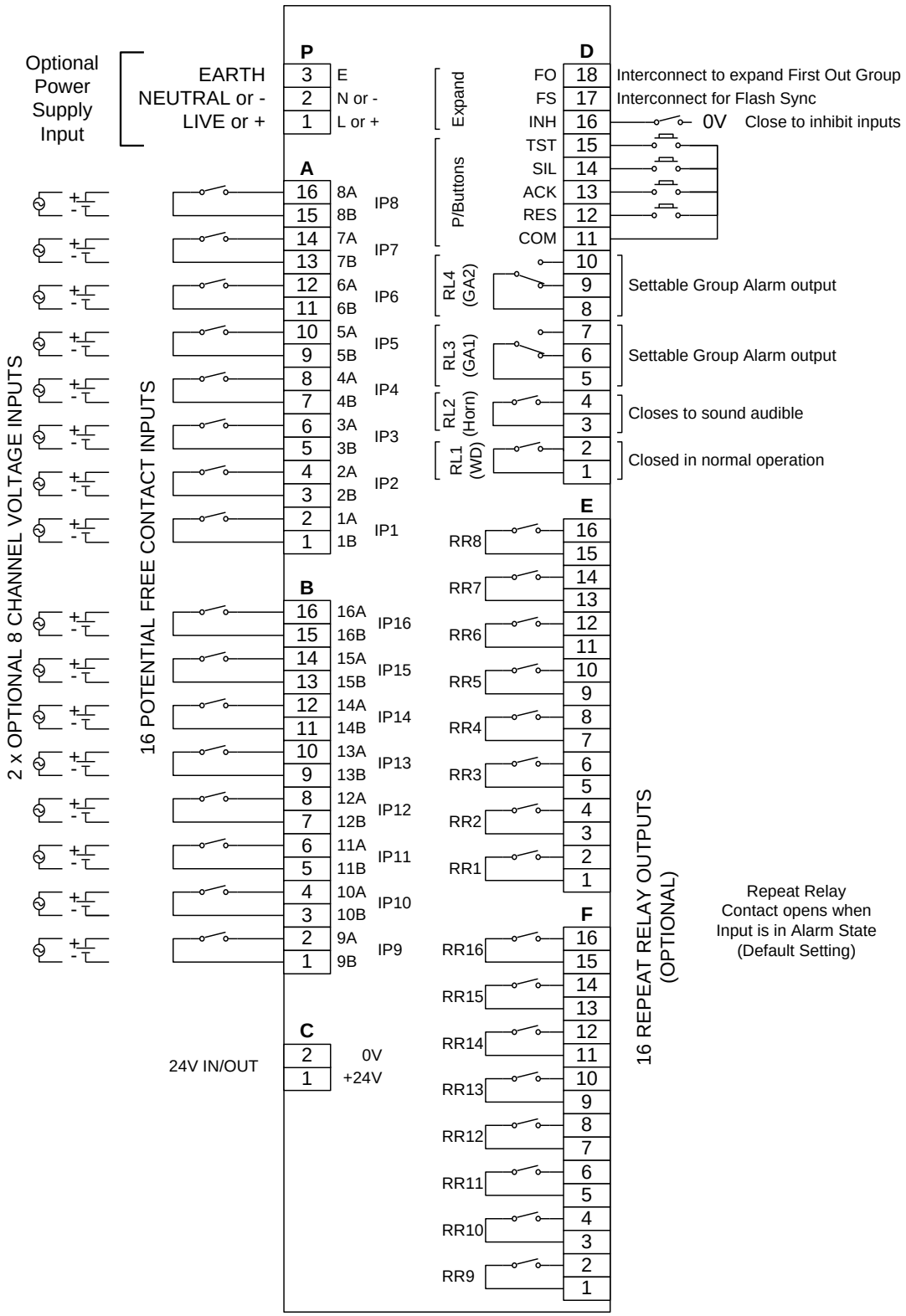


Figure 4-3 – Omni16C Annunciator Block Diagram showing Terminal Numbers

4.5 Intrinsically Safe (Ex ic) Omni16C-Ex Block Diagram

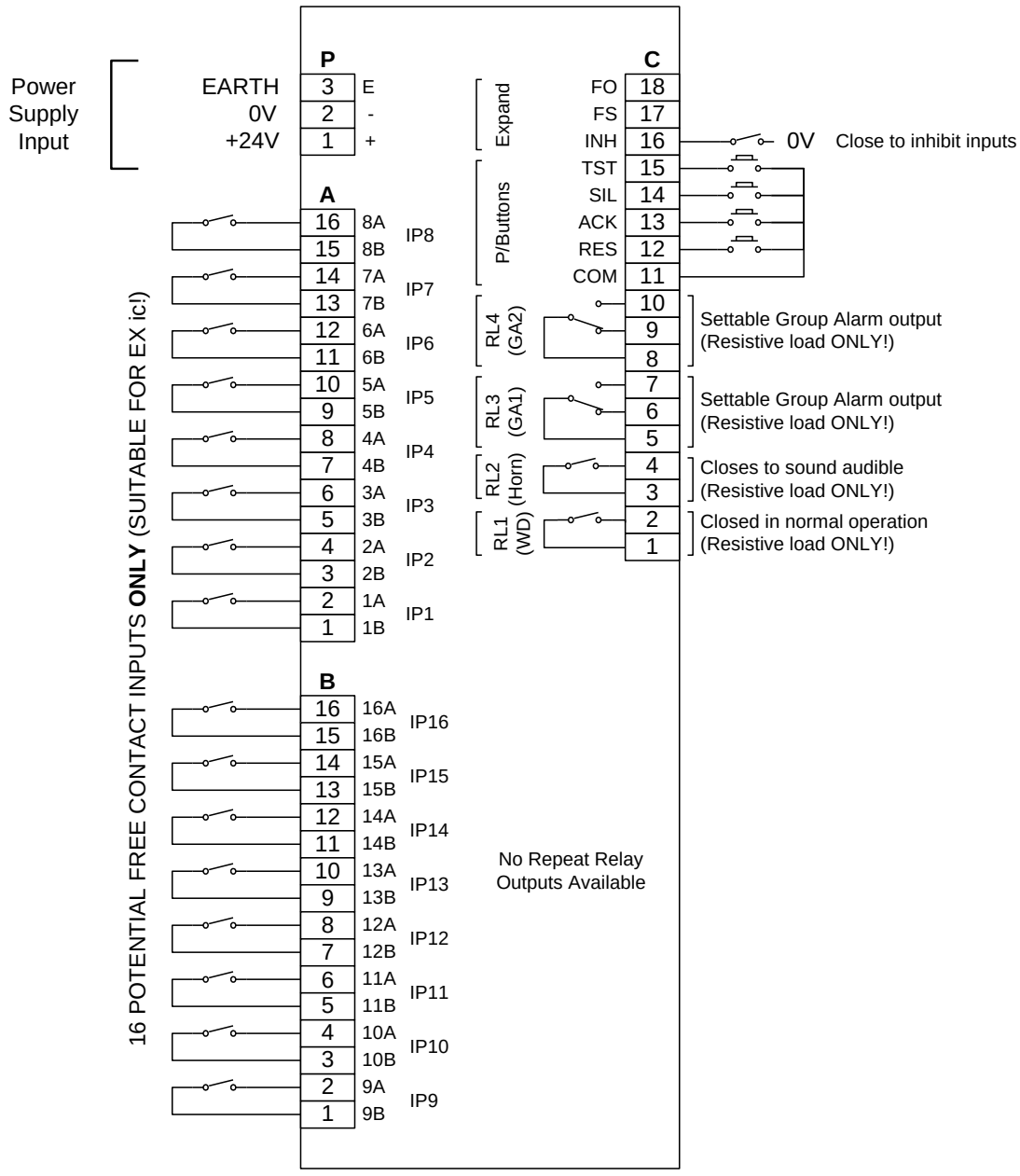


Figure 4-4 – Omni16C-Ex Annunciator Block Diagram showing Terminal Numbers

4.6 Omni8C/8P/16C Terminal Schedule

Omni16C Terminal Number	Omni8C/8P Terminal Number	Terminal Marking	Description
Optional Power Supply (Omni16C only)			
P-1	-	L / +	Live (ac) or + (dc) power supply connection when optional internal power supply is installed.
P-2	-	N / -	Neutral (ac) or - (dc) power supply connection when optional internal power supply is installed.
P-3	-	E (symbol)	Safety Earth power supply connection when optional internal power supply is installed.
Inputs 1 to 8			
A-1	A-1	IP1 - B	Input 1 Connection (Excitation) – A potential free contact is wired across terminals A and B to activate each input. For other input connection configurations see section 4.10
A-2	A-2	IP1 - A	Input 1 Connection (Active)
A-3	A-3	IP2 - B	Input 2 Connection (Excitation)
A-4	A-4	IP2 - A	Input 2 Connection (Active Input)
A-5	A-5	IP3 - B	Input 3 Connection (Excitation)
A-6	A-6	IP3 - A	Input 3 Connection (Active Input)
A-7	A-7	IP4 - B	Input 4 Connection (Excitation)
A-8	A-8	IP4 - A	Input 4 Connection (Active Input)
A-9	A-9	IP5 - B	Input 5 Connection (Excitation)
A-10	A-10	IP5 - A	Input 5 Connection (Active Input)
A-11	A-11	IP6 - B	Input 6 Connection (Excitation)
A-12	A-12	IP6 - A	Input 6 Connection (Active Input)
A-13	A-13	IP7 - B	Input 7 Connection (Excitation)
A-14	A-14	IP7 - A	Input 7 Connection (Active Input)
A-15	A-15	IP8 - B	Input 8 Connection (Excitation)
A-16	A-16	IP8 - A	Input 8 Connection (Active Input)
Inputs 9 to 16			
B-1	-	IP9 - B	Input 9 Connection (Excitation)
B-2	-	IP9 - A	Input 9 Connection (Active Input)
B-3	-	IP10 - B	Input 10 Connection (Excitation)

Omni16C Terminal Number	Omni8C/8P Terminal Number	Terminal Marking	Description
B-4	-	IP10 - A	Input 10 Connection (Active Input)
B-5	-	IP11 - B	Input 11 Connection (Excitation)
B-6	-	IP11 - A	Input 11 Connection (Active Input)
B-7	-	IP12 - B	Input 12 Connection (Excitation)
B-8	-	IP12 - A	Input 12 Connection (Active Input)
B-19	-	IP13 - B	Input 13 Connection (Excitation)
B-10	-	IP13 - A	Input 13 Connection (Active Input)
B-11	-	IP14 - B	Input 14 Connection (Excitation)
B-12	-	IP14 - A	Input 14 Connection (Active Input)
B-13	-	IP15 - B	Input 15 Connection (Excitation)
B-14	-	IP15 - A	Input 15 Connection (Active Input)
B-15	-	IP16 - B	Input 16 Connection (Excitation)
B-16	-	IP16 - A	Input 16 Connection (Active)
24 Volt power			
C-1	C-1	+24V	+24 volt supply to/from the Omni8/16C. If the optional internal supply is fitted to the Omni16C, then 24 volts becomes available here to power external devices.
C-2	C-2	0V	0 volt supply to/from the Omni8/16C.
Common Services Relays			
D-1	D-1	RL1 - C	Common Contact from Relay 1. In “Switch-set” mode this relay acts as a Watchdog output, and is normally energised, making this contact closed in the normal operating mode of the Omni8/16C. On detection of a fault, this relay de-energises, and this contact opens.
D-2	D-2	RL1 - NO	Normally Open Contact from Relay 1
D-3	D-3	RL2 - C	Common Contact from Relay 2. In “Switch-set” mode this relay provides the Horn output, and energises whenever the audible sounds, closing this contact.
D-4	D-4	RL2 - NO	Normally Open Contact from Relay 2

Omni16C Terminal Number	Omni8C/8P Terminal Number	Terminal Marking	Description
D-5	D-5	RL3 - C	Common Contact from Relay 3. In "Switch-set" mode this relay operates as Group Alarm 1. (see text later for operating options available – refer to section 5.5)
D-6	D-6	RL3 – NC	Normally Closed Contact from Relay 3
D-7	D-7	RL3 – NO	Normally Open Contact from Relay 3
D-8	D-8	RL4 - C	Common Contact from Relay 4. In "Switch-set" mode this relay operates as Group Alarm 2. (see text later for operating options available – refer to Section 5.5)
D-9	D-9	RL4 – NC	Normally Closed Contact from Relay 4
D-10	D-10	RL4 – NO	Normally Open Contact from Relay 4
Common Services Pushbuttons			
D-11	D-11	COM	Common Connection for external pushbuttons.
D-12	D-12	RES	Connection to an external Reset pushbutton (or to another Omni8/16C.)
D-13	D-13	ACK	Connection to an external Acknowledge pushbutton (or to another Omni8/16C.)
D-14	D-14	SIL	Connection to an external Silence pushbutton (or to another Omni8/16C.)
D-15	D-15	TST	Connection to an external Test pushbutton (or to another Omni8/16C.)
Common Services Expansion			
D-16	D-16 (Omni8C)	INH	Connection to an external Inhibit contact used to inhibit new alarms from occurring. (Not available on the Omni8P)
D-16	D-16 (Omn8P)	HORN IN	Connect this input to 0 Volts to activate the internal Horn in the Omni8P only/
D-17	D-17	FS	Connect to another Omni8/16C to synchronise flashing between units.
D-18	D-18	FO	Connection to another Omni8/16C to create a single First-Out Group across more than one unit.

Omni16C Terminal Number	Omni8C/8P Terminal Number	Terminal Marking	Description
Inputs 1-8 Repeat Relays			
E-1	B-1	RR1 - C	Input 1 Repeat Relay Common Contact When Input 1 is in the alarm condition, then this relay is de-energised, causing the contact to open.
E-2	B-2	RR1 - NO	Input 1 Repeat Relay Normally Open Contact.
E-3	B-3	RR2 - C	Input 2 Repeat Relay contact (Com).
E-4	B-4	RR2 - NO	Input 2 Repeat Relay contact. (NO)
E-5	B-5	RR3 - C	Input 3 Repeat Relay contact (Com).
E-6	B-6	RR3 - NO	Input 3 Repeat Relay contact. (NO)
E-7	B-7	RR4 - C	Input 4 Repeat Relay contact (Com).
E-8	B-8	RR4 - NO	Input 4 Repeat Relay contact. (NO)
E-9	B-9	RR5 - C	Input 5 Repeat Relay contact (Com).
E-10	B-10	RR5 - NO	Input 5 Repeat Relay contact. (NO)
E-11	B-11	RR6 - C	Input 6 Repeat Relay contact (Com).
E-12	B-12	RR6 - NO	Input 6 Repeat Relay contact. (NO)
E-13	B-13	RR7 - C	Input 7 Repeat Relay contact (Com).
E-14	B-14	RR7 - NO	Input 7 Repeat Relay contact. (NO)
E-15	B-15	RR8 - C	Input 8 Repeat Relay contact (Com).
E-16	B-16	RR8 - NO	Input 8 Repeat Relay contact. (NO)

Omni16C Terminal Number	Omni8C/8P Terminal Number	Terminal Marking	Description
Inputs 9-16 Repeat Relays			
F-1	-	RR9 - C	Input 9 Repeat Relay Common Contact When Input 9 is in the alarm condition, then this relay is de-energised, causing the contact to open.
F-2	-	RR9 - NO	Input 9 Repeat Relay Normally Open Contact.
F-3	-	RR10 - C	Input 10 Repeat Relay contact (Com).
F-4	-	RR10 - NO	Input 10 Repeat Relay contact. (NO)
F-5	-	RR11 - C	Input 11 Repeat Relay contact (Com).
F-6	-	RR11 - NO	Input 11 Repeat Relay contact. (NO)
F-7	-	RR12 - C	Input 12 Repeat Relay contact (Com).
F-8	-	RR12 - NO	Input 12 Repeat Relay contact. (NO)
F-9	-	RR13 - C	Input 13 Repeat Relay contact (Com).
F-10	-	RR13 - NO	Input 13 Repeat Relay contact. (NO)
F-11	-	RR14 - C	Input 14 Repeat Relay contact (Com).
F-12	-	RR14 - NO	Input 14 Repeat Relay contact. (NO)
F-13	-	RR15 - C	Input 15 Repeat Relay contact (Com).
F-14	-	RR15 - NO	Input 15 Repeat Relay contact. (NO)
F-15	-	RR16 - C	Input 16 Repeat Relay contact (Com).
F-16	-	RR16 - NO	Input 16 Repeat Relay contact. (NO)

4.7 Omni8C/8P/16C Serial Port Pinouts to PC or PLC

The isolated serial port option must be specified separately when ordering your annunciator, and will be factory fitted before delivery.

If fitted with the Serial Port option, the Serial connections are as follows:

DB9M Pin	RS232	RS485
1		RxD+
2	RxD	RxD-
3	TxD	
4		TxD+
5	GND	GND
6	+5V(ISO)	+5V(ISO)
7		
8		
9		TxD-

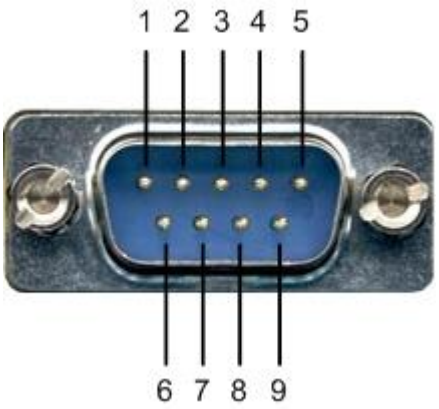


Figure 4-5 – RS232/485 Connector Pin-out (Omni8C/16C/8P).

The selection of RS232or RS485 communications is done only by the way that the connector is wired. No other settings or adjustments are necessary.

NB: Once the Serial Port (DB9) Option Board has been fitted, the Serial Jack plug facility normally used to configure the annunciator is disabled and configuration must then be done through the DB9 Serial Port.

4.8 Power Requirements

The standard Omni8/16C is 24 Volt dc powered.

The table below gives the maximum current requirement of each of the products in the range.

If any of the options are fitted, then these must be added to the base consumption to determine the total consumption of the product.

Table 4-1 – Omni8C/8P/16C Power Consumption

Model	Max Current Consumption at 24 Volts dc
C1180	0.1 Amps Note1
C1181	0.1 Amps Note1
C1182A	0.1 Amps Note1
C1184	0.1 Amps Note1
C1185	0.1 Amps Note1
C1427	0.6 Amps
C1428	0.6 Amps
C1429	1.1 Amps
C1478	0.1 Amps Note1
C1479B	0.1 Amps Note1
C1480B	1.1 Amps
C1481B	0.6 Amps
C1482B	2.0 Amps
C1483B	1.1 Amps
C1484B	0.6 Amps
C1485B	2.0 Amps
C1486A	1 Amp
C1487A	0.6 Amps
C1488A	0.6 Amps
C1489A	2 Amps
C1490B	0.6 Amps
C1491B	0.3 Amps

Model	Max Current Consumption at 24 Volts dc
C1492B	1.1 Amps
C1493B	0.1 Amps
C1494B	0.3 Amps
C1495B	1.0 Amps
C1496A	0.5 Amps
C1497A	0.3 Amp
C1498A	0.3 Amp
C1499A	1 Amps
Options	
C1425	0.08 Amps [2]
C1426	0.03 Amps

Note 1: This power consumption excludes the requirements of the remote display used in conjunction with this product.

Note 2: With all relays energised.

An optional internal Power Supply may be fitted to the Omni16C. This option allows the unit to be directly powered from higher voltage ac or dc sources. These power supplies generate a galvanically isolated 24Vdc at 2.2Amps maximum to power the Omni8/16C.

The following two options are available:

Table 4-2 – Power Supply Options

Model	Description	Source Voltage	Max Current Requirements
C1421	AC Option	85-264Vac/dc	1.2A_{rms} at 115V 0.6A_{rms} at 230V
C1422	DC Option	20-60Vdc	2.8A at 24Vdc 1.5A at 48Vdc

4.9 Connecting the Power Supply

4.9.1 With no Internal Power Supply Installed (24Vdc non Ex versions)

Without an optional internal Power Supply installed, the Omni8/16C is powered from an external 24Vdc supply.

Connect the external 24Volt supply to terminals C-1 and C-2 on the rear of the unit. There is no galvanic isolation provided between the 24Volt supply and the internal logic of the unit.

Table 4-3 – Power Supply Connections

Terminal	Connection
C - 1	+24 Volts +/- 15% (20.4 – 27.6 Volts)
C - 2	0 volts

When power is correctly applied, then the Green “Pwr” indicator on the rear of the unit is lit.

Reverse Polarity Protection

The Omni16C is equipped with reverse polarity protection on these terminals. If the 24Volt supply is connected in reverse, then a momentary short circuit will exist until the internal resettable fuse opens to protect the unit. Once the reverse connections are removed, the unit should be left for approximately 2 minutes without power to allow time for the resettable fuse to reset.

4.9.2 With the Optional Internal Power Supply installed (non Ex versions)

With the optional internal Power Supply installed, 24Vdc is produced inside the unit from the primary supply voltage.

24Vdc is then available as an output on Terminals C-1 and C-2.

Connect the primary supply to the supply terminals P-1, P-2 and P-3.

Table 4-4 – Power Supply Terminals

	AC Option Model C1421 85-264Vac/dc	DC Option Model C1422 20-60Vdc
Terminal	Connection	Connection
P – 1	LIVE or +	+
P – 2	NEUTRAL or -	-
P – 3	Safety Earth	Safety Earth

Reverse Polarity Protection

The Model C1421 AC option will operate with a dc supply connected in either polarity, but the above connections are required to comply with radiated emission standards.

The Model C1422 DC option is reverse polarity protected. Reversing the dc supply will not damage the unit, but it will not function.

4.9.3 Omni16C Intrinsically Safe Version (Ex ic)

The Omni16C Ex is fitted with special DC power supply unit. The maximum supply voltage for this unit is Um=27 VDC. Connection of voltages higher than 27VDC is not allowed.

Note: Connection of a reverse polarised power supply to the unit will blow an internal fuse with no auto recovery. This fuse can only be replaced by an Omniflex service centre

Connect the supply to the supply terminals P-1, P-2 and P-3.

Table 4-5 – Power Supply Terminals

	DC Connection 27VDC maximum
Terminal	Connection
P - 1	+
P - 2	-
P - 3	Safety Earth

4.9.4 24Vdc Power externally available (non Ex versions only)

With either internal power supply option installed, the 24Volt terminals C-1 and C-2 now become a limited source of 24Volt power for use with other devices. For example, a 24 volt dc audible device could be powered by the Omni8/16Cfrom these terminals.

