Technical Information

intelligent build
smart homes
lighting control solution
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C-Bus Wireless System Operation

The C-Bus Wireless product range incorporates a family of C-Bus Radio Frequency (RF) devices, including Wall Plates, Plug Adaptors, Remote Control and a Gateway to Category 5 Wired C-Bus units.

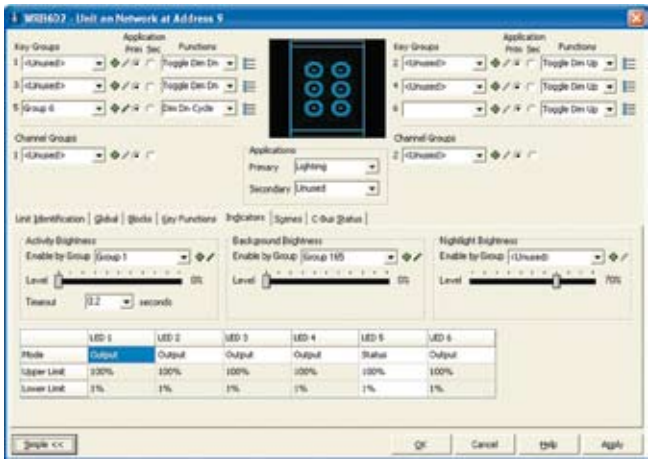
C-Bus Wireless Wall Plates are designed to easily replace standard, 240V wall switches. They incorporate patented Clipsal technology and are two wires devices requiring no Neutral (240VAC Active and Load connections only).

All C-Bus Wireless units incorporate Clipsal C-Bus' unique Learn Mode functions for programming devices. Wall Plates, Plug Adaptors and the Gateway unit can also be programmed via the C-Bus Toolkit software. Multiple C-Bus Wireless units can be linked into a common network using Learn Mode or the C-Bus Toolkit software.

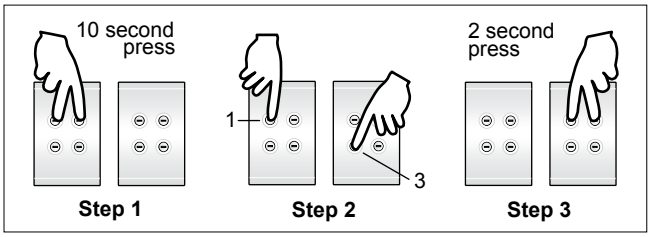
Associations can be created between buttons on multiple units, so that a button press on one unit will operate a button on another (and the connected lights or other electrical devices).

C-Bus Wireless units include scene capabilities, which allow the user to perform a series of actions across multiple outputs by pressing a single button. For example, on arrival home a home owner could use a scene to switch on lights in the hallway, kitchen and lounge, and also switch on a heater.

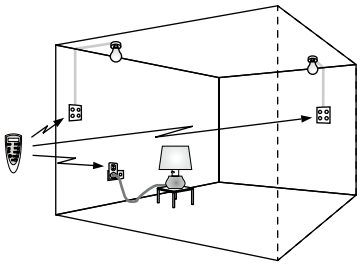
The diagrams below show two of the many possible basic C-Bus Wireless unit installations. Room A uses stand-alone units, which can be switched via the Wireless Remote Control. Room B uses networked units where buttons on one unit can operate other units or trigger scenes.



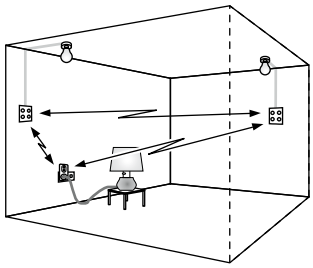
Programming a C-Bus Wireless via C-Bus Toolkit Software



Grouping C-Bus Wireless Units via Learn Mode



Room A
Standalone C-Bus Wireless Units



Room B
Networked C-Bus Wireless Units

C-Bus Wireless System Operation

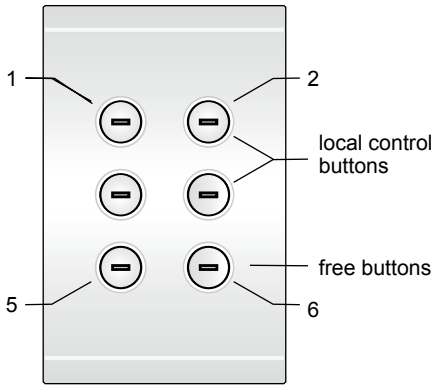
Basic Operation

Buttons on a Wireless Wall Plate or Plug Adaptor are organised in pairs that control the output channels (local control buttons). Remaining pairs (free buttons) are used to control outputs on other units when multiple C-Bus Wireless units are configured as part of a network. For example, the figure below shows a 6 button, 2 channel ULTI Wireless Dimmer unit. Its buttons perform the following functions:

- Buttons 1 and 2 control the first channel. (A quick press on either button toggles the channel on or off. A long press on button 1 or 2 dims down or up respectively).
- Buttons 3 and 4 control the second channel.
- Buttons 5 and 6 are unused when the unit is used as a stand-alone unit. They may be used to control outputs on other units when part of a multi-unit network.

When a C-Bus Wireless Wall Plate or Plug Adaptor unit is first installed, it functions as a stand-alone unit. In this basic default mode, the unit functions as a dimmer or switch, depending on the model.

C-Bus Wireless Plug Adaptors have one output channel (a single, 240VAC socket) and two buttons. Wall plate units are available in one or two output channel versions, with two, four, six or eight buttons (eight button, NEO only). Each channel controls one or more lights or other electrical devices connected to its output.



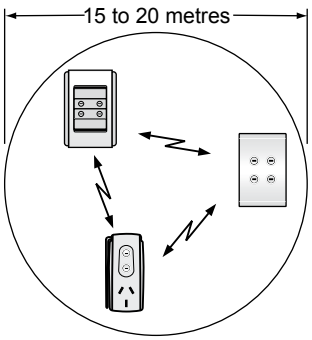
Two output channels

C-Bus Wireless Networks

To experience the full capabilities of wireless operation, C-Bus Wireless units must be linked together to form a network.

To communicate with each other, units within the same network should be located within 15 to 20 meters of each other. This distance depends on building materials used.

Up to 30 units may be connected within the same C-Bus Wireless network.



C-Bus Wireless Network Security

C-Bus Wireless units can optionally use 128-bit encrypted messages to communicate with each other. This results in a highly secure network.

Nearby C-Bus Wireless Networks

It is possible to have several separate networks present alongside each other without interfering, as each separate C-Bus Wireless network has an automatically assigned, unique 'House Code'.

C-Bus Wireless Modes of Operation

C-Bus Wireless units have five major modes of operation.

Mode 1

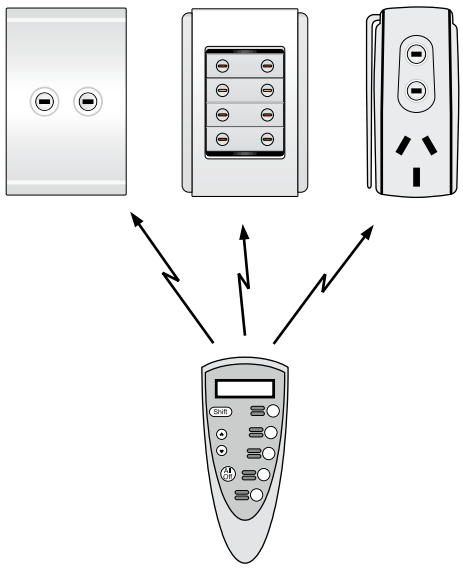
Stand-Alone Mode

In this mode, C-Bus Wireless Wall Plates and Plug Adaptors acts as stand-alone dimmers or switches and make no use of the inbuilt wireless capabilities. No setup is required for this mode, Plug Adaptors simply plug into the mains, and Wireless Wall Plates are installed by a licensed electrician in place of existing wall switches. The buttons on the units control the local dimming or switching channels of the unit only.

Mode 2

Simple Remote Controlled Mode

In this mode, a C-Bus Wireless Wall Plate acts as a standalone dimmer or switch and a C-Bus Wireless Remote Control operates the Wall Plate from a distance. This mode is simple to set up and is suitable for small installations where networking is not needed. C-Bus Wireless Wall Plate or Plug Adaptor units are controlled using a C-Bus Wireless Remote: In this mode, the buttons on the Wireless Wall Plate control the local dimming or switching channels of the unit, and the Remote Control is linked to buttons on a Wall Plate using a Learn Mode operation. No PC is required.



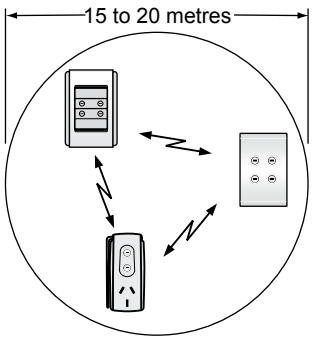
C-Bus Wireless System Operation

C-Bus Wireless Modes of Operation *(cont'd)*

Mode 3

Networked Mode

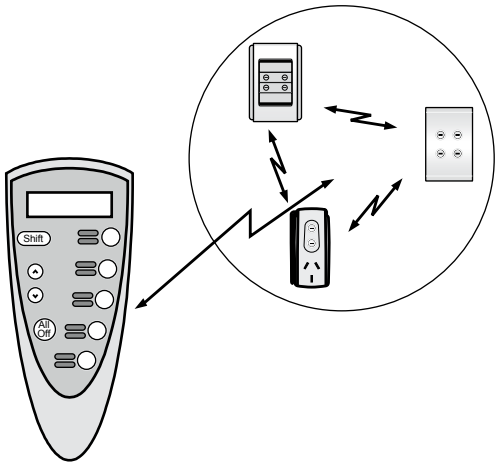
In this mode, a C-Bus Wireless Wall Plate acts as a dimmer or switch and multiple C-Bus Wireless units can be linked to each other with the C-Bus Wireless technology. This mode is simple to setup, and is suitable for more complex installations. In this mode, local control buttons control the dimming or switch channel of the unit, and may also control other C-Bus Wireless units. Free buttons can control the dimmer or switch channels of other units via a C-Bus Wireless network established using Learn Mode operations. The operation of buttons is set using Learn Mode operations or using the C-Bus Toolkit Software.



Mode 4

Networked with Remote

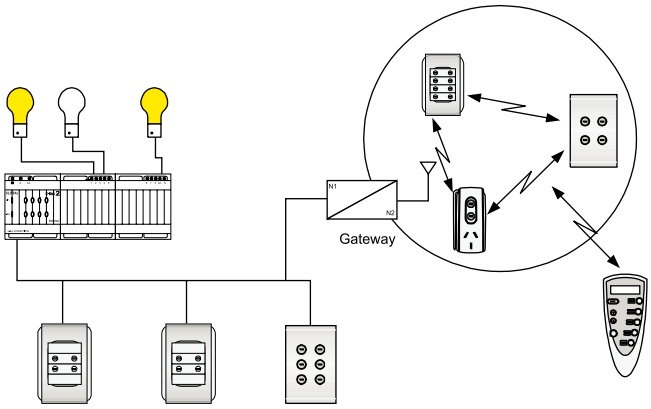
In this mode, a C-Bus Wireless Wall Plate acts as a dimmer or switch and multiple C-Bus Wireless units can be linked to each other with the C-Bus Wireless technology. Local control buttons control the dimming or switch channel of the unit, and may also control other C-Bus Wireless units. Free buttons can control the dimmer or switch channels of other units via a C-Bus Wireless network established using Learn Mode operations or C-Bus Toolkit software. Buttons on the Wireless Remote are linked to Wall Plate and Plug Adaptor buttons as desired.



Mode 5

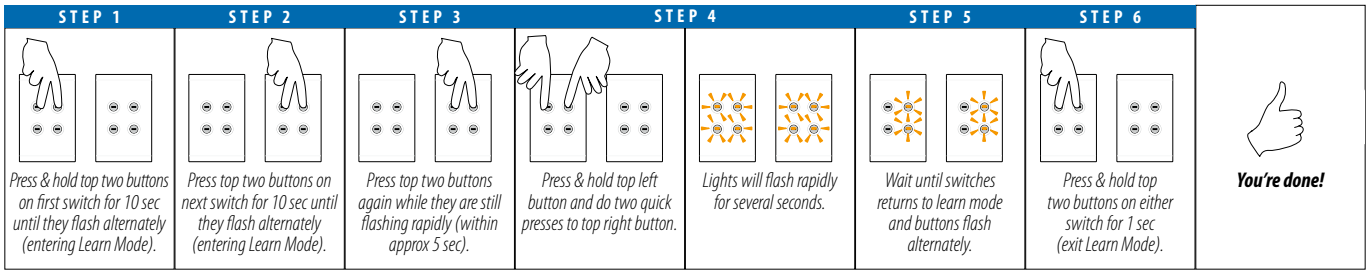
Networked Mode in Combination with Category 5 Wired C-Bus Units

The C-Bus Wireless Gateway is used to link a C-Bus Wireless network to a C-Bus Category 5 wired network. It is functionally equivalent to a C-Bus Network Bridge. Using the Gateway, C-Bus Wireless and Category 5 networks can communicate and interact with each other. Both Wireless and Category 5 networks use the same command structure, and are 100% compatible.



C-Bus Wireless Quick Start Guide

Creating Your Network *(getting your units to talk to each other)*

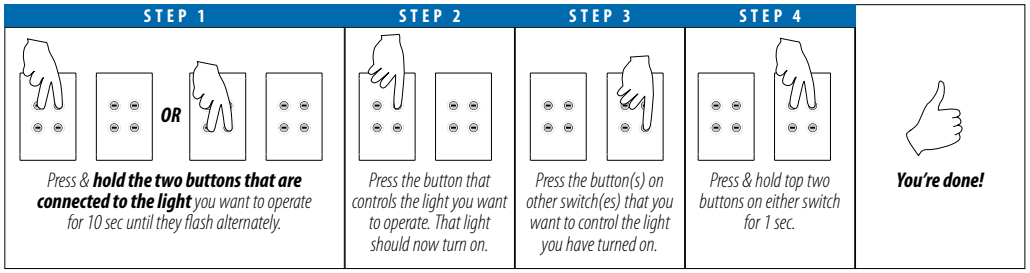


Quick Tips

- When a switch is put into learn mode the buttons will flash rapidly for approx 5 sec - this is normal.
  It is best to wait for them to flash slowly before performing your next task unless specified (such as step 3 above).
- You can network more than one switch at a time - repeat steps 2 and 3 on following switches before performing steps 4 to 6
- Network a plug adaptor exactly the same way as a switch - the buttons are just vertical instead of horizontal.
- Once all of your switches are networked they will all automatically go into learn mode the next time it is entered on one of the switches.
- It is best to network all of your switches and plug adaptors before moving on to grouping buttons and creating scenes.

Grouping Buttons *(getting a button on one or more switches to turn on a light on another switch)*

IMPORTANT: If your switch controls two separate lights, you MUST enter learn mode using the two buttons that are connected to the light you wish to control.



Quick Tips

- You can turn on a light from several switches - repeat step 3 on other buttons you would like to operate the light before performing step 4.
- If the grouped buttons flash after performing step 3, it means you have held the button too long and it has become a timer.
  If this happens, simply press it twice. This will unnasign the button as a timer it, and reassign it as a group.
- If learn mode is entered on a switch whose lights have been used in a group, those buttons will become illuminated after a few seconds instead of flashing alternately.

C-Bus Wireless Quick Start Guide

Creating Scenes *(dimming and turning several lights on or off with the press of one button)*

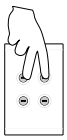
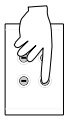
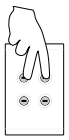
IMPORTANT: Before you can create scenes you must:

Part 1: Create a Scene Button as per below

Part 2: Ensure that any buttons that will be included in your scene have either been used in a "group" as per above "Grouping Buttons" section OR "grouped to itself" as per Step 2 below. This is because buttons require an individual "ID" number to be included in a scene which is only given to a button when it is used in a group or grouped to itself.

