

EASICHECK 2 Planning Guide

1.0 Overview

Easichack2 is an addressable emergency lighting testing system. Each Easichack2 panel is designed to operate with up to 200 addressable test interfaces connected on a data circuit, for larger sites control panels can be networked together to function as a single system (see section 4.0).

Connections between the control panel and the Easichack2 interfaces, is by means of a 2 core twisted pair cable.

Fittings for use with Easichack2 must be fitted with a suitable Easichack2 test interface, this interface **MUST** be fitted by Cooper Lighting and Safety, fitting of the interface by others is not acceptable and can result in a system malfunction. When fitted by Cooper Lighting and Safety careful checks are carried out to ensure the test interface is fully compatible with the fitting and has been correctly installed.

1.1 Location of control panel

When selecting a location for the Easichack2 control panel it should be noted that the panel incorporates a maintenance free lead acid battery, the panel should therefore be located in a clean dry environment with an ambient temperature of between 5°C and 25°C

2.0 Data Cable planning

This section relates to the data cable for the connection of the addressable interfaces to the main control panel. Two way communication takes place along this cable and although the Easichack2 system protocol is extremely robust, careful attention to the following points is essential to ensure reliable operation.

2.1 Choice of cable type

The cable used to connect Easichack2 interfaces to the Easichack2 control panel must be an unscreened 2 core twisted pair cable. The recommended data cable type is **Belden type 8471**, or alternatively if a LSZH type cable is required, **Belcom cables type 4001P1644 (16AWG)** can be also used. Other cable types can be used providing they fully meet the following performance requirements:

- 1) It must be an unscreened 2 core twisted pair cable.
- 2) It is not acceptable to include additional cores, which are left unconnected or used for other systems or other Easichack2 panels.
- 3) The total capacitance of all cable connected to the data loop must not exceed 1µF, this is best verified by calculation, cable manufacturers data should specify the total core to core capacitance per km and this should then be multiplied by the total length of connected cable.

2.2 Cable volt drop limitations

The worst case volt drop between the loop terminals on the panel and any other point on the system must not exceed 10V.

For calculation purposes the average current consumption of an Easichack2 interface may be taken as 0.0012A Typical cable size for the data circuit will be 1 – 2.5mm² depending on the number of connected devices, circuit configuration and length of cable runs

2.3 Installation of data cable

1) Due to the soft addressing functionality of the Easichack2 2 System it is imperative the loop connections are as per Fig 2.1 below with a common positive connection and –Ve Loop in/out are observed. When loop connections are installed incorrectly the system will fail to soft address luminaires.

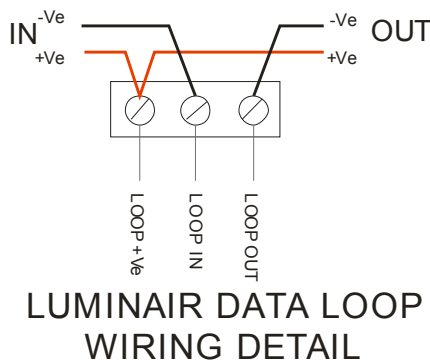


Fig 2.1

2) Avoid running the cable within 500mm of cables operating at above 240V with respect to Neutral and from heavy current switching devices such as motor control equipment.

2.4 Circuit configuration

2.4.1 Loop circuit

To facilitate the soft addressing function and improved circuit integrity of the Easichack 2 system a loop configuration must be used, however radial circuits can be utilised (see section 2.4.2 – Combined loop/radial arrangement).

2.4.2 Combined loop / radial arrangement

With this method a loop is run between the start and end terminals of the panel and the interfaces are then connected by spurs running from various points on the loop using a Spur isolator. See Diagram 2.2. Experience has shown that a combined loop circuit with multiple spurs is the simplest in terms of installation planning and fault finding. When soft addressing occurs, addressing continues from start of the loop until a spur isolator is encountered and diverts addressing sequence along the spur leg. When all luminaires within the spur have been addressed, addressing returns to the next luminaire following the spur isolator. See Diagram 2.2 for wiring detail of the combined loop/radial arrangement.