Calculate the externally available current from this 24Vdc supply as follows:

1. The maximum current capacity from the optional internal power supply is 2.2Amps at 24Vdc
2. Determine the maximum internal consumption of the Omni8/16C (see Section 4.8)
3. The difference between this and 2.2 Amps is the available current.

Example:

A 24-point panel mounted alarm system is required, made up of a backlit LED Omni16C (Model C1480) and a backlit LED Omni8C (Model C1490).

Design considerations:

1. What is the total power requirement of the system?
2. Can an optional C1421 internal ac power supply fitted in the Omni16C power the Omni8C as well?

Solution (From Table 4-1):

Table 4-6 – Power Supply Calculations

Model	Max Current Consumption at 24 Volts dc
C1480	1.1 Amps
C1490	0.6 Amps
Total Current Requirement	**1.7 Amps**
C1421 Supply capacity	**2.2 Amps**
Surplus Available	0.5 Amps

The C1490 Omni8C may be powered from the Omni16C unit's internal supply with still 0.5 Amps at 24Vdc available from terminals C-1 and C-2 for further accessories, such as the audible device.

4.10 Connecting the alarm inputs

4.10.1 With Potential Free Contacts

The Omni8/16C is operated with potential free contacts connected to the input terminals. Each input is provided with a pair of terminals marked A and B. Terminal A is the alarm input and terminal B is an independently current limited wetting voltage supplied from the internal 24 Volt supply as shown below. The standard Input option is 24V common; 0V common is an order option.

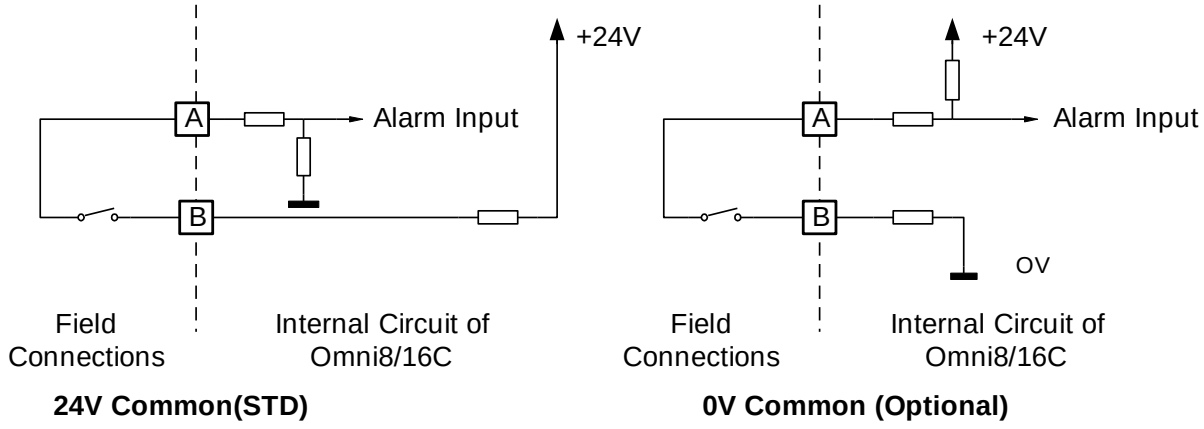


Figure 4-6 – Input Connection Diagram using individually wired Potential Free Contacts.

If a common return wire for all inputs in the system is required, then this must be wired directly to the +24 Volt supply as shown below. For Omni16C units fitted with the optional internal power supply, this +24 Volts may be found on terminal C-1.

CAUTION: When connecting the inputs in this way, the common +24 Volt return MUST be fused to prevent an earth fault in the field wiring from shorting the power supply. (Power Supply 0 Volts is commonly earthed in practice to ensure that covert earth faults in the system do not go unnoticed.)

In this configuration, a field earth fault on any one input loop will remove the 24 Volt wetting voltage from all the alarm inputs in the system. For this reason, the installation configuration in Figure 4-7 is always preferable.

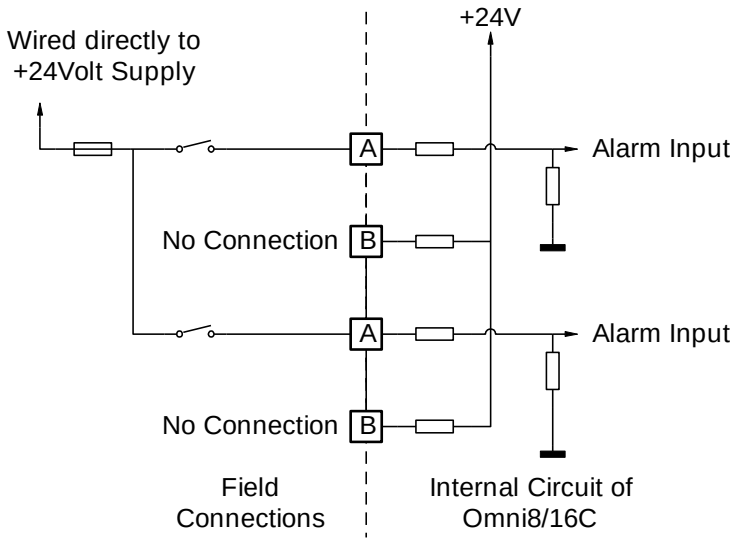


Figure 4-7 – Input Connection Diagram using Common Return Wire

4.10.2 With Optional Isolated Input Card

These cards are designed for use in applications where a dc input source voltage is supplied externally to the Omni16C. They provide 1500 Vac input to logic isolation and 500Vac inter channel isolation. The input terminals may be fed with a nominal 24Vdc or 48Vdc (see the specifications in section 8 for voltage range). With these boards fitted the annunciator will become a C14XX-2.

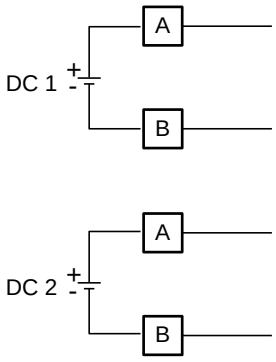


Figure 4-8 – Input Connection Diagram using Isolated Input Cards (external supply)

4.10.3 With Optional High Voltage Input Cards

These cards are designed for use in applications where ta high voltage input source voltage is supplied externally to the Omni16C. They provide 1500 Vac input to logic isolation and 500Vac inter channel isolation. The input terminals may be fed with a nominal 110Vac or dc (see the specifications in section 8 for voltage range). With these boards fitted the annunciator will become a C14XX-3.

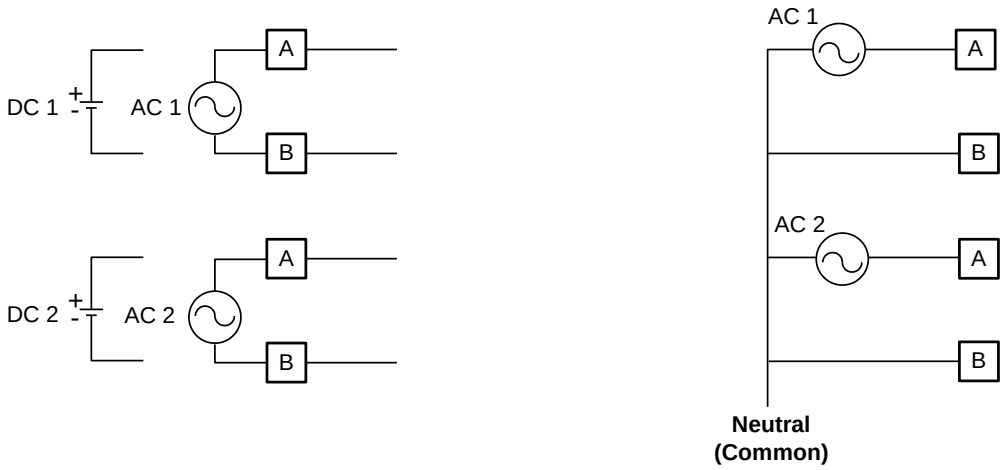


Figure 4-9 – Input Connection Diagram using High Voltage Input Cards

4.10.4 Ribbon Header Input Cards

The annunciators may also be fitted with a ribbon header input card. This option is usually used where the annunciator interfaces to an Omniflex product with ribbon header outputs. However it may also be used to save a card slot in the unit as all 16 inputs are accommodated on one ribbon header input card.

4.11 Connecting the Common Service Relay Contacts

Contacts from four Relays are provided as Common Outputs from the Omni8/16C.

The functions of these contacts may vary between “SWITCH-SET” mode and “SOFT-SET” mode.

NOTE All relay contacts are described below as being “normally open” or “normally closed”. This refers in all cases to the “rest” state of the contact, with no power on the relay coil.

This is not be confused with the “normal” system operating condition, where the relay coil may be “normally” energised (as in “normal” for the operating condition of the system) causing a “normally open” contact to be closed when the system is functioning “normally”!

4.11.1 Switch Set Mode

In "Switch-Set" mode the functions of these relays are predefined as follows:

Table 4-7 – Relay Functions

RELAY	FUNCTION	Description
RL1	Watch-dog	A normally open contact is provided from this relay. This relay is derived from the hardware watch-dog circuitry in the Omni8/16C. If the hardware watch-dog detects a failure, then this relay will de-energise, and the contact will open. This output can be used in critical applications to monitor the health of the Omni8/16C.
RL2	Horn	A normally open contact is provided from this relay. This relay is de-energised with no alarms present and will energise when an alarm occurs causing the audible to be sounded. This contact will close to sound the audible device.
RL3	Group Alarm	A change-over contact is provided from this relay. This relay acts as a Group Alarm output for the Omni8/16C. There are various modes of operation of this Group Alarm. See Section 5.5 for further details of these modes.
RL4	Not Used	A change-over contact is provided from this relay. This relay is not used in Switch-Set mode, and will remain de-energised.

4.12 Connecting Control Pushbuttons

CAUTION: External Pushbuttons are powered from the internal circuitry of the alarm annunciator. Do NOT connect the external pushbuttons to any external power supply.

4.12.1 Controlling a single Omni8/16C with internal pushbuttons

When a single Omni8/16C is fitted with a C1420 Integral Pushbutton Station, no external wiring of pushbuttons is required and Terminals C-11 to C-15 on the rear of the unit are left unconnected.

4.12.2 Controlling a single Omni8/16C with external pushbuttons

External Test, Silence Acknowledge and Reset pushbuttons may be connected to the Omni8/16C via Terminals D-11 to D15 as shown in the following schematic:

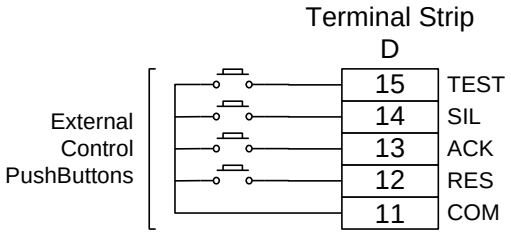


Figure 4-10 – External Pushbuttons controlling a single Omni8/16C

4.12.3 Controlling multiple Omni8/16C's with external pushbuttons

Up to 16 Omni8/16C units may be controlled by a single set of external pushbuttons. Simply wire all units in parallel as shown below.

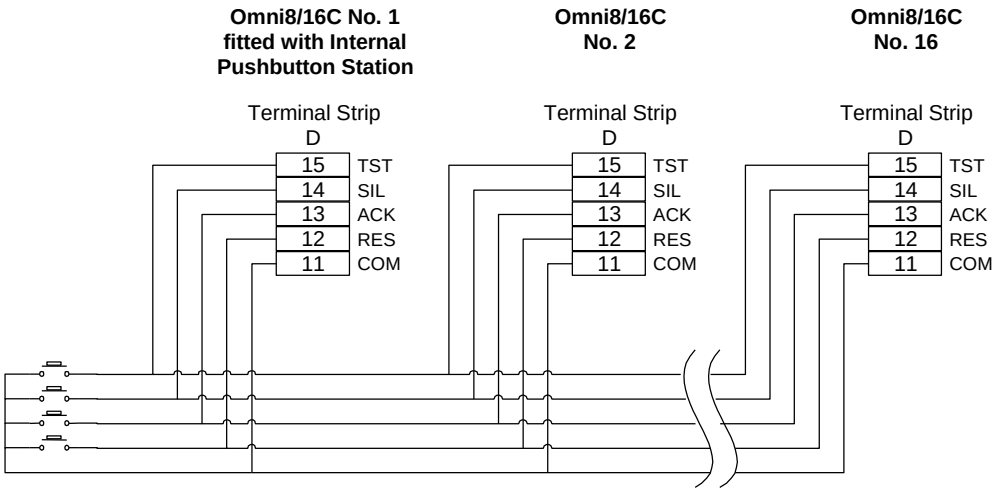


Figure 4-11 – External Pushbuttons controlling multiple Omni8/16C's

4.12.4 Controlling multiple Omni8/16C's with an Integral Pushbutton Station

Up to 16 Omni8/16C units may be controlled from a Model C1420 Integral Pushbutton Station. Install the Integral Pushbutton Station as shown in section 3.8, and simply wire all units in parallel as shown below.

The internal Pushbutton Station will control all of the connected units.

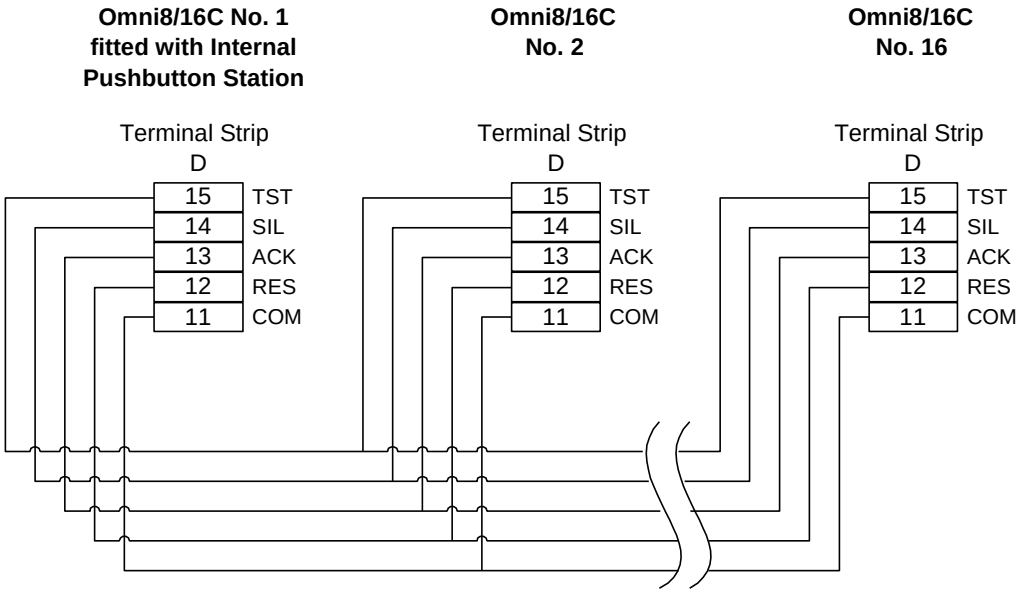


Figure 4-12 – Internal Pushbutton Station controlling multiple Omni8/16C units.

4.12.5 Controlling multiple Omni8C/16C's with an Omni8P Alarm Annunciator

Up to 16 Omni8/16C units may be controlled as part of a single alarm system using an Omni8P Alarm Unit. Wire the pushbuttons of all units in parallel as shown below:

The Pushbuttons of the Omni8P will control all of the connected units.

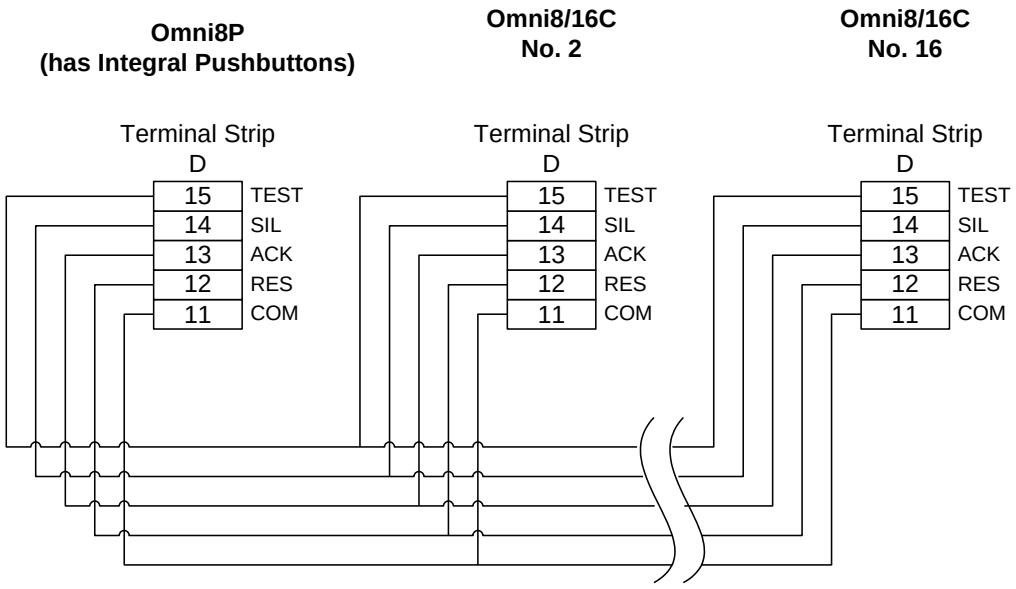


Figure 4-13 – Omn8P Annunciator controlling multiple Omni8C/16C units.

4.13 Connecting the C1415 Remote Pushbutton Station

Omni8/16C units may be controlled by a single Remote Pushbutton Station C1415. Simply wire as shown below.

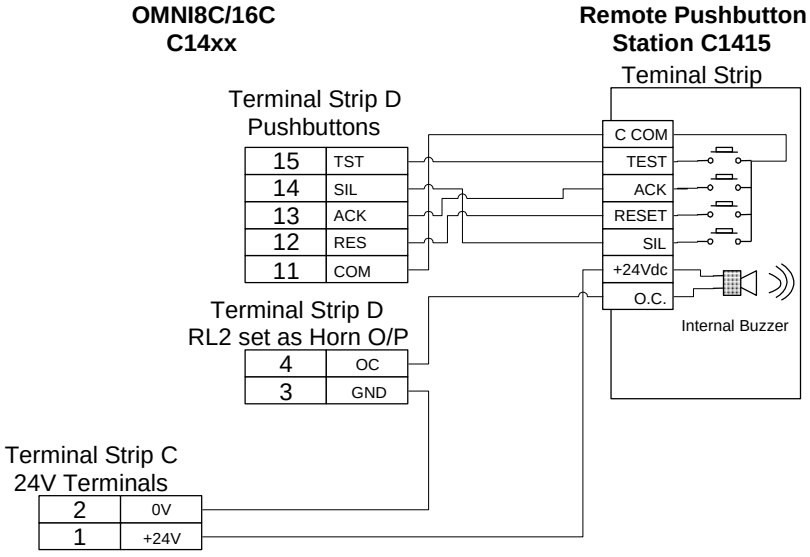


Figure 4-14 – Connecting C1415 Remote Pushbutton Station to Omni8/16C units.

4.14 Connecting the Omni8P Internal Audible Device

The Omni8P is supplied with an internal audible device that can be connected to sound when an alarm occurs on the Omni8P.

Connect the Omni8P HORN relay output contact to the internal HORN as shown below:

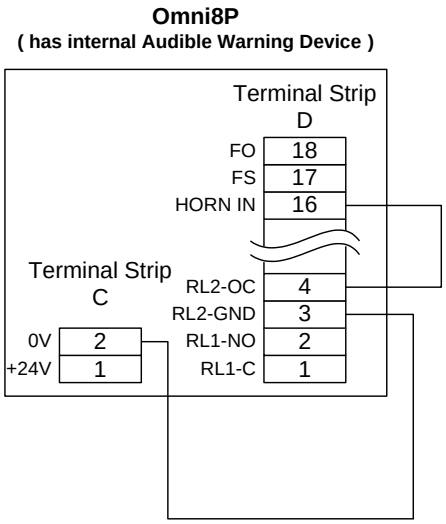


Figure 4-15 – Connecting the internal Omni8P Audible Device

4.15 Connecting the Omni8P Internal Audible Device to other Omni8/16C's

The Omni8P is supplied with an internal audible device that sounds when an alarm occurs on the Omni8P.

Multiple Omni16C's can be connected to operate this audible device for any alarm in the system. Connect the Omni16C HORN relay output contacts to the Omni8P as shown below:

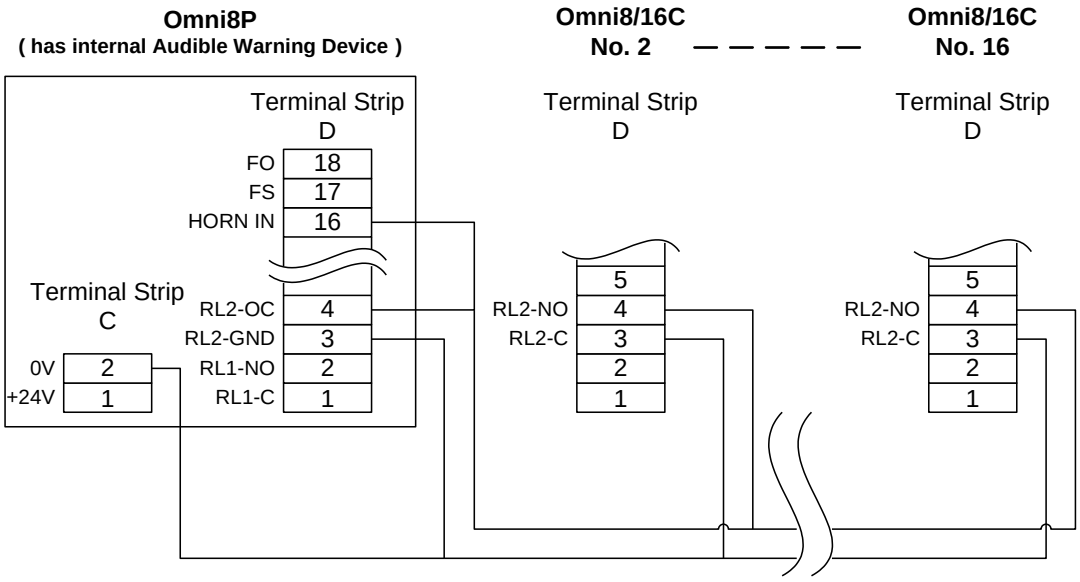


Figure 4-16 – Connecting Omni8P Audible to Omni16C's

4.16 Connecting the C1169 Lamp Driver board outputs

The Lamp Driver board is designed to provide extra load drive capability for Omni8C and 16C where high power lamps need to be driven typically where old mimic panel or alarm beacons are utilized.