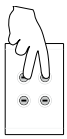
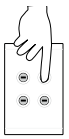
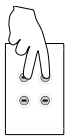
Part 1 - Create your Scene Button

Creating the button you want to control your scene.

STEP 1	STEP 2	STEP 3	
			
Press & hold top two buttons for 10 sec until they flash alternately.	*Double quick-press the button you want to control your scene.*	*Press & hold top two buttons for 1 sec.*	***You're done!***

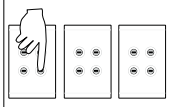
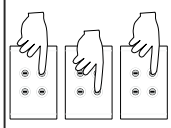
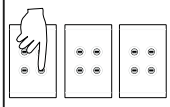
Part 2 - Grouping a Button to "itself"

Creating an ID number - if button has not been included in group.

STEP 1	STEP 2	STEP 3	
			
Press & hold top two buttons for 10 sec until they flash alternately.	*Press the button you want to "group to itself".*	*Press & hold top two buttons for 1 sec.*	***You're done!***

Part 3 - Create your Scene

Now that you have created your scene button and made sure all of your buttons have their own ID number - it's time to create your scene.

STEP 1	STEP 2	STEP 3	
			
Press & hold the scene button for 10 sec until it flashes (entering Scene Learn Mode).	*Turn on any lights to the desired level for your scene. This may include plug adaptors with lamps.*	*Press the scene button for 2 sec (exit Scene Learn Mode).*	***You're done!***

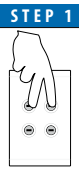
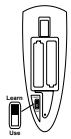
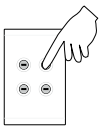
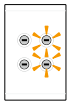
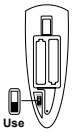
Quick Tips

- If a light you have included in your scene does not turn on it may mean it has not been "grouped" - see "Important, Part 2" section above.
- To create an "all off" button for when you go to bed or leave the house, put the scene key into learn mode, then go around your house and turn every light on then off, then exit scene learn mode. The scene button will now turn every light off in your home with one press.
- Why not create an "all on" scene in your bedroom as an emergency panic button.
- Another great idea is a dimly lit scene in your hallway for when you get up at night to check on the kids.

C-Bus Wireless Quick Start Guide

Programming Your Remote Control

(getting the buttons on your remote control to turn your lights on and off)

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	
							
Press & hold top two buttons on any switch for 10 sec until they flash alternately.	*Remove the remote back cover and slide switch to the "learn" position.*	*Press the button on the remote you want to control your light.*	*Press the button on the switch that you want to control with your remote.*	*Wait until switches return to learn mode and buttons flash alternately.*	*Press & hold top two buttons for 1 sec.*	*Slide switch to "use" mode and replace back cover.*	***You're done!***

Quick Tips

- To program other remote buttons at the same time, simply repeat steps 3 to 5 before performing steps 6 and 7.
- If you want to reassign a remote button that you have used previously, you must first clear it by doing steps 1 to 2 above, then press the remote button you wish to clear, then do quick double press on any button on the switch.
- The "scene" button on the remote allows each remote button to perform a second function. To program the second function, simply press the "Scene" button so that two light bulbs appear in the remote's blue display immediately before performing step 3 above.

C-Bus Enabled Program

The C-Bus Enabled program is Clipsal's Open Systems program for third party developers and manufacturers, who wish to develop and integrate C-Bus compatible products and software applications. The C-Bus Enabled program ensures 100% compatibility between applications and products developed by third parties and existing products. It also facilitates the successful and seamless integration between the robust and reliable C-Bus protocol standard with other third party protocols.

Companies that develop products and software programs which meet the requirements of the program, and which have been certified by Clipsal, may use the C-Bus Enabled logo on their equipment.

As part of this program, Clipsal has developed new applications and messaging structures that support third party applications such as security and access control, metering, heating, ventilation and air-conditioning control and others. The Clipsal C-Bus control system is widely recognised as the Asian standard for control system architecture, with local manufacture of products and technical support in this region. C-Bus is a low cost, microprocessor based, distributed intelligence system, with patented message structure realising high reliability and robust communications between devices.

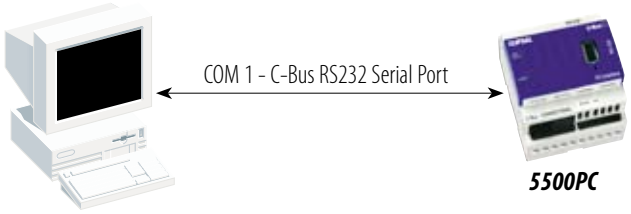
C-Bus Protocol

The C-Bus protocol is designed on the International Standards Organization (ISO) 'Open Systems Interconnection' seven-layer reference model for communication protocols. The protocol utilises high speed, full duplex communications and provides constant feedback on the operational status of inputs and outputs, including the ability to interrogate the status of specific modules. The protocol utilises communication algorithms based on Synchronous Carrier Sense, Multiple Access with Collision Detection, implemented with Collision Avoidance (CSMA/CD-CA) standards (IEEE Standard 802).

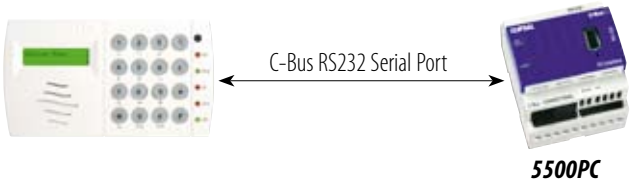
Serial Integration

The serial C-Bus protocols permits third parties to develop software to interface to the C-Bus via the serial RS232 communications port. The C-Bus protocol document defines the message syntax, to issue commands and retrieve status directly from the C-Bus, via the C-Bus PC Interface. This technique of interfacing is particularly useful between C-Bus and microprocessor embedded applications such as security systems, building and home controllers and HVAC equipment for instance.

Example 1: PC to C-Bus Integration



Example 2: Security to C-Bus Integration



Hardware Integration

The C-Bus Enabled program permits the direct implementation of the C-Bus core onto third party equipment. Clipsal have developed a masked processor with the embedded software core, which permits third parties to develop "input and output modules" such as switches, sensors, dimmers, relays and dimmable electronic ballasts. The C-Bus input and output cores consist of all the electronic interface circuitry, network impedance matching components, and C-Bus transceivers to provide full C-Bus integration.

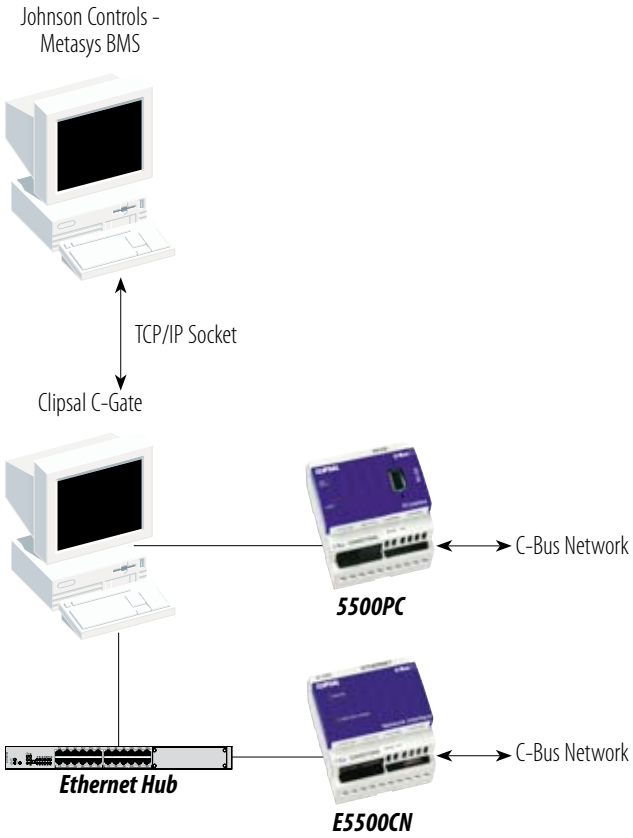
C-Bus Enabled Program

Software Integration

C-Gate

C-Gate, Clipsal's server application is a software application that provides a computer database model of the C-Bus network. When installed on a computer, C-Gate automatically models the C-Bus networks attached to it, any changes to the network or network parameters are automatically updated in the C-Gate database. C-Gate provides a high level interface to third party programmers, diminishing the need for software developers to know the C-Bus protocol. C-Gate is written in Java, and is fully compatible with Windows, Linux and Unix operating systems. C-Gate may be embedded into third party applications and is ideal for interfacing between building management system software and C-Bus for instance, and provides the gateway between C-Bus and other protocols. Clipsal C-Gate is a software program available in various network configurations, pricing is available through Clipsal Integrated Systems.

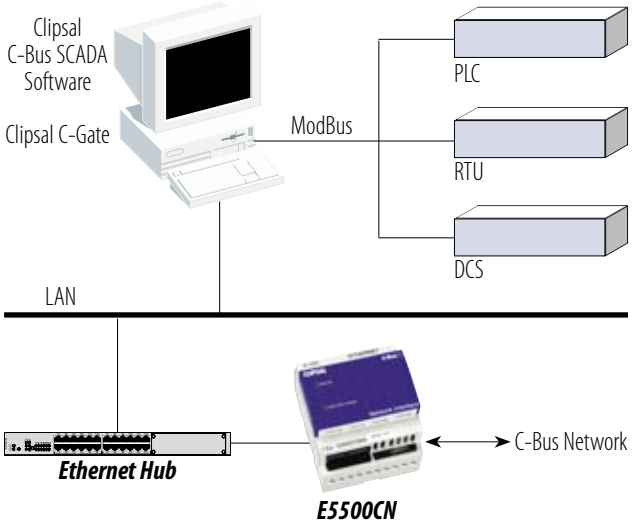
Example 1: BMS to C-Bus Integration



C-Lution

C-Lution, Clipsal's SCADA software includes a driver library to interface with proprietary equipment such as Building Management Systems (BMS), Programmable Logic Controllers (PLC), Remote Terminal Units (RTU), etc. Over 130 3rd party hardware and software protocols are available for integration. C-Lution supports data exchange between applications via OPC (open access to field data), ODBC (import/export data in standard database formats), DDE and API.

Example 2: C-Lution SCADA - 3rd Party Network Integration



How To Apply

The C-Bus Enabled Program is open to all third party companies who have a desire or need to interface to the industry standard C-Bus control system. The serial protocols and C-Bus core are available through Clipsal Integrated Systems. Companies must first make an application to Clipsal, and must enter a confidentiality agreement. Clipsal provides technical support and ongoing updates to the C-Bus documentation to all registered companies and provides the certification for the C-Bus Enabled Program.

C-Bus Design Guide

1 Introduction

The C-Bus System

Clipsal C-Bus is a control system that can be used to control lighting, electrical equipment, audio-visual equipment and other electronic systems in commercial, hotel, industrial and residential installations. A reduction in the amount of mains cabling, reduced installation times, energy savings and extra control system functionality make C-Bus a cost effective alternative to conventional wiring. C-Bus is a microprocessor based system and requires an installer to program the operating variables and control relationships between C-Bus Units. This guide outlines a suggested method for design and installation using C-Bus, and should be read in conjunction with the C-Bus Technical Manual (5000M/2), which provides a detailed overview of the C-Bus system.

Objective

This guide provides a system to aid C-Bus designers; to design and plan C-Bus installations. Additional technical support is offered by Clipsal Integrated Systems offices. If assistance is required, contact your local CIS office.

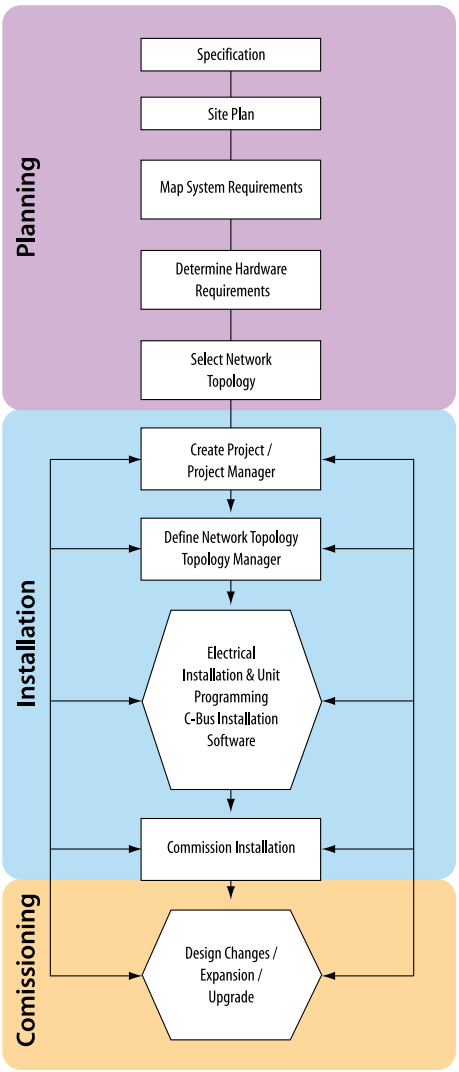
System Requirements

The first step in using C-Bus is to define what is required of C-Bus; that is, how devices and electrical loads are to be controlled and what features are required by the installation.

2 Methods of System Design

Design Philosophy

There are several methods of designing and installing C-Bus. An overview of the installation approach is shown below.



C-Bus Design Guide

2 Methods of System Design

Installation Approach

Planning and Design

The most important phase of any C-Bus installation is in the planning and design of the system. Accurate planning requires a good understanding of the capabilities of the system, and the requirements of a successful installation (refer to the Design Checklist). It is also an advantage to fully define the functional specifications for the installation before design work begins. In this way, designers can realise the full potential of the C-Bus system, and get maximum performance from it.

The planning phase usually involves mapping the system requirements, and determining the hardware needs of an installation. Thought should be given as to the placement of the hardware, and the cabling requirements. Programming & functionality requirements should also be fully investigated at this stage. Strict adherence to any documentation procedures is necessary.

Installation

Once the design phase has been completed, installation may begin. Several simple steps are typically followed:

- Implementation of Programming Requirements of the Design on a Personal Computer (Build C-Bus Database).
- Unit Initialisation and Programming (One at a Time).
- Cabling and Electrical Installation of the Hardware.
- Finalization and Further Programming of Units on the Network as required.

The details of the design are first input into a personal computer using the C-Bus Installation Software. Hardware should then be initialised (on a Unit by Unit basis). This involves the assignment of a Unit Address to each Unit, one at a time. In this way Units can be uniquely identified once installed on the Network. It is recommended that each Unit be clearly labeled for easy identification before final electrical fitting takes place. Testing and any further programming may be undertaken at this time, or tackled once all Units have been physically installed.

Commissioning

Subject to compliance with the specification, the system may now be commissioned. Modifications or design review can be undertaken at any time, often requiring programming changes only. A well designed system should seldom call for the installation of new hardware, except where revised specifications dictate the necessity.

Programming Principles

All C-Bus devices require programming (with the exception of Power Supplies). This is achieved by dedicated software running on a Personal Computer.
Unit programming is carried out to achieve the following objectives:

- Create/Define Units on the C-Bus Network
- Identify each Unit using the C-Bus addressing convention
- Create/Define/Edit control relationships between Inputs and Outputs
- Edit Unit operating parameters

The operating parameters vary from Unit to Unit, depending on it's type. They include:

- Key Functions
- Timer Functions
- Dimming Functions
- Toggle (On/Off) Control
- Preset Levels
- Custom/Other Functions
- Output Switching Logic Assignments
- Power Fail Recovery Status
- Power Up Sequences
- Dimming Rates
- Indicator Options
- Sensor Switching Conditions
- Override Controls (Enable/Disable)
- Error Status Options

C-Bus Design Guide

3 Implementing C-Bus Designs

Addressing Conventions

Introduction

Once a basic list of hardware requirements has been established, planning of the programming requirements of an installation can begin. The C-Bus system uses a simple addressing scheme to identify Units, Groups, Applications, Areas, and Networks. The purpose of each parameter will be discussed in the next section.