EASICHECK 2 DATABUS WIRING DETAIL

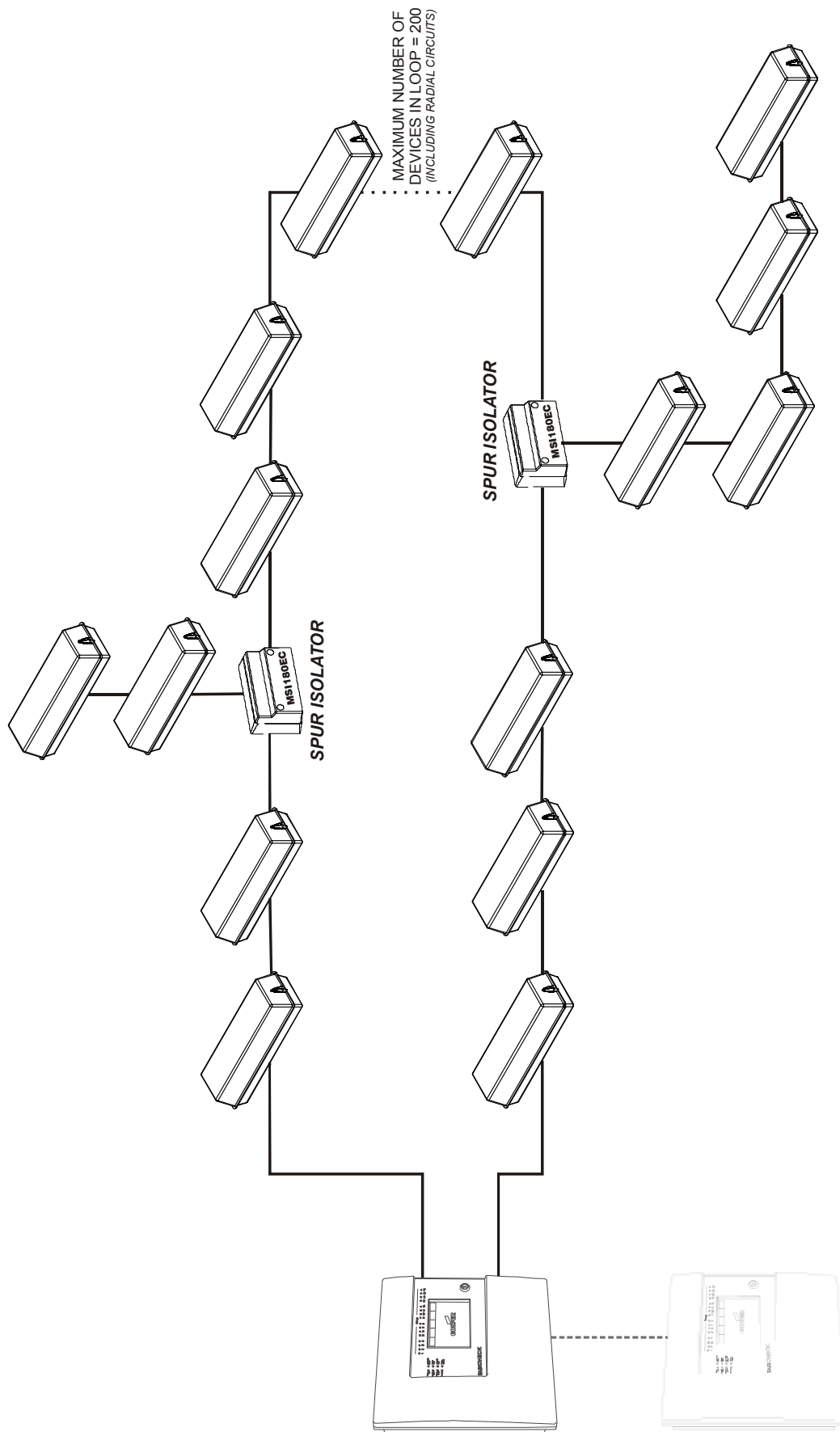


Fig 2.2 Typical loop circuit – N.B. for clarity individual conductors are not shown