The Lamp Driver board is fitted into one of the Repeat Outputs Slots on the Omni8 or 16. It has 16 Channels connected via detachable terminals which can be removed with the wiring.

Each output channel can deliver 250mA to a lamp using an externally connected 24Vdc power supply.

The connection uses a 24 V common on Terminal 1 and 2 with each lamp having a dedicated output from terminals 3 to 18. The Lamp return going back to the external supply negative.

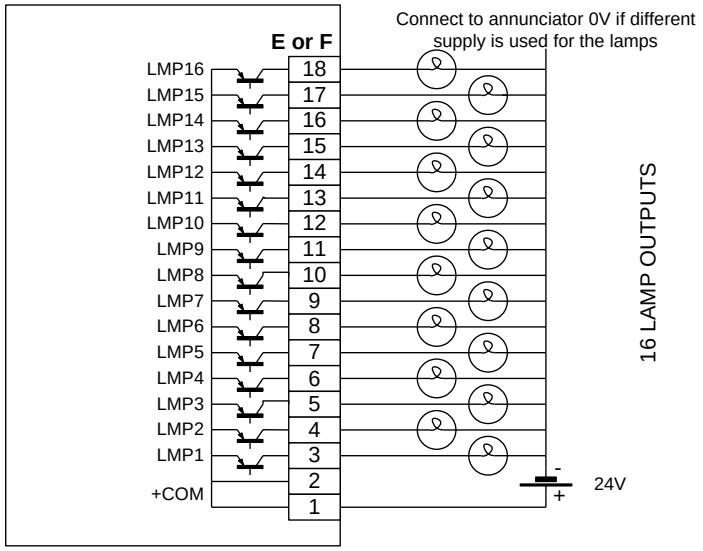


Figure 4-17 – Connecting the optional C1169 Lamp Driver Board

4.17 Connecting the Inhibit Input

By switching this input to 0 Volts of the 24Volt Supply (terminal C-2), all new alarms are prevented from occurring. Repeat outputs when set to follow inputs will be unaffected and input status can still be monitored via the serial link.

NOTE: The Omni8P does not have this inhibit input.

4.18 Connecting the optional Input Repeat Relay Contacts (Model C1425)

The Omni8/16C may be fitted with optional Input Repeat Relay boards. These boards provide a single normally open contact as a repeat of each alarm input in the unit. This may be used for connecting to other equipment such as sequence-of-event recorders or data-loggers.

The contact will be closed when the corresponding input is the normal condition, and will be open when the input is in the alarm condition. This is independent of whether the input is set to be normally open or normally closed. Should a single C1425 be utilised in either slots E or F, relay outputs will be mapped to Inputs 1 to 8 only.

4.19 Connecting the optional Ribbon Header Outputs (Model C1426)

The Omni8/16C may be fitted with an optional Ribbon Header Output Board. (The Model C1479 Omni16C Remote Logic Unit is fitted with this board as standard.)

This board is equipped with two 20 way ribbon cable headers.

The first header provides 16 outputs used to drive a remote display. The output will be on when the corresponding lamp is illuminated.

In panel mount Omni8/16C units with integral displays, the lamp repeat outputs on this board are in parallel with internal lamps in the unit.

The second ribbon cable header provides 16 outputs as repeats of each alarm input in the unit. This header may be used for connecting to other equipment such as OMNIFLEX's OMNILOG sequence-of-event recorders.

The output will be off when the corresponding input is the normal condition, and will be on when the input is in the alarm condition. This is independent of whether the input is set to be normally open or normally closed.

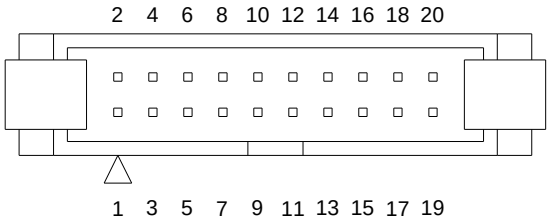
Each of these outputs is an open collector transistor output with the following electrical specification:

Collector Voltage	40Volts max.
Collector Current	100mA max.

CAUTION:

These outputs are not protected from short circuits, and exceeding the above ratings will damage the unit.

Ribbon Header Pinouts:



Pin No.	Description
1	0 Volts
2	0 Volts
3	24 Volts
4	24 Volts
5	Output 16
6	Output 15
7	Output 14
8	Output 13
9	Output 12
10	Output 11
11	Output 10
12	Output 9
13	Output 8
14	Output 7
15	Output 6
16	Output 5
17	Output 4
18	Output 3
19	Output 2
20	Output 1

Figure 4-18 – Ribbon Header Pin Layout

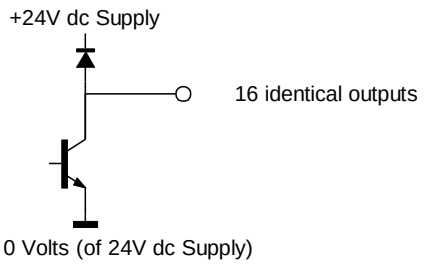


Figure 4-19 – Open Collector Transistor Output Arrangement

4.20 Synchronising flashing between multiple Omni8/16C's

Up to 16 Omni8/16C's may be connected together into a single display system of up to 256 points. In order to synchronise the display flashing in the system Terminal D-17 on all units in the system must be wired together.

All units in the system must share a common power supply reference. Wire Terminal C-2 on all units together to achieve this.

4.21 Expanding First-Out Groups between multiple Omni8/16C's

Some of the alarm sequences selectable in the Omni8/16C are "First-Out" alarm sequences. This means that the flashing sequence is such that the first alarm to occur in the group will flash differently to all subsequent alarms to allow the operator to identify which alarm occurred first.

Up to 16 Omni8/16C's may be connected together into a single First-Out group. Wire Terminal D-18 on all units in the group together to accomplish this.

All units in the system must share a common power supply reference. Wire Terminal C-2 on all units together to achieve this.

4.22 Electrical Installation Requirements for Intrinsically Safe Annunciators

External electrical connections to Omni16C C1480B-Ex must comply with the requirements of IEC60079-0 and IEC60079-11.

Omni16C Ex is fitted with special DC power supply unit. The maximum supply voltage for this unit is Um=27 VDC. Connection of voltages higher than 27VDC is not allowed.

Note: Connection of a reverse polarised power supply to the unit will blow an internal fuse with no auto recovery. This fuse can only be replaced by an Omniflex service centre.

Mains power supply option is not available with Omni16C Ex.

Inputs and outputs can only be connected to devices with equivalent degree of protection if connection is within hazardous area. This is typically satisfied if connections to non-reactive contacts (such as pushbuttons) are used. Connections to other electrical or electronic devices may require the use of barriers. In all cases requirements of relevant part of IEC60079 must apply.

Terminals of the Omni16C Ex may not be used to power other devices.

5 Configuring the Omni8/16C for Operation

5.1 Introduction

The Omni8/16C is configured by means of 8-way “set-up” switches. These are located with the connection terminals. The location of these switches can be seen in Figure 2-4 or Figure 2-6.

These “set-up” switches fall into two groups:

Input Sense Selection Switches

There is an 8 way “set-up” switch associated with each group of 8 alarm/display inputs and is used to configure these inputs for normally open or normally closed operation. See section 5.3 for further information.

Mode Selection Switches

This is a group of two 8-way switches located above Terminal Strip “C” on the unit. These switches are marked SW1 and SW2.

Each 8-way switch has 8 individual miniature switches, numbered from 1 to 8. Each of these miniature switches can be referred to individually: for example, the 8 miniature switches on SW1 are referred to as SW1-1 to SW1-8.

5.2 Modes of Operation

SW1 and SW2 are used to set the operational configuration of the Omni8/16C.

The Omni8/16C can be set into one of two modes of operation:

“SWITCH-SET” mode or “SOFT-SET” mode.

In “SWITCH-SET” mode, the entire operation of the unit is set by selections on these mode switches.

In “SOFT-SET” mode, the operation of the product is set via the programming port or (serial port if fitted) on the rear of the unit using the optional Software Configuration Software.

The product is put into “SOFT-SET” mode by a specific selection on the mode switch SW1. (SW1-1 to SW1-8 set on)

This manual covers the “SWITCH-SET” configuration. "For SOFT-SET configuration see the on-line help in the Omni16C Configuration template supplied with the Omniset Configuration Utility"

SOFT-SET mode offers the optimum in flexibility whilst SWITCH-SET Mode offers Omni16A and b style functionality and limited options. The table below summarises the capabilities of each mode and the limitations.

Table 5-1 – Comparison of DIP Switch Mode versus Softset Mode Configuration Options

CONFIGURATION OPTION	*DIP SWITCH SET MODE*	*SOFT-SET MODE*
Input Sense		
SET INPUT FOR NORMALLY OPEN OR CLOSED *Can only be set on DIP switch on each Input module*	Yes	No
Common Services		
Common Service Input Status If any bit below is 1 then the input is ON. Bit 0: INH (Inhibit input) Bit 1: TST (Lamp Test input) Bit 2: ACK (Acknowledge input) Bit 3: SIL (Silence input) Bit 4: RES (Reset input) Bit 5: FS (Flash Sync input - this bit is READ ONLY) Bit 6: FO (First Out input - this bit is READ ONLY) Bits 7-15: Reserved	No *Actuated via terminals at rear of Omni16*	Yes
Alarm Sequences		
Select Sequence number from Table 5-3. DIP switches must be set to Sequence 31 on SW1 for this register to be recognised, otherwise the DIP switch setting is used.	Sets : Input 1-8 Input 9-16	Each Input individually set
Timers		
Setup Timer Setting: Input delay timer set per input. One input per byte.	Input 1-16 *Single Timer for all Alarm Points*	*Each Alarm Point individually set Timer*
Setup Timer Resolution	Yes	Yes
Relay Outputs 1 to 4		
Setup Relay Output Function	No RL1 = Watchdog RL2 = Horn RL3 = Group Alarm RL4 = Not used	Yes Choose option for each
Setup Relay Output 1 to 4 Alarm Members. i.e. Map inputs to Relay Outputs	No Fixed all 16 Alarms mapped to Relay Outputs	Yes

CONFIGURATION OPTION	*DIP SWITCH SET MODE*	*SOFT-SET MODE*
Setup Group Alarm 1 to 4 Type If a relay output has been configured as a GA output, then the GA operation can be set-up for one of the following: ▪ GA follows input ▪ GA follows alarm ▪ GA acts as ring back ▪ GA set to multiple reflash ▪ GA follows ACK pushbutton (not available in switchset mode)	Yes GA1 RL 3 only	Yes
Lamp Sense		
Setup Lamp Sense All Lamps Normal Sense or Lamps Reversed Sense. Note: This setting only applies when SW1-8 is ON.	Yes	Yes
Split First Out Group		
First Out Group Split Enter a number between 1 and 16 to decide the split between First Out Group 1 and 2. For example: A value of **4** will arrange input 1 to 4 into First Out Group 1 and inputs 5 to 16 into First Out Group 2.	No Single group of 16	Yes
System Operation		
Various System functions can be setup as follows: ▪ Pushbutton Edge/Level Detection (default: edge) ▪ Auto ACK on Startup i.e. Turn off running light sequence (default is ON) ▪ Inhibit Input operation i.e. Close or Open to Inhibit (default is Close to Inhibit) Note: Only applies when SW1-8 is ON. ▪ Repeat Relay Output Options: ▪ Follows Input, Normally Open ▪ Follows Input, Normally Closed (Default) ▪ Follows Alarm, Normally Open ▪ Follows Alarm, Normally Closed ▪ Acts as GA output	No No Yes No	Yes Yes Yes Yes

5.3 Selecting the Input Sense

There is an 8 way “set-up” switch associated with each group of eight inputs. These are used to set the sense of the eight input contacts – normally open or normally closed.

These switches are located directly above each group of eight input terminals on the rear of the Omni8/16C and are clearly marked.

There is one switch for each input (numbered 1 to 8 in the group).

When the switch is OFF, the input is set to NORMALLY OPEN. (i.e. the input will enter the alarm state when the input contact is closed.)

When the switch is ON, the input is set to NORMALLY CLOSED. (i.e. the input will enter the alarm state when the input contact is opened.)

5.4 Selecting the alarm/display logic sequences

There are three fundamental variations to the switch settings chosen, dependent upon the settings of SW1-8 and SW2-7

First decide upon the setting of these two switches before proceeding to select the other switch settings.

These are shown in the following table (The input numbers shown in parentheses are for the Omni8C) :

Table 5-2 - Selecting the alarm/display logic sequences

	SW1-8	SW2-7	SW1-1 to 5	SW2-1 to 5	SW2-6 to 8
A	Off	Off	Sets sequence for inputs 1-8 (1-4)	Sets sequence for inputs 9-16 (5-8)	Operate as per Table 5-3
B	Off	On	Sets sequence for inputs 1-16 (1-8)	Sets Timer value for all input timers.	Operate as per Table 5-3
C	On	-	Sets sequence for inputs 1-16 (1-8)	Sets Serial Port address and R/W	Sets Baud Rate etc.

NOTES:

1. Settings A and B are compatible with the previous Omni16A and Omni16B products.
2. When SW1-8 and SW2-7 are set as per A or B in the table above, the serial port address defaults to 2, and the communications settings default to ASCII 9600 baud.
3. When SW1-8 is ON as per C in the table above, then the following default settings apply:

   Inhibit Contact Sense is set to normally open, close to inhibit.

   Lamp sense is set to normal.

Table 5-3 – The Sequence Switch Settings

	SEQUENCE SWITCHES																	
	SW1								SW2									
SEQ. NO.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	DESCRIPTION	ISA DESIGNATION	T TIME DELAY ON...
0	0	0	0	0	0				0	0	0	0	0				FACTORY TEST MODE		
1	1	0	0	0	0				1	0	0	0	0				LAMP FOLLOWS INPUT	--	--
2	0	1	0	0	0				0	1	0	0	0				MOMENTARY (FLEETING) ALARM, MANUAL RESET	M-1	INPUTS
3	1	1	0	0	0				1	1	0	0	0				ALARM ONLY (NO LOCK-IN) AUTO RESET	A-1-4	INPUTS
4	0	0	1	0	0				0	0	1	0	0				MOMENTARY ALARM, MANUAL RESET WITH RINGBACK	R-1-10	INPUTS
5	1	0	1	0	0				1	0	1	0	0				MULTIPLE GROUP, FIRST OUT MANUAL RESET	F2M-1	--
6	0	1	1	0	0				0	1	1	0	0				FIRST OUT, AUTO RESET, F.O. RESET INTERLOCK	F3A-1-3	--
7	1	1	1	0	0				1	1	1	0	0				SINGLE GROUP, 1st OUT, MANUAL RESET, 1st UP CONTINUOUS FLASH	--	--
8	0	0	0	1	0				0	0	0	1	0				1st OUT, MANUAL RESET WITH NO SUBSEQUENT ALARM STATE SILENCE PUSHBUTTON	F1M-1	INPUTS
9	1	0	0	1	0				1	0	0	1	0				MOMENTARY (FLEETING) ALARM MANUAL RESET	--	HORN
10	0	1	0	1	0				0	1	0	1	0				MOMENTARRY (FLEETING) ALARM MANUAL RESET	--	REFLASH
11	1	1	0	1	0				1	1	0	1	0				MOMENTARY (FLEETING) ALARM MANUAL RESET FOR MOTOR ALARMS	--	INPUTS
12	0	0	1	1	0				0	0	1	1	0				MOMENTARY (FLEETING) ALARM	--	RETURN TO NORMAL
13	1	0	1	1	0				1	0	1	1	0				PULSE MONITORING ALARM WITH MANUAL RESET	--	--
14	0	1	1	1	0				0	1	1	1	0				MOMENTARY (FLEETING ALARM), MANUAL RESET, WITH RINGBACK.		
18	0	1	0	0	1				0	1	0	0	1				MOMENTARY (FLEETING) ALARM AUTO RESET	--	INPUTS
21	1	0	1	0	1				1	0	1	0	1				MULTIPLE GROUP, FIRST OUT, AUTO RESET	F2A-1	--
23	1	1	1	0	1				1	1	1	0	1				SINGLE GROUP, 1st OUT, AUTO RESET, 1st UP CONTINUOUS FLASH	--	--
24	0	0	0	1	1				0	0	0	1	1				MULTIPLE GROUP, FIRST OUT, AUTO RESET, NO SUBSEQUENT ALARM STATE, SILENCE PUSHBUTTON	F1A-1	--

	SEQUENCE SWITCHES																	
	SW1								SW2									
SEQ. NO.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	DESCRIPTION	ISA DESIGNATION	T TIME DELAY ON...
25	1	0	0	1	1				1	0	0	1	1				MOMENTARY (FLEETING) ALARM AUTO RESET	--	HORN
26	0	1	0	1	1				0	1	0	1	1				MOMENTARY FLEETING ALARM, AUTO RESET	--	NO ACTION REALARM
27	1	1	0	1	1				1	1	0	1	1				MOMENTARY ALARM AUTO RESET FOR MOTOR ALARMS	--	INPUT
28	1	0	1	1	1				1	0	1	1	1				PULSE MONITORING ALARM AUTO RESET	--	--
31	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	SOFT-SET MODE. ALL SETTINGS ARE SET VIA SOFTWARE. *(Refer to Table 5-1)*	--	--
FOLLOWS INPUT						0	0										FUNCTION OF GROUP ALARM ON RELAY 3 (G.A.)	NOTE: In the above sequences, the switch sense is as follows: "1" = switch in on position "0" = switch in off position	
FOLLOWS ALARM STATE						1	0												
ACTS AS RINGBACK HORN						0	1												
ACTS AS MRF (REFLASH)						1	1												
SW2=TIMERS/SEQUENCE 9-16								0									When SW1-8 is OFF, SW2 sets functions as shown in this table.		
SW2=SERIAL PORT SETTINGS								1	#	#	#	#	#	#	#	#	When SW1-8 is ON , SW2 sets Serial Port Address and Baud Rate etc. See Section 5.9		
CLOSE TO INHIBIT														0			With SW1-8 OFF, when SW2-6 is OFF, close contact on Inhibit Input to stop further alarms		
OPEN TO INHIBIT														1			With SW1-8 ON, when SW2-6 is ON, open contact on Inhibit Input to stop further alarms		
TIMERS OFF															0		With SW1-8 OFF and SW2-7 OFF: Timers are off, and SW2-1 to SW2-5 set the sequence of inputs 9-16		
TIMERS ON									*	*	*	*	*		1		With SW1-8 OFF and SW2-7 ON: SW2-1 to SW2-5 sets Time-out value. See Figure 5-1		
LAMP SENSE NORMAL																0	With SW1-8 OFF, when SW2-8 is OFF: Lamp outputs operate normally		
LAMP SENSE REVERSE																1	With SW1-8 OFF when SW2-8 is on: Lamp outputs operate in reverse sense. i.e. On instead of off and v.v.		

5.5 Selecting the Group Alarm Relay (RL3) Output Function

The Group Alarm (G.A.) relay RL3 offers a changeover contact on Terminal Strip D.

SW1-6 and SW1-7 are used to set the mode of operation of this relay.

There are four modes to choose from:

1. *Relay follows input*

The relay is normally energised.

Any abnormal input will de-energise the relay. The relay will re-energise when all inputs return to their normal states, regardless of the state of the alarm lamps.

This is useful for tracking the actual state of the inputs. Any abnormal input will cause the relay to be de-energised.

2. *Relay follows alarm state*

The relay is normally energised.

Any alarm state will de-energise the relay. The relay will return to normal when all alarm states have returned to normal. (i.e. the alarms have been acknowledged by the operator and the entire display is off)

This is useful for tracking the actions of a local operator in clearing the problem. If a 'fleeting' alarm sequence is chosen, the relay will remain de-energised until the operator clears the display, even though the input contact may have already returned to the normal state.

3. *Relay acts as ring-back horn*

The relay is normally de-energised.

The G.A. relay will energise when any abnormal input returns to normal. The RESET pushbutton must be depressed to return the G.A. to its normal state.

(This G.A. type can be used to alert an operator to the fact that an alarm has returned to its normal state).

4. *Relay acts in Multiple Reflash Mode*

The relay is energised with all inputs in their normal state.

The relay is de-energised by the first input changing to the abnormal state.

Upon each subsequent input changing to the abnormal state, the relay will momentarily energise (for about 1 second), then return to the de-energised state.

This is useful when the relay contact is used for example to trigger a dial up alarm, and if subsequent inputs going into alarm must also trigger the dial-up alarm.

Referring to Table 5-3, select one of the 4 relay modes by setting switches SW1-6 and SW1-7 to the appropriate positions.

5.6 Selecting the Inhibit Input Contact Sense

Select the required inhibit input sense by setting switch SW2-6 to the appropriate position (refer to Table 5-3).

Note: SW1-8 must be off for this selection to be operational. When SW1-8 is on, SW2-8 is reassigned, and the inhibit input defaults to normally open, close to inhibit.

5.7 Selecting the Lamp Status

The lamp status of the display windows may be selected on SW2-8 to give the following:

NORMAL: lamps OFF when inputs are normal, ON when inputs are abnormal.

REVERSE: lamps ON when inputs are normal, OFF when inputs are abnormal.

Note: SW1-8 must be off for this selection to be operational. When SW1-8 is on, SW2-6 is reassigned, and the lamp status defaults to Normal.

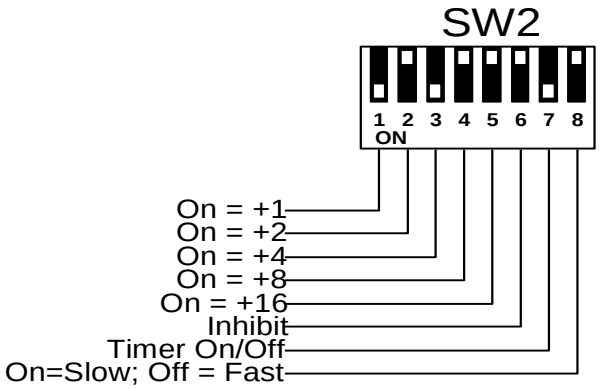
5.8 Selecting Time Delays

The Omni8/16C has a timer associated with each alarm point.

These timers are used with special Timer sequences. A large "T" in the sequence diagram in Section 9 identifies these sequences.

There are two methods of selecting a time delay setting for these sequences:

1. The timers may be set using SW2-1 to SW2-5. This method is invoked by switching SW2-7 on. This method is recommended when all timers have the same time setting.
2. Programming the memory of the Omni8/16C using the optional Software Configuration Utility will set each input timer individually. If this memory is not programmed, then the timers default to the switch settings. This method should be used when different input timer settings are required.



Example:

SW1-8 must be off to enable SW2 as time setting.

