

# USER'S MANUAL



Omni2 Series Annunciators

DATE	REVISION	COMMENTS
May 2016	1	Initial issue
Dec 2016	2	Model updated to C1190B and C1191B. Wiring and proof test details added
Dec 2016	3	Correction to door siren connection details and beacon wiring colours for C1191B and updated C1190B photo
Feb 2017	4	Updated Reliability Data and replaced photo of C1190B (photo was A version); added Table of Figures and Table of Tables
Apr 2017	5	Note 2 modified to include that terminals 10 and 15 are linked in Table 3-1
Dec 2017	6	FMEDA Reference included in Functional Parameters
Feb 2018	7	RoHS Compliance and 24Vdc option added; updated ordering options and for Omni2s
Feb 2018	8	Added 24V Terminal Layouts, battery specifications and terminal numbers, corrected terminal layout for Omni2S, standardised naming conventions including 85-264Vac and ordering options for Dual Channel Omni2
Sep 2018	9	Comment added that a battery is not included in DC Versions and added wiring entry details
Oct 2018	10	Naming conventions inconsistent
May 2022	11	Updated application recommendations

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## SCOPE

This Operation and Maintenance Manual provides information necessary to install, configure and operate your Omni2 product.

This manual covers the following product Model Numbers:

Model	Description	Picture*
<b>Wall-mounted Door Warning Signs</b>		
C1190B	Omni2 Standard 85-264Vac Single Channel Alarm Annunciator	Figure 1-1
C1190B-X-X-X-1	Omni2 Dual Channel Alarm Annunciator with custom windows & PSU	
<b>Wall-mounted Slave Alarm Units</b>		
C1191B	Omni2S Standard 85-264Vac Slave Alarm Unit	Figure 1-2
C1191B-X	Omni2S Slave Alarm Unit with custom Power Supply Unit	

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

## Introduction

The OMNIFLEX Omni2 family are wall-mount alarm annunciators, designed to act as Door Warning Signs (DWS) to prevent personnel from entering hazardous or contaminated areas. Similar functionality is offered for Omni2S Slave Alarm Unit.

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 and redundant circuits create a product suitable for use in IEC61508 SIL2 applications.

All products in the range are available “off-the-shelf” with no factory customisation required. Because these units are standard, spares holding, and maintenance are significantly enhanced.

Display legends for the C1190B-1-X-X-X and C1190B-X-1-X-X are created to order and supplied with the product.

Omni2 is an ac-powered (optional dc-powered) unit with battery backup. The products are designed to be mounted directly on the wall with straightforward interface to alarm inputs and repeat outputs.

The manual covers products listed on page 3. See section 6 for details of available options.



*Figure 1-1: The Omni2 Door Warning Sign.*



***Figure 1-2: The Omni2S Slave Alarm Unit.***

# Table of Contents

1.	General Description	8
1.1	Standard Features of C1190B Omni2 DWS and C1191B Omni2S SAU .....	8
1.2	Omni2 Door Warning Sign showing terminations. ....	8
1.3	Omni2S Slave Alarm Unit showing terminations.....	9
1.4	Omni2S Slave Alarm Unit termination differences. ....	10
2.	Mechanical Installation	11
2.1	Mounting.....	11
3.	Electrical Installation	13
3.1	Introduction.....	13
3.2	Omni2 Block Diagram.....	14
3.3	Omni2S Block Diagram .....	15
3.4	Omni2 Terminal Schedule .....	16
3.5	Omni2S Terminal Schedule.....	17
3.6	Fixed wiring identification. ....	18
3.7	Alarm Beacon connections on Omni2S .....	18
3.8	Power connections. ....	19
3.9	Storage.....	19
3.10	Connecting alarm inputs. ....	20
3.11	Connecting Alarm Repeat Relay Contacts. ....	20
3.12	Connecting FAIL Relay Contacts.....	21
3.13	Connecting Remote Reset .....	21
4.	Configuring Omni2s For Operation	22
4.1	Introduction.....	22
4.2	Sounder alarm tones of door sounder (Omni2S only).....	23
4.3	Power-up .....	23
4.4	Normal Operation .....	24
4.5	Test Functions.....	24
4.5.1	Overview of the Test Functions.....	24
4.5.2	Pressing the Test Button .....	24
4.5.3	Fault Indication on Circuit Test.....	24
4.5.4	Pressing the FAIL button.....	24
5.	Functional Safety Manual	26
5.1	Function specification. ....	26
5.2	Hardware configuration. ....	26
5.3	Changing configuration:.....	27
5.4	Installation requirements. ....	27
5.5	Functional Safety Parameters. ....	27

5.6	Diagnostics.....	29
5.7	Proof Test.....	30
5.8	Prevention of systematic failures .....	31
6.	Specifications .....	32

## Table of Figures

Figure 1-1: The Omni2 Door Warning Sign. ....	4
Figure 1-2: The Omni2S Slave Alarm Unit. ....	5
Figure 1-1: Panel Mount 85-264Vac Omni2 Front View showing terminations. ....	8
Figure 1-2: Panel Mount 24Vdc Omni2 Front View showing terminations. ....	9
Figure 1-3: Panel Mount 85-264Vac Omni2S Front View showing terminations.....	9
Figure 1-4: Panel Mount 24Vdc Omni2S Front View showing terminations.....	10
Figure 2-1: Mechanical Outline of the Omni2 .....	11
Figure 2-2: Mechanical Outline of the Omni2S .....	12
Figure 3-1: Omni2 Block Diagram showing Terminal Numbers .....	14
Figure 3-2: Omni2S Block Diagram showing Terminal Numbers.....	15
Figure 3-3: Input Connection Diagram using individually wired potential free contacts.....	20

## Table of Tables

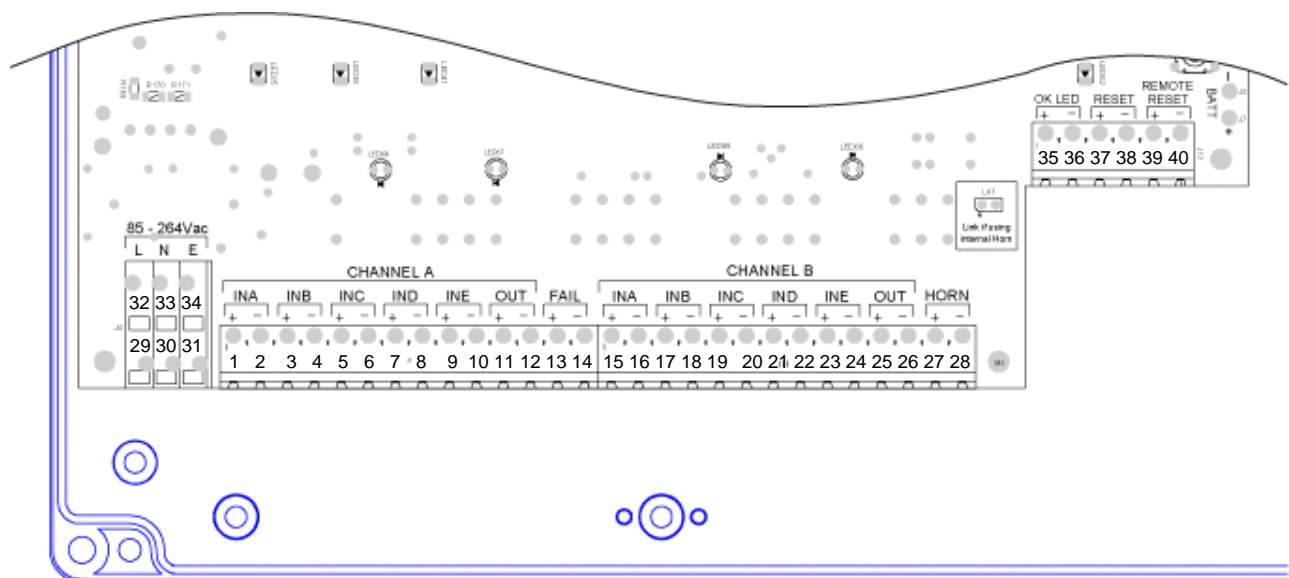
Table 3-1: Omni2 terminal schedule.....	16
Table 3-2: Omni2S terminal schedule. ....	17
Table 3-3: Omni2's terminal wiring schedule. ....	18
Table 3-4: Omni2S Beacon connections. ....	18
Table 3-5: Omni2's Power Consumption. ....	19
Table 3-6: Omni2's backup battery voltages .....	19
Table 4-1: Omni2S Alarm Tone Settings .....	23
Table 5-1: Omni2 hardware configuration .....	26
Table 5-2: Omni2 safety parameters* .....	28
Table 5-3: Omni2S safety parameters* .....	28
Table 5-4: Key to safety parameters.....	28

