

C-Bus Network Analyser

User's Guide

5100NA



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Contents

1.0	Description	5
2.0	Important Notes	5
3.0	Packing List	5
4.0	Connection to the C-Bus Network	6
5.0	Using the Analyser	6
6.0	Network Status Indicators	7
7.0	Responding to Network Faults	8
8.0	Network Troubleshooting	8
	8.1 Flow Chart	9
	8.2 Notes	10
9.0	Product Specifications	14
10.0	Warranty	15

1.0 Description

The 5100NA C-Bus Network Analyser is a device designed to help installers quickly fault-find a C-Bus network. The device analyses the network parameters and prompts you via its front LED indicators to take appropriate action.

When connected to a C-Bus network, the 5100NA device detects whether the network:

- has insufficient or excessive voltage
- has a clock
- requires or has excessive network burden(s)
- has excessive cabling.

2.0 Important Notes

- For best results, connect the 5100NA C-Bus Network Analyser at a location near a C-Bus PC Interface.
- Remove the analyser from the network after fault-finding. Permanent connection to the network may severely slow down communication and response time between C-Bus units.
- Do not connect the 5100NA C-Bus Network Analyser to a non-C-Bus network. Doing so may permanently damage the device and will void any applicable warranties.

3.0 Packing List

The following parts are included with the 5100NA C-Bus Network Analyser:

- a network burden pack containing two network burdens
- one pair of banana/alligator-clip test leads
- this User's Guide.

4.0 Connection to the C-Bus Network

The 5100NA C-Bus Network Analyser connects to a C-Bus network using a pair of standard banana plug leads (supplied). The connection is polarity sensitive; the terminals of the unit are colour coded. When connecting to the C-Bus network, ensure the red terminal of the device is connected to the C-Bus (+) rail, and the black terminal is connected to the C-Bus (-) rail as shown in Figure 1.

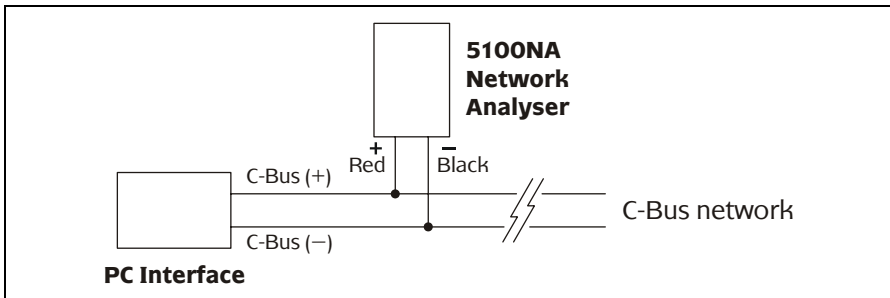


Figure 1 - Connecting the 5100NA to the C-Bus network

Remove the analyser from the network after fault finding (see Important Notes on Page 5).

5.0 Using the Analyser

The 5100NA C-Bus Network Analyser draws approximately 20 mA from the network it is connected to. Ensure that the C-Bus network to be tested has sufficient power to supply the analyser.

When first connected there is a 5 second settling time during which the 5100NA initialises and stabilises itself. All LEDs then illuminate briefly to show that the indicators are in working order. When analysing a C-Bus network the 5100NA suspends network communication briefly while it determines network parameters. It indicates the network status via the LEDs which are described in the following section.

While connected to an active C-Bus network, the 5100NA analyses the network every 3 seconds.

The analyser includes a built-in $1\text{ k}\Omega$ network burden for testing purposes. This network burden is momentarily applied to a connected C-Bus network when the Network Burden button is pressed (Figure 2).