Group Addressing

The Group Address is usually related to the output connected to the terminal of the Output Unit. Hence the Group Address should accurately describe the load or device being controlled. Alternatively, numerical designators can be used for describing outputs such as lighting circuits. Up to 255 Groups in a single C-Bus network can be defined (255 minus the number of Area Addresses defined).

Valid Group Address description include:
- Bedroom Lights
- L4-2B
- Main Office Lights
- A4-2L-3
- Pool Pump

The default Group is "Unused".

Area Addressing

The Area Address is a convenient method of addressing multiple output channels collectively. Large areas consisting of many Units may be controlled from a single point on the C-Bus system. Individual loads (Groups) can still be controlled. Each Unit (Inputs and Outputs) in a control area must be assigned the same Area Address. The Area Address must be unique and must not be repeated as a Group Address in that Application or Network. Up to 255 Areas can be defined (255 minus the number of Group Addresses defined).

Examples of valid Areas are:
- House Lights
- Banquet Room Lights
- Outside Lights

The default Area is "Unused".

Application Addressing

Applications are used in the C-Bus system to divide the Network into independent functional systems. All Group Addresses in any Unit are associated with that Unit's Application, and commands issued by an Input Unit will affect only Output Units with matching Application and Group Addresses. Up to 255 Application Addresses can be used. By default, two Applications have been defined: Lighting and Heating. Clipsal Integrated Systems has reserved and defined commands for other Applications such as security and metering, for more information contact Clipsal Integrated Systems. The installer has the facility to define other Applications.

Input Units and Output Units within one Application will operate independently of other devices in another Application, even if Group Addresses are repeated across Applications on the same Network.

Examples of valid Applications are:
- Lighting
- Heating
- Air-conditioning
- Security

The default Application is "Lighting".
The default Group is "Unused".

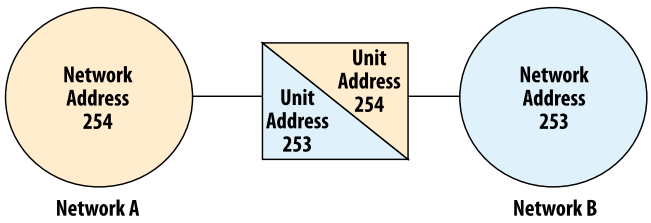
Network Addressing

The Network Address is used to identify Networks in a Multi-Network C-Bus installation. Each Network may be interconnected using a C-Bus Network Bridge.

The Unit Address of the Network Bridge must match the Network Address of the adjacent Network. This applies to both sides of the Bridge, and is required to successfully establish communications between these Networks. The C-Bus Installation Software automates this task by reserving Network Addresses for use as Network Bridge Unit Addresses. This is achieved using the configuration information as defined by the Network Topology. In practice the Network Address describes a physical region, area or entity. Up to 255 unique Network Addresses can be defined.

Examples of valid Networks are:
- First Floor
- Movie Theatre
- My House
- Building 12A

The default Network is the "Local Network".



C-Bus Design Guide

3 Implementing C-Bus Designs *(cont'd)*

Assigning Addressing

The C-Bus design requires that all Units on the Network are uniquely identified by a Unit Address. Loads must also be assigned a control Group Address. Various methods of assigning addresses and their descriptions are now discussed.

Grid Method of Addressing

The Grid Method is the procedure whereby Unit Addresses are conveniently allocated to C-Bus Units as a function of physical location in the installation. A grid consisting of 10 columns by 10 rows is superimposed over the site plan locating C-Bus Units and loads. This defines the Unit Addresses.

This method does however have limitations, when:

- Two or more Units are located in the same physical grid co-ordinate.
- The grid size exceeds 10 columns by 10 rows, for large or diverse projects (more than the maximum 100 Units are required for multiple Network installations.)

When the Grid Method becomes insufficient, alternative methods need to be explored.

Systematic Address Allocation

Unit Addresses are assigned in an ascending order on an installation plan, traversing left to right, up and down. This process is repeated systematically until all Units are covered off.

Reserved Addressing (Recommended)

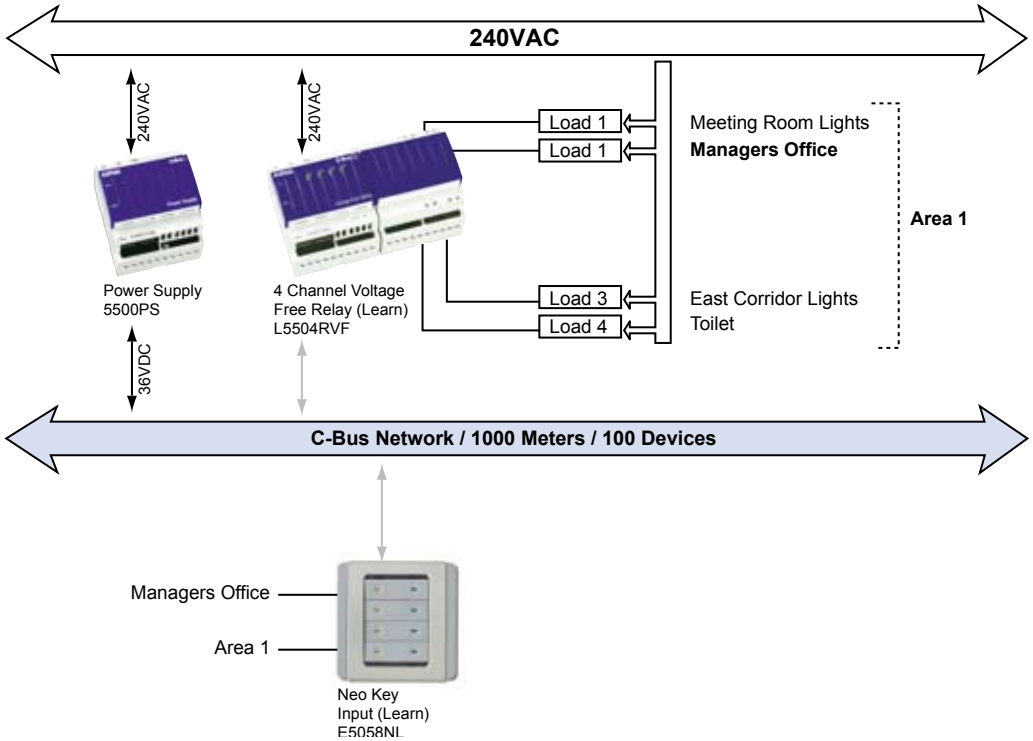
With 255 unique three digit decimal Unit addresses available to the designer, an allocation or block of numbers could be assigned to specific C-Bus device types. This is known as 'Reserved Addressing'.

A typical Reserved Addressing scheme is shown below;

- PC Interface* 000
- Four Channel Relays 010-019
- Four Channel Dimmers 020-029
- One Gang Key Inputs 030-039
- PIR Occupancy Sensors 040-049 etc. . .

** The PC Interface must be allocated the Unit Address 000 in every Project.*

C-Bus Addressing - Example Configuration



C-Bus Design Guide

4 Specifying Large Installations

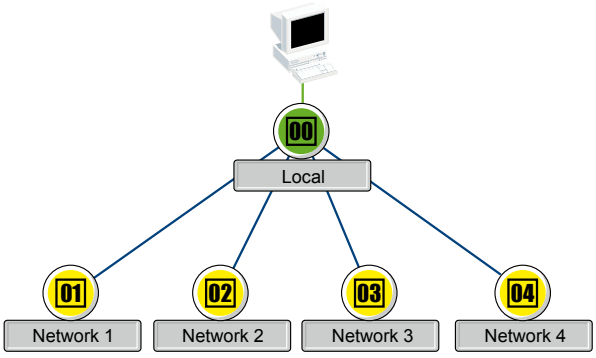
Multi-Network Installations

The C-Bus system has been designed for a maximum number of 100 Units on each Network. When an installation requires control exceeding this number then Networks may be interconnected with the use of C-Bus Network Bridges or C-Bus Ethernet Network Interfaces.

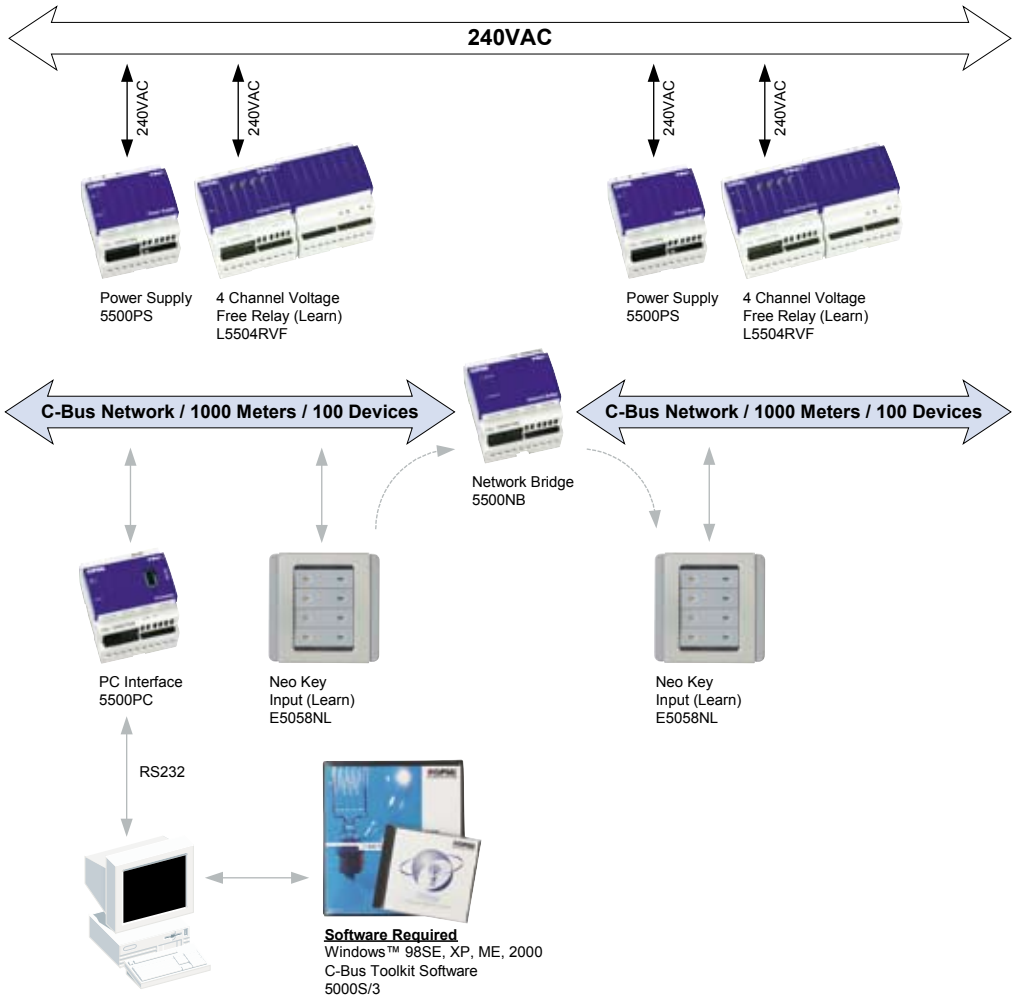
Procedures and Design

The design process and procedures are the same as previously discussed. Each Network and its operation needs to be defined separately. By partitioning the design, sub-systems can be defined and programmed in a systematic process. The way in which the Networks are interconnected is called the Network Topology. When using Bridges, it is recommended that attempt be made to minimise the 'depth' of the Network Topology. Minimizing the depth ensures faster communications between the Local Network and Remote Networks. It is further suggested that in such applications the Local Network functions purely as a 'Backbone Network', servicing all other Networks, with no active Input or Output elements ie, the Local Network consists of the; PC Interface, Power Supplies, and Network Bridges.

C-Bus Network Interfaces can also be used when large systems are required. The C-Bus Network Interface is a 10-Base T Ethernet compliant device. This allows a C-Bus network to be connected to an Ethernet network. In this approach each C-Bus network is treated as a separate network and the only limitations to system design are PC hardware resources (memory) and network bandwidth, dependent on the response times required. For large systems where central control with real time response is required, the C-Bus Ethernet Network Interface approach is recommended.



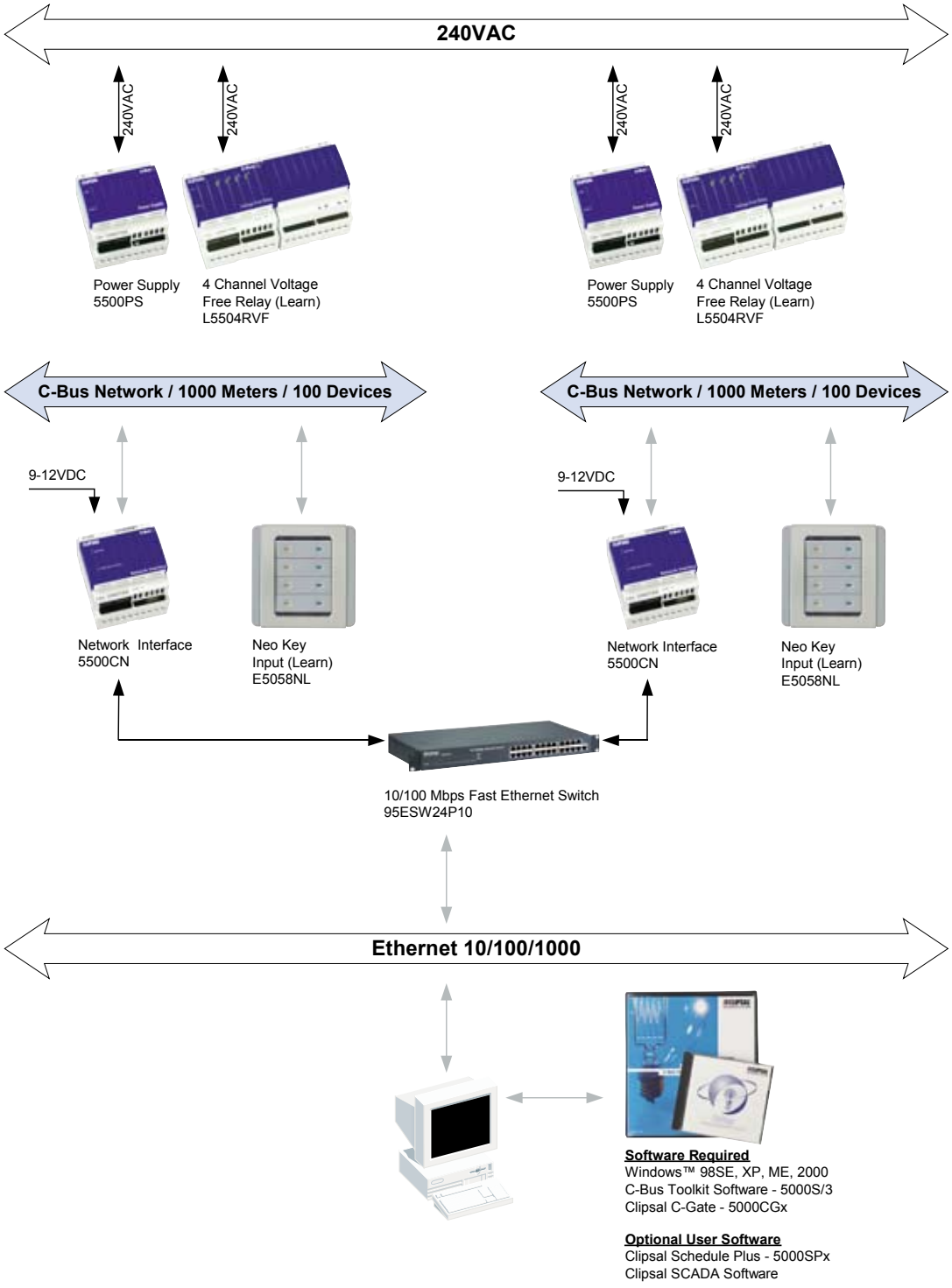
C-Bus Network Bridge Interface Architecture



C-Bus Design Guide

4 Specifying Large Installations *(cont'd)*

C-Bus Ethernet Network Interface Architecture



Software Required
Windows™ 98SE, XP, ME, 2000
C-Bus Toolkit Software - 5000S/3
Clipsal C-Gate - 5000CGx

Optional User Software
Clipsal Schedule Plus - 5000SPx
Clipsal SCADA Software

C-Bus Design Guide

5 Design Documentation

Documenting Hardware Installation

As with any conventional electrical installation, documentation of the details of the design are required. This documentation is not only used throughout the planning stages, but also provides an invaluable record as to the placement of hardware, and the cabling structures employed. In addition, vital information may be communicated between the designer or the specifier, and the installer, where contract labour is to be utilised.