SW2 in this diagram shown set for 0.5 seconds.

Slow = Uses the Slow timer i.e. 1 sec increments

Fast = Uses the Fast timer i.e. 1/10 sec increments

Figure 5-1 – Setting Time Delays on SW2

5.8.1 Omni8/16C Fast and Slow Timers

Figure 5-1 above shows the use of the Fast and Slow timer. These timers allow the user the most flexible timing options. For very short timing durations, the Fast timer should be used. This timer counts time in units of 100ms or 1/10 of seconds.

For longer time periods, the Slow timer should be used. This timer is derived from the Fast timer and therefore counts time in multiples of the Fast timer. The default setting of the Slow timer is to count time in seconds. It is possible to alter the timing mechanism of the Slow timer to count in larger units of time via the programming port.

5.8.2 Explanation of Timer Operation in a Timer Sequence

With reference to any one of the special timer sequences:

When the alarm point moves from a state where the timer is stopped to a state where the timer is running, the timer will be started.

When the alarm point moves from a state where the timer is running to a state where the timer is also running, the timer is allowed to continue timing.

When an alarm point moves from a state where the timer is running to a state where the timer is stopped, the timer is put into the timed-out (stopped) state.

5.9 Selecting Serial Port Settings

The Omni8/16C can be equipped with an optional RS232/485 serial port. This port supports the Modbus protocol. In Switch-Set or Soft-Set mode, inputs and outputs can be read via the serial port using standard Modbus commands. Please refer to Section 10 for the layout of Modbus Registers that are available in the Omni8/16C.

5.9.1 Default Settings

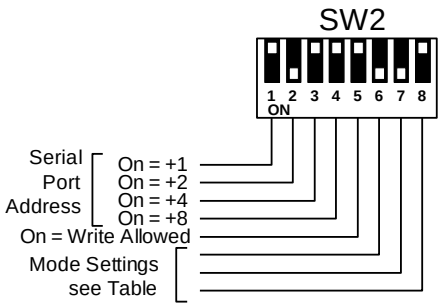
When the unit is in Switch set mode (refer to settings A or B of section 5.4), the unit may be accessed via Modbus without changing the dipswitch settings at all. In this mode, communications settings are fixed as follows:

Table 5-4 – Default Serial Port Settings with SW1-8 OFF

Default Modbus Settings with SW1-8 OFF	
Modbus Slave Address	2
Comms settings	ASCII; 9600 baud; No Parity, 7 Data bits, 2 Stop Bits

5.9.2 Modbus Address and Mode Settings

In applications where the Modbus Slave address and/or comms settings are to be different from the default settings as shown in the table above then set SW1-8 ON to enable SW2 for additional serial port settings.



Example:

SW1-8 must be ON to enable SW2 for serial port settings.

SW2 in this diagram is shown set for Address 2; Read only; and RTU mode, 1200 baud, No Parity,

Figure 5-2 – Serial Port Settings on SW2

Table 5-5 – Serial Port Address Setting on SW2-1 to 4

SW2-1 to 4 – Modbus Address Settings	
(0 = Off ; 1 = On)	1:2:3:4
Modbus Slave Address 1	1:0:0:0
Modbus Slave Address 2	0:1:0:0
Modbus Slave Address 3	1:1:0:0
Modbus Slave Address 4	0:0:1:0
Modbus Slave Address 5	1:0:1:0
Modbus Slave Address 6	0:1:1:0
Modbus Slave Address 7	1:1:1:0
Modbus Slave Address 8	0:0:0:1
Modbus Slave Address 9	1:0:0:1
Modbus Slave Address 10	0:1:0:1
Modbus Slave Address 11	1:1:0:1
Modbus Slave Address 12	0:0:1:1
Modbus Slave Address 13	1:0:1:1
Modbus Slave Address 14	0:1:1:1
Modbus Slave Address 15 – 31 With this selection, the Modbus address can be set in Soft-Set mode to any address from 15 (default) to 31.	1:1:1:1

NOTE: The Omni16C will respond to a broadcast write sent to Address 0 if Modbus writes are enabled regardless of the address setting of the unit. Any data write command from the Modbus Master sent to Address 0 will be recognised by all Omni16C's. No response will be sent.

Table 5-6 – Modbus Write Enable Setting

Modbus Write Enable Setting	
SW2-5 Off	Modbus Port is Read Only. No settings or alarms can be changed when this switch is off.
SW2-5 On	Switch this switch ON to enable the Modbus Master to write to any registers in the Omni8/16C.

Table 5-7 – Serial Port Mode Parameters on SW2-6 to 8

SW2-6 to 8 Mode Settings	
(0 = Off ; 1 = On)	6:7:8
ASCII; 9600 baud; No Parity; 7Data 2Stop	0:0:1
ASCII; 4800 baud; No Parity; 7Data 2Stop	1:0:1
ASCII; 2400 baud; No Parity; 7Data 2Stop	0:1:1
ASCII; 1200 baud; No Parity; 7Data 2Stop	1:1:1
RTU; 9600 baud; No Parity; 8Data 1Stop	0:0:0
RTU; 4800 baud; No Parity; 8Data 1Stop	1:0:0
RTU; 2400 baud; No Parity; 8Data 1Stop	0:1:0
RTU; 1200 baud; No Parity; 8Data 1Stop	1:1:0

5.10 Changing the operation of the Repeat Outputs

It is possible to change the operation of the Repeat Output relays should the application require it. In most applications it the Repeat Outputs will repeat the inputs status of the inputs i.e. if the input is normal then the corresponding repeat relay is energised and if the input is abnormal then the repeat relay output is de-energised. This is the default operation.

Using the Omni8/16C Configuration Utility, the repeat relays may be setup to repeat the Alarm status of the inputs i.e. the repeat is energised when the Alarm sequence is in the alarm condition. This is identified as the state in which the corresponding lamp is illuminated. This is particularly useful in timer sequences where the lamp illuminates after the input timer delay has elapsed. When the repeats are setup for alarms, the repeats will energise when the lamp illuminates, not when the input goes abnormal.

Repeat outputs can additionally be setup for fail-safe operation. In this mode the output relay is energised in the normal condition and de-energised in the alarm condition.

Please refer to the On-line help available in the Configuration Utility for more information.

6 Operation

6.1 Power up

When power is applied to the Omni8/16C, the unit commences an automatic, built-in circuit test routine. This results in the unit sounding the audible for approximately half a second followed by the cyclic illumination of each lamp in turn starting at lamp 1 to the last lamp and back to 1 again etc. in a “marching sequence”.

If no internal faults are detected in the unit, then this test mode display continues until the Acknowledge Pushbutton is pressed or until an input changes to the alarm state.

If an internal fault is detected, then the unit will display a fault indication by continuously flashing one of the lamps. If this occurs, then the unit must be sent for service.

If a new alarm occurs while the Omni8/16C is in this test routine, the unit will immediately revert to its normal mode of operation and will deal with the alarm state according to the pre-selected alarm sequence.

6.2 Normal Operation

During the normal operation, the Omni8/16C will deal with any alarm states according to its pre-set alarm sequences. (The instructions for setting-up these sequences are given in section 5.4).

Section 9 provides detailed block diagrams for the function of each alarm sequence.

When an alarm condition occurs and the horn sounds, the operator should depress the relevant pushbuttons, where necessary, according to the pre-selected alarm sequence.

When the Omni8/16C is put into its test routine by depressing the TEST pushbutton, any existing alarm states are “remembered” and the alarm annunciator will revert to its previous state when it returns to its normal mode of operation.

If a new alarm state occurs while the Omni8/16C is performing its test routine, the unit will immediately revert to its normal mode of operation and deal with the alarm state according to the pre-selected alarm sequence.

6.3 Test Functions

6.3.1 Overview of the Test Functions

The Test button operates as a combined lamp test and circuit test function.

No information is lost during the entire test routine, and each alarm display returns to the exact state it was in before the test

6.3.2 Pressing the Test Button

When the Test button is pressed, the unit checks the results of its regular full circuit test, and if all checks performed pass, then a conventional lamp test is performed, by illuminating all of the lamps while the Lamp Test Pushbutton is held down. When the Test pushbutton is released, the Omni8/16C reverts to the state it was in before the Test button was pushed.

If the circuit Test fails then the unit enters its “marching sequence” test routine described in Section 6.3.5 and the test failure code will be displayed by flashing one of the lamps continuously.

In this way, the display/annunciator Test button acts both as a Lamp Test and Circuit Function.

6.3.3 Fault Indication on Circuit Test

If a fault is found in one of the tests performed, then the unit enters its full “marching lamp sequence”, with, in addition, one or more of the lamps flashing continuously to indicate the fault located. This is described in detail in Section 6.3.5.

6.3.4 Manually invoking the Circuit Test Function

As a confidence measure, the unit may be placed in the full “marching sequence” Circuit Test Mode at any time by holding down the Silence button and then pressing the Test Button. See section 6.3.5.

6.3.5 The "Marching Sequence" Circuit Test Display

This routine is entered upon the following conditions:

- Upon power up.
- If the Test button is pressed and a fault is detected in the unit.
- By holding down the Silence button and then pressing the Test button manually enters this function.
- Any time during normal operation, if the unit during its regular self-test routines detects a fault.

This test routine begins by activating the horn output circuit for approximately one second.

The operator should therefore check that the horn sounds for this short period.

Immediately after this half-second period, if the Omni8/16C is functioning correctly, the following visual indication will occur:

The display will begin a “marching light” sequence, with each display window illuminating and then extinguishing, one at a time, starting with the display point 1 (top left-hand window) and ending with the display point 8 or 16(bottom right-hand window). All display windows will then remain extinguished for a brief moment.

The “marching” sequence will then begin again, and this procedure of “marching” sequence followed by the brief “blank” display period will be repeated continuously until the ACKNOWLEDGE pushbutton is depressed, or until an input changes state.

This marching sequence indicates that the alarm annunciator has passed all its own internal tests and is functioning correctly. If the lamp display exhibits any other pattern then a fault has been detected, and the unit should be returned for service.

To exit the test mode and begin normal operation, the ACKNOWLEDGE pushbutton should be pressed.

The pushbuttons may also be tested in this mode:

- If the SILENCE button is depressed - lamp No. 1 flashes continuously.
- If the ACK button is depressed - the annunciator reverts to normal operation.
- If the RESET button is depressed - lamp No. 3 flashes continuously.

- If the TEST button is depressed - lamp No. 4 flashes continuously.
- If any other lamp flashes continuously, then the unit has detected a fault and must be returned to the factory for service.
- If a new alarm occurs while the Omni8/16C is in this test routine, the unit will immediately revert to its normal mode of operation and will deal with the alarm state according to the pre-selected alarm sequence.

It is possible under some circumstances to continue to operate the Omni8/16C even after a fault has been detected. The table below will assist in diagnosing the fault found.

Table 6-1 Fault diagnosis during Circuit Test

Display Window No.	FAULT SYMPTOM		POSSIBLE CAUSE
1	FLASHING	during "Marching Sequence"	SIL pushbutton held down, or stuck in ON state
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period.	Window No. 1 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period.	Window No. 1 has lamp failure or output circuit fault.
2	FLASHING	during "Marching Sequence"	ACK pushbutton held down, or stuck in ON state (this condition must have been present BEFORE the CCT. TEST mode was initiated)
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period.	Window No. 2 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period.	Window No. 2 has lamp failure or output circuit fault.
3	FLASHING	during "Marching Sequence"	RESET pushbutton held down, or stuck in ON state.
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period	Window No. 3 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period	Window No. 3 has lamp failure or lamp output circuit fault.
4	FLASHING	during "Marching Sequence"	TEST pushbutton held down, or stuck in ON state.
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period.	Window No. 4 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period.	Window No. 4 has lamp failure or lamp output circuit fault.

Display Window No.	FAULT SYMPTOM		POSSIBLE CAUSE
ANY OTHER LAMP	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period	Window has lamp output circuit fault.
	STEADY OFF	During "Marching Sequence", and stays OFF during "Blank" display period.	Window has lamp failure or lamp output circuit fault.
1,2,3,4,6	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	Fault detected on one of the INPUT logic circuits
1,2,3,4	STEADY ON	During "Marching Sequence"	Fault detected on the SPI bus OR all four pushbuttons stuck ON
1,2,3,4,5,6	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	Fault detected on the SPI bus
1,2,3,4,5,7	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	DIP switches are set all OFF. (Note: This is a special factory test mode. If the acknowledge button is pressed in this mode, then the marching light sequence will stop, and other factory tests will be implemented. Changing any DIP switch will exit this mode.)
1,2,3,4,7	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	Fault detected with the on-board EEPROM

6.4 Use of the inhibit input

If the Inhibit Input (on TS-D terminal 16) is in the abnormal condition, then all of the alarm inputs will be disabled from setting a new alarm. All other functions of the unit will remain unaffected.

When this input reverts to the normal state, then operation of the Omni8/16C reverts to full operation, and the unit will respond to any input changes that may occur thereafter.

The normal state is conventionally with the Inhibit input normally open and may thus be left unconnected.

If SW1-8 is off, the normal state of the Inhibit input may be changed to normally closed by switching SW2-6 on.

7 FUNCTIONAL SAFETY MANUAL

7.1 Function Specification

Omni16C Alarm Annunciator is a product designed to alert the operator to abnormal process or plant conditions, one or more of which may be safety-critical. The unit has visual indication windows on the front and all terminals and other connection facilities at the back. Configuration switches are also accessible at the back of the unit.

When using Omni16C in SIL1 applications, one safety function is defined as change to Alarm state in response to one input.

Omni16C accepts inputs from field devices. In SIL1 applications an input must originate from contact which is normally closed and opens on abnormal condition. The contacts can be potential free or use positive common.

Output is in the form of visual Alarm indication on the front panel which is achieved by flashing a display window corresponding to the activated input. In normal operation the unit also activates General Alarm (GA) output in the form of relay contacts and Audible alarm, also in the form of relay contact. These contacts can be connected to the next logic device in the safety loop.

Alarms can be Silenced, Acknowledged (Accepted) or Reset by means of external pushbuttons connected to Omni16C terminals.

Diagnostic output is provided by special illumination pattern of alarm windows or opening of watchdog relay output.

7.2 Hardware Configuration

The SIL1 certification refers to the 24V unit and to the following hardware configuration:

Table 7-1 – Hardware Modules of SIL1 Omni16

Assembly	Quantity
CPU board	1
Logic Bus board	1
Common Services board	1
Input board	2
Display board	1
LED board red	16

Several hardware configurations using the same or smaller set of these modules are possible which have then different product designations (e.g. Omni8C, Remote Logic Units etc.). However, the safety parameters remain the same in each case and no reduction in failure rates is assumed on account of unused modules.

Software is the same in all Omni16C family products.

Safety parameters for additional optional cards are available on request. Their use must be assessed separately.

Hardware fault tolerance is 0.

Omni16C is a Type B subsystem.

Changing configuration:

Hardware configuration is performed by means of DIP switches:

- on Input cards for input type
- on CPU card for alarm sequence configuration

Input DIP switches in SIL1 applications must be closed.

Alarm sequence options can be selected as described elsewhere in this User Manual.

Configuration can also be changed through the Programming port ("soft-set mode"). Programming port should not be used other then for initial or periodic setup of unit configuration.

7.3 Installation Requirements

- To maintain the specified performance of Omni16C products, the units must be used within specified limits of safety, environmental and EMC parameters.
- Installation, configuration and operation must only be carried out by suitably trained personnel. Maintenance and repairs can only be performed by Omniflex personnel.
- Units must be installed in panels in such a way that access to configuration switches and connections at the back is not possible in normal operation, thus preventing unauthorized configuration changes.

7.4 Functional Safety Parameters

This paragraph describes functional safety parameters of Omni16C family unit in configuration described. All units use embedded firmware revision 8.02, which was subjected to SIL1 assessment through EMPHASIS.

Failure of the unit is defined as the failure to illuminate the window and activate General Alarm (GA) relay when input contacts in the field are opened (failure to respond to alarm).

Safe failure is defined as any failure which does not impact on the function described above.

Dangerous failure is defined as any hardware failure, which results in a unit not accepting and displaying an alarm (remains in NORMAL state of alarm and watchdog).

Any of the failures are defined as detected when the operator is alerted to abnormal operation, when diagnostic output is opened, or the unit indicates alarm on any output (visual, audible or logic) without input being activated.

Safety parameters are summarised in Table 7-2 below.

Table 7-2 – Omni16 Safety Parameters

Subsystem	Type B
Hardware Fault Tolerance	0
DC	78%
SFF	83%
MTTR	8 hours
Proof Test Interval	1 year
PFD_{avg}, (TI = 1 year)	2.02×10^{-3}
Safe failures detected λ_{SD}	495.5 FIT
Safe failures undetected λ_{SU}	192.1 FIT
Dangerous failures detected λ_{DD}	1623.0 FIT
Dangerous failure undetected λ_{DU}	458.8 FIT

An MTTR of 8hrs was used in the above PFD calculations.

Table 7-3 – Key to Abbreviations

DC = Diagnostic Coverage	λ = failure rate per billion hours (1 FIT = 1 failure in 10^9 hours)
SFF = Safe Failure Fraction	Failure Rate Categories:
PFD = Probability of Failure on Demand	SU = Safe Undetected
TI = Proof Test Interval	SD = Safe Detected
MTBF = Mean Time Between Failures	DU = Dangerous Undetected
MTTR = Mean Time To Repair	DD = Dangerous Detected

7.5 Diagnostics

There are two methods used to indicate internal failure detected in the unit:

- The unit flashes alarm windows in specific pattern, thus identifying the circuit section that failed.
- For other general hardware failures alarm indication is used. If input is in normal state then flashing window, activated audible alarm or open GA contacts all indicate failure. In such cases alarm indication typically cannot be acknowledged and reset.

For other general failures when abnormal operation is detected, Omni16C diagnostic watchdog contacts change to open. This mainly indicates CPU board failures. To fully benefit from diagnostics, the state of watchdog should be monitored.

7.6 Proof Test

Two tests of the unit are described in this paragraph (refer also to Test Functions section):

- Circuit test
- Proof Test

Test – pressing the Test button performs circuit test and if all internal checks pass then the unit illuminates all lamps to check that alarm window illumination operates correctly. If one of the checks fails the unit enters the "marching sequence" and then displays an error code. See Test Functions section 6.3 in this manual for further details. It is recommended that this is performed daily or at the intervals no greater than MTTR (begin of shift).

Full Proof Test is conducted once a year and requires activation of input contacts for safety-critical alarms to simulate Alarm condition. The following test steps must be performed to conclude that the unit operation is failure-free:

Only perform the test when no abnormal (alarm) conditions exist and plant safety is not affected by the testing.

Isolate the unit from outputs so that it can be tested without disturbing the rest of the plant.

a) First perform the manual Circuit Test by holding down the Silence button and pressing the Test button. The unit will start the "marching sequence" (all windows flashing consecutively in order 1-16).
b) After one marching sequence is completed, stop it using Acknowledge pushbutton. Omni16C operation will revert to normal. Continue if there were no error indications.
c) Open the circuit for alarm input under test (number of inputs depending on application).
d) Only the correct Alarm window must be flashing.
e) The flashing as well as the functions of Silence, Acknowledge and Reset buttons must correspond to the sequence selected.
f) Operation of General Alarm relays must correspond to the sequence selected.
g) The Watchdog contacts must stay closed during the entire duration of the test.
h) Close the input contacts (input testing is finished at this point).
i) Change configuration DIP-switches so that both switches have only position 2 ON and others OFF. The change must cause a unit reset and the "marching sequence" to start.
j) After one marching sequence is completed, stop it using Acknowledge pushbutton.
k) Change DIP switches back to the original alarm sequence. The change should again reset the Omni16C unit. The marching sequence may or may not start at this point, depending on the alarm sequence selection.
l) This completes the Proof Test procedure.

7.7 Prevention of Systematic Failures

It is crucial to prevent systematic failures so that performance of the unit with respect to general random failures is not affected. As this is a stand-alone unit, systematic failures are generally attributed to incorrect connection or configuration.

In this context, the following points must be observed:

- Omni16C inputs must be configured for positive common and closed contacts. Open contacts represent alarm condition.
- 24V DC supply voltage for the Omni16C and the DC supply voltage for field contacts must have the same ground potential.
- Common Services inputs (Silence, Ack, etc.) must be wired to normally-open contacts which close to ground (COM on Omni16C terminals) when activated by an operator.
- Check that sequence selected is suitable and correct for the type of alarm being monitored.
- The watchdog output should be used for maximum Diagnostic Coverage. Although PFD and SFF without the watchdog meet SIL1 requirements, the figures quoted in Table 7-2 assume the use of the watchdog function.
- Software revision 8.02 should be used.
- The unit should be used within the range of ambient temperatures and humidity as specified in the datasheet.
- Vibration can be up to 1g in the range 10-250Hz
- EMC – Omni16C must be operated so that interference levels stated in Specifications are not exceeded.
- The Operator should perform the full Circuit Test at intervals of 8 hours (start of shift). Indicated Faults must be attended to immediately.

8 SPECIFICATIONS

Power Supply Options			
Voltage Option	24Vdc	20-60Vdc	85-264Vac/dc
Isolation PSU to inputs	None	1500Vrms	1500Vrms
Max dc Ripple	10% pk. to pk.	10% pk. to pk.	N/A
Current Consumption	See Section 4.8 of this manual		

Alarm/Display Inputs - Non Isolated		
Type	Potential Free Contacts or switch to 0volts Common +ve	Switch to +24volts Common -ve
Contact Sense	User Selectable Normally Open or Closed on rear of unit	
Max. open circuit voltage	28Vdc	
Max. closed circuit current	5mA per input circuit	
Max. Loop Resistance to detect closed contact	200 ohms	
Min. Loop Resistance to detect open contact	100 kohms	
Input Scan Rate	4 milliseconds with 8millisecond filter. Inputs must be stable for at least 8 milliseconds for a change of state to be detected.	
Wire size	1.5mm^2 (17SWG/15.5SWG) max.	
Connections	Via plug-in Terminals	

Alarm/Display Inputs - Isolated		
Type	19-60Vdc	90 to 150V ac or dc
Isolation Input to Logic	1500Vac rms	1500Vac rms
Input to Input Isolation	500Vac rms	500Vac rms
Qty and Type	16 Inputs dc	16 Inputs dc or ac
Contact Sense	User Selectable Normally Open or Closed on rear of unit	
Compliance to Standards		
Safety	IEC 950	
EMC	EN50081-2: EN50082-2	

Wire size	1.5mm^2 (17SWG/15.5SWG) max.
Connections	Via plug-in Terminals

Alarm Sequences	
Quantity	27 (user selectable by set-up switches)
ISA types	M-1, A-1, A-1-4, R-1-10, F2M-1, F2A-1, F3A-1-3, F1M-1, F1A-1
Other types	See sequence diagrams for full selection.