2.5 Volt drop and capacitance calculations.

2.5.1 Loop arrangement

The maximum allowable volt drop to the furthest point on the system is 10V and can be confirmed using the formula below, however since the loop is driven from both ends, assume for calculation purposes that half of the current flows in each half of the loop, therefore, the current per interface can be halved.

$$\text{Max_Length_Cable(Km)} = \frac{10}{0.0012 \times \text{No.Interfaces} \times \text{cable_impedance_per_Km}}$$

It should also be noted that the resulting maximum cable length calculated will be for each half of the loop i.e. the distance will equate to the furthest point from the panel rather than the total amount of cable. Based on the suggested cable types which have a DC resistance of 30Ω / km, and assuming a fully loaded system (200 fittings) the maximum allowable cable length would be:

$$\frac{10}{(0.12 \times 30)} = 2.77\text{km}$$

This equates to 2.77km of cable on the go leg and a further 2.77km of cable on the return leg.

Verification of total capacitance.

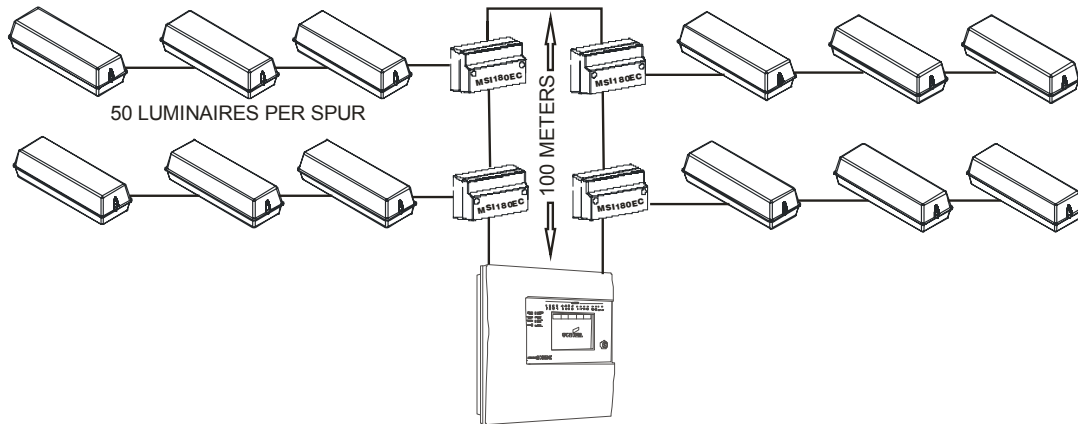
The core to core capacitance of the suggested cable is 0.11 μF / km, the maximum allowable connected capacitance is 1μF, therefore the maximum amount of the suggested cable that can be connected whilst remaining within the capacitance limit is 9km therefore the total of 4.44km would be well within the allowable limit

2.5.2 Using a combined arrangement

From the above it can be seen that a loop arrangement helps to limit volt drop but can result in large amounts of cable being installed, which increases the total amount of capacitance.

In many cases an ideal compromise will be found in the form of a combined arrangement consisting of a relatively short loop with a number of connected spurs.

Consider an installation consisting of a loop of cable which is 100 meters in length (from the panel to the furthest point) and feeds 4 spurs each having 50 connected Easichck2 interfaces.



The worst case volt drop at any point on the system must not exceed 10V, it is therefore necessary to first calculate the volt drop to the furthest point in the loop and then it is possible to calculate the allowable length of each spur based on the remaining maximum allowable volt drop.

Because the 100 Metre loop is driven from both ends, it can be assumed that half of the total current flows in each half of the loop so for calculation purposes the individual current per interface can be halved, therefore the volt drop to the furthest point will be:

No of interfaces (200) X (Current per interface X 0.5)[0.0006] X cable resistance per KM (30Ω) X distance to furthest in point km (0.1) = 0.36V.