Documentation of the hardware installation is usually best achieved through CAD generated site drawings, presented in the conventional industry standard format. The following drawing shows an example of a typical installation plan. The drawing shows product to be installed, and their location. Switching and other control relationships are also depicted using easily decipherable conventions similar to those used for conventional wiring.

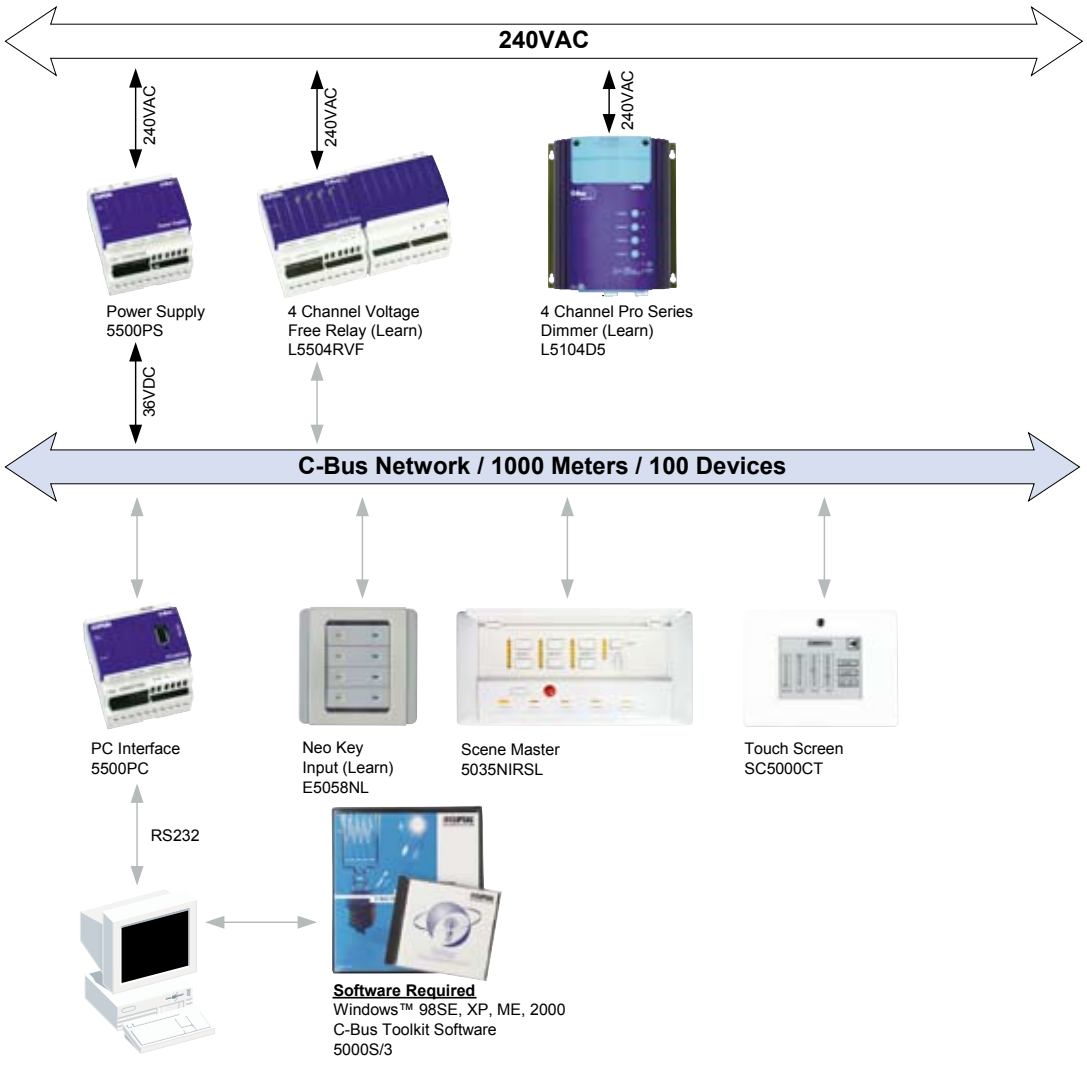
Documenting Programming Requirements

All C-Bus programming requirements for any given project can be specified during the planning process. This allows 'on-paper' design of the Unit configuration, and can form a part of the documentation retained as a matter of record once the installation has been completed. Typically tables are used to specify all Units required for the installation, and can further be used as a template for the allocation of addresses. Control relationships can easily be established, and basic operating parameters dictated. Programming the Units on a C-Bus Network then becomes a simple matter of transferring the design information from paper, to the PC using the C-Bus Installation Software, and downloading to the hardware.

There is a different template for each different C-Bus device type, where appropriate controls that are relevant for that type of Unit are presented.

6 Programming Methods

There are three preferred methods for programming the C-Bus modules; this chapter discusses these alternatives. Programming is conducted using a C-Bus PC Interface to connect to the C-Bus Network. Programming can also be completed using C-Bus Learn Mode - see attached section on Learn Mode.



C-Bus Design Guide

6 Programming Methods *(cont'd)*

Method 1, Individual Unit Programming

The Units are initialized one at a time, on-the-bench or in an office environment. The Units may or may not be fully programmed at this stage. Any programming variables may be entered, including control relationships, and then the Units are installed into the building. It is important that the contractor uses the labels provided with the C-Bus Units to record the Unit Address, Network and Part Number (Part Name), such as location, to ensure correct placement of the Unit on site. Once installed, any further programming changes can be entered, and the installation may be commissioned. It is important that each module has a unique Unit Address otherwise unpredictable behavior may result.

Method 2, Programming The System In-site

The Unit Addressing may be programmed on site, one Unit at a time, as they are installed. The installer should mark the label provided and attach it to the Unit, with the Unit Address, Network, Part Number, and location. All other programming variables are then entered, including control relationships.

Method 3, As Installed Programming

In this method, all Units are installed into the building, unprogrammed. Factory default settings of the Unit Address for all products in the C-Bus range is 255. The Network will exhibit unpredictable behavior at this stage, since Unit Addresses will not be unique. The C-Bus Toolkit Software v3.0 incorporates a new Network Unraveller facility. This has the ability to detect and resolve Unit Addressing conflicts automatically during a Network scan. The Unraveller has limited capabilities, and should not be relied upon to unravel large Networks at the time of installation.

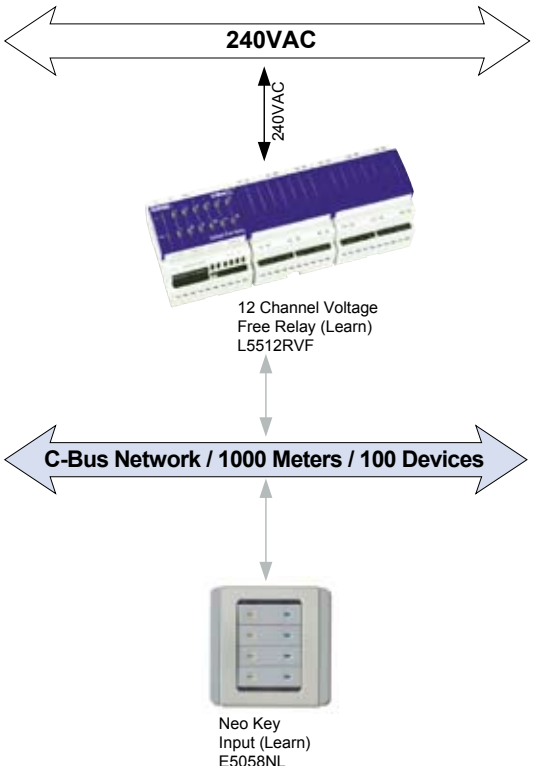
This method has the advantage of not requiring any pre-programming of C-Bus Units, however this comes at a price. Once the Network has been unravelled, and a unique Unit Address assigned to all Units, each must be located and identified within the installation using the labels provided. This process may be aided using the Quick Toggle facilities built into the Installation Software, but can be cumbersome for larger Networks. The installer should mark the label provided and attach it to the Unit, with the Unit Address, Network and Part Number.

With the Units installed, and with each Unit having a unique Unit Address, each Unit may in turn be interrogated on the C-Bus Network, and the operating parameters and control relationships programmed into it. Individual Unit programming, programming the system in-situ, or as installed programming may be used, but each method is prone to misuse and error. If the Unit Addresses are incorrectly programmed or if the equipment is incorrectly placed in an installation, unpredictable behavior may result. The designer and installer must ensure the planning process and installation documentation are correct, and the placement of the equipment proceeds in a systematic manner. Identification labels should be used on all C-Bus Units. The templates have been produced to simplify the task of allocating Addressing information and assist in the programming methods as recommended by Clipsal Integrated Systems.

Labels are included with PC Interface and Network Bridge Units. Completed labels can be stuck on to the rear of the product. Alternatively, the label may be adhered to the front of any wall mounted Unit (such as a Key Input Unit) for easy reference without the need to remove any screws. In this case the label should be positioned on the edge of the grid plate such that it will be covered by the surround when snapped in place. Key input plates may also be labeled according to key function, or controlled load, for the benefit of the user. 2000 Series and metal plate input Units may be hot stamped or engraved as appropriate. Classic (C2000) Series plates incorporate a small label window. Typical label examples include 'Warehouse', 'Office', 'Entry', 'Welcome', 'Goodbye', and 'Party'. Contact your local Clipsal sales representative for more information.

C-Bus Learn Mode

Learn Mode is designed for contractors to program small to medium scale systems without the use of a PC. This method is well suited to small networks, with simple functionality. Networks with a large number of devices and complex functions should be programmed using the C-Bus Installation Software. Learn Mode is activated by pressing the manual override keys on an output unit for a predetermined time. For more information on programming Learn Mode see the following section for an in depth guide.



C-Bus Design Guide

7 C-Bus Wiring Rules

C-Bus is a safe extra low voltage electronic control system, primarily used in mains rated load control applications. A C-Bus Network consists of various Input, Output, and System Support Units which are interconnected using Unshielded Twisted Pair (UTP) LAN cable. Some simple rules should be observed when specifying or designing any C-Bus installation.

Power Supplies

The C-Bus Power Supplies and C-Bus Output units provide the safe extra low voltage of 36VDC to the Network. Each C-Bus Unit typically requires 18mA current to operate and each Power Supply is capable of supplying current to 17 C-Bus Units. When a Network consists of more than 17 Units, additional Power Supplies can be added to the Network to restore the C-Bus voltage levels to within operating limits between 15-36VDC Distributed Power Supplies will share the Network load evenly.

- One C-Bus Power Supply for every 17 C-Bus Units, and
- Distribute Power Supplies evenly on the C-Bus Network

The C-Bus Power Supply is a specially designed Unit offering the impedance characteristics essential for communication signal propagation on C-Bus. Ordinary 36VDC power supplies must not be used in conjunction with C-Bus.

Maximum Cable Length

This depends on Network impedance resulting from the choice of cable type. The cable has a finite and known impedance comprising of resistive and capacitive components, which should be taken into account when designing a C-Bus system. The upper limit of cable length at which communication can no longer be guaranteed reliably for Category 5 UTP cable is 1000 meters.

- The maximum cable length between any two Units on a Network should be limited to less than 1000 meters.
- Allow a maximum total cable length of 1000 meters on each Network.
- A Network Bridge should be used to split the installation into multiple Networks when the total cable length exceeds 1000 meters on any single Network.

Network Size

The maximum number of C-Bus Units on any Network should not exceed 100 Units. If an installation requires more than 100 Units, then a new Network should be added, connected through a Network Bridge.

- A maximum of 100 standard C-Bus Units per Network.
- A maximum of 255 Networks per Installation.

Network Topology

C-Bus devices can be interconnected as a part of a single, or multiple Network installations. Segregation of a large Network into multiple Networks may be required for any of the following reasons:

- When the required C-Bus cable length exceeds 1000 meters;
- To overcome addressing limitations;
- To reduce local communications traffic on the Bus, and thus speed up response times;
- To accommodate the physical layout/structure of the building (for example in a multi story building, one Network per floor may be required);

The following basic guidelines should be observed:

- Minimize the depth of the Network Topology for faster, more effective communications;
- Consider use of C-Bus Ethernet Network Interface units to integrate with a high speed Ethernet backbone.
- Distribute Units on separate Networks proportionally to avoid communications and power supply issues (for example 120 Units required - split into two Networks of 60 Units each where possible, rather than say 100 Units on the first Network and 20 Units on the second).

C-Bus Design Guide

8 Practical Wiring Considerations

The C-Bus is designed to operate at a safe, extra-low voltage of 36VDC, with optical and/or galvanic isolation from mains voltages. The installer must ensure that acceptable wiring practices for extra low voltage cabling are adopted with C-Bus.

In particular, the routing of the C-Bus cable near mains wiring, where physical separation criteria between cables need to be satisfied. In this respect C-Bus is treated as a data cable, and the same practices should be employed. The C-Bus, operating at the safe extra low voltage of 36VDC, allows electrical work to be performed on the C-Bus side while the system is powered on. The C-Bus side with short circuit protection ensures that the equipment will not be damaged if the supply is shorted for an indefinite period. The installer needs to be aware that shorting the C-Bus Network will disable operation of the C-Bus Network as long as the short circuit persists. A benefit of the C-Bus method of wiring is that wiring of the C-Bus Units may be accomplished in a number of ways. The C-Bus Units are all wired in parallel on the Bus, and the Units may be daisy chained, or be part of a branch/star structure or a combination of these. Closed loop ring structures are not recommended.

Installation of every Unit on the C-Bus Network requires connection to the Unshielded Twisted Pair C-Bus Network Cable. This connection is polarity sensitive, and is clearly marked on the terminal block of the Unit.

Clipsal has Category 5 cable for use with C-Bus (Catalogue Number 5005C305B). The cable features eight single core conductors (four Unshielded Twisted Pairs (UTP), encased in a pink outer sheathing. Pink has been chosen in order to distinguish between the C-Bus cabling in an installation. A second feature is that the cable may for short runs be routed into a switchboard close to mains cable.

The outer sheath insulation resistance is suitable for this application. The following illustration shows the recommended technique for cable termination giving optimum performance, and immunity from electromagnetic interference (EMI).

Note: The mutual twist of solid and dotted conductors of opposing colored conductors. This ensures a good electrical termination, with favorable common mode noise characteristics.