# 1. General Description

## 1.1 Standard Features of C1190B Omni2 DWS and C1191B Omni2S SAU

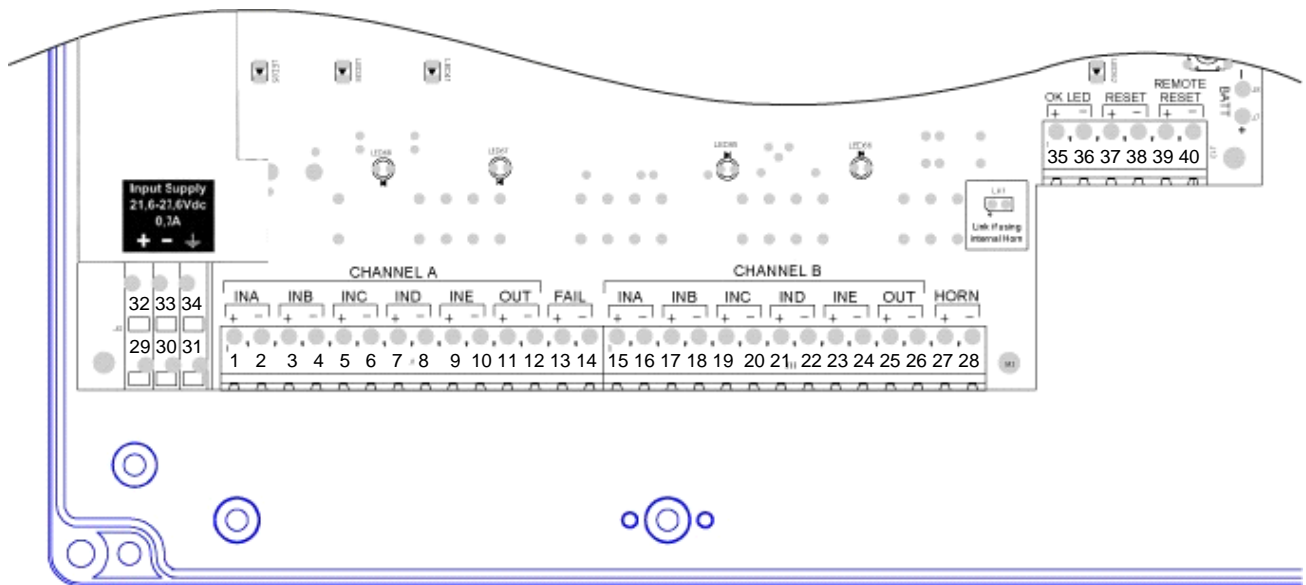
- Single-channel (C1190B or C1191B) or dual channel (C1190B-X-X-X-1) operation.
- Up to 10 alarm inputs (5 per channel in C1190B-X-X-X-1).
- Two high-visibility alarm display windows.
- All modules in the range are supplied off-the-shelf with no factory customisation required, minimising spares holding.
- User-specified display legends factory screened on display windows (C1190B-1-X-X-X).
- Choice of two colours (white or yellow) for display windows (C1190B-X-1-X-X).
- Optional 24Vdc power supply (C1190B-X-X-2-X and C1191B-2))
- Relay outputs for alarm and unit failure indication.
- Integral circuit test functions.
- Internal or external audible device control in C1191B.
- Facility for external Reset on C1190B.
- Selectable alarm tones on C1191B.
- Integral failure monitoring system for safety critical applications.
- Redundant hardware architecture for alarm function.
- Wetting voltage supplied to the inputs to allow potential free input contacts to be directly connected.
- Failsafe input configuration – for Normally Closed contacts.
- Battery backup (12V in C1190B and 24V in C1191B) in AC versions only.

## 1.2 Omni2 Door Warning Sign showing terminations.



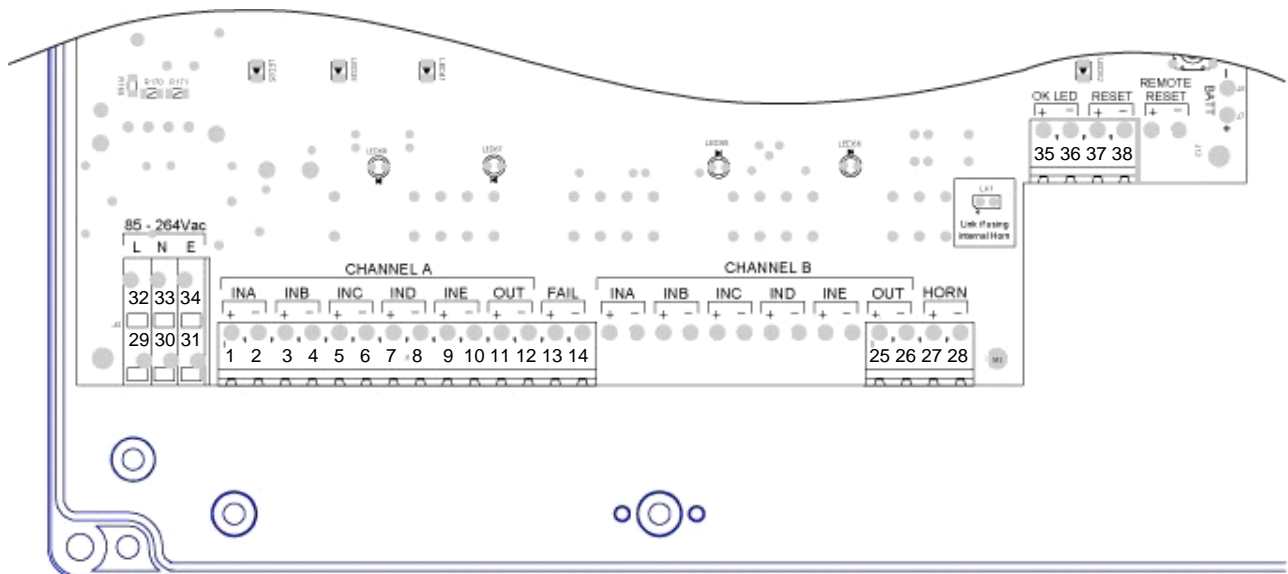
**Figure 1-1: Panel Mount 85-264Vac Omni2 Front View showing terminations.**