The maximum allowable volt drop is 10V so the maximum volt drop on each spur is 9.64V. Feeding this into the standard spur volt drop calculation gives the following values

$$Max_Length_Cable(Km) = \frac{9.64}{0.0012 \times No.Interfaces \times Cable_impedance_per_Km}$$

Based on a of the suggested type, with an resistance of 30Ω / km, and 50 fittings on the spur the maximum allowable cable length would be:

$$\frac{9.64}{(0.06 \times 30)} = 5.3Km$$

Verification of total capacitance.

The core to core capacitance of the suggested cable is 0. 11 μF /Km, the maximum allowable connected capacitance is 1μF, therefore the maximum amount of the suggested cable that can be connected whilst remaining within the capacitance limit is 9km

For this example based on 5 circuits, although the maximum length of any one circuit could be up to 6.1km whilst still remaining within the volt drop limit, the total amount of cable connected to the panel must not exceed 9km in order to remain within the capacitance limit.

3.0 Short circuit isolators function (integral to luminaire)

With typical addressable testing systems, a single short circuit will completely disable communication between the panel and the luminaires. For this reason short circuit isolators are incorporated into each Easichack 2 luminaire interface and a short circuit in any section of the data loop will only eliminate one luminaire from the testing system and will be highlighted with a faulty comms error on the Easichack 2 panel. Short circuit isolators are always incorporated into the panel to provide short circuit isolation at the very start and end of the loop

In the event of a short circuit occurring, short circuit isolators at either side of the luminaire will open circuit eliminating the short circuit section of the data bus and allow all other interface s to communicate

3.1 Use of Crowbar devices

The Easichack2 data circuit operates at a nominal 24V. If mains voltage is connected to the data loop then it is likely that equipment will be damaged, and there is a risk of electric shock if the 24V circuit is inadvertently touched.

There are two potential areas of risk:

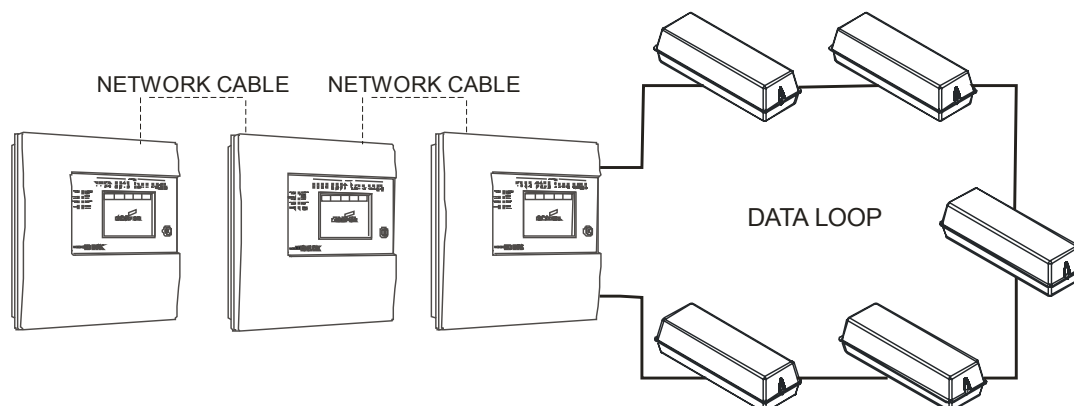
- a. If 240v is connected across the 24v circuit equipment will be damaged due to over-voltage.
- b. If one side of the 24v circuit is connected to 240v all the equipment becomes live.

The connection to mains may be from a wiring error, damaged insulation or water ingress. Crowbar devices (EC210) constantly monitor the voltage of the data circuit and if mains voltage is detected, the crowbar device will immediately clamp both sides of the data circuit together and then to earth, preventing any over-voltage being applied to the Easichack2 interfaces and also causing the protective device upstream of the live supply to operate. For Crowbar devices to operate correctly they must be positioned with a cable length between each crowbar unit of 500m maximum.

4.0 Networking of panels

A single Easichack2 panel can accommodate up to 200 interfaces, if a greater number are required then additional panels will be required. If multiple panels are used and there is a requirement to view the entire system status or control the entire system from a single point, then it is necessary to network the panels together. Both central battery system panels and self contained system panels can be networked together, a network can contain a mixture of self contained Easichack2 panels and Central battery system Easichack2 panels.