Laying of C-Bus Cabling and Precautions

Close proximity parallel runs with mains voltage cables should be avoided where possible.

If the C-Bus Network cabling must cross mains voltage cabling it is preferred that the cross over is done at right angles.

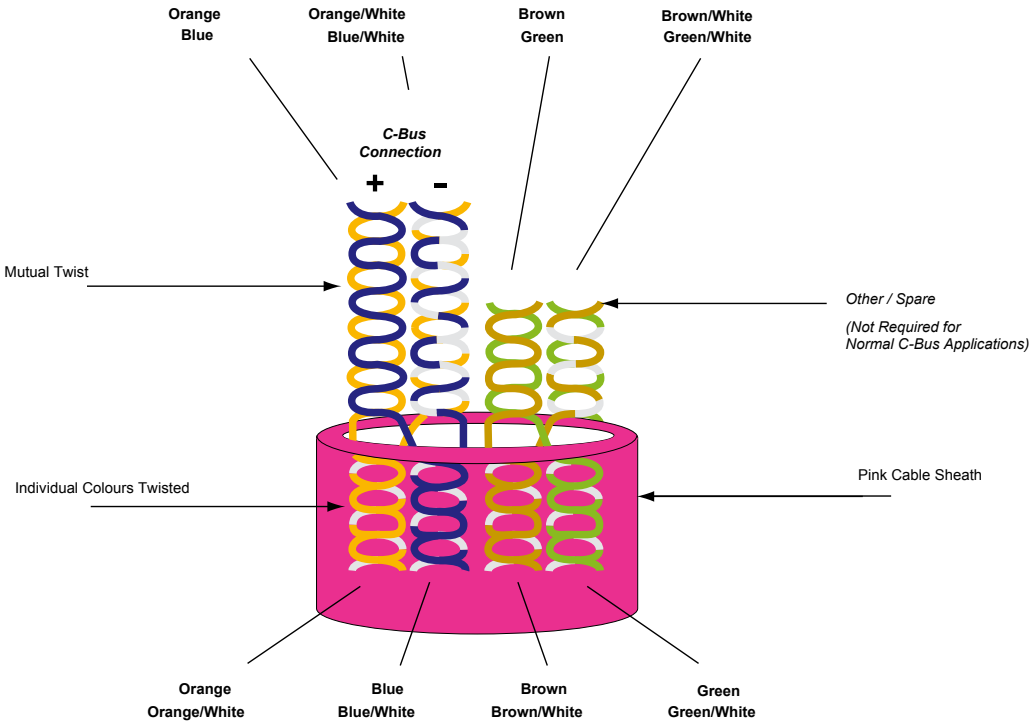
The C-Bus Network cable is kept at least 50 millimeters from mains voltage cabling, in accordance with the appropriate safety standards (AS/NZS 3100) or as determined by local regulations. It is recommended that, wherever possible, at least 100mm segregation is maintained for superior communications performance.

- The type of cable used in a C-Bus installation usually consists of solid core conductors. This cable type is prone to stretching or breaking if badly installed.
- Multiple pairs of UTP may be used in parallel, remembering to preserve the twisted pair nature of the cable. The resulting increase in conductor cross sectional area serve to reduce any voltage drop over the length of the cable.

C-Bus Terminations

Care must be taken when connecting C-Bus Units to the Network. The reliability of the system, and the quality of the installation depends upon the reliability and quality of the termination made. The Category 5 cable used in C-Bus installations consists of solid core conductors. This type of cable is typically very brittle, and will break easily. They are not tolerant to multiple rewiring. It is strongly recommended that a fresh termination is always made when adding and replacing C-Bus Units, modifying the system, or rewiring the installation. Using bootlace crimps, or ferrules provides the most reliable termination.

Terminate of devices mounted in distribution boards requires an RJ45 crimp tool. Terminated interconnect leads are provided with each DIN rail output unit.



C-Bus Design Guide

8 Practical Wiring Considerations *(cont'd)*

Connection to A Personal Computer

Connection of the PC Interface to the Serial Communication Port of a Personal Computer is made via the 9 pin D type connector or 2 x RJ45 jacks fitted on the Unit. The installer may also provide access to the PC Interface through a wall mounted connector, such as the Clipsal 2231/1 data connection plate.

Connection can also be via a C-Bus Network Interface. This will require a C-Bus Network Interface to be connected to an Ethernet Hub or Switch and a PC with an Ethernet compatible Network Interface Card (NIC).

Placement of C-Bus Equipment

The placement of C-Bus Output, and System Support Units in any installation is made with consideration to available space, in relation to other service requirements, such as air-conditioning ducts and accessibility for maintenance purposes. Many choose to install the C-Bus hardware in a Clipsal Distribution Panel, located adjacent the relevant Distribution Board. Input Units are placed as required. Take particular heed of any specific installation instructions shipped with the product. Sensor devices such as the Light Level and Temperature Sensors, as well as the Passive Infra Red (PIR) Occupancy Sensor all require special consideration when choosing an installation location. This avoids false triggering and erroneous sensor readings.

Every effort should be made to avoid placing C-Bus Equipment Network cabling in proximity to sources of excessive electrical noise or other electromagnetic interference (for example heavy inductive motor load switching).

The C-Bus Units have been designed to operate, over an ambient temperature range between 0˚C and 45˚C, the Units should be placed away from heat sources such as air-conditioning compressor outlets and hot water services, and Units should not be covered by insulation material if mounted in the roof space. Avoid installing mains powered C-Bus equipment in areas of high humidity, such as bathrooms and laundries.

Over Voltages and Transients

C-Bus Side

The C-Bus Network connection of every C-Bus Unit incorporates transient protection circuitry to safeguard against the effects of unintentionally induced transient voltages. During transient conditions, information may be lost, however the C-Bus system incorporates a mechanism to recover from such losses. If the C-Bus is run between buildings, or there is a likely hood of over voltage conditions, then over voltage protection is recommended on the C-Bus cable. The over voltage equipment used should have a rated continuous operating voltage of approximately 50VDC such as an in-line telephone filter or similar.

Mains Side

The mains voltage must be limited to the range specified for any Unit which is mains powered. Each Unit incorporates transient protection circuitry, and additional external power surge protection devices is recommended to be used to enhance system immunity to power surges. It is strongly recommended that over voltage equipment is installed to protect the C-Bus equipment from transients and over voltage conditions. Clipsal offer the 970 range of over voltage and over current equipment for this application.

Megger Testing

Megger testing of an electrical installation which has C-Bus Units connected will not cause any damage to the C-Bus Units. Since C-Bus Units contain electronic components, the installer should interpret megger readings with due regard to the nature of the circuit connection. Operation on Isolated Supplies Isolated supplies such as local generator sites may have inadequate output frequency stability to allow C-Bus dimmer Units to function correctly. The dimming ability of the C-Bus Dimmer Units can be affected if the mains supply frequency is out of the specified range. The use of isolated supplies does not affect the operation of any other C-Bus devices.

Operation on Inverter Supplies

All C-Bus Units which are mains powered are designed to operate from sinusoidal voltage waveforms. Any inverter which produces a square-wave voltage output may cause damage to or degrade the performance of the C-Bus devices connected to it.

Working Live on the C-Bus Network

One of the many advantages of the C-Bus safe extra low DC operating voltage, is that connections can be made whilst the Network is still powered up. Should a short circuit occur while this is happening, the Power Supply's output current limiting/overload circuitry will protect it from damage for an indefinite period of time.

Short Circuits on the C-Bus Network

Output Units will assume the state defined on the hardware signifying to the user that a C-Bus wiring fault has occurred. Units on the C-Bus Network will be rendered inoperable until such time as the short circuit is removed. No damage can result from such a short circuit.

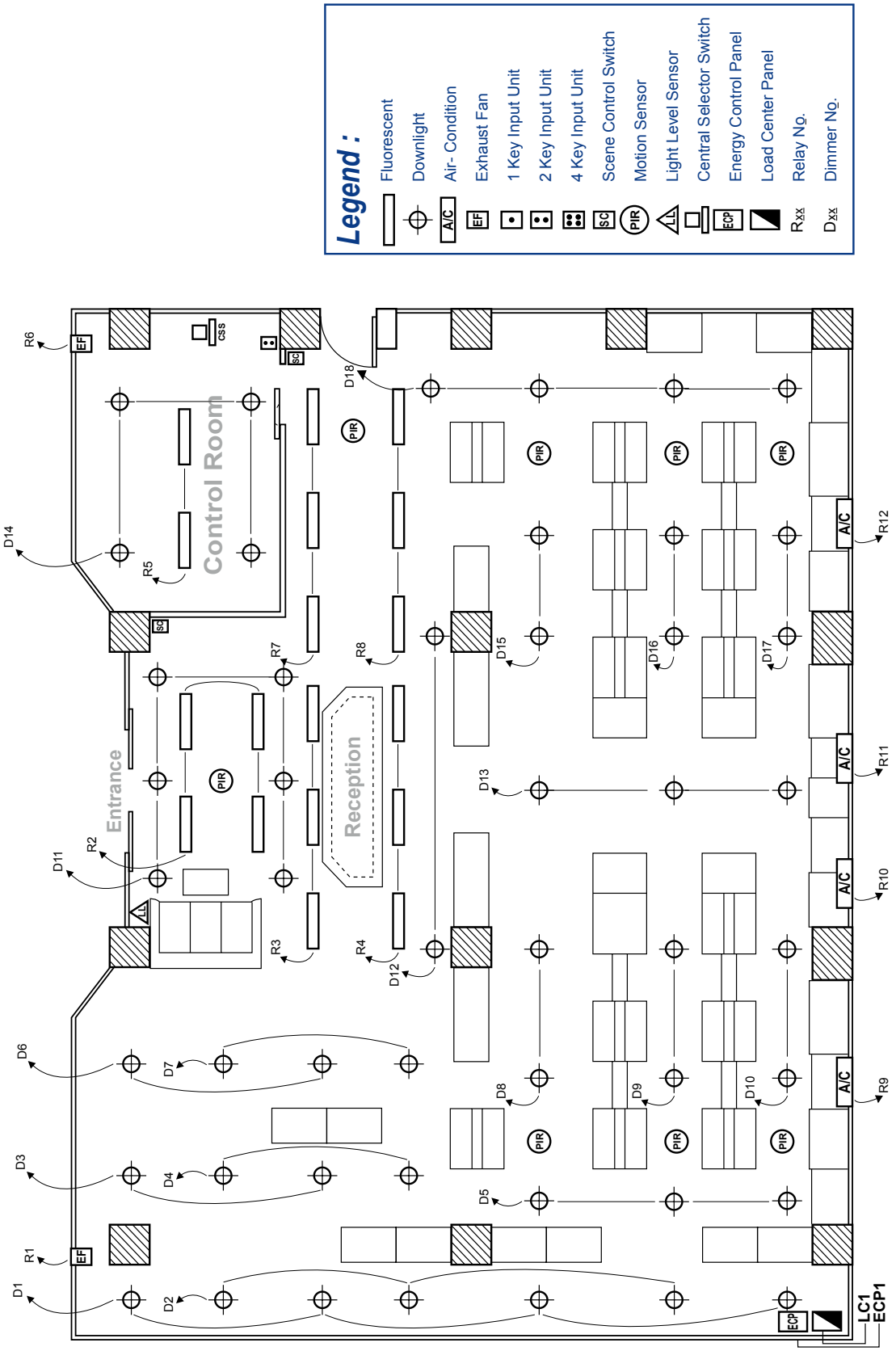
Open Circuits on the C-Bus Network

An open circuit on the C-Bus Network may result from a poor termination, or in the unlikely event of a cable breakage. If C-Bus Units are daisy chained on the Network, an open circuit may effectively remove C-Bus power from the rest of the Network. Underpowered or missing Units will not appear on the Network, and will not operate correctly. This is a good reason to distribute power supplies on any C-Bus Network. An open circuit will not otherwise affect operation of the C-Bus Network. No damage can result from an open circuit.