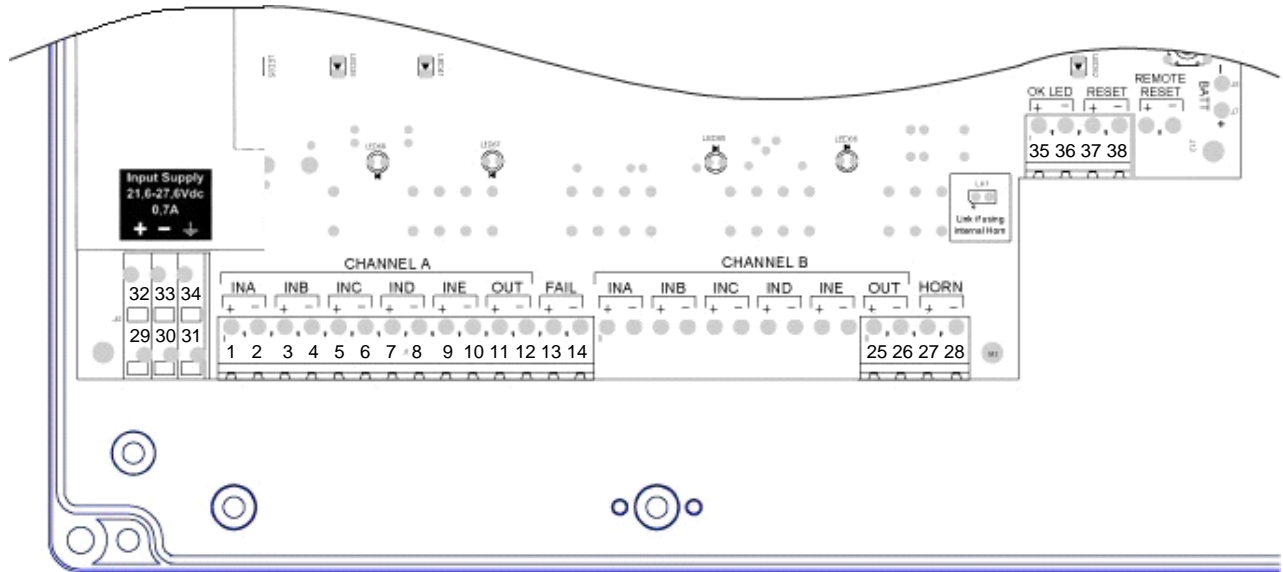


**Figure 1-2: Panel Mount 24Vdc Omni2 Front View showing terminations.**

### 1.3 Omni2S Slave Alarm Unit showing terminations.



**Figure 1-3: Panel Mount 85-264Vac Omni2S Front View showing terminations.**



**Figure 1-4: Panel Mount 24Vdc Omni2S Front View showing terminations.**

#### 1.4 Omni2S Slave Alarm Unit termination differences.

On Omni2S the terminals marked as Channel B INA+ through to INE- are not populated.  
 The terminals marked as Remote Reset are not populated.  
 Terminals marked Reset are wired to MUTE / TEST pushbutton.  
 Terminals marked OK LED are wired to pushbutton lamp.

## 2. Mechanical Installation

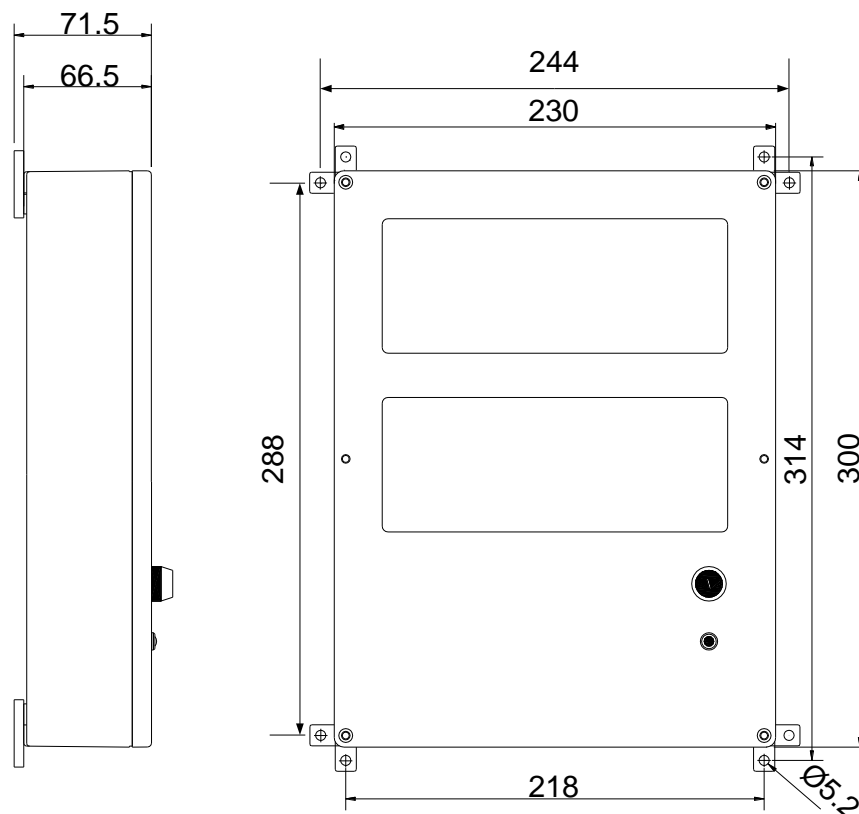
### 2.1 Mounting.

Options for mechanical mounting include internal mounting holes or external mounting brackets (supplied). For mounting, ensure the mounting feet are installed at corner positions.

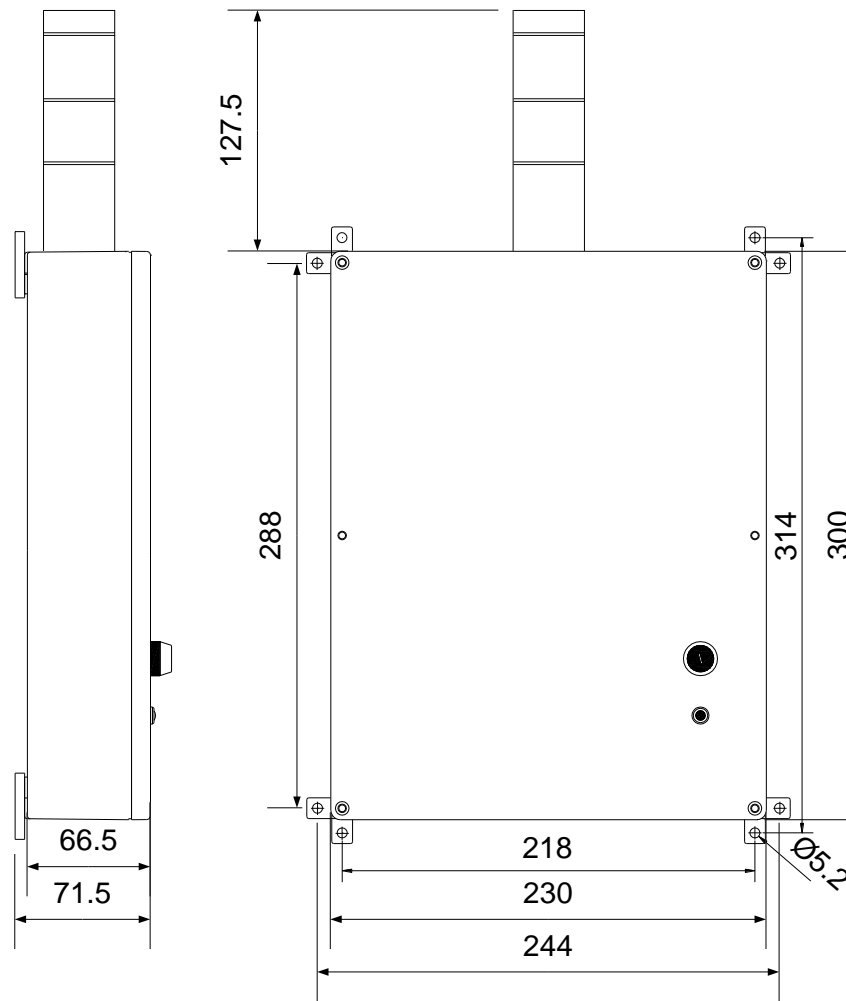
NB: To correct or adjust mounting feet the cover must be opened. Drill mounting holes in the square pattern that corresponds to the mounting holes. Follow instructions for the mounting holes selected for Omni2 installation.

The mounting points securing of the Omni2 and Omni2S to the surface have the spacing and pitch as shown in Figure 2-1 and Figure 2-2 respectively.

It is also possible to use the holes in the corner of the housing for mounting and avoid using the mounting feet. However, the front cover has to be opened to access the mounting screws.