Self contained and Central battery system panels can be mixed in any combination subject to a maximum of 63 panels in total.
networking requires use of Easichack2 control panels that have been factory modified to make them network compatible and which are then connected together using a suitable network cable.
The network cable connects Easichack2 control panels together and should not be confused with the data cable, which connects Easichack2 control panel to luminaire interfaces.
Networked Easichack2 panels should be connected in a radial spur topology as detailed above



4.1 Network system planning

When networking the above panels there are a number of important considerations that relate to the cable type, cable length and ancillary equipment required to achieve reliable networking.

4.1.1 Recommended cable type

The recommended cable for the network connection is a **Belden cable type 8719 CL2 (screened cable)**

4.1.2 Installation of Network cable

Screen continuity must be maintained throughout the entire network circuit including at each junction point. The screen should only be earthed at the connection point provided at the first Easichack2 panel and not at any other point. The screen or drain wire of the network cable should not be considered as a safety earth and therefore should not be connected to terminals marked with the earth symbol, except at the panel, and should not be insulated with green and yellow sleeving. Where the network cable passes between buildings, screen continuity should not be maintained from building to building. A booster device must however be used irrespective of cable length and should be fitted at a suitable point in the link between buildings. The cable screen should be connected to the earth of one Easichack2 panel in each building.

4.1.3 Acceptable Cable length.

Based on the above cable, the maximum acceptable length between signal boosters is 1500 Metres. This distance can only be achieved when the above cable is used, Cooper lighting and safety does not recommend the use of other network cables.

Once the maximum cable length has been reached, a booster must be fitted which then allows a further length of the same distance (1500 Metres for the recommended cable). A maximum of 3 network boosters can be used

N.B. Easichack2 control panels do not act as boosters, therefore the location of such panels is irrelevant when calculating cable lengths and the requirement for booster devices. For convenience when using 24V boosters (see following) it may be desirable to house the booster near to an Easichack2 panel to derive a convenient power supply.

4.1.4 Central Reporting

With a networked system, any luminaire or system fault that occurs, is transmitted around the system and displayed on every panel connected to the network. A fully loaded networked system could contain as many as 63 panels each with up to 200 connected fittings giving a maximum system capacity of 15,750 fittings. Easichack2 panels have only limited capacity for storing and displaying

fault information, and whilst this is perfectly adequate for most normal projects, on large projects where full central reporting is required, a central computer system should be incorporated. Cooper Lighting and Safety offer a choice of two computer software packages, either site monitor or colour graphics software.

These software systems are purpose designed for this application and can accept, handle summarise, filter, display and store all information from even the largest of projects.

This provides a simple clear overview of the status of the emergency lighting system on even the very largest of projects. Both of these systems are supplied complete with all necessary software and externally mounted hardware to enable installation onto a host computer that is normally provided by others. Site monitor is a standard text based off the shelf package, all device status and location information is collected directly from the network so no setting up or programming is required. The colour graphics package is a bespoke system designed to show the physical location of system components which are in need of attention on a series of maps. These systems utilise site specific maps and are quoted on a project specific basis

There is no set point at which these systems must be used, but as a rule of thumb, on a networked system that has a total of more than 500 fittings and a requirement for central reporting of the entire system status, a computer software package is highly recommended.

4.2 Booster devices

Two types of booster are available, both have a similar function except that one is powered by a 24V supply and the other is powered from a local mains supply. However it should be noted that the network will cease to function if the booster loses power therefore for most applications the 24V device would be more suitable and would be connected to a battery backed supply such as the auxiliary DC output of an Easichack2 panel. Booster Device details

Part number Description

| Part Number | Description |
|--------------------|----------------------|
| 7660-3250 | 24V LONWORK REPEATER |

4.3 Non Standard networking options

The standard method of networking Easichack2 is by means of a hard wired connection as detailed above. For applications where this is not suitable, other options are available consisting of either Fibre optic or TCP/IP interfaces.

