

EBL RING NETWORK

Fire alarm solutions
technical description

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1. INTRODUCTION

This document describes the EBL Ring network.

The EBL Ring network is a network used for EBL512 G3 system, software version 3.0 or later.

This document is intended to be used by planning engineers as well as service / commissioning engineers.

The engineer should also have basic knowledge of the fire alarm system.

The document includes information about EBL Ring network communication, network design, recommended products, maintenance and troubleshooting.

2. ABBREVIATIONS

| | | |
|----------------|-------------------------------------|----------------|
| CIE | Control and indicating equipment | = control unit |
| LED | Light Emitting Diode | |
| Segment | The distance/space between two CIEs | |

3. GENERAL DESCRIPTION

EBL Ring network is a local network that connects a system of two or more EBL512 G3 control units. Up to 30 control units can be connected in one network.

The network is constructed of two rings running in opposite order. The control units in the network don't need to be connected in control unit number order.

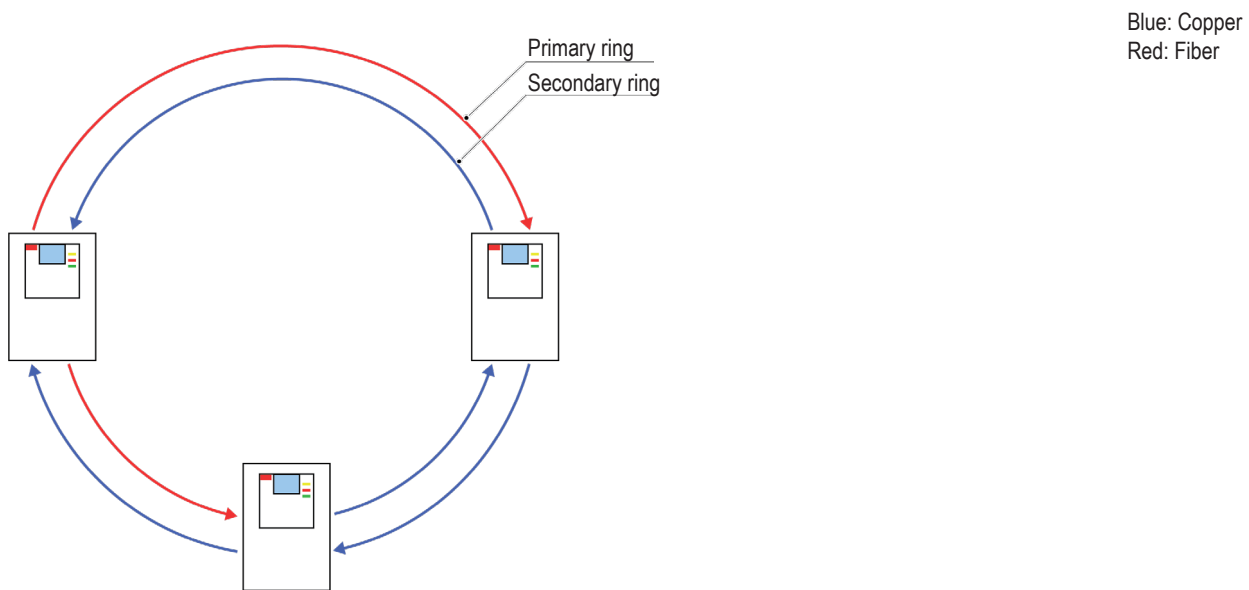
All communication is point-to-point between the control units. Messages are received and repeated forward in the ring network. When a control unit receives its own message, that's the confirmation that the message has been reported to the entire network.

The cable types in the network can be either copper or fiber. A network ring can use different cable types in different parts of the ring.

EBLWin is used for the configuration of EBL Ring network.

Panasonic Fire & Security cannot take responsibility for third part products. However all recommended products in this document have been tested in systems with maximum number of EBL512 G3 control units.