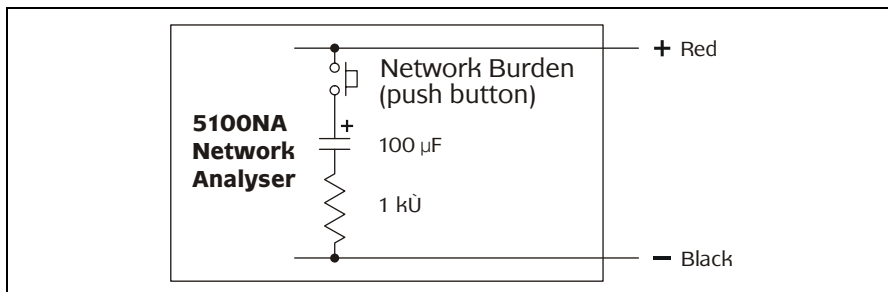


Figure 2 - The 5100NA includes a built-in network burden

6.0 Network Status Indicators

Six LED indicators are provided on the front panel of the 5100NA to show the network status. The indicators and their meanings/action required are shown in Table 1.



NOTE

If a Burden or Excess Cable indicator has an inconsistent state (e.g. on-off-on-off), it is likely that the network operates at limiting margins or oscillation exists on the network power supply.

Indicator	Colour	Status	Action/Meaning
Power Available	Green	On	C-Bus power available
		Flash	Network voltage low ($15 < V < 20\text{ V DC}$)
		Off	Network has no power or $V < 15\text{ V DC}$
Clock Not Present	Red	On	Network clock not present
		Off	Network clock status OK
Excess Voltage	Red	On	Network voltage high ($V > 38\text{ V DC}$)
		Off	Network voltage within range
Remove Burden	Red	On	Network impedance low, remove burden
Add Burden	Red	On	Network impedance high, add burden
Excess Cable	Red	On	Network has excessive cable

Table 1 - Status indicators

7.0 Responding to Network Faults

When a network fault is detected, the 5100NA C-Bus Network Analyser reports the fault via its LED indicators. It is recommended you rectify faults one at a time, using the analyser to remeasure the network each time. Repeat this process until no faults are reported.

The Trouble Shooting Flow chart and Network Trouble Shooting Guide in the next section serve as a guideline for actions when using the Network Analyser to fault-find the C-Bus network.

8.0 Network Troubleshooting

This guide is intended to provide C-Bus system installers with assistance in solving network problems that may arise in field installations.

Prior to using the Network Analyser for network diagnosis, check the Network window of the C-Bus Toolkit project for the relevant C-Bus network (if available). The Network window provides a summary of the C-Bus network according to the units added to the Database. This can be helpful in determining the power supply and network burden requirements of a particular network.

Following this, use the flow chart and accompanying notes in conjunction with the 5100NA, to troubleshoot a C-Bus network.

Should a faulty C-Bus unit be identified, it must be returned to Clipsal Integrated Systems for repair. Attempts to service the unit without prior consent of Clipsal Integrated Systems will void all applicable warranties.

8.2 Notes

The following checks of C-Bus units require the use of a digital multimeter.

Note 1

When the 5100NA is connected to the network and its Power Available LED is not lit, either the network has no power supply or the network voltage is below 15 V DC. Ensure that adequate C-Bus Power Supplies are installed on the network. If so, check that their network connections are correctly made (no bad connections) and that mains has been connected and turned on.

Once the above checks have been made, temporarily disconnect each C-Bus Power Supply from the network while it is powered from the mains supply. Connect a 1 k Ω , 2 W resistor across the unit's terminals and use the multimeter to measure the DC output voltage. The voltage should be in the range of 32 to 38 V DC. If not, it is likely that the unit is faulty; it should be returned to Clipsal Integrated Systems for repair.

It is possible that the power supply of the network is dragged down as a result of a short. Such a short circuit can be anywhere in the network and may be caused by loose connections (wires coming into contact with each other) or faults of other C-Bus units on the network. In such cases, a search to locate the short or faulty unit should be carried out. This can be done by splitting the network into smaller networks, each of which is checked using the analyser until the fault is located.

Note 2

The Power Available LED indicates an insufficient network power supply condition (supply voltage between 15 and 20 V DC). This may be due to insufficient power supply units (PSUs), a faulty power supply or a long cable run between the nearest power supply and the 5100NA.

Check the PSUs installed on the network as described in Note 1 and replace any which are faulty.