Flash Rates	
Fast Flash Rate	140 flashes per minute
Slow Flash Rate	35 flashes per minute

Integral Pushbuttons	
Quantity	Four buttons mounted externally or optionally on front panel in last window position.
Type	Normally Open, Close to operate
Functions	Silence; Acknowledge; Reset; combined Lamp & Circuit Test

Window Display			
Types	Backlit LED	Sidebar LED	Incandescent Lamp
Window Size	24mmx64mm	21mmx51mm	24mmx64mm
Legend Area	21mmx60mm	20mmx40mm	21mmx60mm
Legend Type	User printed on film with laser/inkjet using software provided.	Engraved plastic coloured window	User printed on film with laser/inkjet using software provided.

Common Service Relay Contact Outputs	
Contact Type	2 Potential free changeover (Form C) 2 Potential free normally Open (Form A)
Contact Rating	2A 30Vdc or 0.5A 230Vac
Isolation	1000Vac from contact to other circuits

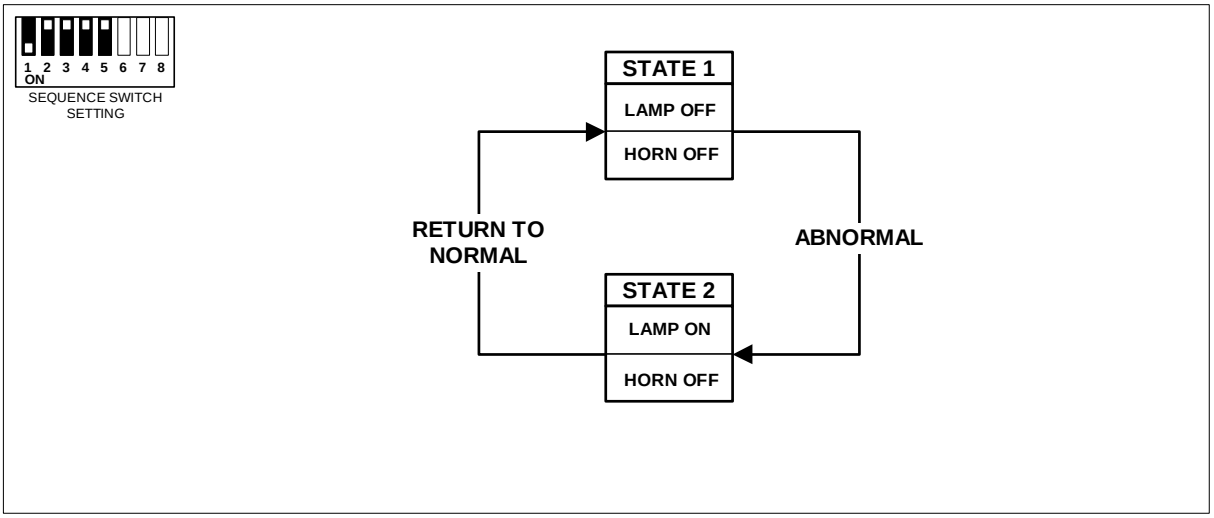
(Optional) Repeat Relay Contact Outputs	
Contact Type	Potential free normally open (Form A) Relay is energised when input contact is normal.
Contact Rating	2A 30Vdc or 0.5A 230Vac
Isolation	250Vac contact/contact and 1000Vac contact/coil

Temperature Range	
Operating Temperature	0°C – 60 °C (+32°F – 140°F) for LED versions 0°C – 50 °C (+32°F – 122°F) for incand. Lamp versions Humidity of up to 90% RH, non-condensing recommended
Storage Temperature	-10°C – 70 °C (+14°F – 158°F) Humidity of less than 40% RH recommended
Weight	
Unpacked	1.8kg approx.
Packed	2.2kg approx.
Compliance to Standards	
Ingress Protection (I.P)	IP42 (front only)
CE	Meets requirements for CE marking.
Safety	EN 60950:1995
Emissions	EN 55011 and EN50081-2:1994 Group I, Class A
Immunity – ESD	IEC 61000-4-2:1995, level 3
Immunity – RF Fields	IEC 61000-4-3:1995, level 3
Immunity – Fast Transients	IEC 61000-4-4:1995 2 kV – DC power port 1 kV – input/output lines
Supply Variations	IEC 61000-4-7:1991, 24 V dc +15% -10%

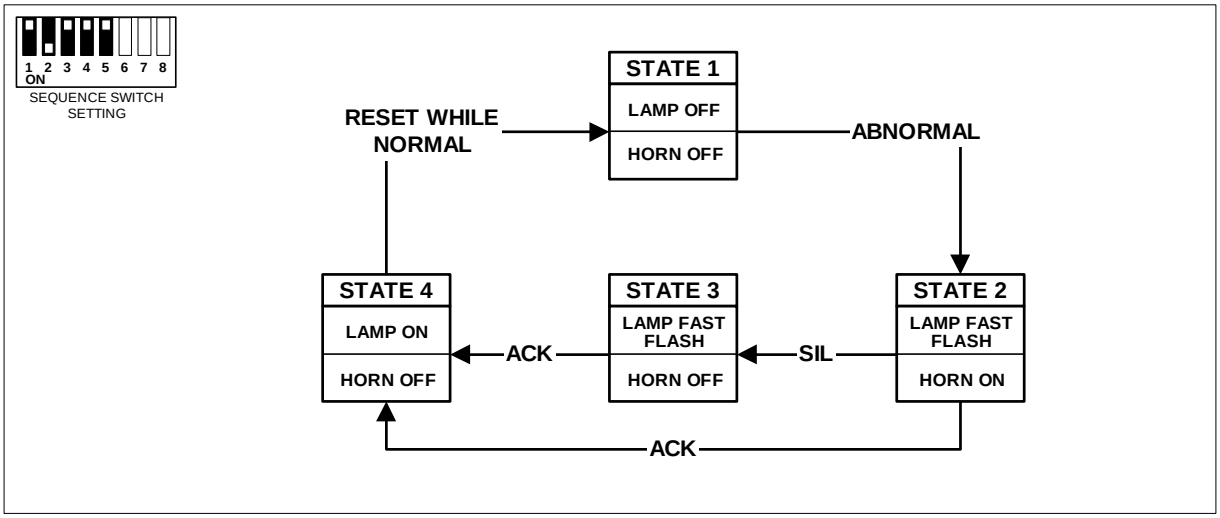
Accessory Ordering Information

ORDER CODE	DESCRIPTION
C1421	85-264Vac/dc Isolated Power Supply
C1422	20-60Vdc Isolated Power Supply
C1423	Isolated RS232/485 Serial Port
C1425	8 way Repeat Relay Board
C1171	Omni8/16C Standard 8 Channel Input Board Common Positive
C1173	Omni8/16C Standard 8 Channel Input Board Common Negative
C1172	Omni 8/16C 8 Channel Isolated 19-60Vdc Inputs
C1170	Omni 8/16C 8 Channel Isolated 90-150Vac/dc Inputs
C1174A	Omni8/16C Ribbon Header Input Board
C1169	Omni8/16C 16 Channel Lamp Driver Board
C1426	Ribbon-Header Repeat Output Board
C1420	Integral Pushbutton Station
C1415	Remote Pushbutton Station with Audible
C1150	Red Back-lit LED Lamp Board
C1151	Yellow Back-lit LED Lamp Board
C1152	Green Back-lit LED Lamp Board
C1153	Blue Back-lit LED Lamp Board
C1161	Incandescent Lamp replacement 10 pack
C1162	Incandescent Lamp replacement 100 pack
C1163	Assorted Back-lit Colour Filter Kit

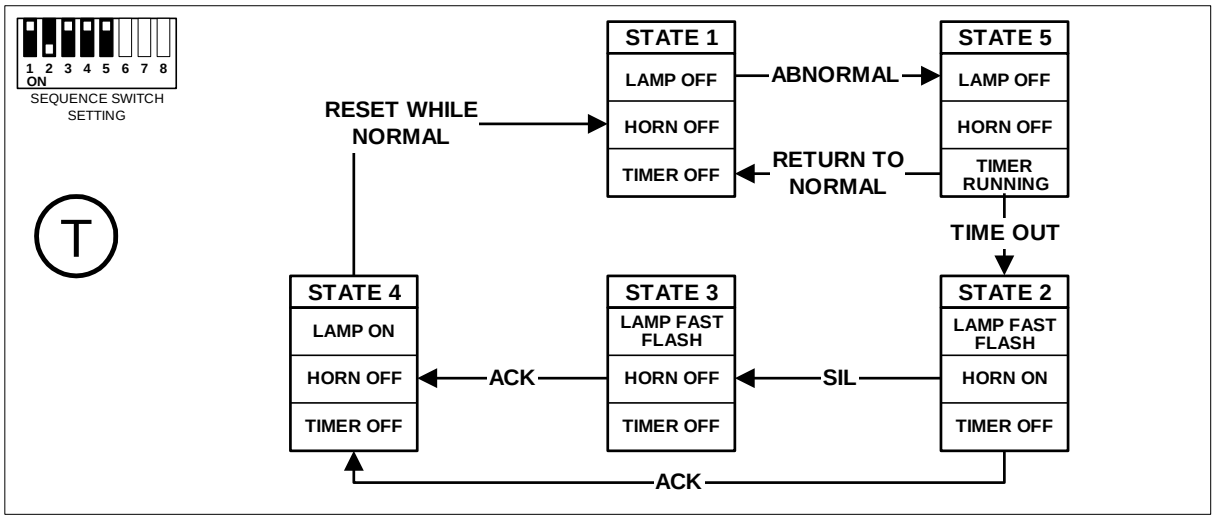
9 ALARM SEQUENCE DIAGRAMS



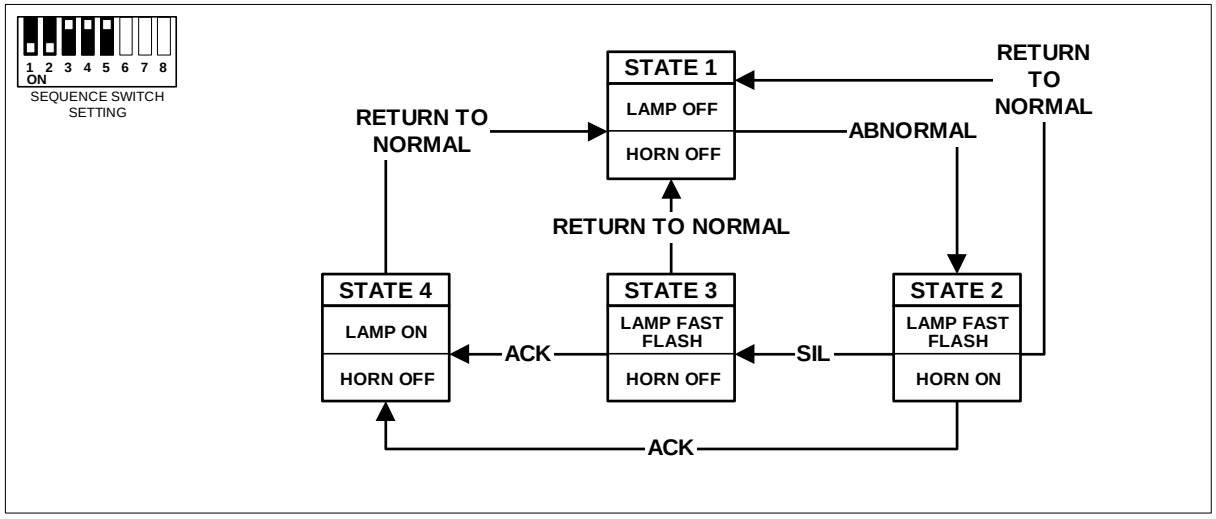
Sequence 1 - Lamp Follows Input



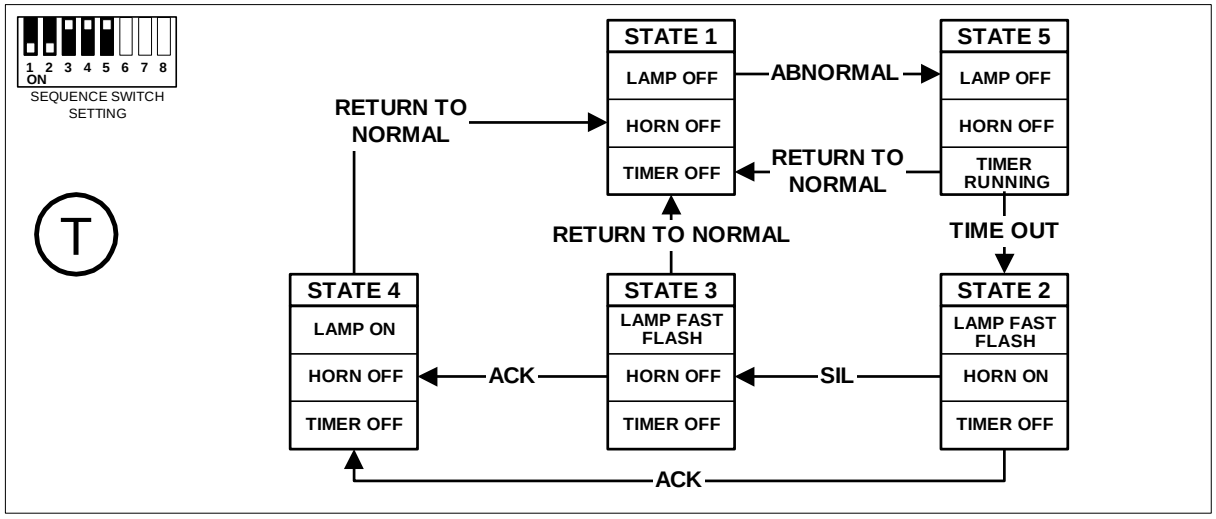
Sequence 2 - Momentary (Fleeting) Alarm, Manual Reset, Timer option off



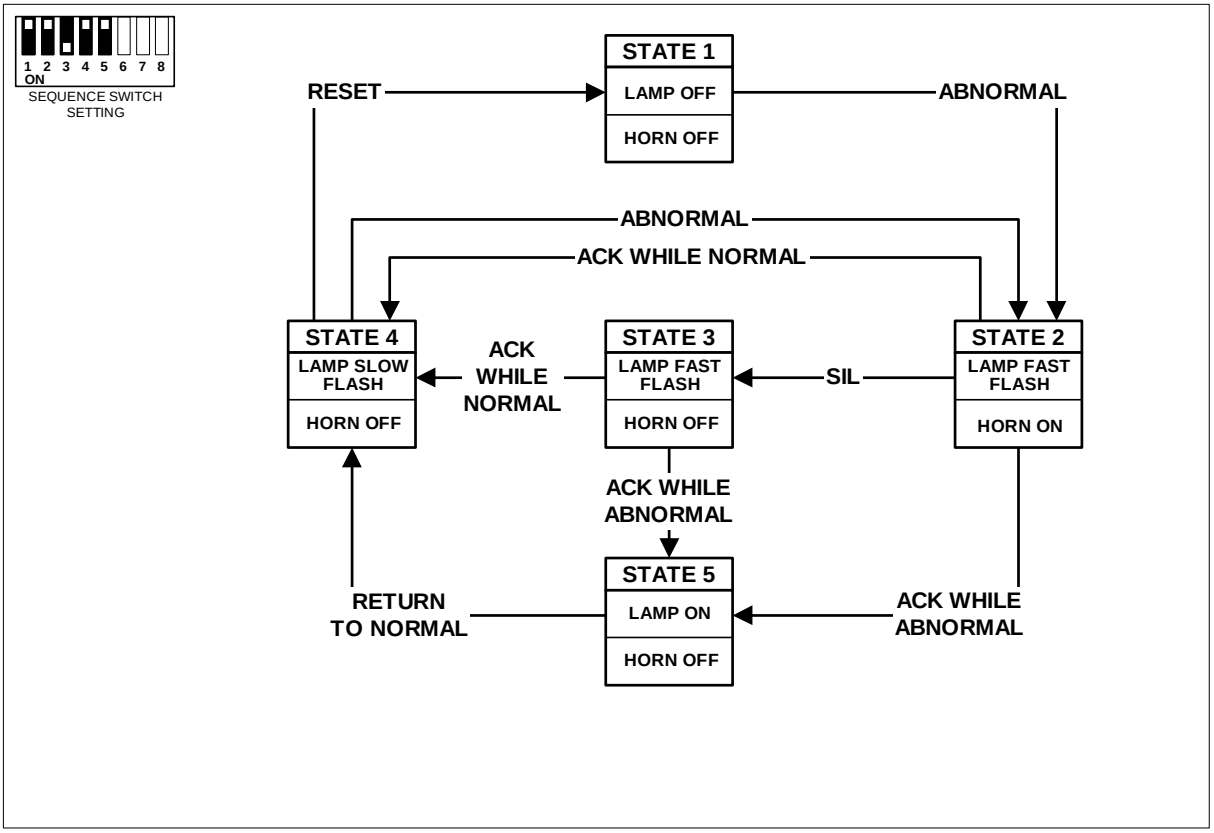
Sequence 2 - Momentary (Fleeting) Alarm Manual Reset with Time Delay on Inputs



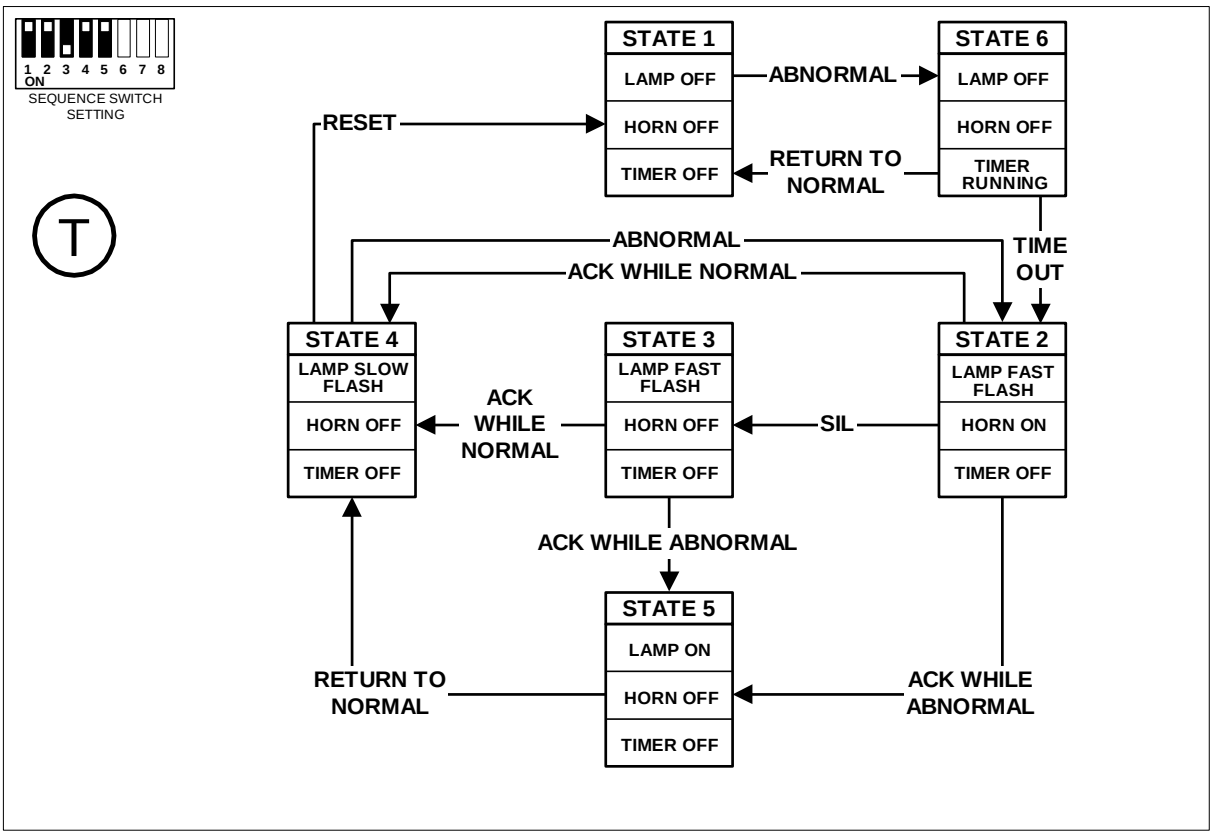
Sequence 3 - Alarm Only (No Lock-in), Auto Reset, (Timer option off)



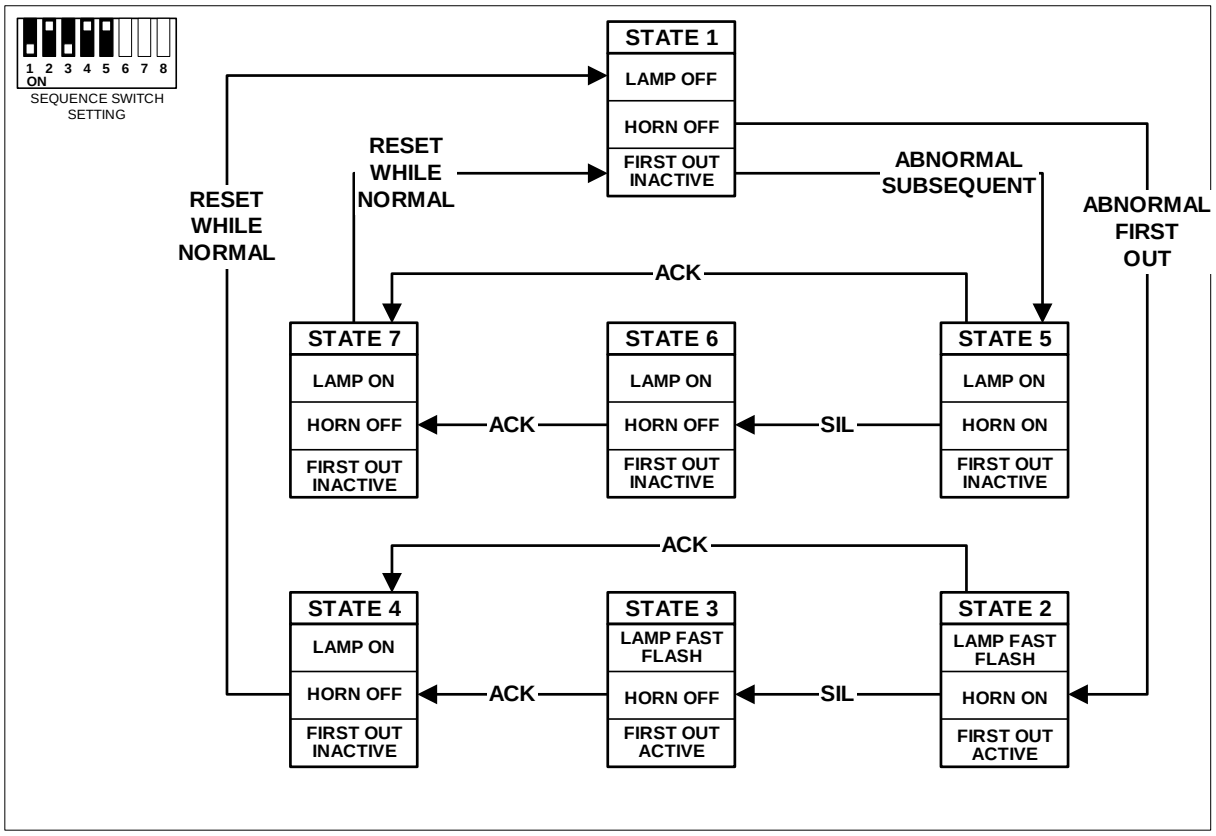
Sequence 3 - Alarm Only (No Lock-in) Auto Reset with Time Delay on Inputs