**Figure 2-1: Mechanical Outline of the Omni2**



**Figure 2-2: Mechanical Outline of the Omni2S**

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## 3. Electrical Installation

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### 3.1 Introduction

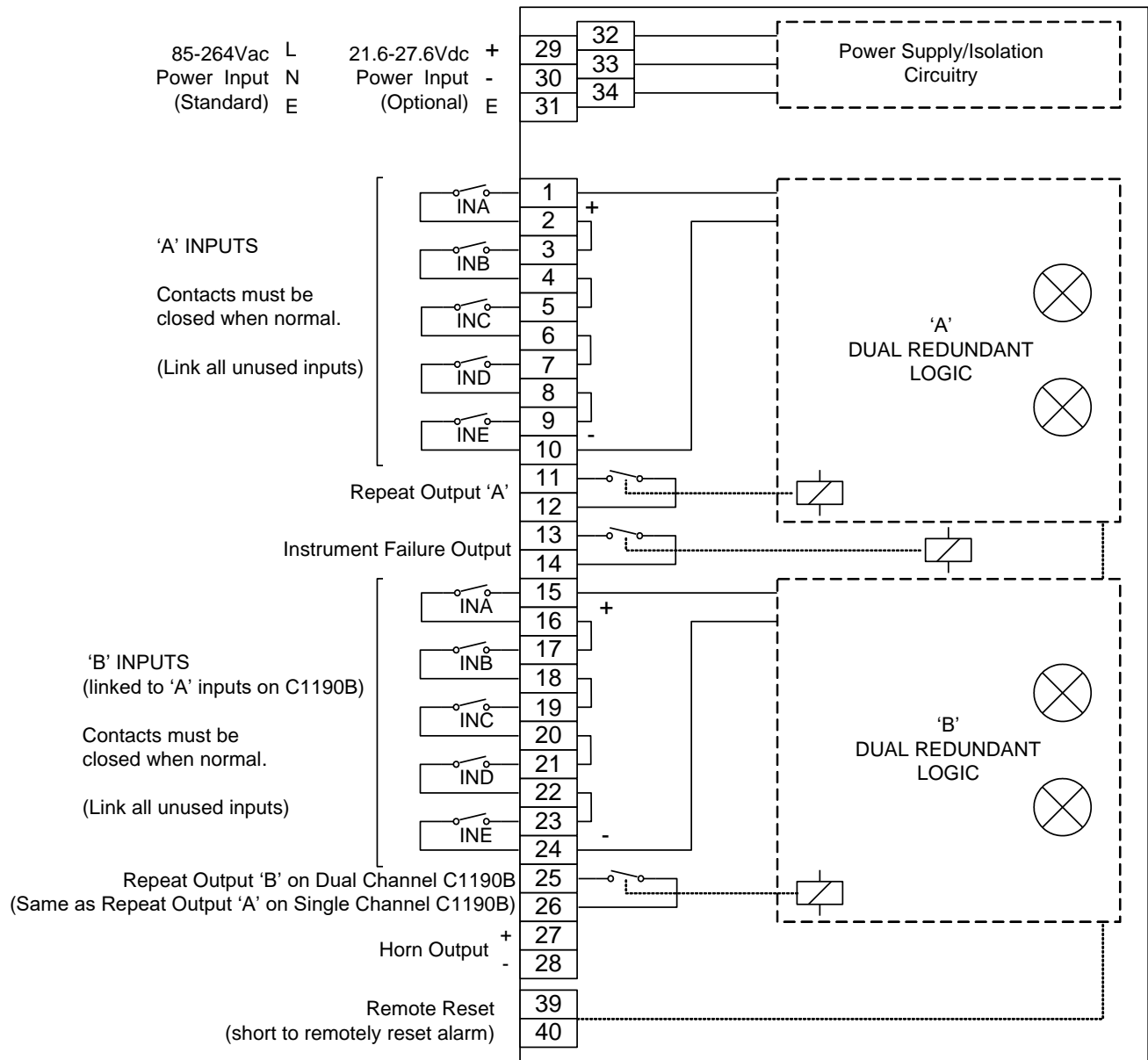
All electrical connections to the Omni2 are made on main board and are accessible after opening the front cover. Wiring entry is provided through the bottom of the unit via up to five 20mm glands.

**SAFETY WARNING:** Incoming mains supply must be isolated while terminations are being done. Turn mains on only after all installation has been completed.

Refer to Figure 3-1 and Figure 3-2 for terminal layouts and Table 3-1 and Table 3-2 for their descriptions.

In the Single Channel C1190B, Sections A and B are internally linked and therefore all 10 inputs are available. They should be connected to normally-closed contacts. Unused inputs must be linked to ensure continuity. It is possible to link a few inputs at a time, “first-to-last”, for example INB+ to INE-.

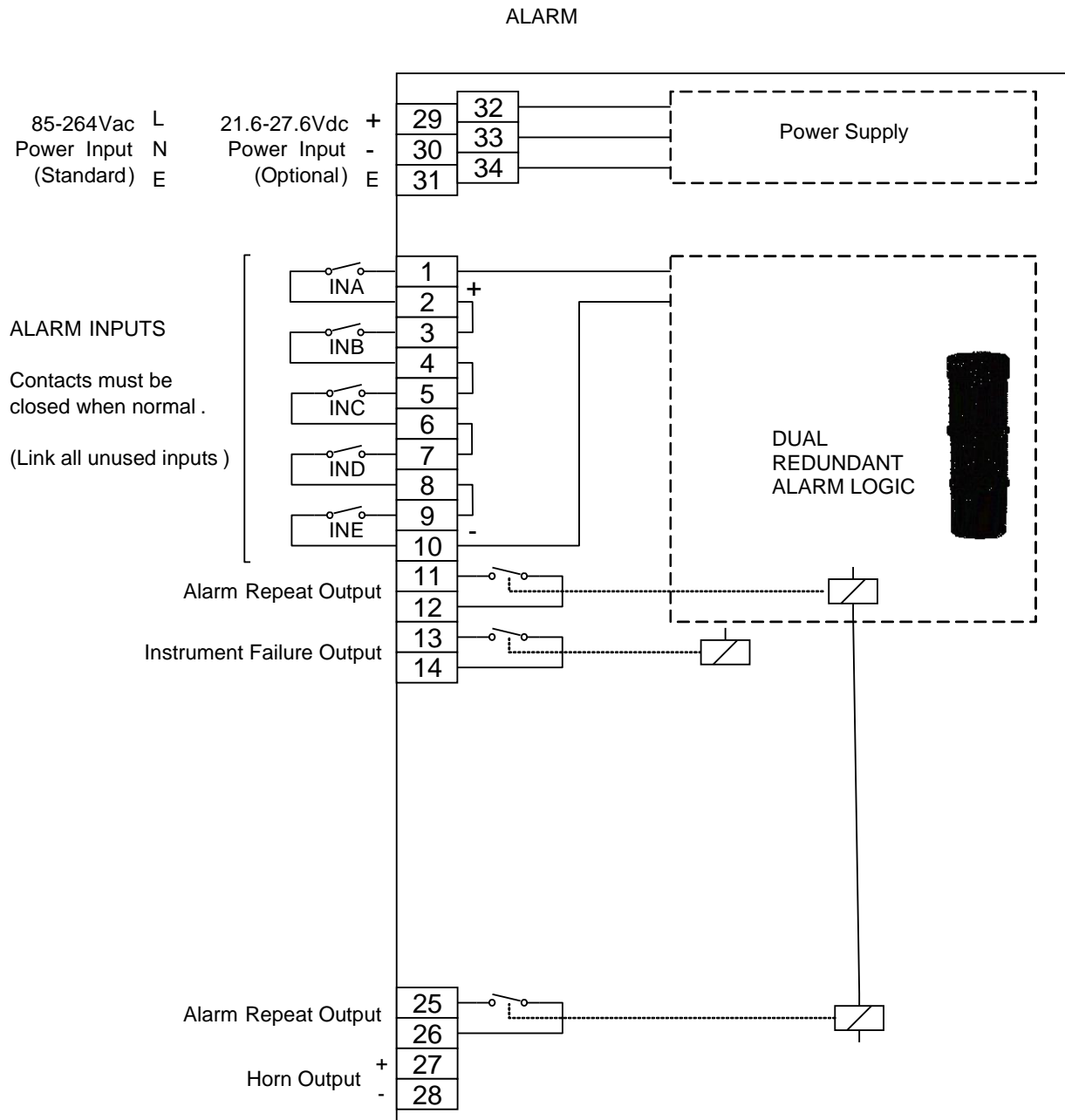
## 3.2 Omni2 Block Diagram



NOTE: 1. All output contacts are closed when normal  
2. For 24Vdc input option, connecting either the positive or the negative of the supply to earth will not affect Omni2 operation

**Figure 3-1: Omni2 Block Diagram showing Terminal Numbers**

### 3.3 Omni2S Block Diagram



- NOTES: 1. All output contacts are closed when normal  
2. For 24Vdc input option , connecting either the positive or the negative of the supply to earth will not affect Omni 2 operation