Example of an EBL Ring network

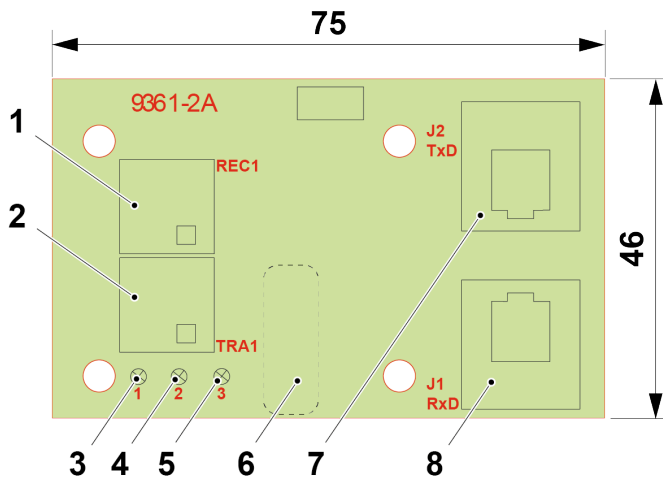


3.1. NETWORK BOARD 5040

Network-5040 is a redundant Network (both Network no. 0 and no. 1 is required), the network boards (5040) shall be mounted in position no. 0 and position no. 1 on the main board.

The network cables are connected directly to the 5040 board.

If there is no need for redundancy, it is possible to use just one network board. See [5.1. SINGLE NETWORK](#) on page 11.

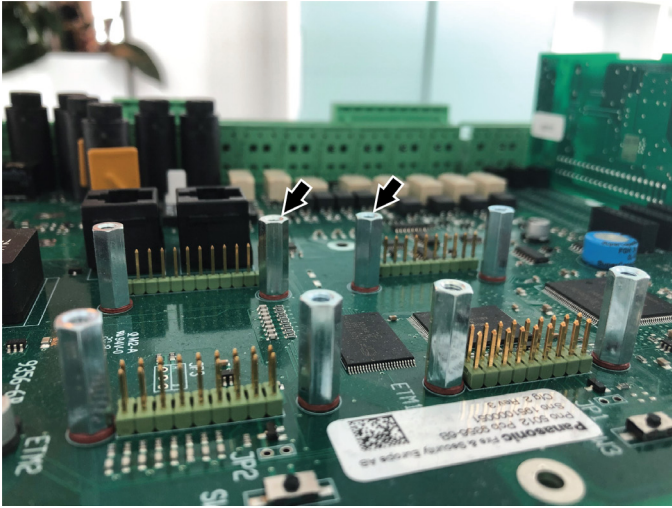


1. REC1, connector (ST) for incoming network cable (fiber)
2. TRA1, connector (ST) for outgoing network cable (fiber)
3. LED 1, Flashing (short pulse) when receiving (Rx)
4. LED 2, Flashing (short pulse) when transmitting (Tx)
5. LED 3, Normally OFF. Turns steady ON when nothing has been received for 30 s (Fault)
6. P.C.B label for identification
7. TxD, connector (RJ45) for outgoing network cable (copper)
8. RxD, connector (RJ45) for incoming network cable (copper)

3.2. MOUNT NETWORK BOARD 5040

The network boards 5040 shall be mounted in position no. 0 and position no. 1 on the main board.

- a) Mount the o-ring and the ferrite on the spacers connected to protective earth, see arrows (one spacer per network board).
The o-ring and ferrite are included/delivered with the network board.
- b) Mount the network boards on the four spacers.
- c) Fasten the network boards with the four screws.
- d) Connect the network cables, fiber or copper, directly to the network boards.



Make sure that the copper cables are well separated from the power supply cables to avoid disturbance from mains.