C-Bus Design Guide

9 Example Configurations

Commercial Office Lighting Control System Architecture

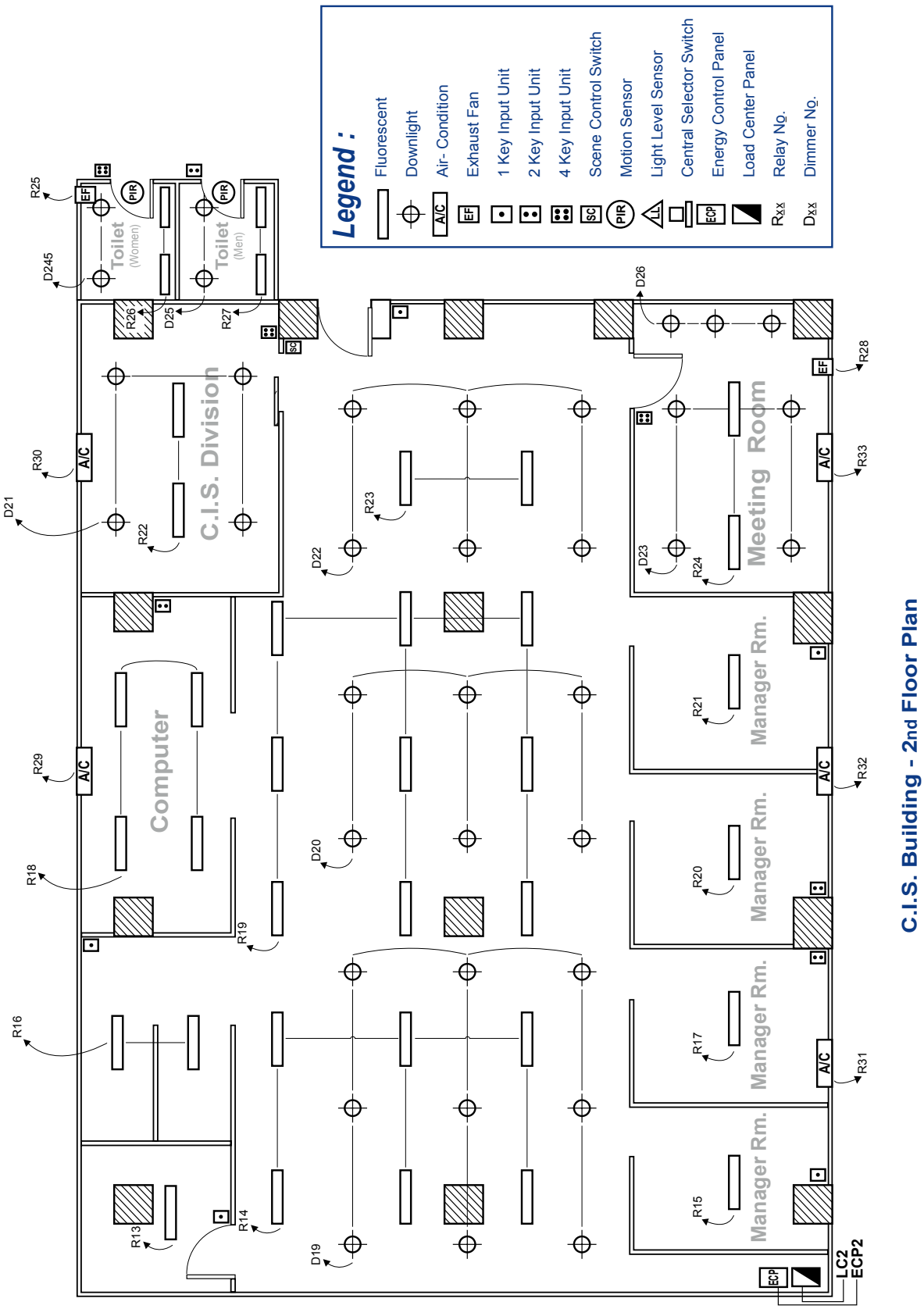


C.I.S. Building - 1st Floor Plan

C-Bus Design Guide

9 Example Configurations *(cont'd)*

Commercial Office Lighting Control System Architecture

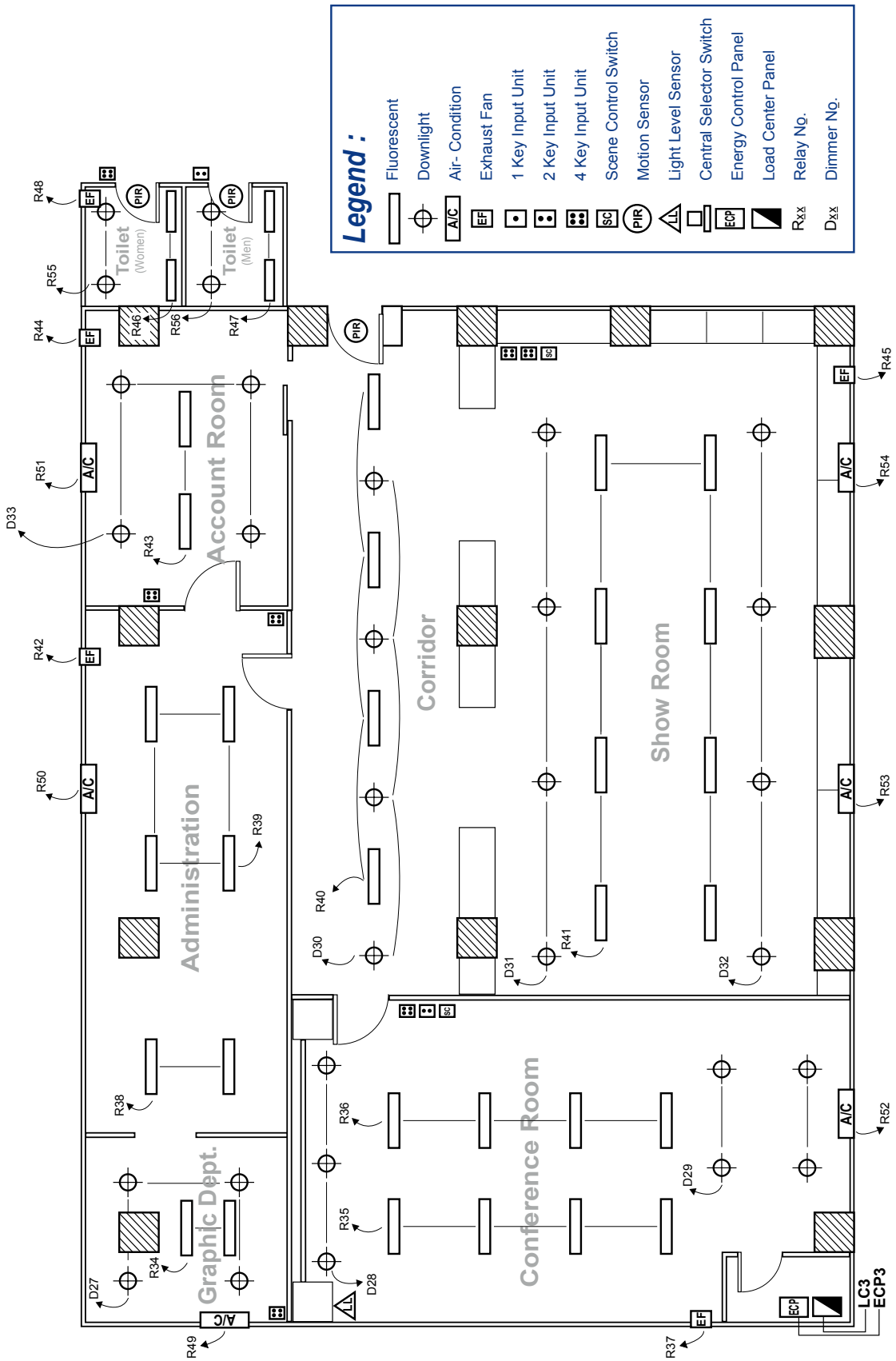


C.I.S. Building - 2nd Floor Plan

C-Bus Design Guide

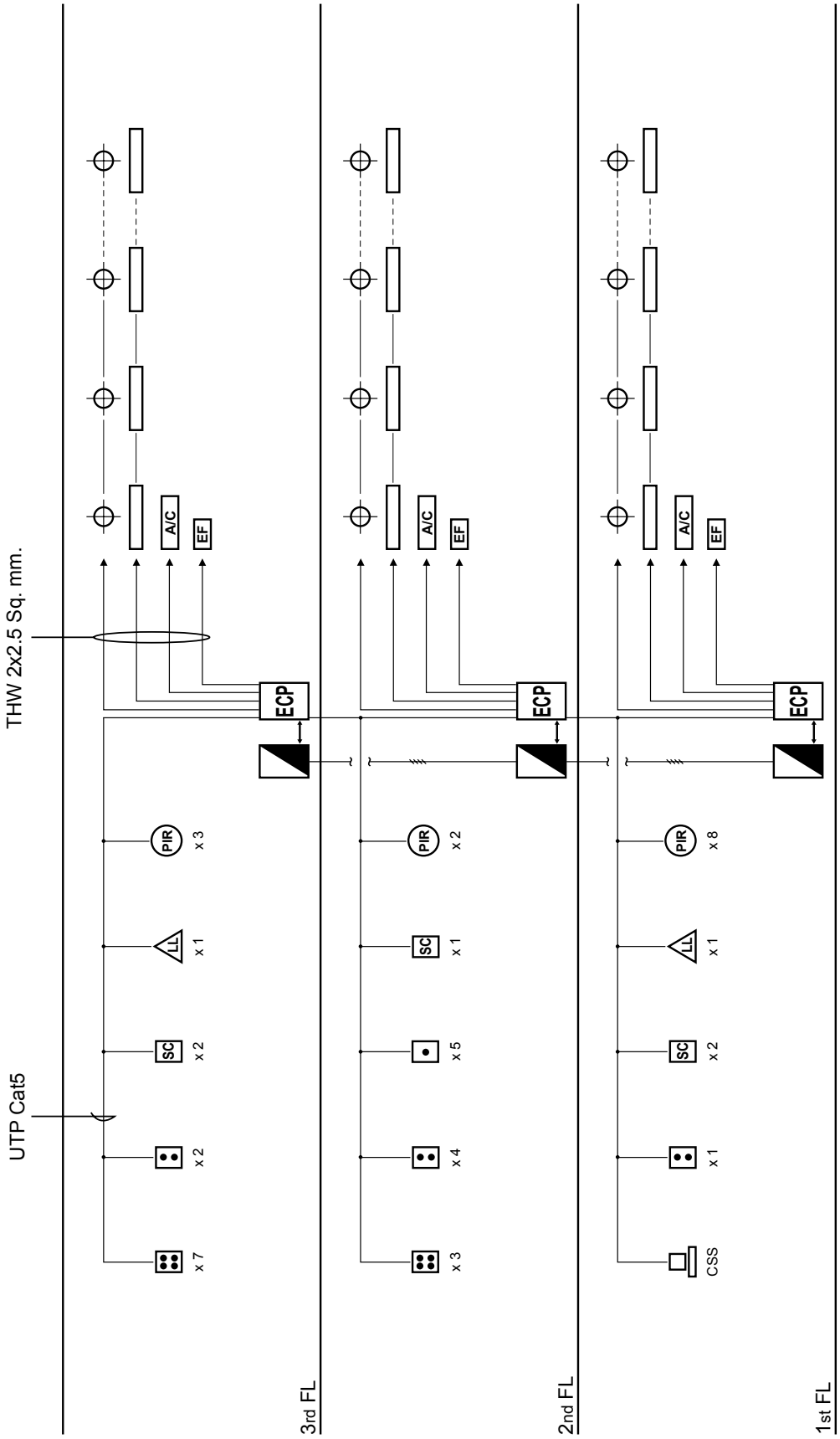
9 Example Configurations *(cont'd)*

Commercial Office Lighting Control System Architecture



C-Bus Design Guide

9 Example Configurations *(cont'd)*



C.I.S. Building - C-Bus Riser Diagram

C-Bus Design Guide

9 Example Configurations *(cont'd)*

Energy Control Panel Schedule

Energy Management System

PROJECT : C.I.S. BUILDING

ENERGY CONTROL PANEL NO. : ECP1 LOCATION : 1st floor

CONNECTED TO : LC1 4CH. RELAY 20A. : 1 SET. 12CH. RELAY 10A : 1 SET. 8CH. DIMMER. 1A : 3 SET.

Address	Relay / Dimmer		Circuit	Power	Description	Remark
Unit No.	No.	Amp.	No.	(VA)		
01	D1	1	LP1/1	100	west wing downlight	
02	D2	1	LP1/1	80	west wing downlight	
03	R1	10	LP1/3	310	exhaust fan west	
04	D3	1	LP1/1	50	booth downlight	
05	D4	1	LP1/1	50	booth downlight	
06	D5	1	LP1/1	80	west walk way downlight	
07	D6	1	LP1/1	50	booth downlight	
08	D7	1	LP1/1	50	booth downlight	
09	D8	1	LP1/1	50	showcase A downlight	
10	D9	1	LP1/5	50	showcase B downlight	
11	D10	1	LP1/5	50	showcase C downlight	
12	D11	1	LP1/5	150	front gate downlight	
13	R2	10	LP1/7	160	front gate lighting	
14	R3	10	LP1/9	120	reception lighting	
15	R4	10	LP1/11	120	reception lighting	
16	D12	1	LP1/5	50	showcase D downlight	
17	D13	1	LP1/5	80	mid walk way downlight	
18	D14	1	LP1/5	100	control room downlight	
19	R5	10	LP1/13	80	control room lighting	
20	R6	10	LP1/15	310	exhaust fan control room	
21	R7	10	LP1/17	120	entrance lighting	
22	R8	10	LP1/19	120	entrance lighting	
23	D15	1	LP1/5	50	showcase E downlight	
24	D16	1	LP1/5	50	showcase F downlight	
25	D17	1	LP1/21	50	showcase G downlight	
26	D18	1	LP1/21	100	east walk way downlight	
27	R9	20	LP1/23	2590	air conditioner unit 1	
28	R10	20	LP1/25	2590	air conditioner unit 2	
29	R11	20	LP1/27	2590	air conditioner unit 3	
30	R12	20	LP1/29	2590	air conditioner unit 4	

Note :

C-Bus Design Guide

9 Example Configurations *(cont'd)*

Energy Control Panel Schedule

Energy Management System

PROJECT : C.I.S. BUILDING

ENERGY CONTROL PANEL NO. : ECP2 LOCATION : 2nd floor

CONNECTED TO : LC2 4CH. RELAY 20A. : 2 SET. 12CH. RELAY 10A : 2 SET. 8CH. DIMMER. 1A : 1 SET.

Address	Relay / Dimmer		Circuit	Power	Description	Remark
Unit No.	No.	Amp.	No.	(VA)		
31	R13	10	LC2/1	80	library lighting	
32	R14	10	LC2/1	480	office zone A lighting	
33	D19	1	LC2/3	230	office zone A downlight	
34	R15	10	LC2/1	80	manager room lighting	
35	R16	10	LC2/1	160	computer room lighting	
36	R17	10	LC2/5	80	manager room lighting	
37	R18	10	LC2/5	320	computer room lighting	
38	R19	10	LC2/5	720	office zone B lighting	
39	R20	10	LC2/5	80	manager room lighting	
40	D20	1	LC2/3	150	office zone B downlight	
41	R21	10	LC2/7	80	manager room lighting	
42	D21	1	LC2/3	100	C.I.S. division downlight	
43	R22	10	LC2/7	160	C.I.S. division lighting	
44	D22	1	LC2/3	150	office zone C downlight	
45	R23	10	LC2/7	160	office zone C lighting	
46	D23	1	LC2/7	100	meeting room downlight	
47	R24	10	LC2/9	160	meeting room lighting	
48	D24	1	LC2/3	50	toilet (w) downlight	
49	R25	10	LC2/9	310	toilet (w) exhaust fan	
50	R26	10	LC2/9	80	toilet (w) lighting	
51	D25	1	LC2/3	50	toilet (m) downlight	
52	R27	10	LC2/9	80	toilet (m) lighting	
53	D26	1	LC2/3	80	white board downlight	
54	R28	10	LC2/11	310	meeting room exhaust fan	
55	R29	20	LC2/13	2000	air conditioner unit 1	
56	R30	20	LC2/15	2000	air conditioner unit 2	
57	R31	20	LC2/17	2000	air conditioner unit 3	
58	R32	20	LC2/19	2000	air conditioner unit 4	
59	R33	20	LC2/21	2000	air conditioner unit 5	
60		-	LC2/23	-	spare	

Note :

C-Bus Design Guide

9 Example Configurations *(cont'd)*

Energy Control Panel Schedule

Energy Management System

PROJECT : C.I.S. BUILDING

ENERGY CONTROL PANEL NO. : ECP3 LOCATION : 3rd floor

CONNECTED TO : LC3 4CH. RELAY 20A. : 2 SET. 12CH. RELAY 10A : 2 SET. 8CH. DIMMER. 1A : 1 SET.

Address	Relay / Dimmer		Circuit	Power	Description	Remark
Unit No.	No.	Amp.	No.	(VA)		
61	D27	1	LC3/1	100	graphic design dept.	
62	R34	10	LC3/3	80	graphic design dept.	
63	D28	1	LC3/1	80	conference room downlight A	
64	R35	10	LC3/3	320	conference room lighting A	
65	R36	10	LC3/3	320	conference room lighting B	
66	R37	10	LC3/3	310	conference room exhaust fan	
67	D29	1	LC3/1	100	conference room downlight B	
68	R38	10	LC3/5	160	personnel admin. Lighting A	
69	D30	1	LC3/1	100	corridor	
70	D31	1	LC3/1	100	showroom	
71	D32	1	LC3/1	100	showroom	
72	R39	10	LC3/5	320	personnel admin. Lighting B	
73	R40	10	LC3/5	320	corridor	
74	R41	10	LC3/5	640	showroom	
75	R42	10	LC3/7	310	personnel admin. exhaust fan	
76	D33	1	LC3/1	100	account downlight	
77	R43	10	LC3/7	160	account lighting	
78	R44	10	LC3/7	310	account exhaust fan	
79	R45	10	LC3/7	310	showroom exhaust fan	
80	R55	10	LC3/9	50	toilet (w) downlight	
81	R46	10	LC3/9	80	toilet (w) downlight	
82	R56	10	LC3/9	50	toilet (m) downlight	
83	R47	10	LC3/9	80	toilet (m) downlight	
84	R48	10	LC3/9	310	toilet (w) downlight	
85	R49	20	LC3/11	2000	air conditioner unit 1	
86	R50	20	LC3/13	2000	air conditioner unit 2	
87	R51	20	LC3/15	2000	air conditioner unit 3	
88	R52	20	LC3/17	2000	air conditioner unit 4	
89	R53	20	LC3/19	2000	air conditioner unit 5	
90	R54	20	LC3/21	2000	air conditioner unit 6	

Note :

C-Bus Design Guide

9 Example Configurations *(cont'd)*

BILL OF QUANTITY (BOQ)