**Figure 3-2: Omni2S Block Diagram showing Terminal Numbers**

### 3.4 Omni2 Terminal Schedule

*Table 3-1: Omni2 terminal schedule.*

Module Terminal Number	Terminal Name		Description
	85-264Vac Standard	24Vdc Option	
C1190B <sup>1)</sup>	Marking		Omni2 DWS
1	INA+		Section A, Input A positive
2	INA-		Section A, Input A negative
3	INB+		Section A, Input B positive
4	INB-		Section A, Input B negative
5	INC+		Section A, Input C positive
6	INC-		Section A, Input C negative
7	IND+		Section A, Input D positive
8	IND-		Section A, Input D negative
9	INE+		Section A, Input E positive
10	INE-		Section A, Input E negative (Note 2)
11	OUT+		Section A, Alarm output positive contact
12	OUT-		Section A, Alarm output negative contact
13	FAIL+		FAIL Relay output positive
14	FAIL-		FAIL Relay output negative
15	INA+		Section B, Input A positive (Note 2)
16	INA-		Section B, Input A negative (Note 2)
17	INB+		Section B, Input B positive (Note 2)
18	INB-		Section B, Input B negative (Note 2)
19	INC+		Section B, Input C positive (Note 2)
20	INC-		Section B, Input C negative (Note 2)
21	IND+		Section B, Input D positive (Note 2)
22	IND-		Section B, Input D negative (Note 2)
23	INE+		Section B, Input E positive (Note 2)
24	INE-		Section B, Input E negative (Note 2)
25	OUT+		Section B, Alarm output positive contact
26	OUT-		Section B, Alarm output negative contact
27	HORN+		External Audible positive
28	HORN-		External Audible negative
29	L (LIVE)	+ (POSITIVE)	Mains Live (L) or positive (+) connection for DC version
30	N (NEUTRAL)	- (NEGATIVE)	Mains Neutral (N) or negative (-) connection for DC version
31	E (EARTH)	E (EARTH)	Protective Earth connection
32	L (LIVE)	+ (POSITIVE)	Second Mains Live (L) connection
33	N (NEUTRAL)	- (NEGATIVE)	Second Mains Neutral (N) connection
34	E (EARTH)	E (EARTH)	Second Protective Earth connection
35	+OKLED		Positive of HEALTHY lamp
36	-OKLED		Negative of HEALTHY lamp
37	+RESET		Positive of Reset Keyswitch (Note 1)
38	-RESET		Negative (gnd) of reset Keyswitch (Note 1)
39	+REMOTE RESET		Positive of Remote Reset contact (if used)
40	-REMOTE RESET		Negative (gnd) of Remote Reset contact (if used)

Note 1: Switches and contact terminals are not polarity-sensitive. Hence same colour wires are used for Reset positive and negative.

Note 2: In C1190B, Section A and Section B act as one input and terminals 10 and 15 are linked. In C1190B-X-X-X-1 Section 1 is the first input with Alarm displayed on the Top window, while Section B operates independently with Alarm displayed in the bottom window.



### 3.5 Omni2S Terminal Schedule.

*Table 3-2: Omni2S terminal schedule.*

Module Terminal Number	Terminal Name		Description
	85-264Vac	24Vdc	
C1191B	Markings		Omni2S Slave Alarm Unit
1	INA+		Input A positive
2	INA-		Input A negative
3	INB+		Input B positive
4	INB-		Input B negative
5	INC+		Input C positive
6	INC-		Input C negative
7	IND+		Input D positive
8	IND-		Input D negative
9	INE+		Input E positive
10	INE-		Input E negative
11	OUT+		Alarm output, positive contact
12	OUT-		Alarm output, negative contact
13	FAIL+		FAIL Relay output positive
14	FAIL-		FAIL Relay output negative
25	OUT+		Alarm output, positive contact
26	OUT-		Alarm output, negative contact
27	HORN+		Audible positive (Note 1)
28	HORN-		Audible negative (Note 1)
29	L (LIVE)	+ (POSITIVE)	Mains Live (L) or DC Positive (+) connection
30	N (NEUTRAL)	- (NEGATIVE)	Mains Neutral (N) or DC Negative (-) connection
31	E (EARTH)	E (EARTH)	Protective Earth connection
32	L (LIVE)	+ (POSITIVE)	Second Mains Live (L) or DC Positive (+) connection
33	N (NEUTRAL)	- (NEGATIVE)	Second Mains Neutral (N) or DC Negative (-) connection
34	E (EARTH)	E (EARTH)	Second Protective Earth connection
35	+OKLED		Positive of MUTE/TEST lamp
36	-OKLED		Negative of MUTE/TEST lamp
37	+RESET		Positive of MUTE/TEST switch (Note 2)
38	-RESET		Negative (gnd) of MUTE/TEST switch (Note 12)

Note 1: Disconnect door siren if connecting an external siren.

Note 2: Switches and contact terminals are not polarity-sensitive. Hence same colour wires are used for Reset positive and negative.

### 3.6 Fixed wiring identification.

Omni2 and Omni2S both have fixed wiring to the front panel which is routed to front terminals. The table below describes the connections and colour-coding of the fixed wiring.

*Table 3-3: Omni2's terminal wiring schedule.*

Module Terminal Number	Terminal Marking	Wire colour	Description
C1190B			Omni2 Door Warning Sign Unit
27	HORN+	User wiring	Ext. audible positive (if used)
28	HORN-	User wiring	Ext. audible negative (if used)
35	+OKLED	ORANGE	HEALTHY lamp (not polarity-sensitive)
36	-OKLED	BLUE	HEALTHY lamp (not polarity-sensitive)
37	+RESET	GREY	Pos. of RESET switch (not polarity-sensitive)
38	-RESET	GREY	Neg. of RESET switch (not polarity-sensitive)
39	+REMOTE RESET	User wiring	
40	-REMOTE RESET	User wiring	
C1191B			Omni2S Slave Alarm Unit
27	HORN+	RED	Positive of Door Horn
28	HORN-	BLACK	Negative of Door Horn
35	+OKLED	ORANGE	Positive of MUTE/TEST lamp
36	-OKLED	BLUE	Negative of MUTE/TEST lamp
37	+RESET	GREY	Pos. of MUTE/TEST switch (not polarity-sensitive)
38	-RESET	GREY	Neg. of MUTE/TEST switch (not polarity-sensitive)
39			NOT POPULATED
40			NOT POPULATED

### 3.7 Alarm Beacon connections on Omni2S

Omni2S has 3 terminals for Beacon connections on the top edge of the PCB. The table below illustrates Beacon connections.

*Table 3-4: Omni2S Beacon connections.*

Connection	Description
WH	Ground (white wire)
GN	Green Beacon connection
RD	Red Beacon connection

### 3.8 Power connections.

Both Omni2s and Omni2S are mains (85 to 264Vac) powered or optional 24Vdc.

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

*Table 3-5: Omni2's Power Consumption.*

Model	85-264Vac Max Current Consumption	24Vdc Max. Current Consumption
C1190B & C1190B-1	0.1A (lamps off) 1.1A (lamps on)	0.7A
C1191B	0.14 A	0.7A

### 3.9 Storage

Both Omni2s and Omni2S should be stored with battery disconnected.

Locate the inline battery connector in the area between the field terminals and cable glands. Pull firmly apart to open.

*Table 3-6: Omni2's backup battery voltages*

Model	Battery
C1190B	+12Volts +/- 15% (10.2 – 13.8 Volts)
C1191B	+24Volts +/- 15% (20.4 – 27.6 Volts)

See Specifications for storage temperature range.

#### Reverse Polarity Protection

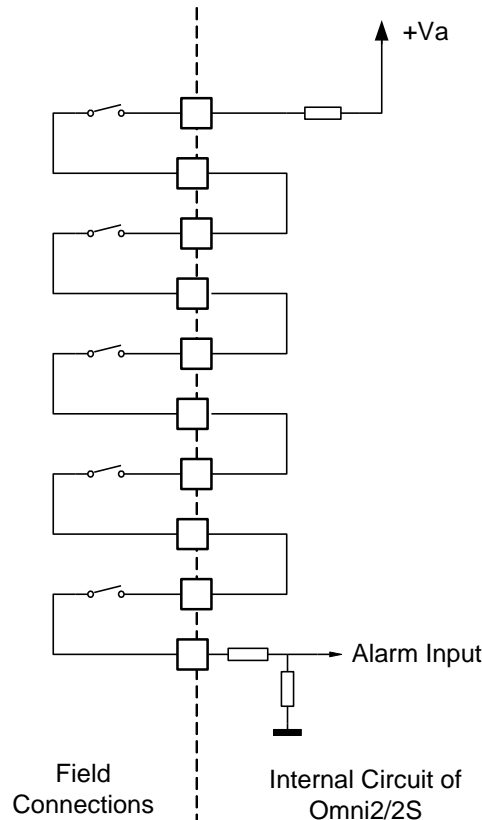
The Omni2 battery connector is keyed to prevent reverse polarity connection on these terminals.