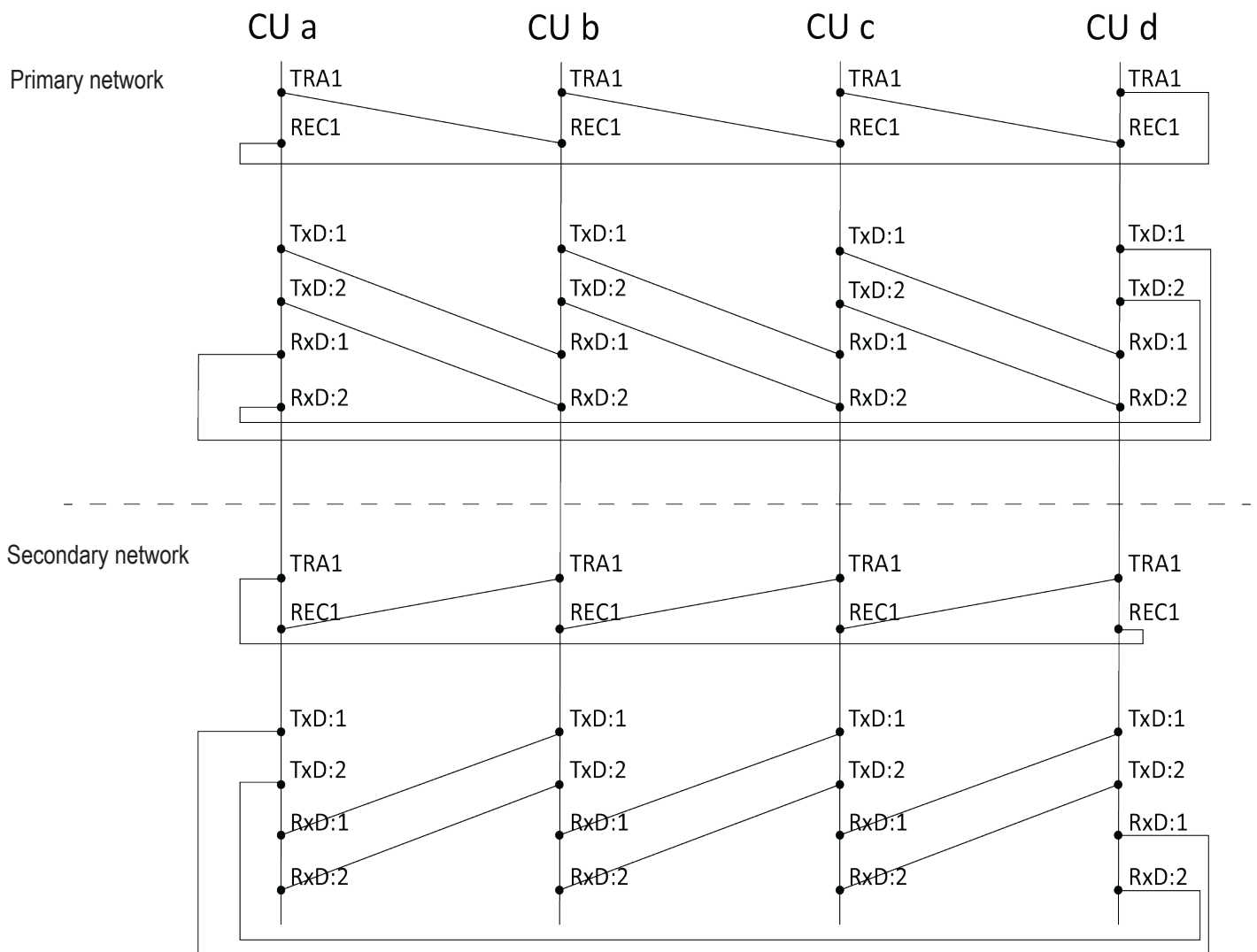


4. NETWORK DESIGN

When planning the installation of a fire alarm system, great care must be taken, especially for the network design.

- The cable shall be of recommended type and the maximum length shall not be exceeded.
- In each segment either fiber or copper cable can be used. Both cable types must not be connected for the same network and same segment.
- The control unit numbers (a,b,c,d) do not have to be in order but the actual order of the control units in the ring must be specified in EBLWin (System-Settings).
- The wiring of the control units in the secondary ring must always be the opposite of the wiring in the primary ring.