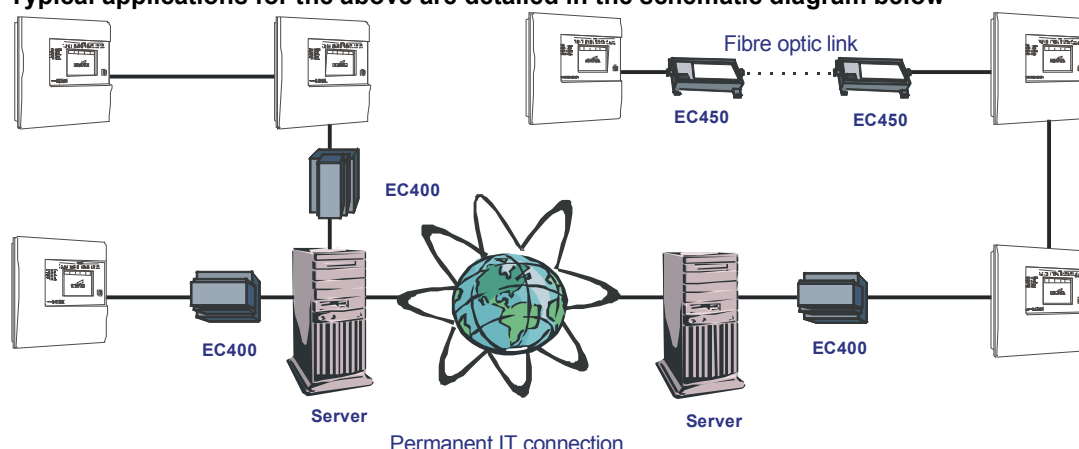
4.3.1 LON to TCP/IP interface (EC400)

This device enables an Easichack2 Network circuit to be connected into the IT infrastructure of a site and then to re-emerge later via a second TCP/IP to LON interface at a further point whereby it reverts to a hard wired connection. Providing a suitable permanent IT connection is available, this facility enables Panels located in different buildings to communicate with each other without the need for a dedicated hard wired link between the panels.

4.3.2 LON to fibre Optic interface (EC450)

This device offers a similar facility to that of EC400 except that the connecting medium between the two devices would be a fibre optic link as opposed to an IT network or the internet. Easichack2

Typical applications for the above are detailed in the schematic diagram below



5.0 Device programming

As an alternative to soft addressing as a means of automatically assigning an address to each luminaire it is possible for Easichck2 interfaces to be programmed manually using CF800ECPROG programmer. Once the system has been commissioned and location text has been assigned to each address, the Easichck2 system is then able to identify the physical location of any luminaires requiring attention. If manual programming of Easichck 2 interfaces is required it is the responsibility of the system installer and should be carried out as the luminaires are being installed. Interface programming is achieved by means of a custom designed hand held programmer unit supplied by Cooper Lighting and Safety, +Ve and -Ve connections of the hand held programmer are connected to the data input connections of the interface to enable two way communication to take place between the programmer and the interface.

Programming of interfaces must be carried out before connecting the data cable to the interface.

Luminaires must never be programmed with the data cable connected, as this will cause the same address number to be programmed into multiple luminaires resulting in system malfunction. When planning the programming of a system, it should be noted that address numbers should be used in order, i.e. no gaps in the address number sequence are allowed, and care should be taken to ensure that no addresses are duplicated.

IMPORTANT NOTE

To avoid confusion; it is essential that drawings are marked up prior to commencing programming and installation with detail indicating the address number to be used for each emergency device and cable as-fitted drawings be kept. It is then possible during installation and programming to verify that the correct device with the correct address number is installed at each location. Commissioning and installation fault finding will be greatly simplified if luminaires are installed such that the address numbers follow a sequential order. Please note Cooper Lighting and Safety Commissioning does not include for fault finding, identification or rectification of installed components and should be error free prior to attendance to site.

5.1 Device labelling

After a device has been programmed a label should be affixed to the device recording the details of the address number of the device and the panel number to which it has been connected.