When units are out of storage, pushing the inline connector closed again will restart the unit. It will still however indicate FAIL condition until mains power is restored. This is undesirable in case of C1191B as it would mean indicating Alarm and sounding the audible. For the C1191B, rather connect it to mains first.

### 3.10 Connecting alarm inputs.

Omni2s are operated with potential free contacts connected to the input terminals. Each input is provided with a pair of terminals marked (+) and (-). Terminal INE- is the alarm input and terminal INA+ is an independently current limited wetting voltage supplied from the internal positive supply as shown below. The standard Input option is 12V common on C1190B, 24V common on C1191B.

**NB:** INA to INE inputs are connected in series so more potential-free contacts can be wired to the unit. This allows connection of several sources of alarm input.



**Figure 3-3: Input Connection Diagram using individually wired potential free contacts**

### 3.11 Connecting Alarm Repeat Relay Contacts.

Two sets of contacts from four Relays (connected as two dual-redundant pairs) are provided as Alarm Output from the Omni2. In standard Omni2 and Omni2S these contacts always assume the same state. In custom Omni2 C1190B-X-X-X-1, one contact output follows state of Section A and the second one follows the state of Section B.

**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.

See Specifications for contact rating.

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### 3.12 Connecting FAIL Relay Contacts.

Omni2 is fitted with FAIL Relay output. The contacts will be closed when the unit is the normal or alarm condition if the unit otherwise operates correctly. It will open when internal fault is detected. Redundant circuits are used in fault detection in 2oo2 (2 out of 2) configuration. FAIL contacts also open on the loss of mains power.

See Specifications for contact rating.

### 3.13 Connecting Remote Reset

Omni2 C1190B may be connected to Remote Reset contacts. The Remote Reset terminals must be connected to potential free contacts. Remote Reset contacts will act in parallel with the key switch on the front door.

## 4. Configuring Omni2s For Operation

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### 4.1 Introduction

Omni2 requires minimal configuration. The steps to be taken are as follows:

#### **Confirm which Omni2 model you have**

In the case of **C1190B**, the standard model acts as a single channel DWS. Terminals labelled as Section 'A' and Section 'B' all act as one and indicate in both windows.

In the **C1190B-X-X-X-1** model, sections 'A' and 'B' are separate from each other. Section 'A' will indicate alarm on the top window and Section 'B' will indicate alarm on the bottom window.

In the **C1191B** model, there is only a section 'A' which will indicate alarm on the red section of the beacon.

#### **Connect Alarm inputs**

Alarm inputs connect to terminals labelled INA+, INA-, where one set of potential free contacts would connect to the pair of INA terminals, second to INB terminals etc. If one set of input alarm contacts is used, it would be connected between INA+ and INA-. The unused inputs, e.g. INB+, INB- etc. should be fitted with shorting links, otherwise they will put Omni2 in the alarm state. Since all the 5 input connections INA to INE are in series, it is then sufficient to short (link) unused inputs INB+ to INE-. This will disable INB, INC, IND and INE.

#### **Select the audible**

Use Link to select internal audible (link on) or external (link off). If required, connect external audible to terminals 27 (+) and 28 (-).

#### **Connect the mains or DC supply**

Connect Live, Neutral and Earth (or Positive, Negative and Earth) to terminals 29,30,31 or 32,33,34 as shown in terminals schedule.

#### **Protective earth must be connected.**

#### **Readily accessible mains isolation switch must be incorporated in the fixed wiring.**

#### **Connect Relay outputs**

Connect relay outputs to subsequent instruments in the safety function as required – terminals 11,12 and 25,26. The outputs act together in C1190B-0 and C1191B Slave but they follow status of Section 'A' or Section 'B' in C1190B-1.

#### **Connect FAIL Relay output**

Connect FAIL relay output to diagnostic input of external monitoring instrument/logic solver so that response to unit failure can be monitored.

#### **Connect the Battery**

Battery is normally disconnected for storage. Locate the two halves of the in-line connector at the bottom of the unit. Press firmly together. The connector is keyed to ensure correct polarity. Even if mains is not on, the unit will turn on when battery is connected but it will indicate fault or alarm due to mains not being on.

#### Connect Remote Reset (if required)

If remote reset function is required, use terminals labelled Remote Reset for that purpose (C1190Bs only). This input accepts normally-open contact, with momentary-close function.

## 4.2 Sounder alarm tones of door sounder (Omni2S only)

Omni2S' internal door sounder is equipped with selectable alarm tones. The table below describes the DIP-switch setting and the corresponding alarm tones. Consult the sounder datasheet if further information is required. The default tone is the BS Fire Tone 1Hz.

*Table 4-1: Omni2S Alarm Tone Settings*

Switch setting	Pattern	Frequency [Hz]	Description
11111	Alternating	800 & 970	British Standard Fire Tone 2Hz
11110	Sweep	800 to 970	BS Fire Tone 7 Hz
<b>11101</b>	<b>Sweep</b>	<b>800 to 970</b>	<b>BS Fire Tone 1 Hz (default)</b>
11100	Continuous	2850	Steady
11011	Sweep	2400-2850	7 Hz
11010	Sweep	2400-2850	1 Hz
11001	Slow whoop	300 to 1200	Dutch Fire Tone
11000	Sweep	1200 to 500	DIN tone 1 Hz
10111	Alternating	2400&2850	2 Hz
10110	Intermittent	970	0.5 Hz
10101	Alternating	800 & 970	BS Fire tone 1Hz alternating
10100	Intermittent	2850	0.5 Hz
10011	Intermittent	970	0.8 Hz
10010	Continuous	970	Steady
10001	Alternating	554 & 440	French Fire Tone
10000	Intermittent	660	Swedish Fire Tone 3.3 Hz
01111	Intermittent	660	Swedish Fire Tone 0.28 Hz
01110	Intermittent	660	Swedish Fire Tone 0.05 Hz
01101	Continuous	660	Swedish Fire Tone steady
01100	Alternating	554 & 440	Swedish Fire Tone 0.5 Hz
01011	Intermittent	660	Swedish Fire Tone 1 Hz
01010	Intermittent	2850	Pelican crossing
01001	Sweep	800 to 970	BS Fire Tone 50 Hz
01000	Sweep	2400-2850	50 Hz sweep
00111	Intermittent	970	ISO8201
00110	Intermittent	800 & 970	ISO8201
00101	Alternating	970 & 800	2Tx31.5s silence then repeat
00100	Alternating	800 & 970	BS Fire Tone 2Hz
00011	Alternating	990 & 650	BS Fire Tone 2 Hz (Symphoni tones)
00010	Alternating	510 & 610	BS Fire Tone 2 Hz (Squashni micro tones)
00001	Sweep	300 to 1200	1 Hz
00000	Alternating	510 & 610	alternating

## 4.3 Power-up

When power is applied to the Omni2 and input contacts are in the normal (closed) state, Omni2 may still indicate alarm due to startup glitches. This is normal and can be cleared with a single reset. If the unit is powered from the supply, the windows in C1190B (or Red

beacon in C1191B) should be off and audible should be silent. The FAIL relay contacts should be closed and Healthy lamp (or Green beacon in C1191B) should be illuminated.

#### **4.4 Normal Operation**

During the normal operation, the C1190B will deal with any alarm states according to its pre-set alarm sequence.

When an alarm condition occurs and the horn sounds, the operator can silence it with the Reset key (or MUTE/TEST pushbutton in C1191B). This action will not clear the alarm. The Output relay contacts will open on alarm and stay open in MUTE condition.

In C1190B the alarm is manually reset with the key. It can only be reset if the alarm condition had returned to normal. Hence, alarm is latched and then reset manually.

In C1191B, the alarm condition will automatically be cleared once the alarm condition returned to normal. Here, alarm is fleeting (not latched).

#### **4.5 Test Functions**

##### **4.5.1 Overview of the Test Functions**

The Test button operates as a combined lamp test and circuit test function. The Test button mimics a real alarm input to a section of the circuit.