Wire the network in ring topology as shown in the figure below. Schematic connection scheme:

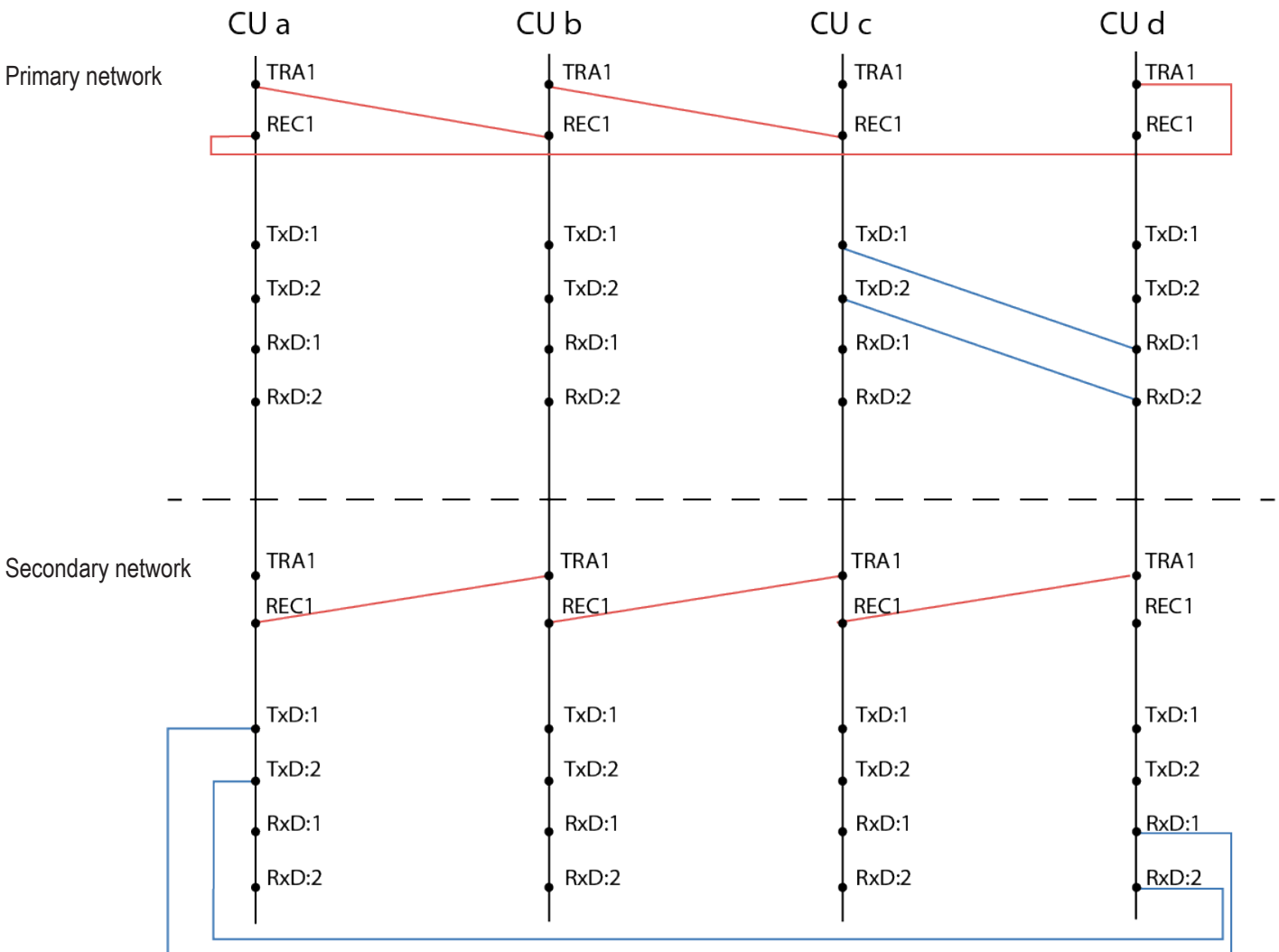


An example of a network wiring in the figure below.

For the primary network there is copper wire between control unit c and d. For all other segments there are fiber.

For the secondary network (backup) there is copper wire between control unit d and a. For all other segments there are fiber.