When all PSUs on the network are verified; if the problem persists, it is likely that there are insufficient PSUs. Additional PSUs should be installed on the C-Bus network to correct the problem.

Note 3

Communication between units on a C-Bus network requires a network clock signal. This network clock can be generated by any clock-generating unit such as a PC Interface, Network Bridge, Professional Series Dimmer, DIN Rail Relay or DIN Rail Dimmer. (Refer to the relevant Installation Instructions for further information).

The absence of a network clock is indicated by the Clock Not Present LED of the 5100NA. It can be due to any of the following:

- no clock-generating unit is installed on the network
- connection to an installed clock-generating unit is poor
- an installed clock-generating unit is faulty.

Ensure at least one clock-generating unit is installed on the network. If so, check that its network connections are properly made (no bad connections at the unit's C-Bus terminals). Older versions of the PC Interface require mains connection in which case check that mains has been connected and turned on. If the above checks have been made and the fault persists, it is likely that the installed clock generating unit is faulty. It should be returned to Clipsal Integrated Systems for repair.

Note 4

The C-Bus network operates in the DC voltage range of 15 to 38 V. Communication pulses between C-Bus units are transmitted over the network on top of this DC voltage. Excess network DC voltage causes communication signals to distort as they are clamped by internal protection diodes. This results in unreliable or halted communication.

Excess network voltage is indicated by the Excess Voltage LED of the 5100NA. It is caused by a faulty power supply unit(s). Check the power supply units installed on the network as described in Note 1 and replace any which are faulty.

Note 5

Each C-Bus device has an impedance that affects the C-Bus network. Some C-Bus units (such as a PC Interface, DIN Rail Dimmer and DIN Rail Relay) have a built-in burden which is applied to the network when enabled via the C-Bus Toolkit software.

A C-Bus network operates correctly when the total impedance (network burden) is within the range of 400 Ω to 1.5 k Ω . This network impedance is provided by the combination of impedances of all C-Bus units that are connected to the network. This includes any external or built-in network burdens which are enabled. If the impedance falls outside the specified range, communication over the C-Bus network becomes unreliable.

The Remove Burden LED of the 5100NA indicates that the C-Bus network has an AC impedance that is too low. This occurs when:

- 1) **Too many units exist on the network.** Reduce the total burden on the network by:
 - disabling all built-in network burdens
 - disconnecting any external network burdens.

If this fails to correct the network impedance, you may need to split the network into smaller networks interconnected by a C-Bus Network Bridge.

- 2) **More than one built-in burden is enabled.** All but one of the units which have a built-in network burden should have their burdens disabled using the C-Bus Toolkit software.
- 3) **A faulty unit exists on the network.** A faulty C-Bus unit can cause the network impedance to fall below the minimum allowable value (400 Ω). Repeatedly halve the network into smaller networks until the faulty unit is located.

Note 6

The Add Burden LED of the 5100NA indicates that the AC impedance of the network exceeds 1.5 k Ω . This occurs when a network with a small number of C-Bus units has no unit with an enabled network burden and no external network burden connected.

Add a network burden to the C-Bus network by either:

- enabling the network burden of one unit with a built-in burden
- connecting a supplied external network burden to the network (plug the burden into an RJ45 C-Bus socket on an output unit).

You can test the result of connecting a 1 k Ω network burden to the network by pressing the Network Burden button for 10 seconds.

Note 7

Excessive network capacitance causes distortion of electrical signals transmitted over the C-Bus network and results in unreliable communication between C-Bus units. Excessive network capacitance is due to too much network cable. This is indicated by the Excess Cable LED of the 5100NA.

When this occurs, network cable should be reduced by shortening the cable runs. If this is not possible, the C-Bus network should be split into smaller networks interconnected by a C-Bus Network Bridge.