The Fail button tests circuit failure detection.

##### **4.5.2 Pressing the Test Button**

When the Test button is pressed, the unit checks the results of its regular full circuit test, using 2oo2 configuration of its redundant hardware. If all checks performed pass, then the FAIL contacts will remain closed. The lamp test is included in the test and both windows are illuminated (flashing) while the Test pushbutton is held down. When the Test pushbutton is released, the C1190B is still in the alarm state and must be reset. The C1191B, on the other hand, will terminate the test and revert to normal.

##### **4.5.3 Fault Indication on Circuit Test**

If a fault is found in one of the tests performed, then the FAIL output contacts will open and the Healthy lamp will extinguish.

##### **4.5.4 Pressing the FAIL button**

When the Fail button is pressed, the unit puts one half of the redundant circuit in the alarm state while the other half remains in the normal state. The 2oo2 configuration of Omni2 redundant hardware will detect the difference and indicate fault. The green HEALTHY lamp on the C1190B will turn off and on C1191B the green beacon will turn off. The lamp test is included in the test and one half of the illumination window will be flashing during this test. The C1191B will just flash the Red beacon but the circuit simulated fault will still be





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detected. To restore the unit to normal operation, the Reset key on C1190B or MUTE/TEST button on C1191B must still be operated to ensure all internal logic is returned to normal state.

## 5. Functional Safety Manual

Information in this section is provided to ensure correct use of any Omni2 products in applications classified as SIL1 or SIL2, as required by 2<sup>nd</sup> edition of IEC61508 standard.

### 5.1 Function specification.

Omni2 Alarm Annunciator/Door Warning Sign & Slave Alarm Unit are products designed to alert the operator to hazardous conditions in the area about to be entered, which are often safety-critical. The unit has visual indication windows on the front and terminals for alarm, FAIL, external sounder and external reset routed through cable gland entry points at the bottom of the unit.

When using Omni2's in SIL2 applications, one safety function is defined as change to indicated Alarm state in response to one input.

Omni2s accepts inputs from field devices. In SIL applications an input must originate from contact which is normally closed and opens on abnormal condition. The contacts must be potential free.

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 Alarm output in the form of relay contacts and Audible alarm. These contacts can be linked to the next logic device in the safety loop.

On C1190B, Alarm can be Silenced by means of momentary action key switch. It can only be Reset if Alarm condition returned to normal.

On C1191B, Alarm can be Silenced by means of Mute pushbutton. It cannot be reset. The indication returns to normal once alarm condition returns to normal.

Diagnostic output is provided by opening of FAIL relay contact and tuning off the HEALTHY indicator (Green Beacon light in C1191B).

### 5.2 Hardware configuration.

The SIL2 assessment refers to the unit in the following hardware configuration:

*Table 5-1: Omni2 hardware configuration*

Assembly	Quantity
Main Omni2 board	1
Internal sounder	1

Hardware fault tolerance is taken as 0. Instead, the redundant circuits are considered as increasing the Diagnostic Coverage and Safe Failure Fraction to the level required for SIL2.

Omni2 is a Type A subsystem.

### 5.3 Changing configuration:

The only possible hardware configuration changes possible on Omni 2 products are the following:

- Selection of internal or external sounder
- Alarm tone selection on Omni2S

These configuration changes do not affect the safety parameters.

Input contacts in SIL applications must be normally open so when de-energised they default to open-circuit.

### 5.4 Installation requirements.

- To maintain the specified performance of Omni2 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.

### 5.5 Functional Safety Parameters.

This paragraph describes functional safety parameters of Omni2 family unit in configuration described.

Failure of the unit is defined as the failure to illuminate the window and activate Alarm 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).

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 5-2 and Table 5-3.

**Table 5-2: Omni2 safety parameters\***

Subsystem	Type A
Hardware Fault Tolerance	0
DC	94%
SFF	97%
MTTR	8 hours
Proof Test Interval	1 year
PFD <sub>avg</sub> , (TI = 1 year)	4.89 x 10 <sup>-4</sup>
PFD <sub>avg</sub> , (TI = 2 years)	9.6 x 10 <sup>-4</sup>
Safe failures detected $\lambda_{SD}$	789.9 FIT
Safe failures undetected $\lambda_{SU}$	1392 FIT
Dangerous failures detected $\lambda_{DD}$	1659 FIT
Dangerous failure undetected $\lambda_{DU}$	108.5 FIT

\*Refer on “Omni2 FMEDA to EN61508 R06” for more details

**Table 5-3: Omni2S safety parameters\***

Subsystem	Type A
Hardware Fault Tolerance	0
DC	95%
SFF	97%
MTTR	8 hours
Proof Test Interval	1 year
PFD <sub>avg</sub> , (TI = 1 year)	4.90 x 10 <sup>-4</sup>
PFD <sub>avg</sub> , (TI = 2 years)	9.63 x 10 <sup>-4</sup>
Safe failures detected $\lambda_{SD}$	368.1 FIT
Safe failures undetected $\lambda_{SU}$	1417 FIT
Dangerous failures detected $\lambda_{DD}$	2282 FIT
Dangerous failure undetected $\lambda_{DU}$	107.8 FIT

\*Refer on “Omni2S FMEDA to EN61508 R02” for more details

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

**Table 5-4: Key to safety parameters**

DC = Diagnostic Coverage	$\lambda$ = failure rate per billion hours (1 FIT = 1 failure in 10 <sup>9</sup> 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

## 5.6 Diagnostics

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

- The unit flashes alarm windows or activates the audible without actual alarm, thus indicating a failure.
- The unit open FAIL contacts and turns off the HEALTHY indicator to indicate failure. In such cases alarm indication typically cannot be reset.

For other general failures when abnormal operation is detected, Omni2 diagnostic watchdog contacts change to open. To fully benefit from diagnostics, the state of watchdog should be monitored. If FAIL output is not monitored, the safety parameters change as follows:

**Table 5-5: Omni2 safety parameters without watchdog**

Subsystem	Type A
Hardware Fault Tolerance	0
DC	94%
SFF	97%
MTTR	24 hours
Proof Test Interval	1 year
$PFD_{avg}$ , (TI = 1 year)	$4.74 \times 10^{-4}$
$PFD_{avg}$ , (TI = 2 years)	$9.07 \times 10^{-4}$
Safe failures detected $\lambda_{SD}$	676.9 FIT
Safe failures undetected $\lambda_{SU}$	1344 FIT
Dangerous failures detected $\lambda_{DD}$	1529 FIT
Dangerous failure undetected $\lambda_{DU}$	99.3 FIT

**Table 5-6: Omni2S safety parameters without watchdog**

Subsystem	Type A
Hardware Fault Tolerance	0
DC	96%
SFF	98%
MTTR	24 hours
Proof Test Interval	1 year
$PFD_{avg}$ , (TI = 1 year)	$4.91 \times 10^{-4}$
$PFD_{avg}$ , (TI = 2 years)	$9.29 \times 10^{-4}$
Safe failures detected $\lambda_{SD}$	368.1 FIT
Safe failures undetected $\lambda_{SU}$	1415 FIT
Dangerous failures detected $\lambda_{DD}$	2207 FIT
Dangerous failure undetected $\lambda_{DU}$	100.0 FIT

While numerical parameters are not materially different, the safety function changes. Without relay monitoring we should assume a longer MTTR (24h in this example) and possibly a lower

risk reduction, as the output is communicated to a human operator, rather than an electronic control system. It should be seriously considered whether this is acceptable.