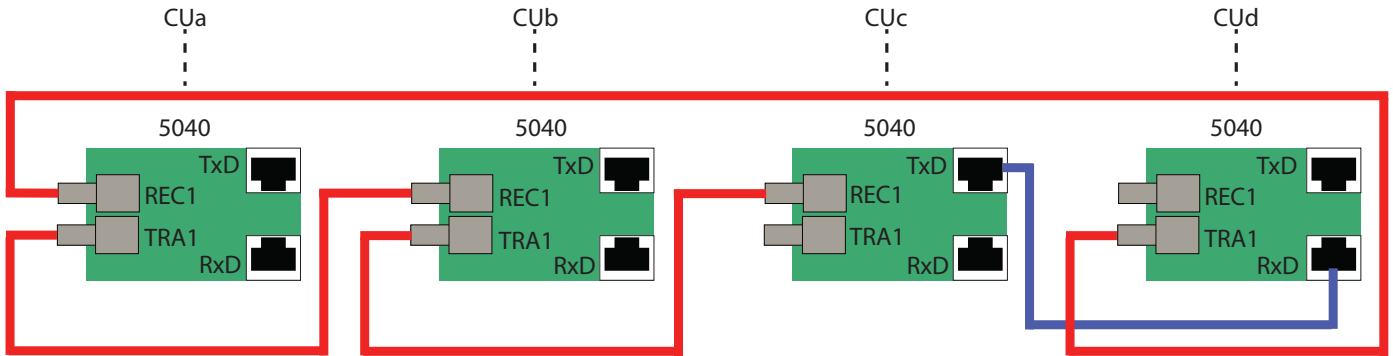
Blue: Copper
Red: Fiber



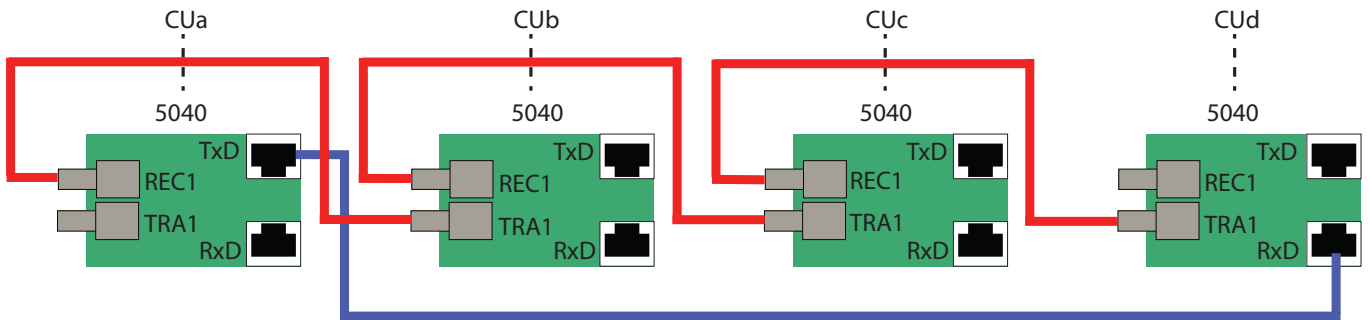
The example on previous page can also be explained like this.

Blue: Copper
Red: Fiber

Primary network



Secondary network



5. REDUNDANT NETWORK

In a redundant network, two network boards (5040) have to be plugged in each control unit. The redundant network are two networks, primary network and secondary network (Network no. 0 and Network no. 1). The secondary network is the back-up board (Network no. 1), and is only supervising / monitoring until primary network (Network no. 0) is not working properly.

Normally only primary network will be in use, and in case of a network fault (i.e. open circuit or short circuit), secondary network will be automatically used until there is no fault on primary network. The redundant network supports full functionality in case of a network fault in one of the networks.

5.1. SINGLE NETWORK

If there is no need for redundancy, it is possible to use just one network board, from SW version 3.2 and forward. The 5040 board shall be mounted in position no. 0 on the main board.

Please make sure that your implementation with single network is not in violation with EN54.

6. NETWORK CABLES

The cable types in the network can be either copper or fiber. A network ring can use different cable types in different parts of the ring.

- Network cable FTP Cat 5e or better. Max 1000m in each segment.
- Opto fiber multimode 62.5/125um with ST-connector. Max 1500m in each segment

6.1. FROM RS422 TO SINGLE MODE - COMMFRONT

It is possible to use single mode by using CommFront Fiber Optic Converter FBR-SERIAL-2 (SM/SC).

With single mode (Fiber Lines), distances up to 40 km are available. The maximum optical fiber distance depends on selected fiber transceiver and fiber type.