Note 8

When a network operates at limiting margins, either the network:

- burden is just above the minimum value (400 Ω)
- burden is just below the maximum value (1.5 k Ω)
- capacitance is near the maximum specified value (160 nF)

It is possible that the 5100NA C-Bus Network Analyser will show inconsistent results (the Remove Burden, Add Burden, Excess Cable LEDs may turn on and off inconsistently). In such cases you should rectify the indicated fault and remeasure the network with the analyser several times to ensure that the fault has been removed. If inconsistent results persist, it is likely that oscillation exists on the network power supplies. This may be caused by any C-Bus unit which is capable of supplying power to the network, such as a:

- 5100PS or 5500PS Power Supply unit
- L5104D5 Professional Series Dimmer
- L5512RVF DIN Rail Voltage Free Relay
- L5508D1A DIN Rail Dimmer.

A thorough investigation of this fault should be carried out with an oscilloscope to locate the source and to pre-empt network failure.

9.0 Product Specifications

Parameter	Description
Input voltage	10 to 43 V DC
Input current	20 mA
Operating temperature	0 to 45 °C
Connections	2 × standard banana plug sockets
Dimensions (W×H×D)	60 × 120 × 28 mm

10.0 Warranty

The 5100NA C-Bus Network Analyser carries a two year warranty against manufacturing defects.

Warranty Statement

- 1) The benefits conferred herein are in addition to, and in no way shall be deemed to derogate; either expressly or by implication, any or all other rights and remedies in respect to Clipsal Integrated Systems Product, which the consumer has under the Commonwealth Trade Practices Act or any other similar State or Territory Laws.
- 2) The warrantor is Clipsal Australia Pty Ltd of 12 Park Terrace, Bowden, South Australia, 5007. Telephone (08) 8345 9500. With registered offices in all Australian States.
- 3) This Clipsal Integrated Systems Product is guaranteed against faulty workmanship and materials for a period of two (2) years from the date of installation.
- 4) Clipsal Australia Pty Ltd reserves the right, at its discretion, to either repair free of parts and labour charges, replace or offer refund in respect to any article found to be faulty due to materials, parts or workmanship.
- 5) This warranty is expressly subject to the Clipsal Integrated Systems Product being installed, wired, tested, operated and used in accordance with the manufacturer's instructions.
- 6) All costs of a claim shall be met by Clipsal Australia Pty Ltd, however should the product that is the subject of the claim be found to be in good working order, all such costs shall be met by the claimant.
- 7) When making a claim, the consumer shall forward the Clipsal Integrated Systems Product to the nearest office of Clipsal Australia Pty Ltd with adequate particulars of the defect within 28 days of the fault occurring. The product should be returned securely packed, complete with details of the date and place of purchase, description of load, and circumstances of malfunction.

For all warranty enquiries, contact your local Clipsal sales representative. The address and contact number of your nearest Clipsal Australia office can be found at <http://www.clipsal.com/locations> or by telephoning Technical Support (refer to the back page).



Technical Support and Troubleshooting

For further assistance in using this product, consult your nearest Clipsal Integrated Systems (CIS) Sales Representative or Technical Support Officer.

Technical Support Contact Numbers	
Australia	1300 722 247 (CIS Technical Support Hotline)
New Zealand	0800 888 219 (CIS Technical Support Hotline)
Northern Asia	852 2484 4157 (Clipsal Hong Kong)
South Africa	(011) 314 5200 (C-Bus Technical Support)
Southern Asia	603 7665 3555 Ext. 236 or 242 (CIS Malaysia)
United Kingdom	0870 608 8 608 (Schneider Electric Support)

Technical Support email: techsupport.cis@clipsal.com.au

Sales support email: sales.cis@clipsal.com.au

Worldwide contacts are provided at <http://www.clipsal.com/locations/>

Information and resources are provided at <http://www.clipsal.com/cis/>

Product of Clipsal Integrated Systems A Division of Clipsal Australia Pty Ltd

ABN 27 007 873 529

Head Office

12 Park Terrace, Bowden, SA 5007, Australia

Telephone: (+61) 8 8345 9500

Facsimile: (+61) 8 8346 0845

Email: cis@clipsal.com.au

Web: <http://www.clipsal.com/cis/>

[clipsal.com/cis](http://www.clipsal.com/cis)

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