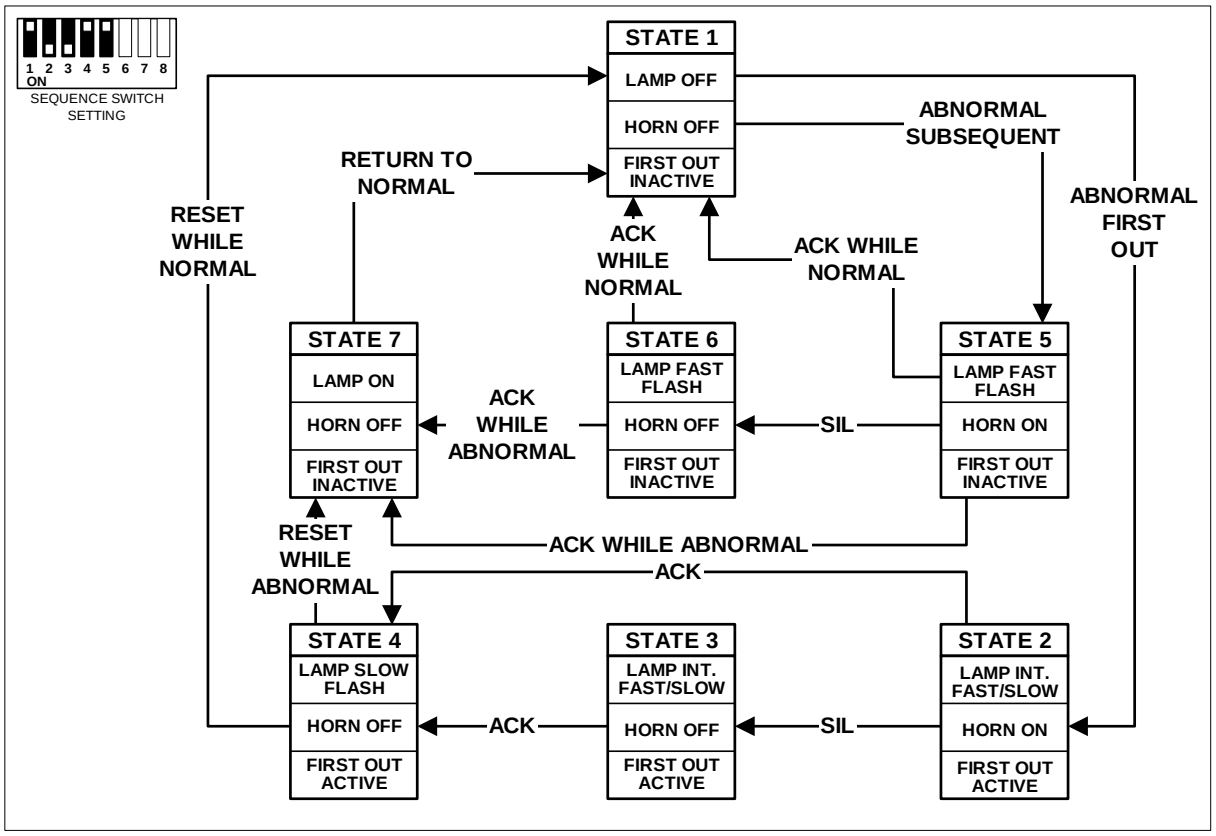
Sequence 4 - Momentary Alarm, Manual Reset, with Ringback, (Timer Option Off)



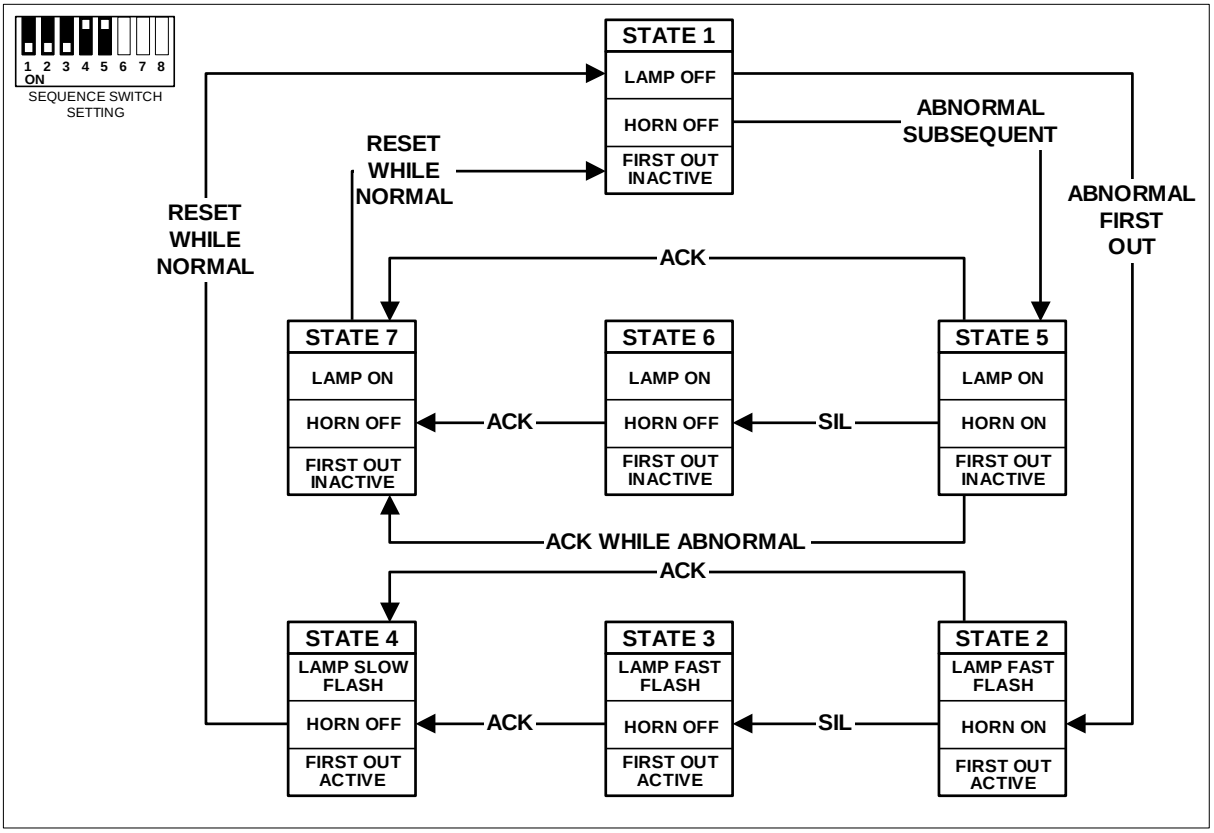
Sequence 4 - Momentary (Fleeting) Alarm, Manual Reset, with Ringback, Timer Delay on inputs.



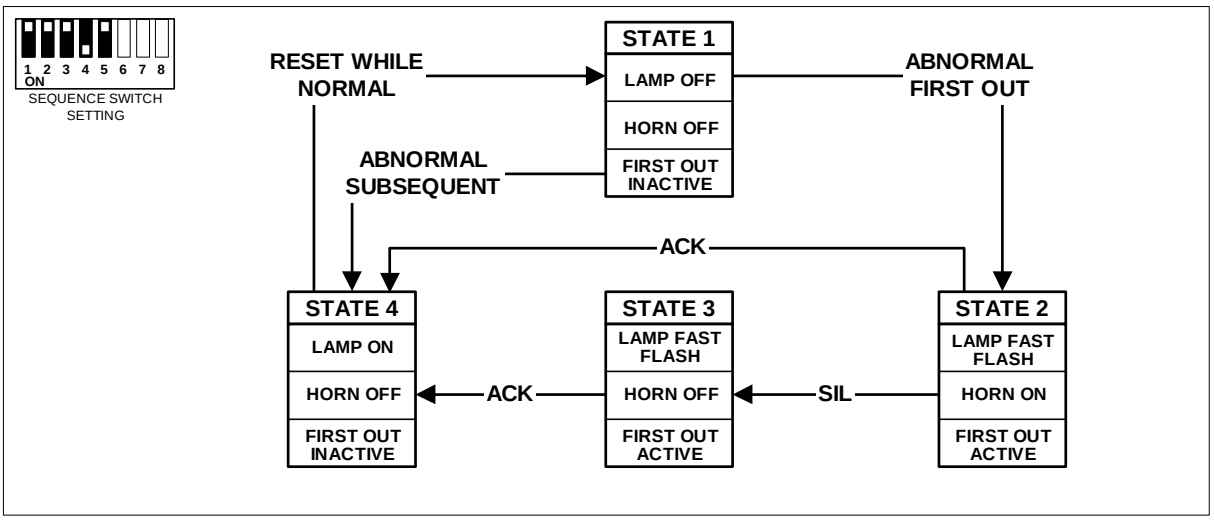
Sequence 5 - Momentary (Fleeting) Alarm, First Out Multiple Groups, Manual Reset, with Ringback.



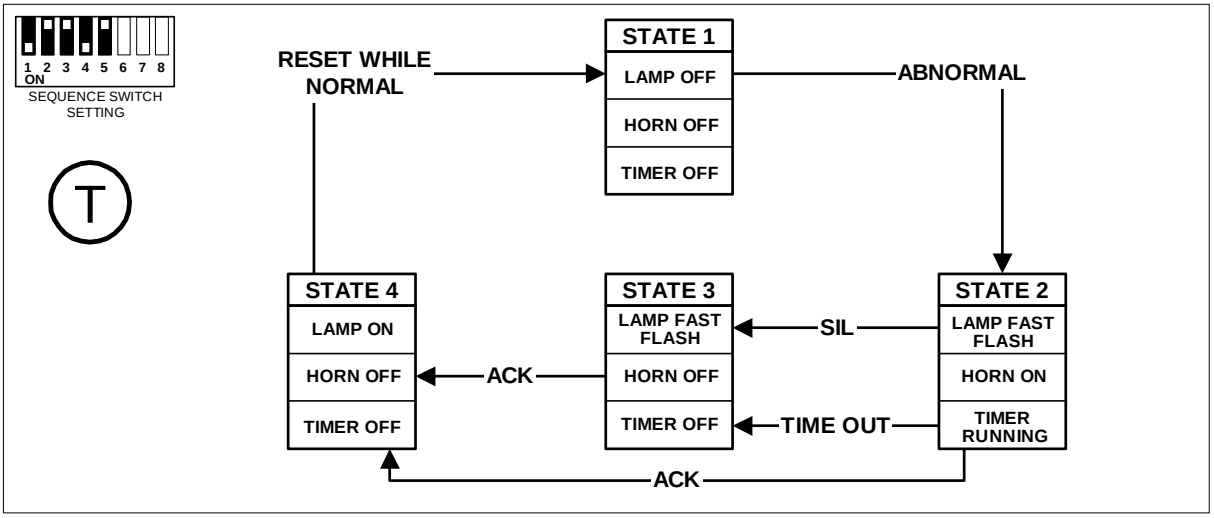
Sequence 6 - Momentary (Fleeting) Alarm, First Out Manual Reset, Auto Reset on subsequent Alarms



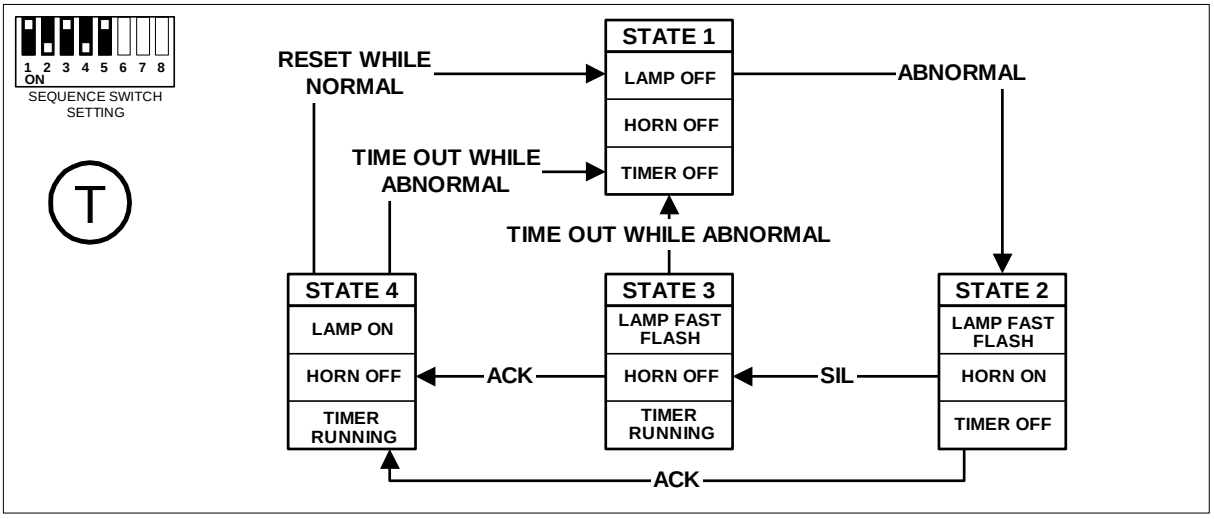
Sequence 7 - Momentary (Fleeting) Alarm, First Out Single Group, Manual Reset, First Out Continuous Flash



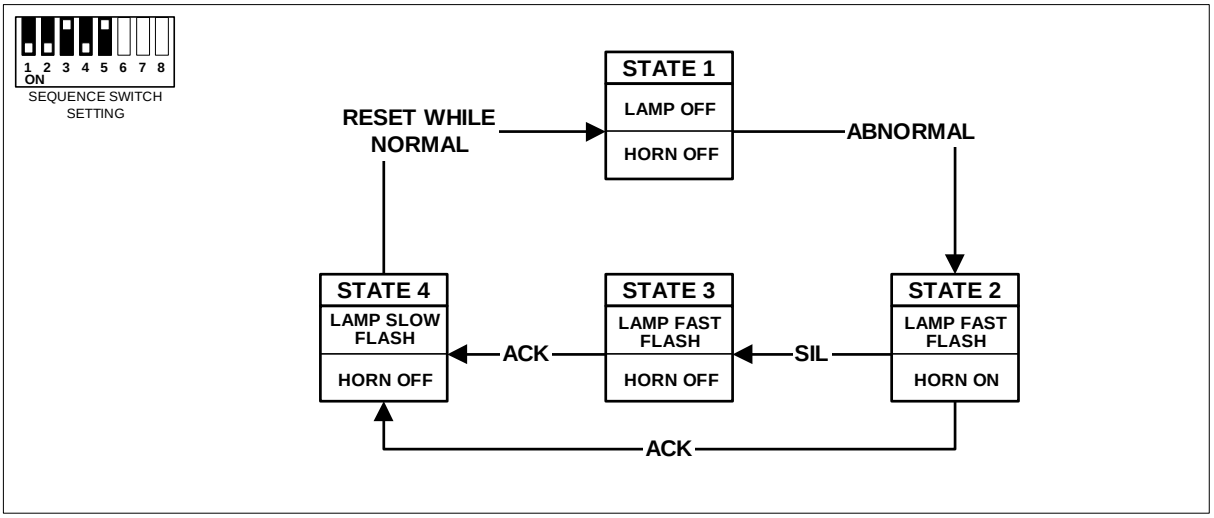
Sequence 8 - Momentary (Fleeting) Alarm; First Out Multiple Group; Manual Reset; No horn for subsequent alarms.



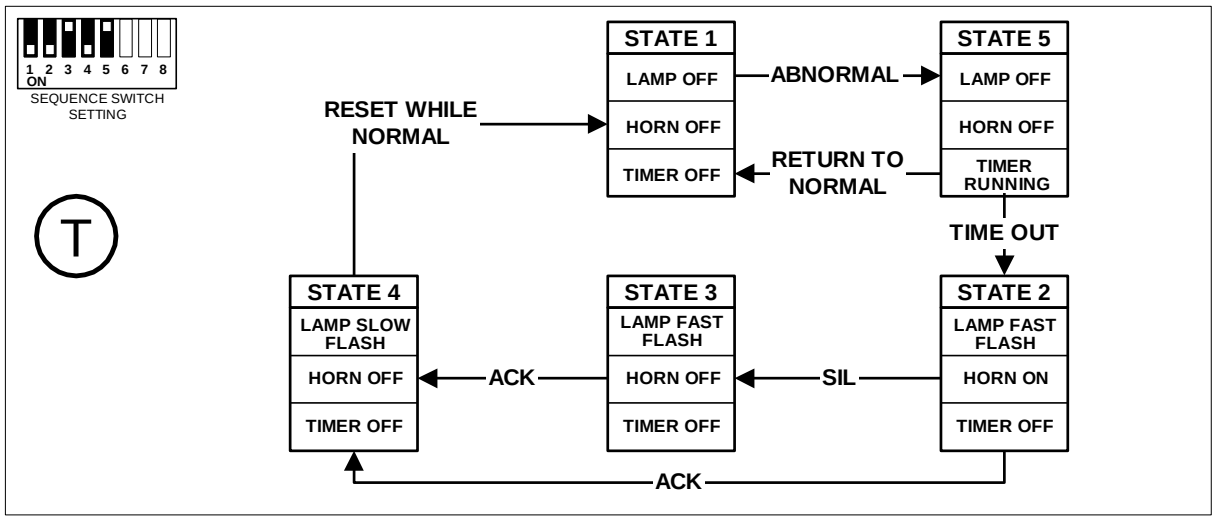
Sequence 9 - Momentary (Fleeting) Alarm; Manual Reset; Auto Silence after Time Delay.



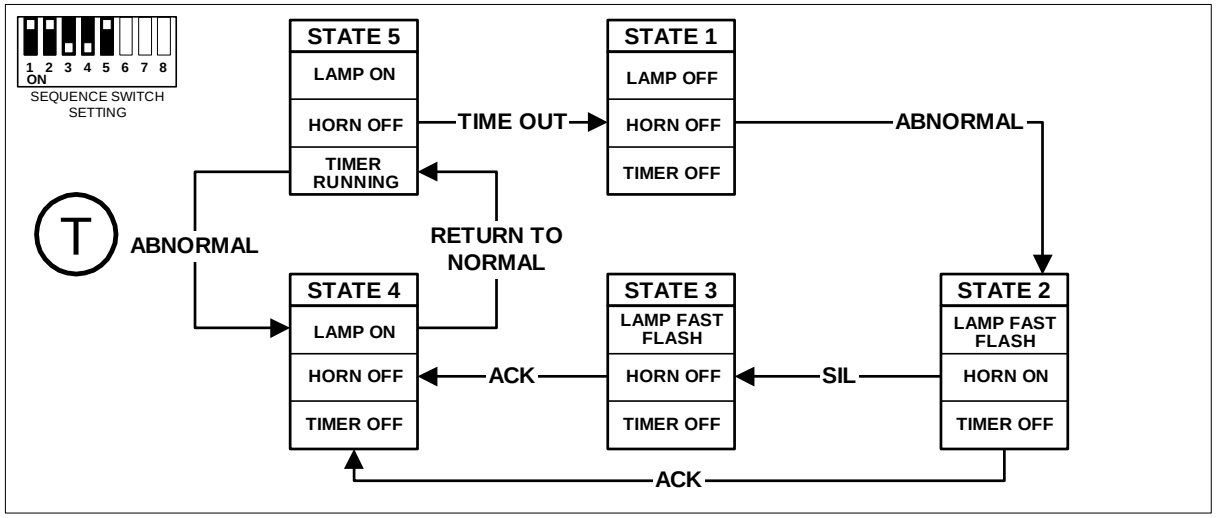
Sequence 10 - Momentary (Fleeting) Alarm; Manual Reset; Re-alarm after time-out if still abnormal.