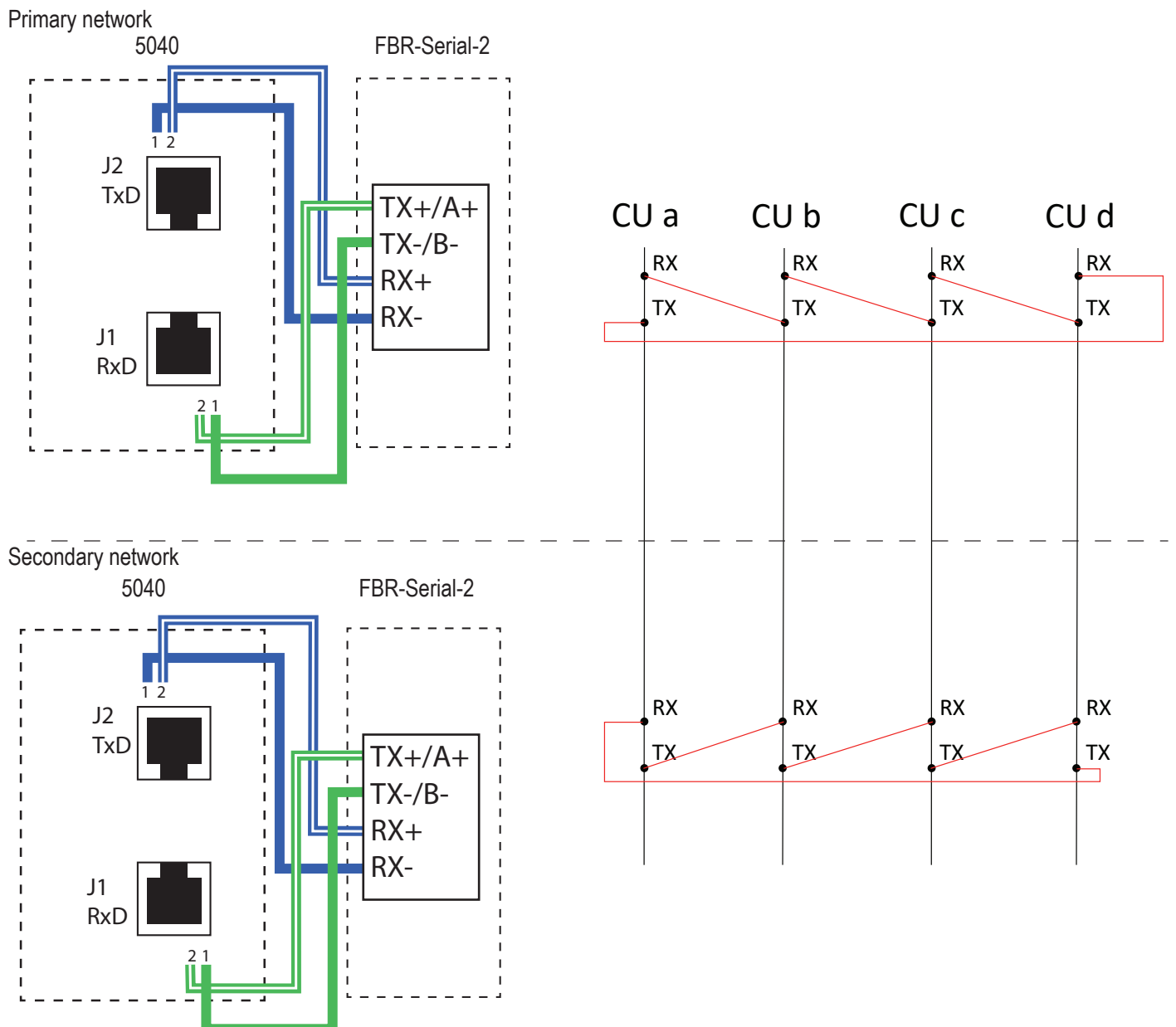
The information below is describing the parts of the installation that are specific for EBL512 G3. You must also read specifications and downloads for RS232 / RS485 / RS422 TO FIBER OPTIC CONVERTER on www.commfront.com.