PROJECT : C.I.S. BUILDING
TITLE: ELECTRICAL SYSTEM

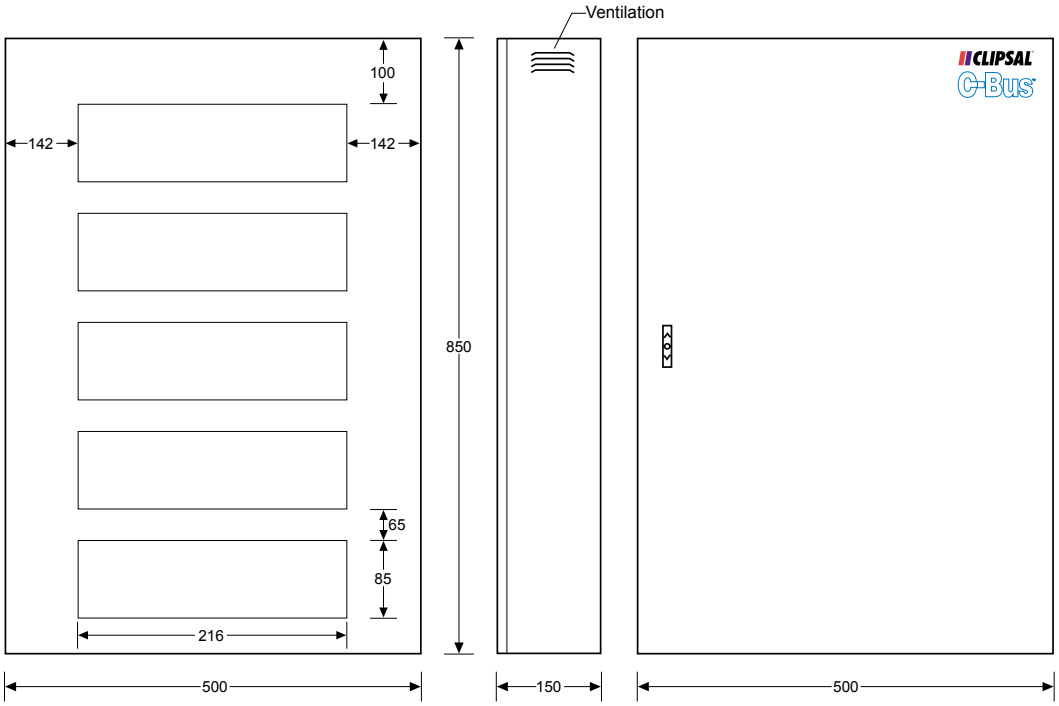
DATE: 29 OCTOBER 2001
DOC. NO.: YUTH/001/002

NO.	DESCRIPTION	QUANTITY		USD / UNIT			REMARK
		NO.	UNIT	MATERIAL	LABOUR	TOTAL USD	
1	**ENERGY MANAGEMENT SYSTEM**						
1.1	ENERGY CONTROL PANEL (ECP)						
	- 4 CHANNEL LATCHING RELAY 20A.	4	SET				
	- 12 CHANNEL LATCHING RELAY 10A.	5	SET				
	- 8 CHANNEL DIMMER 1A.	5	SET				
	- PANEL & ACCESSORIES WIRING	3	SET				
	- PC INTERFACE UNIT	1	SET				
	- POWER SUPPLY 240 VAC.	3	SET				
	SUB TOTAL ITEM 1.1						
1.2	LOCAL SWITCH & SENSOR						
	- 1 KEY INPUT UNIT	5	SET				
	- 2 KEY INPUT UNIT	8	SET				
	- 4 KEY INPUT UNIT	10	SET				
	- LIGHT LEVEL SENSOR	2	SET				
	- PIR OCCUPANCY SENSOR	13	SET				
	- 4 SCENE CONTROLLER	5	SET				
	SUB TOTAL ITEM 1.2						
1.3	CENTRAL SELECTOR SWITCH (CSS)						
	- DESKTOP COMPUTER	1	SET				
	SUB TOTAL ITEM 1.3						

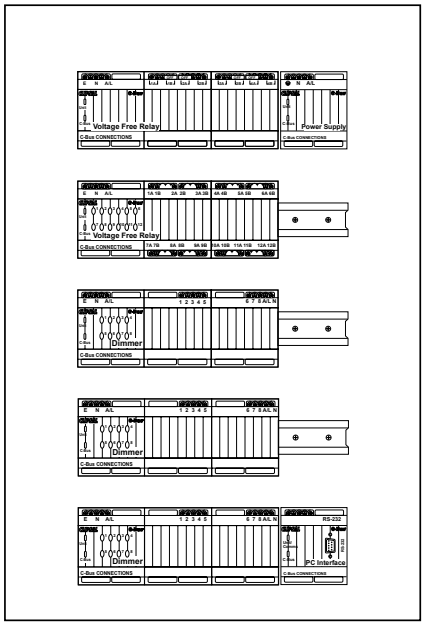
C-Bus Design Guide

9 Example Configurations *(cont'd)*

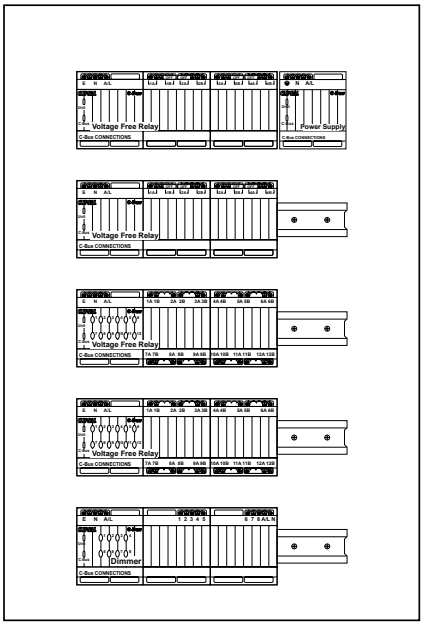
Energy Control Panel



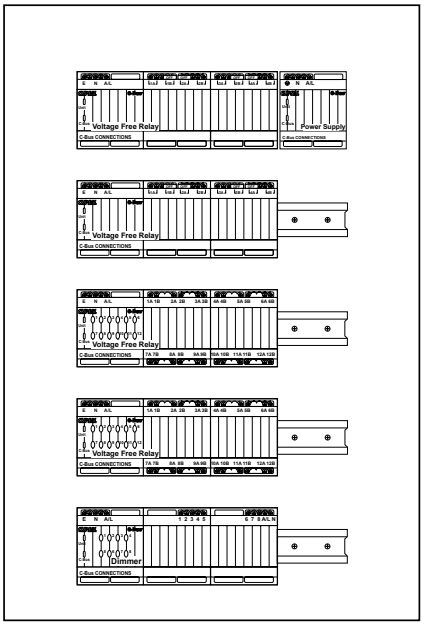
Inside View **Side View** **Front View**



Energy Control Panel (ECP1)



Energy Control Panel (ECP2)

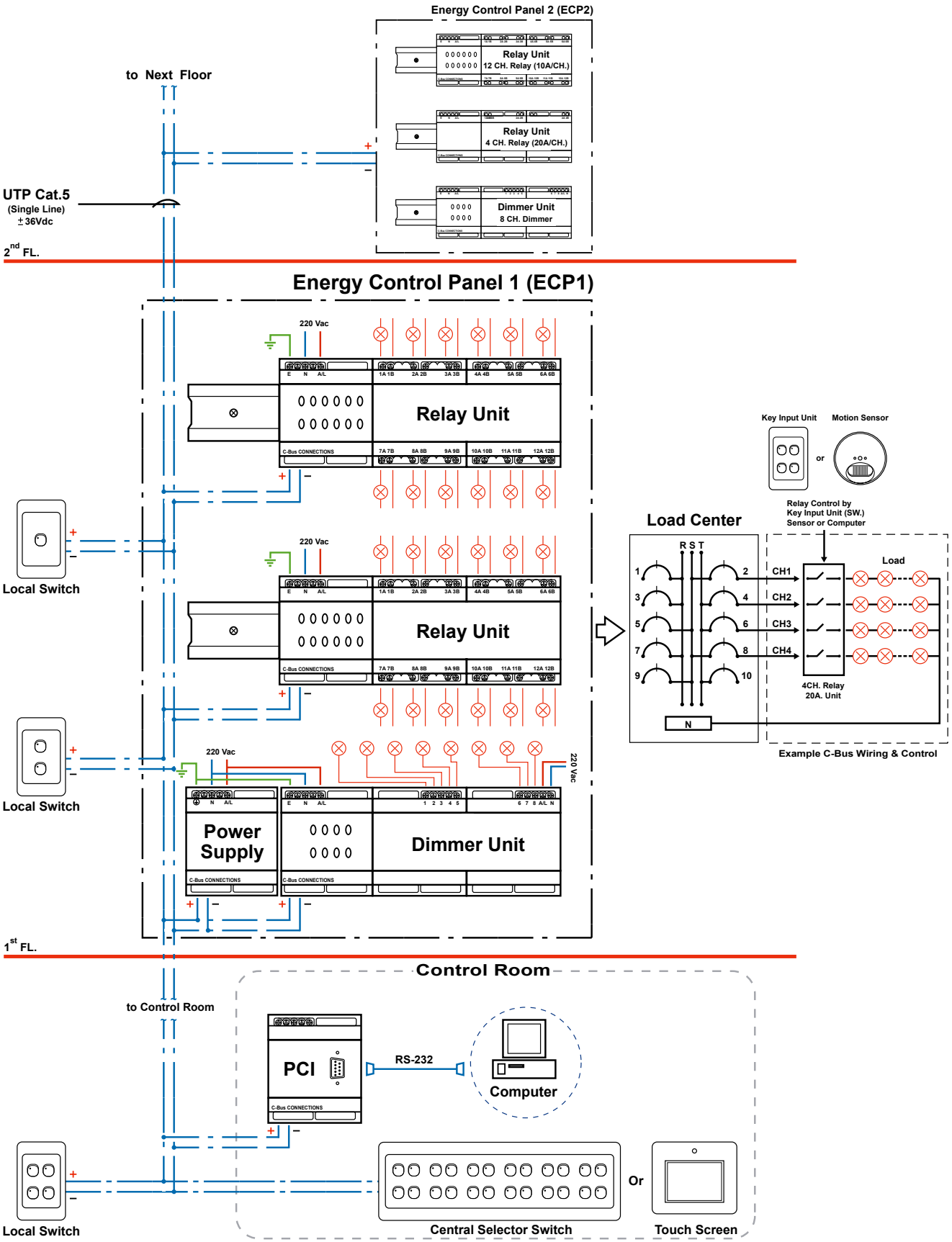


Energy Control Panel (ECP3)

C-Bus Design Guide

9 Example Configurations *(cont'd)*

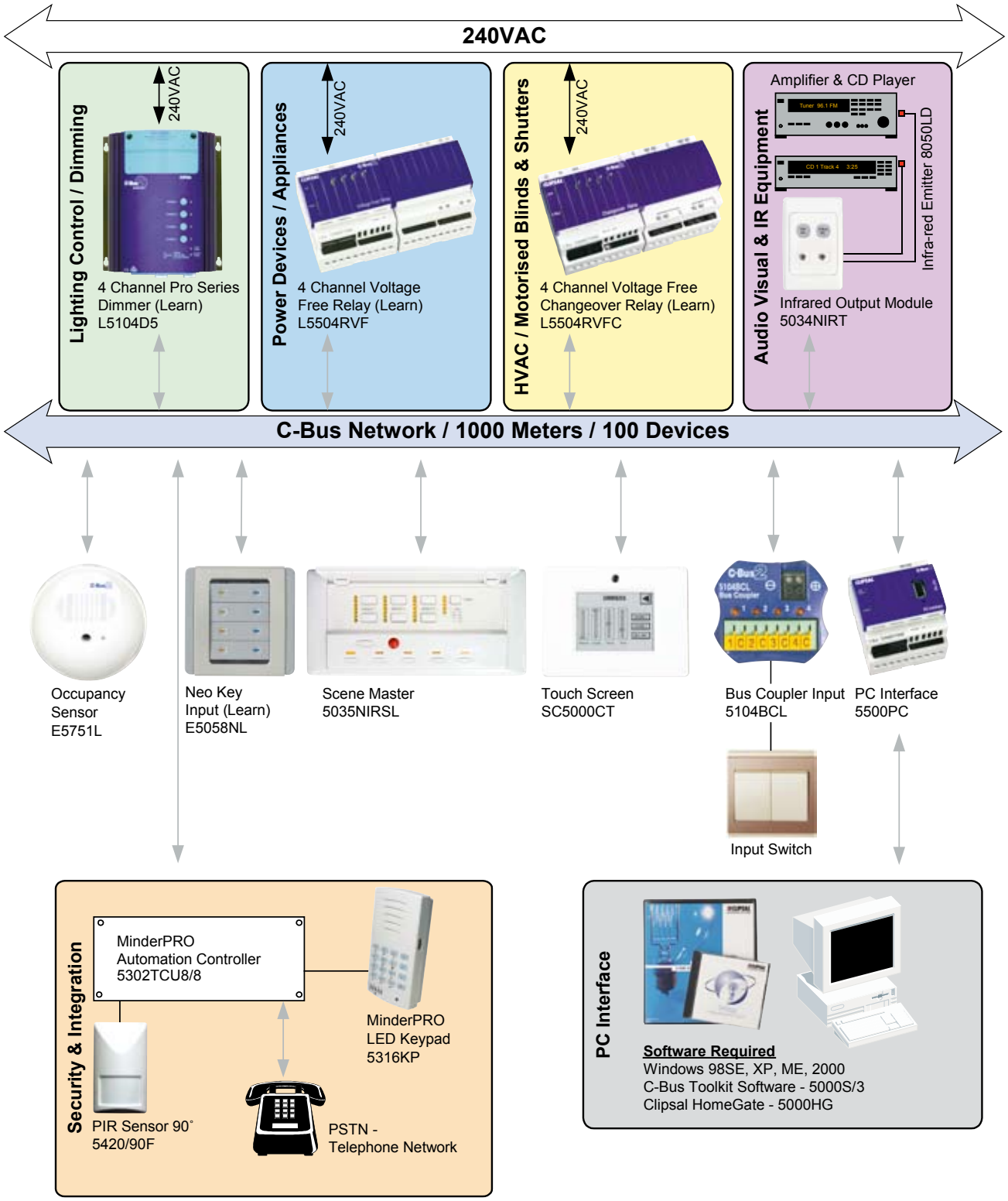
C-Bus Basic Wiring Diagram



C-Bus Design Guide

9 Example Configurations *(cont'd)*

Integrated Home Automation System



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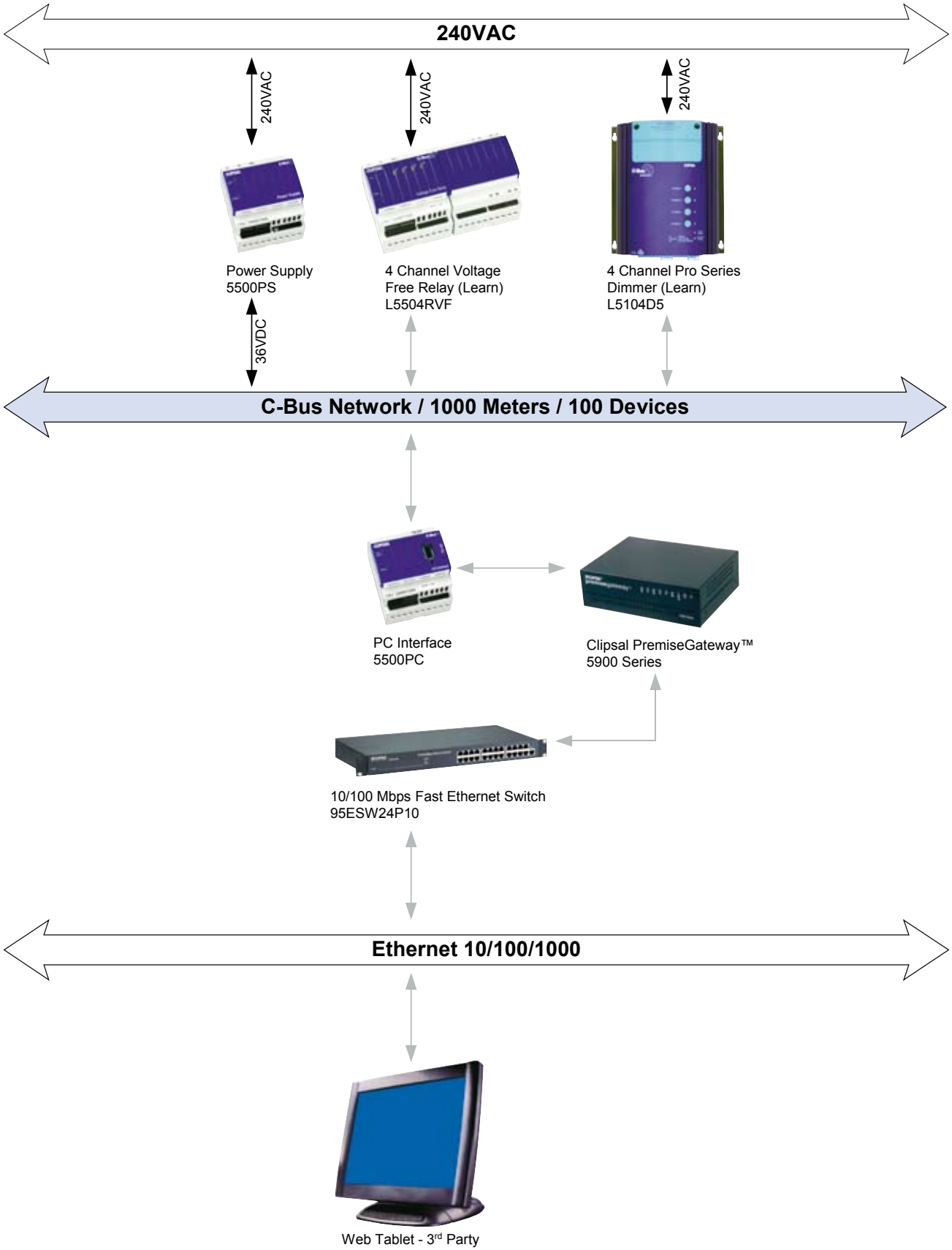
9 Example Configurations *(cont'd)*