## 5.7 Proof Test

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

- Circuit test
- Proof Test

Test – using the Test switch performs circuit test and if all internal checks pass then the unit flashes the visual alarm indication but the HEALTHY lamp (or Green beacon) stays illuminated. If one of the checks fails the green indication will turn off. 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:

1. Only perform the test when no abnormal (alarm) conditions exist and plant safety is not affected by the testing.
2. Isolate the unit from outputs so that it can be tested without disturbing the rest of the plant.
3. First perform the manual Circuit Test by using a TEST key switch in C1190B or MUTE/TEST pushbutton in C1191B.
4. Check that unit flashes visual alarm indication and sounds the audible. The green indicators must stay on.
5. Open the front cover of the unit. Make sure not to touch the HV area under the HV protective cover accidentally.
6. Open the circuit for Channel A alarm input (it's sufficient to unplug Channel A terminals).
7. Alarm windows (Red Beacon light in C1191B) must be flashing. NB: in C1190B-1 this will only flash top window.
8. The HEALTHY light or Green Beacon light must stay illuminated.
9. Check that FAIL contacts are closed.
10. Test that alarm output relay contacts are open. NB: in C1190B-1 this will only open Channel A output contacts.
11. Check that operating RESET/TEST/MUTE key or MUTE/TEST button on C1191B silences the alarm.
12. Close the input contacts.
13. On C1191B this should revert the unit to normal condition. The Red beacon should be off and the Green beacon should be on. The Alarm relay contact outputs should be closed.
14. On C1190B this should make it possible to RESET the unit to normal condition. The visual indication should be off and the HEALTHY light should be on. The Alarm relay contact outputs should be closed. NB: On C1190B-1 this only refers to top window and Channel A output contacts.
15. Open the circuit for Channel B alarm input (it's sufficient to unplug Channel B terminals). NB: Channel B input tests are not done on C1191B.
16. Alarm windows must be flashing. NB: in C1190B-1 this will only flash bottom window.
17. The HEALTHY light must stay illuminated.
18. Check that FAIL contacts are closed.

19. Test that alarm output relay contacts are open. NB: in C1190B-1 this will only open Channel B output contacts.
20. Check that operating RESET/TEST/MUTE key silences the alarm.
21. Close the input contacts.
22. On C1190B this should make it possible to RESET the unit to normal condition. The visual indication should be off and the HEALTHY light should be on. The Alarm relay contact outputs should be closed. NB: On C1190B-1 this only refers to bottom window and Channel B output contacts.
23. Now press and hold the top FAIL button. One half of the top window must start flashing (Red beacon on C1191B) and the HEALTHY light must be off (Green beacon on C1191B). Other indications are not relevant for the test.
24. Check that FAIL output contacts are open.
25. Reset the unit using RESET/TEST/MUTE key or MUTE/TEST button on C1191B. Indication must revert to normal and FAIL output contacts must be closed.
26. On C1190B press and hold the bottom FAIL button. One half of the bottom window must start flashing and the HEALTHY light must be off. Other indications are not relevant.
27. Check that FAIL output contacts are open.
28. Reset the unit using RESET/TEST/MUTE key. Indication must revert to normal and FAIL output contacts must be closed.
29. Disconnect mains input. **For safety, use external isolator switch only. Do not attempt to disconnect mains wiring from the terminals.**
30. On C1190B, this should turn the HEALTHY indication off. Check that FAIL contacts are now open.
31. On C1191B, this should turn the Green beacon off and indicate alarm with red beacon flashing and audible ON. Check that FAIL contacts are now open.
32. Restore mains. This should return any Omni2 unit to a normal state. Check that green indicators are back on and FAIL contacts are closed.
33. This completes the Proof Test procedure.

## 5.8 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:

- Omni2 inputs must use closed contacts. Open contacts represent alarm condition.
- The 0V for both the 24V DC supply voltage for the Omni2 and the DC supply voltage for field contacts must be commoned.
- FAIL output should be used for maximum Diagnostic Coverage.
- The unit should be used within the range of ambient temperatures and humidity as specified in the datasheet.
- EMC – Omni2 must be operated so that interference levels stated in Specifications are not exceeded.
- The Operator should perform the Circuit Test with external TEST switch at intervals of 8 hours (start of shift). Faults must be attended to immediately.

## 6. Specifications

### Power Supply

#### 85-264Vac (Standard version)

Supply Voltage	85-264Vac 47-63Hz
Isolation PSU to I/O	None
Max dc Ripple	10% pk. to pk.
Current Consumption	See Section 3.8

#### 24Vdc (Optional version)

Supply Voltage	21,6-27.6Vdc at 0.7A
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### Battery Charger with built-in Battery\*

	C1190Bs	C1191B
Battery Quantity & Type	One off 12V 0.8Ah	Two off 12V 0.8Ah
Dimensions (Lx W x H)	96 mm x 25 mm x 62mm	96 mm x 25 mm x 62mm
Float Voltage (at 25°C)	13.7V-13.9V	27.4V-27.8V
Charging Current	0.1A max.	0.1A max

**\*Battery charger and built-in battery(ies) only available on AC units.**

### Alarm/Display Standard Inputs - Non Isolated

Type	5 Potential Free Contacts per alarm (10 contacts for C1190B)
Contact Sense	Normally Closed, open to alarm
Max. open circuit voltage	15Vdc (C1190Bs) 28Vdc (C1191B)
Max. closed circuit current	5mA per input circuit
Max. Loop Resistance to detect closed contact	<200 ohms total per alarm point
Min. Loop Resistance to detect open contact	>100 kohms to guarantee open contact detection
Wire size	1.5mm <sup>2</sup> (17SWG/15.5SWG) max.
Connections	Via cage clamp terminals

### Operator Controls

	C1190B	C1191B
Type	One spring-loaded key switch for both alarm points	One illuminated pushbutton
Functions	Reset / Lamp Test / Alarm Mute	Alarm Mute / Lamp Test

### Audible Alert (Internal) - Can be disabled or enabled via link

	C1190B	C1191B
Location	PC Board	Door
Type	Piezo Sounder	Piezo Sounder
Audible Selection	N/A	Tone select via DIP switches



### Audible Alert (External)

Rating	12V 100mA max.
Connection	Via terminals 27 and 28 (For C1191B, disconnect door siren prior to connecting an external audible alert)

### Alarm Display

	C1190B	C1190B-X-X-X-1	C1191B
Alarms	One	Two	One
Type	Back-lit LED Window	Back-lit LED Window	Red/Green LED Beacon
Window Size	2 x 180mm x 70mm	2 x 180mm x 70mm	Beacon
Alarm Indication	Windows flashing	Window flashing	Red Section flashing
Flash Rate	1 to 1.4 Hz	1 to 1.4 Hz	1 to 1.4 Hz
Healthy (OK) Indication	Fail Relay Normal Health indicator ON	Fail Relay Normal Health Indicator ON	Fail Relay Normal Green Section ON
Legend/Colour 1	Danger/Yellow	Depending on ordering options	N/A
Legend/Colour 2	Keep Out/White		N/A

### Relay Contact Outputs

		C1190B	C1191B
Outputs provided	Repeat Alarm Outputs Quantity Instrument Fail Output Quantity	Two One	One One
Contact Type	Potential free – Form A contact (Contact closed when normal and opens on alarm/fault)		
Contact Rating	3A 30Vdc or 3A 250Vac 90W		
Isolation	1000Vac from contact to other circuits		

### Temperature Range

Operating Temperature	0°C – 60 °C (+32°F – 140°F)
Storage Temperature	-10°C – 70 °C (+14°F – 158°F)

### Weight

Unpacked	1.3kg approx.
Packed	1.6kg approx.

### Compliance to Standards

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%
RoHS Compliance	2011/65/EU (RoHS2)

## Ordering Information

ORDER CODE	DESCRIPTION			
C1190B	Omni2 Standard 85-264Vac Supply Door Warning Sign Single Channel Alarm Annunciator with Yellow "Danger" Window (Top) & White "Keep Out" Window (Bottom). For non-standard options, refer to table below			
Model	Window Text	Window Colours	Power Supply	Channels
C1190B	-X	-X	-X	-X
	0=Standard <sup>1</sup>	0=Standard <sup>2</sup>	0=85-264Vac	0=Single
	1=Custom <sup>3</sup>	1=Custom <sup>3</sup>	2=24Vdc	1=Dual
<b>Notes:</b> 1. Standard Top Window Text is "Danger" and standard Bottom Window Text is "Keep Out". 2. Standard Top Window Colour is Yellow and standard Bottom Window Colour is White. 3. For Custom Window text and colours, please specify both text and colours (choice of White or Yellow) for EACH of the windows. 4. Typical custom order code C1190B-1-1-0-1 would be an Omni2 Door Warning Sign Dual Channel Alarm Annunciator with Custom Window Text (specify for each window), Custom Window Colour (specify for each window [White or Yellow]) and 85-264Vac Power Supply.				
C1191B	Omni2 Slave Alarm Unit (Single Alarm) with 85-264Vac PSU			
C1191B-2	Omni2S Slave Alarm Unit (Single Alarm) with 24Vdc Power Supply Unit			