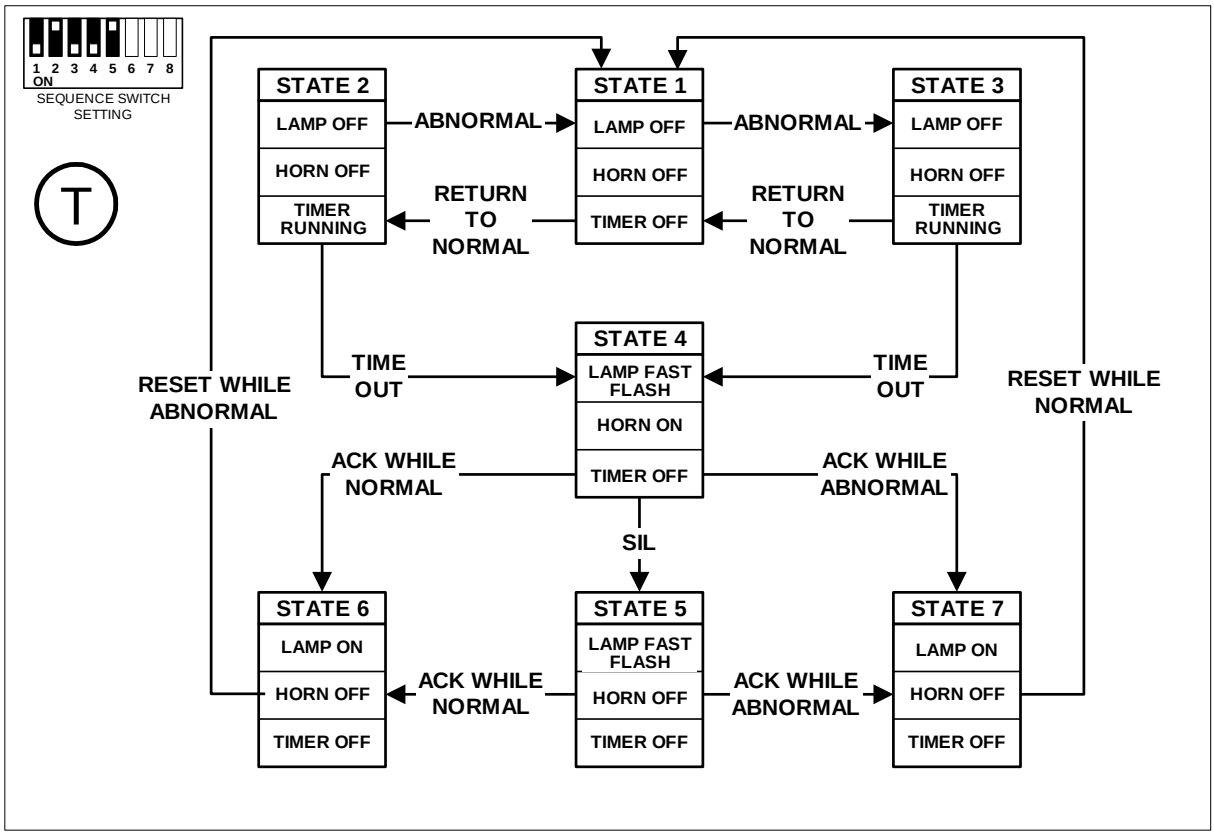
Sequence 11 - Momentary (Fleeting) Alarm, Manual Reset, for Motor Alarms (Timer option off)



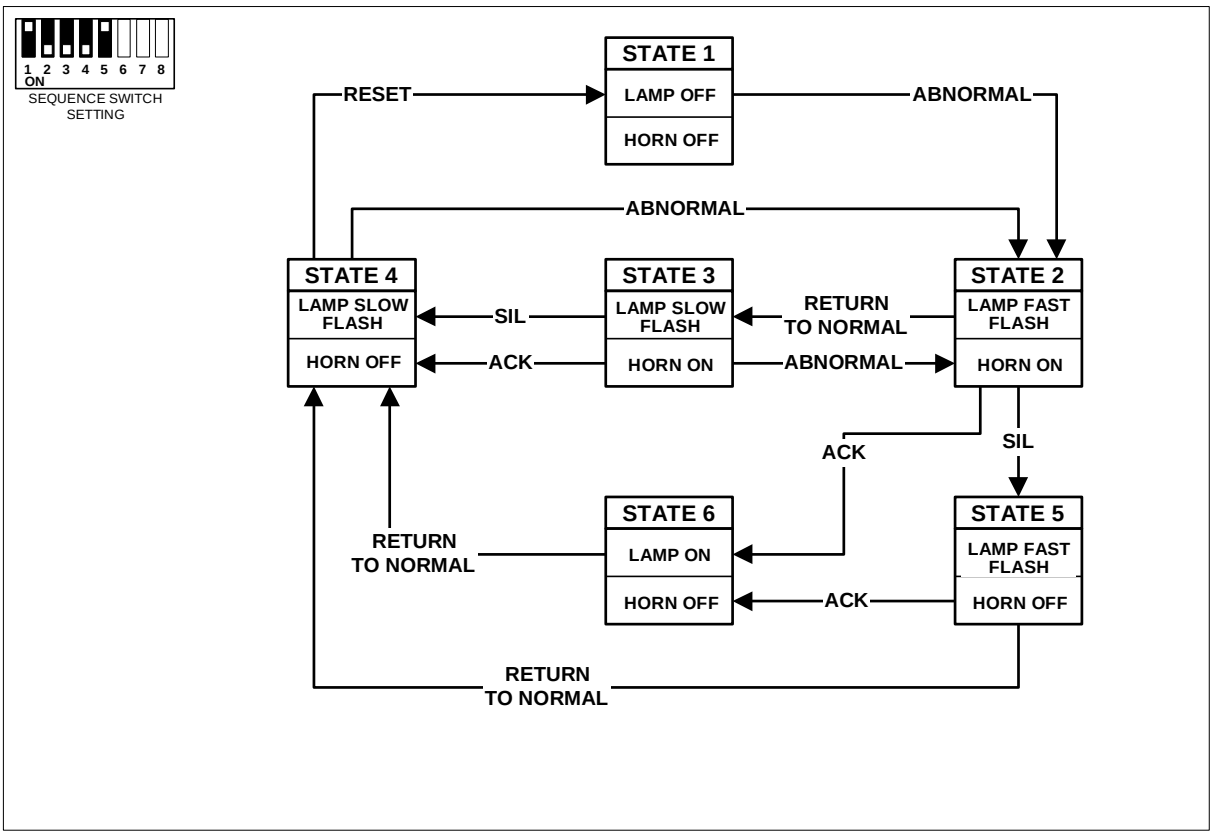
Sequence 11 - Momentary (Fleeting) Alarm; Manual Reset; for Motor Alarms; with Time Delay on Inputs



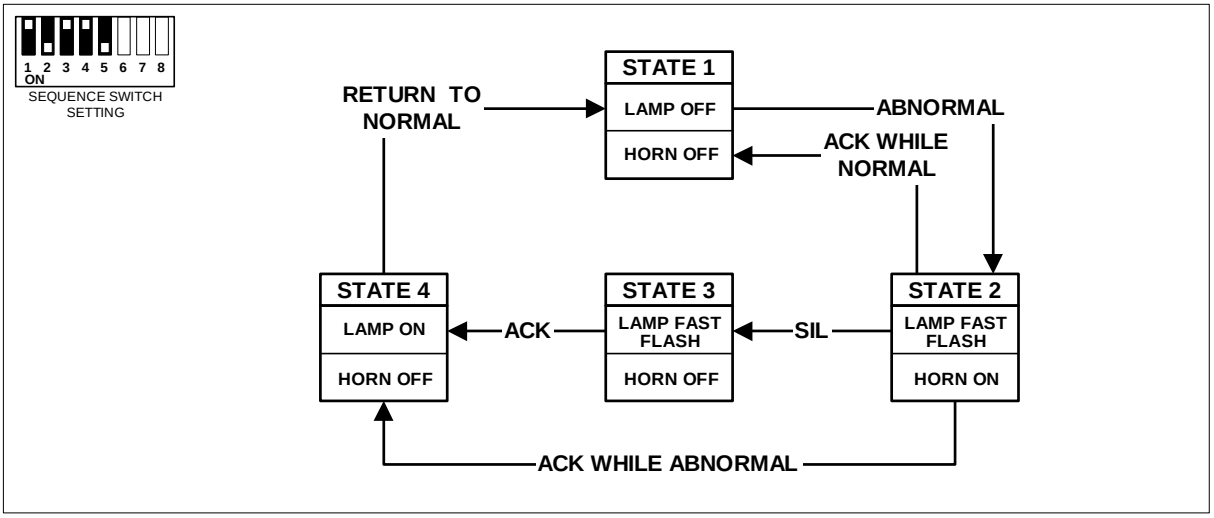
Sequence 12 - Momentary (Fleeting) Alarm; Auto Reset; with Time Delay on Return to Normal.



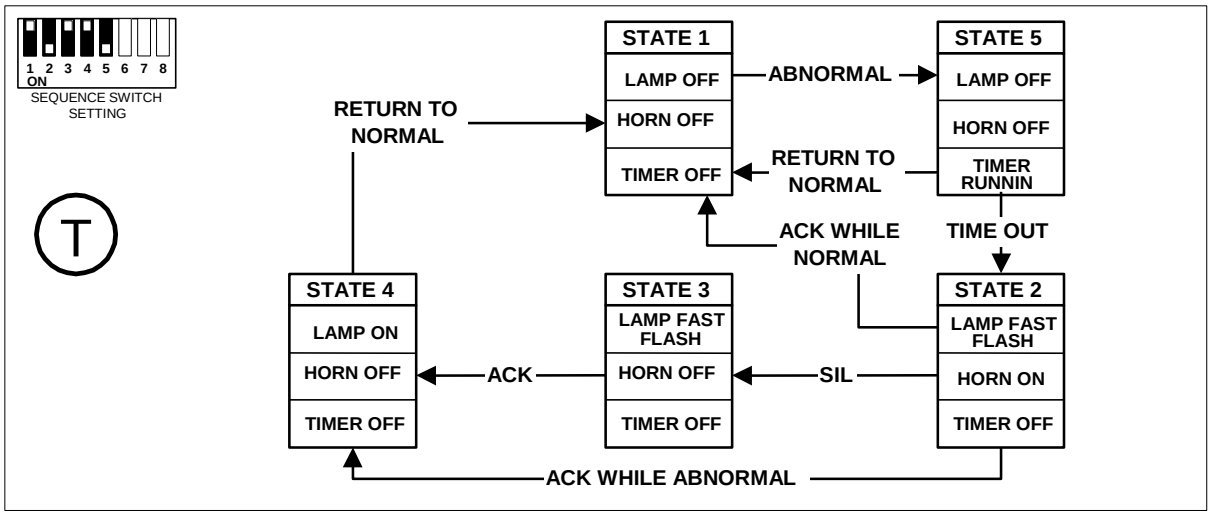
Sequence 13 - Pulse Monitoring Alarm, Manual Reset



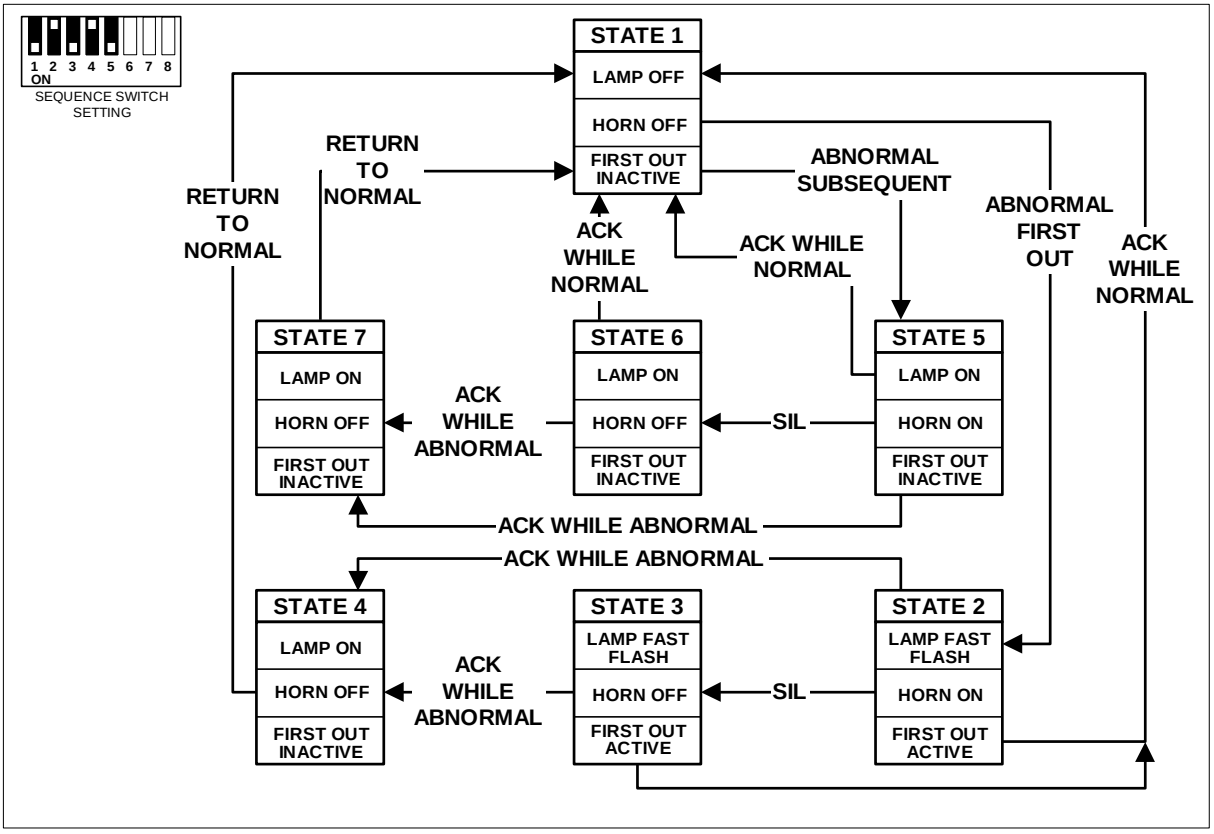
Sequence 14 - Momentary (Fleeting Alarm), Manual Reset, with Ringback.



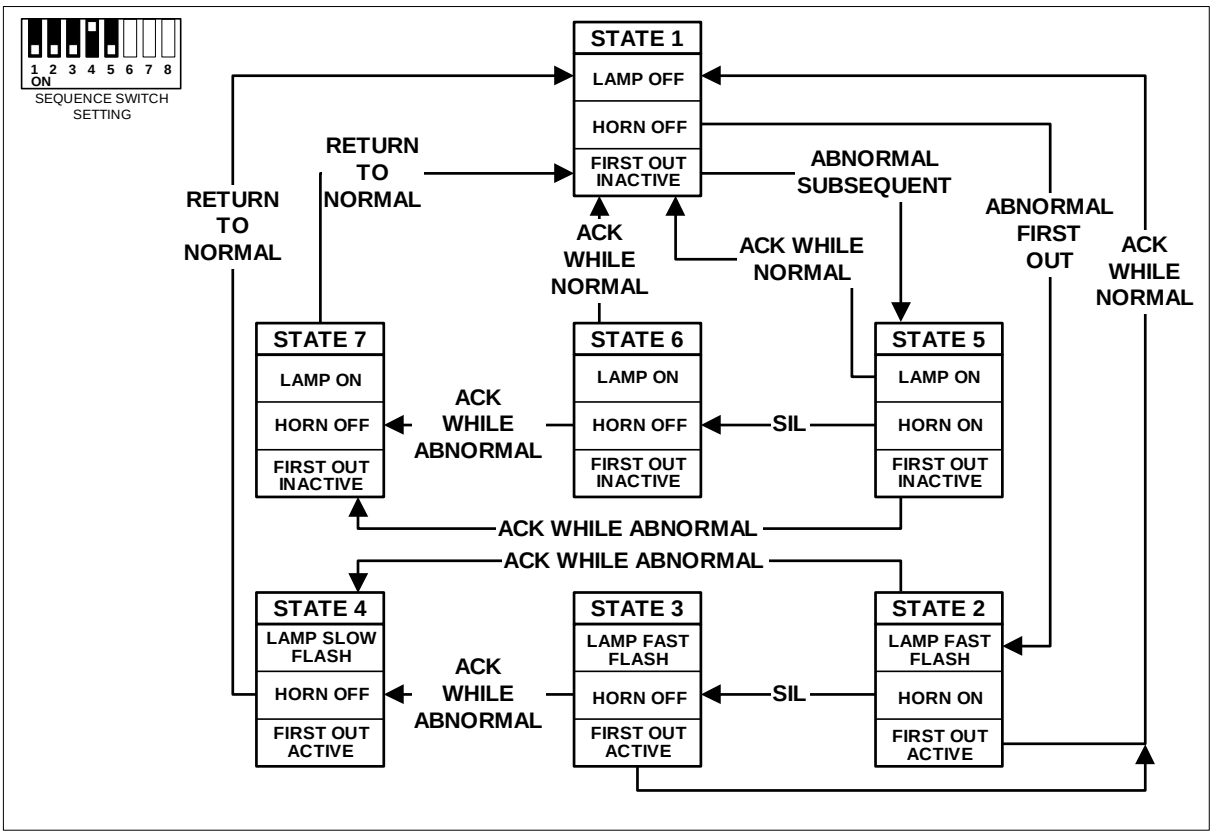
Sequence 18 - Momentary (Fleeting) Alarm, Auto Reset, (Timer option off)



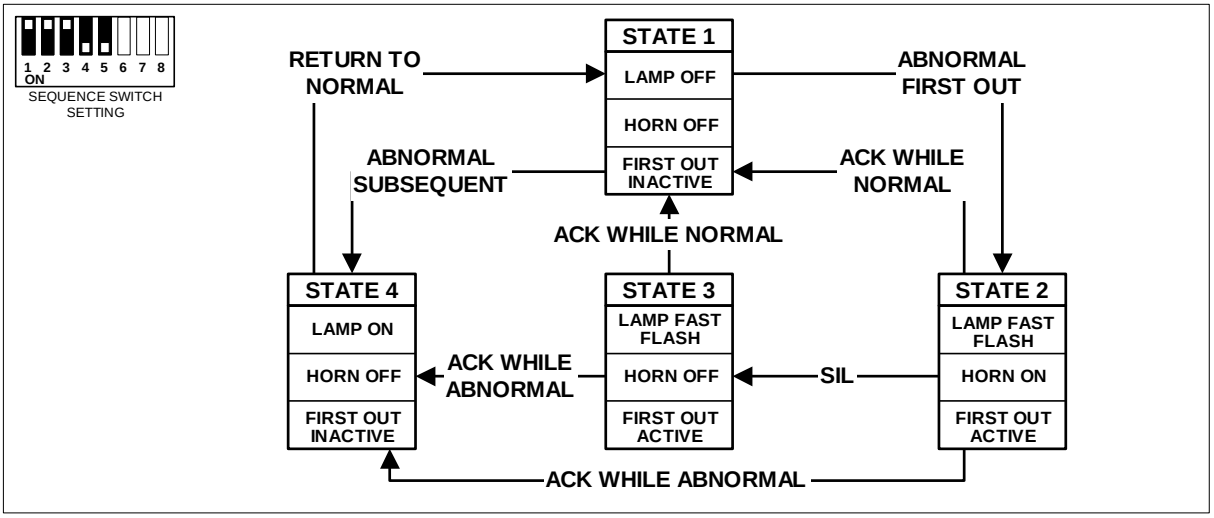
Sequence 18 - Momentary (Fleeting) Alarm; Auto Reset; with Time Delay on Inputs



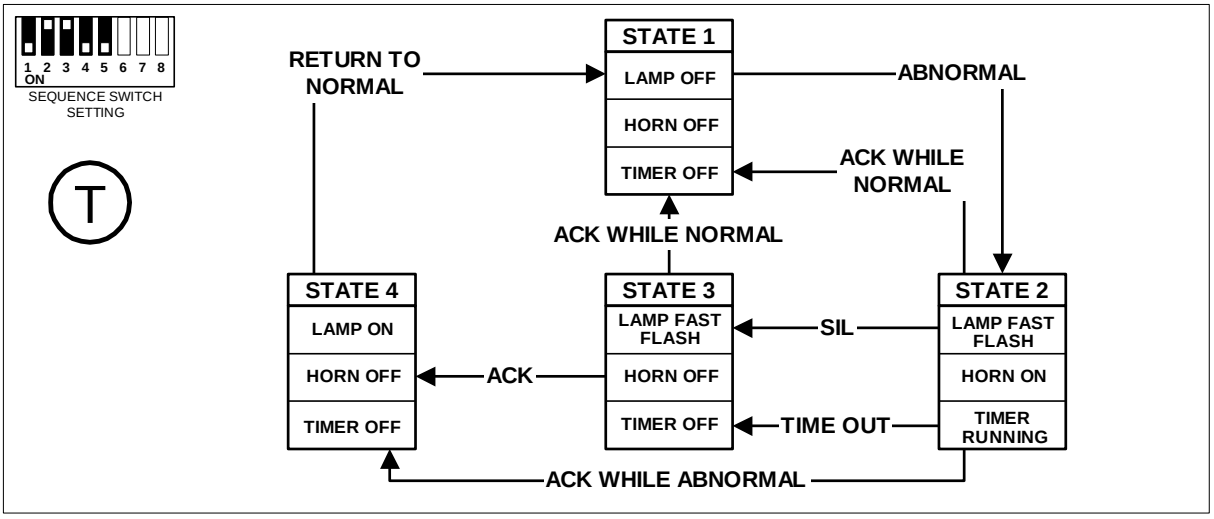
Sequence 21 - Momentary (Fleeting) Alarm, First Out Multiple Groups, Auto Reset.



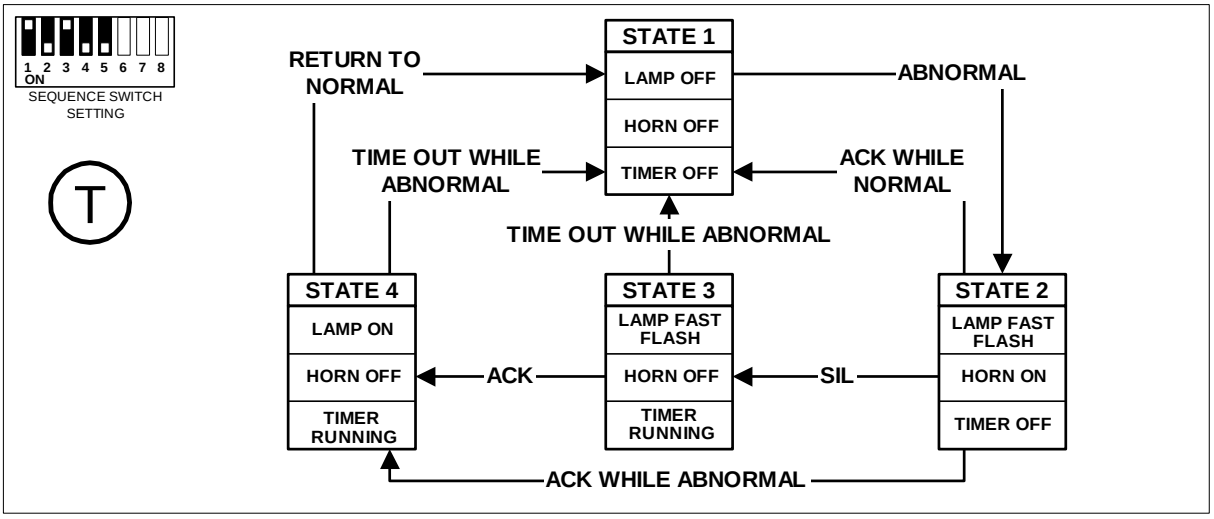
Sequence 23 - Momentary (Fleeting) Alarm, First Out Single Group, Auto Reset, First Out Continous Flash.