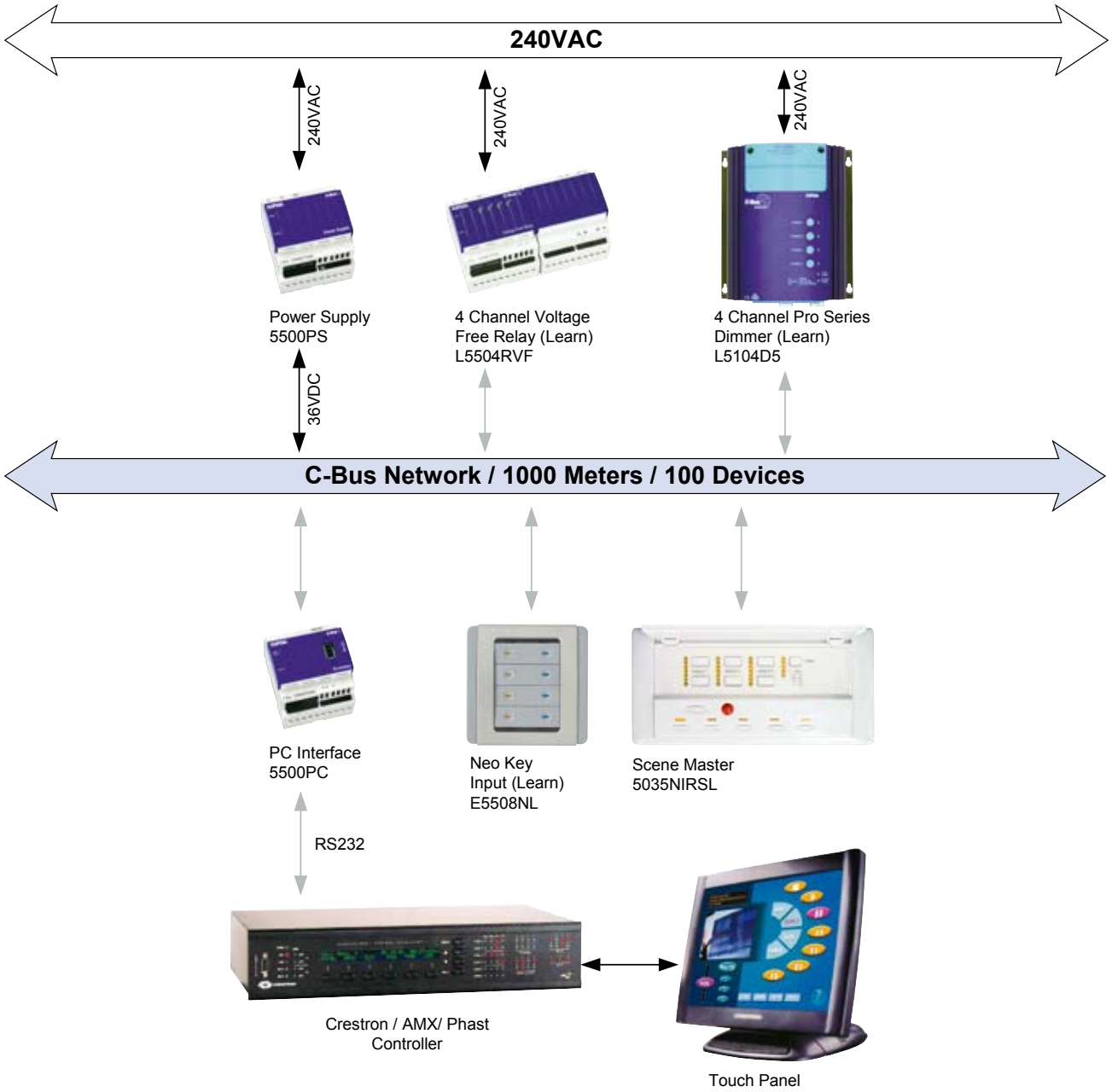
PDA/WEB Tablet Integration



C-Bus Design Guide

9 Example Configurations *(cont'd)*

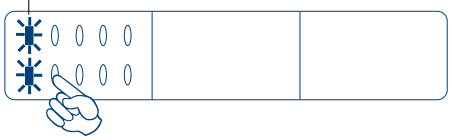
Integrated to 3rd Party Media Control Systems - Crestron/AMX/Phast



C-Bus Learn Units Quick Programming Guide

1. Entering Learn Mode

Hold down a toggle key on any output unit for 10 seconds.



Unit and C-Bus indicators on Output Units will flash alternatively.

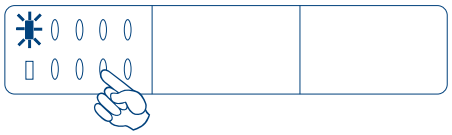
Note: These two indicators may initially flash together for up to 20 seconds before flashing alternatively.

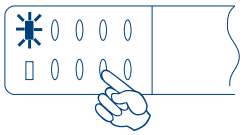
All loads and indicators will turn off except the one pressed which will turn on.

All indicators on Input Units will turn off.

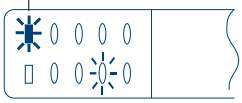
2. Choosing the Electrical Load to be Controlled

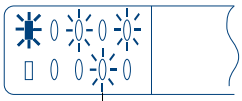
Press the toggle key switches on the Output Units which turn on the desired lights.





Unit and C-Bus indicators continue to flash alternatively.



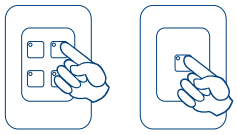


The selected lights and indicators are switched on.

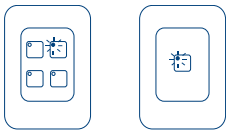
3. Selecting the Key Input Switches to Control the Chosen Loads

3A. Setting Input Keys as On/Off Switches

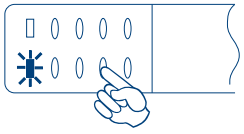
Press the Key Inputs required to control the selected loads.



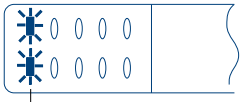
The switches required to control the loads will be illuminated.



Exit Learn Mode by pressing any toggle switch on a Relay Output Unit for 2 seconds.



C-Bus2 will now Learn the relationship and will return to normal operation.



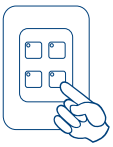
Units and C-Bus indicators will stop flashing.

C-Bus Learn Units Quick Programming Guide

3. Selecting the Key Input Switches to Control the Chosen Loads

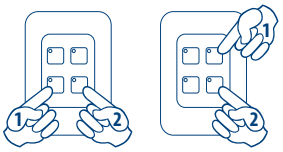
3B. Setting Input Keys as Dimmer Switches

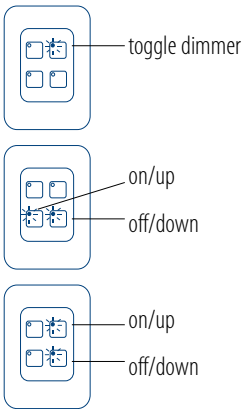
Press one key for a single operated dimmer.



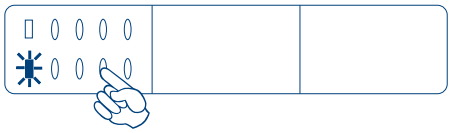
OR

Press two keys on the same unit for two key operated dimmer. The first key pressed will be an on/up key and the second key pressed will be the off/down button.

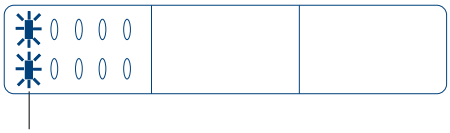




Exit Learn mode by pressing any toggle switch on a Dimmer Output Unit for 2 seconds.



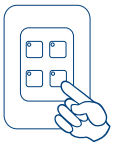
C-Bus2 will now Learn the relationship and will return to normal operation.



Units and C-Bus Indicators will stop flashing.

3C. Setting Input Keys as Timer Switches

Hold down a key until the indicator comes on, then release the key.



Continuing to hold down the key will cause the indicator to double flash every one second.

The key switch will flash at one second intervals.

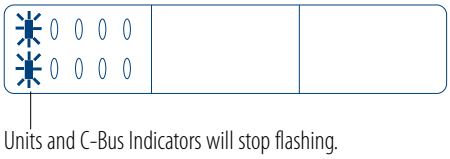
Note: Exiting Learn Mode at this point will make the key a 5 second timer.

Each double flasah represents 5 minutes.

For example, releasing the key after 4 double flashes gives a 20 minute timer.

Exit Learn Mode by pressing any toggle switch on a Relay or Dimmer Output Unit for 2 seconds.

C-Bus2 will now Learn the relationship and will return to normal operation.

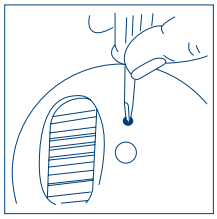


Units and C-Bus Indicators will stop flashing.

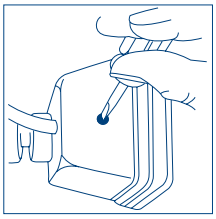
C-Bus Learn Units Quick Programming Guide

4. Setting C-Bus2 Movement Sensors to Control the Chosen Electrical Loads

Using a screwdriver, change the light level setting on the bottom of the C-Bus2 Movement Sensor. → The red indicator behind the Sensor Windor will **flash once.**



Indoor Sensor



Outdoor Sensor

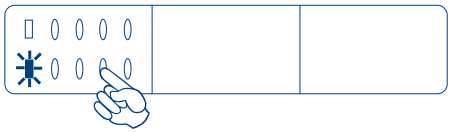
Wait for the indicator to **double flash** (after 5 seconds) then immediately (within 1 second) turn the adjusting trimpot back the other way. → The red indicator behind the Sensor Window will then come on and stay on. The unit is now ready to learn its time out.

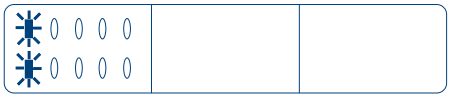
Note: If the indicator stays off then go back to the first step.

Changing the setting again will cause the indicator to begin double flashes. → Each double flasah represents a 5 minute timer duration.

Turn the adjustment trimpot back the other way. → The indicator will single flash showing that a timer function has been set.

Exit Learn Mode by pressing any toggle switch on a Relay or Dimmer Output Unit for 2 seconds. → C-Bus2 will now Learn the relationship and will return to normal operation.





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EZinstall Technology

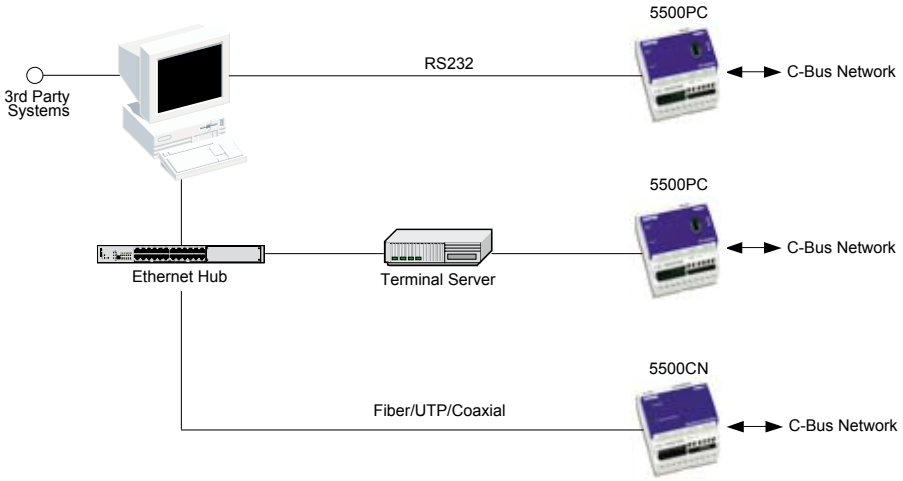
Index by Product Description

C-Gate Server Application Software

C-Gate is a powerful server application, designed to provide a high-level interface between third party systems and the C-Bus control system. Developers and system integrators can use C-Gate to integrate their products to C-Bus.

A high level command and event interface allows control and monitoring of a C-Bus network without detailed knowledge of C-Bus protocol. The C-Gate Server software can be located on a separate server machine or can run in the background on a personal computer.

C-Gate uses industry standard TCP/IP protocols to support:
- Multiple C-Bus networks - connected to a TCP/IP backbone network.
- Multiple connections - from one or more front end or building management systems using TCP/IP sockets.
- Simple connection to web servers for Internet based control and monitoring.



5000CG

PRODUCT FEATURES

- Open standard TCP/IP interface for integration to third party systems - Building management systems, CCTV, access control, fire alarm, HVAC, SCADA, Java applications, Web Servers and Web Browsers.
- Utilise standard Ethernet technology products to network multiple C-Bus networks over a standard LAN or WAN.
- High speed monitoring & control of Clipsal C-Bus devices.
- Utilise standard Ethernet technology products to run C-Bus over different media i.e. fiber optic, UTP or coaxial cable.
- Connectivity of multiple C-Bus networks through serial, terminal server or C-Bus Network Interface options.
- A number of C-Bus networks can be managed in parallel high speed, hence control is rapid and monitoring is accurate even when multiple networks are involved.
- C-Gate allows C-Bus networks to be connected across TCP/IP backbone network as well as through a local TCP/IP interface.
- Operates in Windows and Linux OS environments.

CATALOGUE NUMBER	DESCRIPTION
5000CG	C-Gate Software, Single Network License
5000CG5	C-Gate Software, Five Network License
5000CG10	C-Gate Software, Ten Network License
5000CG50	C-Gate Software, Fifty Network License
5000CGUNL	C-Gate Software, Unlimited Network License

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