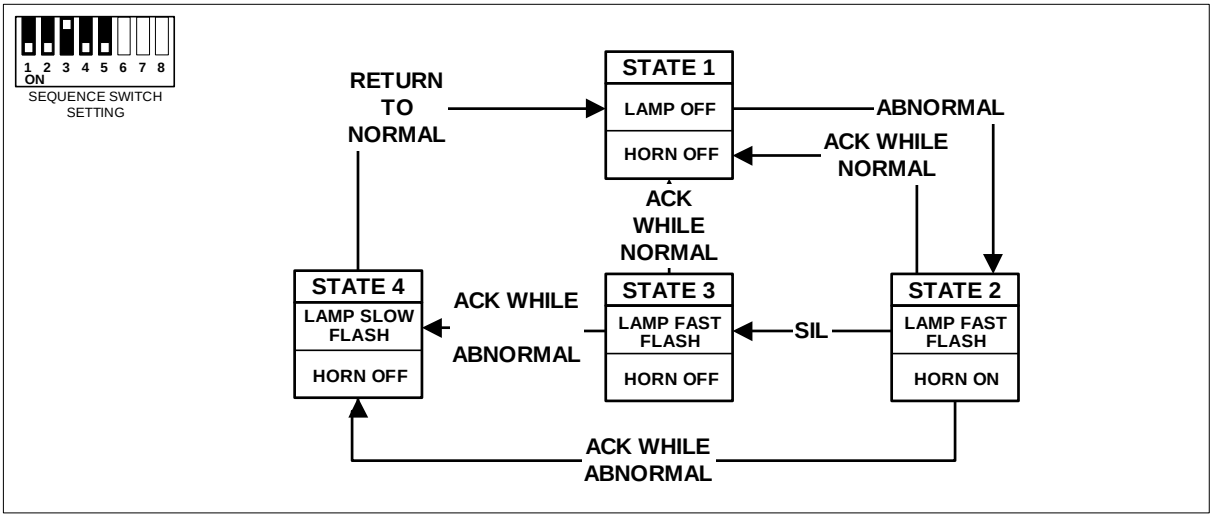
Sequence 24 - Momentary (Fleeting) Alarm; First Out Multiple Group; Auto Reset; No horn for subsequent alarms.



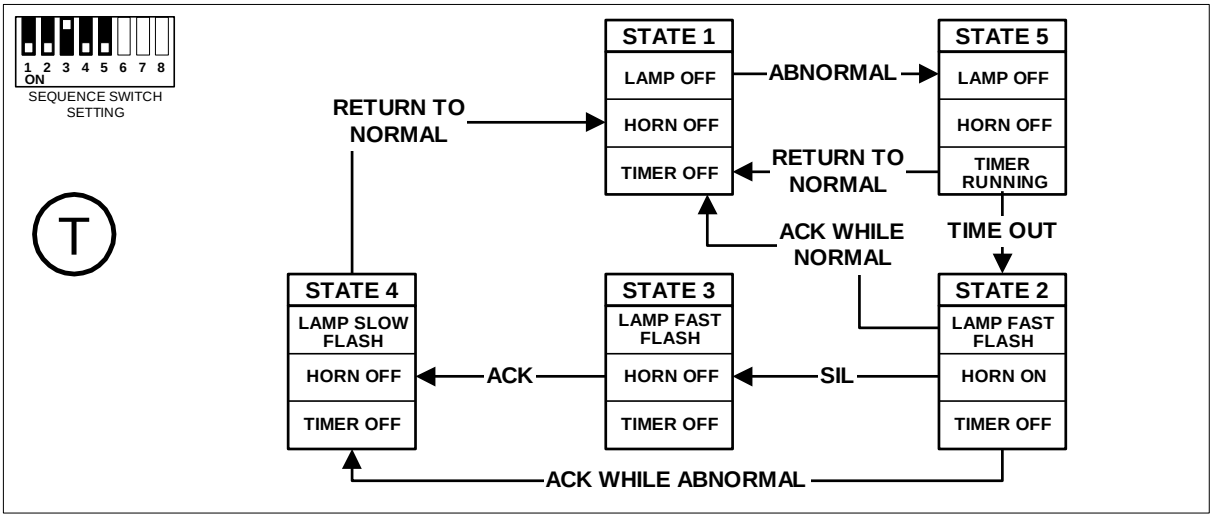
Sequence 25 - Momentary (Fleeting) Alarm; Auto Reset; Auto Silence after Time Delay.



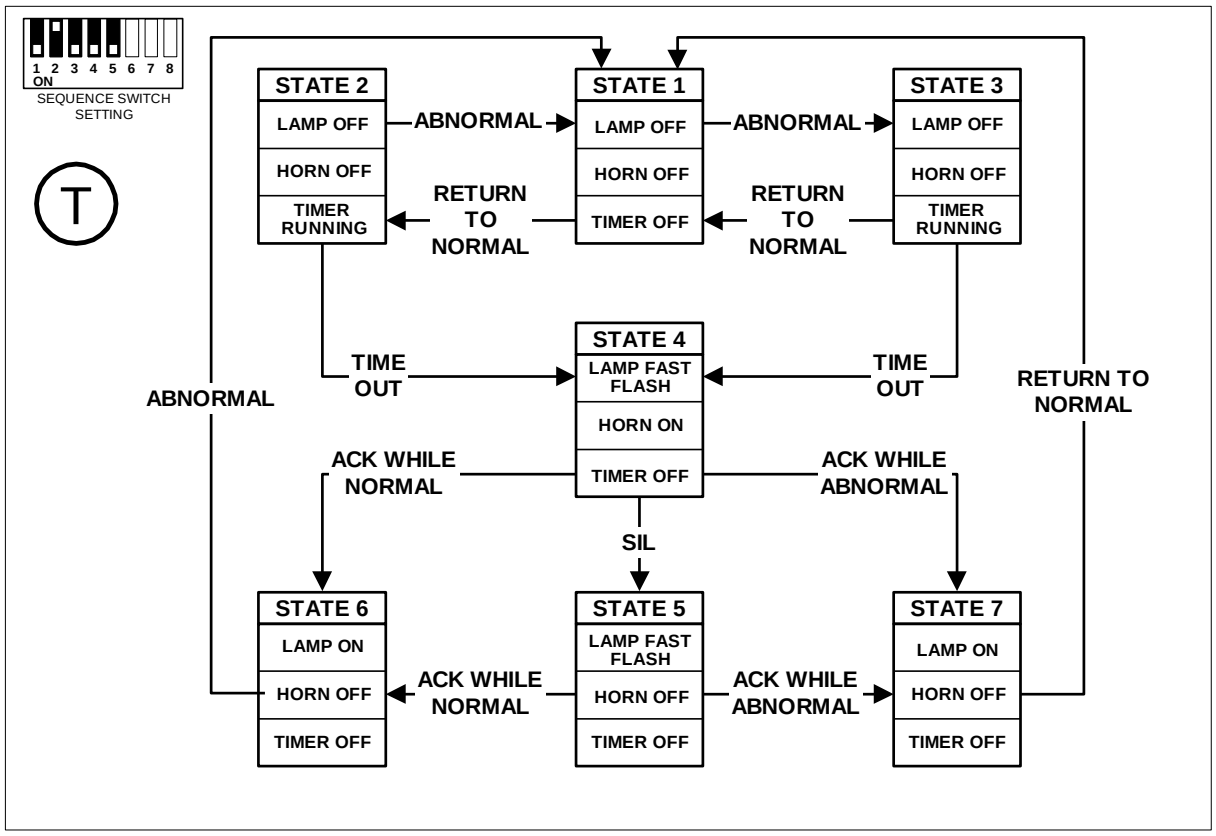
Sequence 26 - Momentary (Fleeting) Alarm; Auto Reset; Re-alarm after time-out if still abnormal.



Sequence 27 - Momentary (Fleeting) Alarm, Auto Reset, for Motor Alarms (Timer option off)



Sequence 27 - Momentary (Fleeting) Alarm; Auto Reset; for Motor Alarms; with Time Delay on Inputs



Sequence 29 - Pulse Monitoring Alarm - Auto Reset

10 MODBUS REGISTER LAYOUT

The following table provides the contents of the registers available through the programming port and the serial port using the Modbus protocol. This layout pertains to Versions of Omni16C that conform to Omni8/16C DIT Layout Version 2.00. (Omni8/16C Software Kernels V5.xx and above support this layout)

Omni8/16C supports the following Modbus functions:

- Modbus Function 1 – Read Coil Statuses
- Modbus Function 2 – Read Input Statuses
- Modbus Function 3 – Read Holding Registers
- Modbus Function 4 – Read Input Registers
- Modbus Function 5 – Write Single Coil
- Modbus Function 6 – Write Single Holding Register
- Modbus Function 16 – Write Multiple Holding Registers

Notes:

1. Maximum Number of Holding Registers to read or write: 4
2. 16 coils or input status to be read at a time, starting from positions1, 17, 33 & 49 only.

Note that the Table below refers to Modbus Holding registers without any starting offset. If a third party Modbus Master is being used to poll the Omni8/16, add the offset for that device to the register addresses below. For example, some Modbus Master devices, Holding registers start at address 40 001. Therefore to read the status of the Omni8/16C inputs, read Holding register 40101.

(Using the optional Configuration Software, this data is presented in easy-to-use pull-down menus enabling the data to be accessed without needing to know the specific register numbers):

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
1-100		0-99	PRODUCT INFORMATION	
1	N/A	0	Product Code Product Code that reflects the product range/ family. For the Omni8/16C family, the product code is 0501.	R
2	N/A	1	DIT Revision Number Version number of the DIT Layout used by the Omni8/16C Kernel. The formal is BCD with major revision number in the MSB and minor revision in the LSB.	R
3	N/A	2	Kernel Version Number Version number of the Omni8/16C Kernel. The value is stored in BCD format with major revision number in the MSB and minor revision in the LSB.	R
4	N/A	3	Supported Services Flags This register shows what network related services are supported by the Omni8/16C Kernel: Bit 0: DIT service Bit 1,2: Reserved Bit 3: Datagram Service Bits 4,5: Reserved Bit 6: Programming Service Bit 7: Presentation Layer Management Service Bits 8-15: Reserved The Omni8/16C currently supports the DIT service. The value read is 1.	R
5	N/A	4	User Tag 1 Name or Model number of the product in ASCII format, 2 characters per register.	R
6	N/A	5	User Tag 2	R

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
7	N/A	6	User Tag 3	R
8	N/A	7	User Tag 4	R
9 - 23	N/A	8 – 22	Reserved	
24	N/A	23	Alive Counter Counter incremented frequently by the Omni8/16C Kernel to indicate it is running.	R
25 – 100	N/A	24-99	Reserved	

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
101- 200		100-199	STATUS DATA	
101	1-16	100	Input Status 16 Inputs as individual bits – bit 0 (lsb) = input 1 etc. Note that any Change of State to "1" will remain latched until read by a Modbus Poll. This will ensure that any fleeting abnormal input is never missed by the Modbus Master. These status bits can also be written to the unit for serial display. When using Modbus Coil writes (Modbus Function 5) the coil mapping is as follows: Coil Number : Input Number 1 : 1 2 : 2 3 : 3 4 : 4 5 : 5 6 : 6 7 : 7 8 : 8 9 : 9 10 : 10 11 : 11 12 : 12 13 : 13 14 : 14 15 : 15 16 : 16	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
102	17-32	101	Common Service Input Status If any bit below is 1 then the input is ON. Bit 0: INH (Inhibit input) Bit 1: TST (Lamp Test input) Bit 2: ACK (Acknowledge input) Bit 3: SIL (Silence input) Bit 4: RES (Reset input) Bit 5: FS (Flash Sync input - this bit is READ ONLY) Bit 6: FO (First Out input - this bit is READ ONLY) Bits 7-15: Reserved NOTE: The SIL, ACK and RES bits are automatically reset to 0 after 3 seconds when set by the Modbus Master. All other bits must be reset by the Modbus Master. When using Modbus Coil writes (Modbus Function 5) the coil mapping is as follows: Coil Number : Control Input 17 : INH (Inhibit input) 18 : TST (Lamp Test input) 19 : ACK (Acknowledge input) 20 : SIL (Silence input) 21 : RES (Reset input) 22-32 : Reserved	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
103	N/A	102	Alarm Status 1 bit for every input where "1" means the input is in alarm and "0" means the input is in the normal condition. Bit 0 (lsb) = alarm status of input 1.	R
104	N/A	103	Common Service Output Status If any bit below is 1 then the output Relay is energised Bit 0: RL1 – Relay 1 output Bit 1: RL2 – Relay 2 output Bit 2: RL2 – Relay 3 output Bit 3: RL2 – Relay 4 output Bits 4-15: Reserved	R
105	N/A	104	Lamp Status: Lamp 2 (high byte) : Lamp 1 (low byte) The current lamp status for a given lamp can be read or written to here. Status for two lamps is provided per Modbus register, one lamp per byte. Status is as follows: 0 = OFF 8 = FAST FLASH 16 = SLOW FLASH 24 = INTERMITTENT FAST FLASH 56 = STEADY ON	R/W
106	N/A	105	Lamp Status: Lamp 4 (high byte) : Lamp 3 (low byte)	R/W
107	N/A	106	Lamp Status: Lamp 6 (high byte) : Lamp 5 (low byte)	R/W
108	N/A	107	Lamp Status: Lamp 8 (high byte) : Lamp 7 (low byte)	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
109	N/A	108	Lamp Status: Lamp 10 (high byte) : Lamp 9 (low byte)	R/W
110	N/A	109	Lamp Status: Lamp 12 (high byte) : Lamp 11 (low byte)	R/W
111	N/A	110	Lamp Status: Lamp 14 (high byte) : Lamp 13 (low byte)	R/W
112	N/A	111	Lamp Status: Lamp 16 (high byte) : Lamp 15 (low byte)	R/W
113-115	N/A	112 – 114	Reserved	
116	N/A	115	Fault Status If the unit discovers a fault it is reflected in this register. The error codes are as follows: NO fault found: 0 INPUT fault: 47 SPI fault: 63 EEPROM fault: 79	R
117-200	N/A	116 – 199	Reserved	

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
201-250		200-249	SETUP DATA	
201	N/A	200	Setup Sequence Number: Input 2 (high byte) : Input 1 (low byte) Select Sequence number from Table 5-3. DIP switches must be set to Sequence 31 on SW1 for this register to be recognised, otherwise the DIP switch setting is used. If an invalid setting is written into these registers, the relevant sequence is set to Sequence 1.	R/W
202	N/A	201	Setup Sequence Number: Input 4 (high byte) : Input 3 (low byte)	R/W
203	N/A	202	Setup Sequence Number: Input 6 (high byte) : Input 5 (low byte)	R/W
204	N/A	203	Setup Sequence Number: Input 8 (high byte) : Input 7 (low byte)	R/W
205	N/A	204	Setup Sequence Number: Input 10 (high byte) : Input 9 (low byte)	R/W
206	N/A	205	Setup Sequence Number: Input 12 (high byte) : Input 11 (low byte)	R/W
207	N/A	206	Setup Sequence Number: Input 14 (high byte) : Input 13 (low byte)	R/W
208	N/A	207	Setup Sequence Number: Input 16 (high byte) : Input 15 (low byte)	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
209	N/A	208	Setup Timer Setting: Input 2 (high byte) : Input 1 (low byte) Input delay timer set per input. One input per byte. The data format for an input is as follows: Most significant bit: 1 = Use the slow timer, 0 = Use the fast timer (1/10 s) Least significant 7 bits: time delay in multiples The fast timer counts time in units of tenths of a second (i.e. 1/10 s). The slow timer counts in multiples of the fast timer and is programmable. Refer to DIT 135 to configure it. The default setting is 10 which makes is a seconds counter. Fast timer example: To delay Input 1 by 20 seconds, enter 200 (or C8 hex) Slow timer example: If DIT 135 is set to 10 then to delay Input 1 by 20 seconds, enter 148 (94hex) Set to 255 to use timer setting set by SW2.	R/W
210	N/A	209	Setup Timer Setting: Input 4 (high byte) : Input 3 (low byte)	R/W
211	N/A	210	Setup Timer Setting: Input 6 (high byte) : Input 5 (low byte)	R/W
212	N/A	211	Setup Timer Setting: Input 8 (high byte) : Input 7 (low byte)	R/W
213	N/A	212	Setup Timer Setting: Input 10 (high byte) : Input 9 (low byte)	R/W
214	N/A	213	Setup Timer Setting: Input 12 (high byte) : Input 11 (low byte)	R/W
215	N/A	214	Setup Timer Setting: Input 14 (high byte) : Input 13 (low byte)	R/W
216	N/A	215	Setup Timer Setting: Input 16 (high byte) : Input 15 (low byte)	R/W
217-228	N/A	216-227	Reserved	

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
229	N/A	228	Setup Lamp Sense 65535 = All Lamps Normal Sense. 0 = All Lamps Reversed Sense. **Note:** This setting only applies when SW1-8 is ON.	R/W
230	N/A	229	First Out Group Split Enter a number between 1 and 16 to decide the split between First Out Group 1 and 2. For example: A value of **4** will arrange input 1 to 4 into First Out Group 1 and inputs 5 to 16 into First Out Group 2.	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
231	N/A	230	Setup System Operation Bit 0: Pushbutton Edge/#Level: 1 – Edge, 0 – Level Bit 1: Auto ACK on Startup: 1 – NO Auto ACK on Startup, 0 - Auto ACK on Startup Bit 2: Inhibit Input operation: 1 – Close to Inhibit, 0 – Open to Inhibit **Note:** This setting only applies when SW1-8 is ON. Bit 3-5: Repeat Output operation: The bit map is as follows: Bit 5:4:3: 1:1:1 – Repeat Relay Follows Input, Normally Open Bit 5:4:3: 1:0:1 – Repeat Relay Follows Input, Normally Closed (default) Bit 5:4:3: 1:1:0 – Repeat Relay Follows Alarm, Normally Open Bit 5:4:3: 1:0:0 – Repeat Relay Follows Alarm, Normally Closed Bit 5:4:3: 0:0:0 – Repeat Relay Acts as GA Bit 6-15: Reserved	R/W
232	N/A	231	Setup Slow Timer The slow timer counts in multiples of the fast timer. This is configurable to allow the most flexible use of timers. Some examples are given below: To count in seconds: set to 10 To count in 10s of seconds: set to 100 To count in 20s of seconds: set to 200	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
233	N/A	232	Setup Common Relay Operation: Common Relay 1 (high byte) : Common Relay 2 (low byte) Configure the operation of the four common fitted to the Common Services Card, labelled RL1, RL2, RL3 and RL4. These relays can be configured for Horn operation or a selection of GA (Group Alarm) operations as follows: ▪ Relay Follows Input: ▪ Relay Follows Alarm ▪ Relay acts as ring-back horn ▪ Relay acts as Multiple Reflash ▪ Relay Follows ACK pushbutton NOTE: Relay 1 can also be configured for watchdog operation.	R/W
234	N/A	233	Setup Common Relay Operation: Common Relay 3 (high byte) : Common Relay 4 (low byte)	R/W
235-236	N/A	234-235	Reserved	R/W
237	N/A	236	Setup Repeat Relay GA Operation: Repeat Relay 1 (high byte) : Repeat Relay 2 (low byte) Configure the operation of the repeat relays fitted to the Repeat Relay cards when they have been configured for "Acts as GA" operation in the Setup System Operation group. In this case the relays can be configured for Horn operation or a selection of GA (Group Alarm) operations as follows: ▪ Relay Follows Input ▪ Relay Follows Alarm ▪ Relay acts as ring-back horn ▪ Relay acts as Multiple Reflash ▪ Relay Follows ACKnowledge pushbutton	
238	N/A	237	Setup Repeat Relay GA Operation: Repeat Relay 3 (high byte) : Repeat Relay 4 (low byte)	R/W
239	N/A	238	Setup Repeat Relay GA Operation: Repeat Relay 5 (high byte) : Repeat Relay 6 (low byte)	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
240	N/A	239	Setup Repeat Relay GA Operation: Repeat Relay 7 (high byte) : Repeat Relay 8 (low byte)	R/W
241	N/A	240	Setup Repeat Relay GA Operation: Repeat Relay 9 (high byte) : Repeat Relay 10 (low byte)	R/W
242	N/A	241	Setup Repeat Relay GA Operation: Repeat Relay 11 (high byte) : Repeat Relay 12 (low byte)	R/W
243	N/A	242	Setup Repeat Relay GA Operation: Repeat Relay 13 (high byte) : Repeat Relay 14 (low byte)	R/W
244	N/A	243	Setup Repeat Relay GA Operation: Repeat Relay 15 (high byte) : Repeat Relay 16 (low byte)	R/W
245	N/A	244	Setup Common Relay Input Members: Relay 1 Configures the group of inputs that the relay will respond to. Inputs are individually mapped to any relay. Mapping is setup in binary format where Input 1 is the least significant bit. For example: to map inputs 1 to 6 to Common Relay 1, set the corresponding binary value: "0000000000111111" for DIT register 244.	R/W
246	N/A	245	Setup Common Relay Input Members: Relay 2	R/W
247	N/A	246	Setup Common Relay Input Members: Relay 3	R/W
248	N/A	247	Setup Common Relay Input Members: Relay 4	R/W
249	N/A	248	Setup Repeat Relay Input Members: Repeat Relay 1 Configures the group of inputs that the repeat relay will respond to. Inputs are individually mapped to any relay. Mapping is setup in binary format where Input 1 is the least significant bit. For example: to map inputs 1 to 6 to Repeat Relay 1, set the corresponding binary value: "0000000000111111" for DIT register 248. NOTE: the function will only apply if the Repeat Relays have been setup to “Act as GA” in the System Operation setup.	R/W
250	N/A	249	Setup Repeat Relay Input Members: Repeat Relay 2	R/W
251	N/A	250	Setup Repeat Relay Input Members: Repeat Relay 3	R/W
252	N/A	251	Setup Repeat Relay Input Members: Repeat Relay 4	R/W

Holding / Input Reg.	*Coil / Input Status*	*DIT No.*	*Description*	Read/ Write
253	N/A	252	Setup Repeat Relay Input Members: Repeat Relay 5	R/W
254	N/A	253	Setup Repeat Relay Input Members: Repeat Relay 6	R/W
255	N/A	254	Setup Repeat Relay Input Members: Repeat Relay 7	R/W
256	N/A	255	Setup Repeat Relay Input Members: Repeat Relay 8	R/W
257	N/A	256	Setup Repeat Relay Input Members: Repeat Relay 9	R/W
258	N/A	257	Setup Repeat Relay Input Members: Repeat Relay 10	R/W
259	N/A	258	Setup Repeat Relay Input Members: Repeat Relay 11	R/W
260	N/A	259	Setup Repeat Relay Input Members: Repeat Relay 12	R/W
261	N/A	260	Setup Repeat Relay Input Members: Repeat Relay 13	R/W
262	N/A	261	Setup Repeat Relay Input Members: Repeat Relay 14	R/W
263	N/A	262	Setup Repeat Relay Input Members: Repeat Relay 15	R/W
264	N/A	263	Setup Repeat Relay Input Members: Repeat Relay 16	R/W
265	N/A	264	Setup Modbus Extended Slave Address When the Modbus address switch is set to 15, then the alarm annunciators will use the setting in this register to determine its Modbus Slave Address. Bits 0-7: Modbus Extended Slave Address: Can be in the range 1-255 Bit 8-15: Reserved. Set to zero when writing to this register.	