CommFront RS 422/485 connection

Two Commfront Fiber Optic converters FBR-Serial-2 are required per CIE if the network is redundant. (One for each 5040 board). Consequently, only one converter per CIE, if it is a single network.

FBR-Serial-2 will convert signals to optic. The converters are connected so that every converter is an extension of each 5040 board, therefore the set up is done in the same way as if you are using multimode fiber from 5040 boards.

To connect the cables to the 5040-board, you must terminate the cables to a RJ45 connector.



6.2. FROM RS422 TO SINGLE MODE - WESTERMO

It is possible to use single mode by using Westermo Fiber Optic Modem ODW-730-F1.

With single mode, distances up to 80 km are available. The maximum optical fiber distance depends on selected fiber transceiver and fiber type.

The information below is describing the parts of the installation that are specific for EBL512 G3. You must also read the documentation westermo_ug_6651-2241_odw-730-f1_revM, which can be downloaded from Westermo's website.

Westermo RS 422/485 connection

Two Westermo Fiber Optic Modem ODW-730-F1 are required per CIE. This is valid, even if only one network is using single mode.

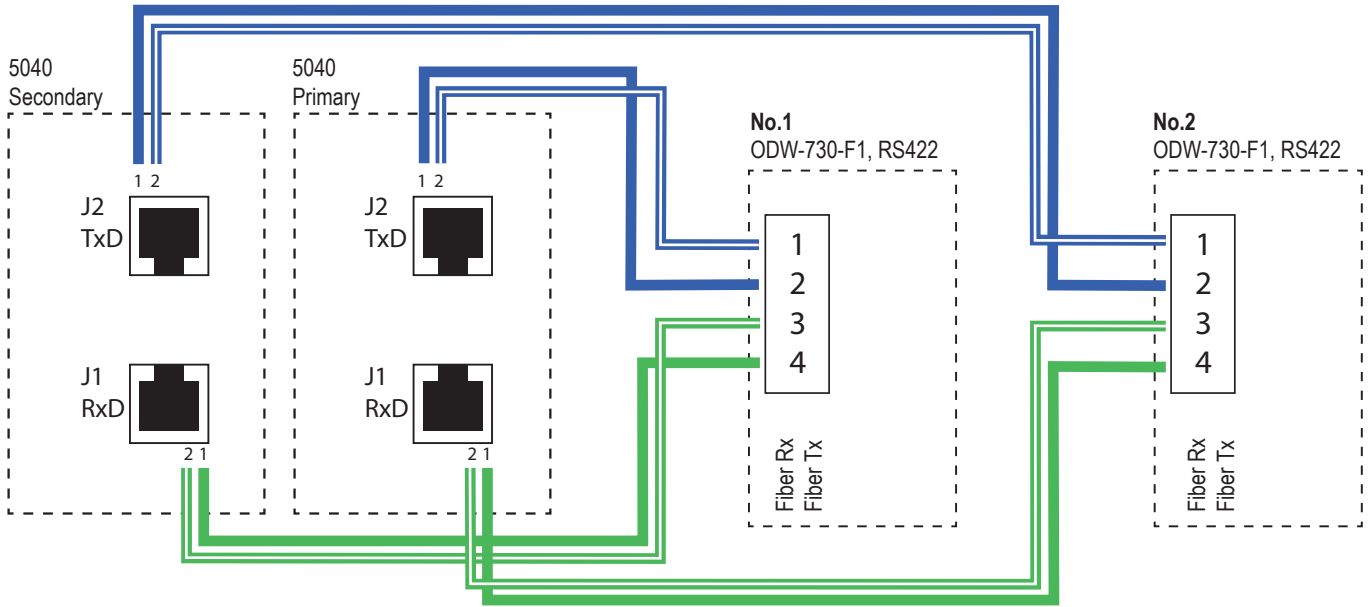
No.1

| Westermo screw terminal position | Description | Product marking | Connection in 5040 board |
|----------------------------------|-------------|-----------------|-----------------------------|
| 1 | R+ | R+ | J2 Pin 2, Primary network |
| 2 | R- | R- | J2 Pin 1, Primary network |
| 3 | T+ | T/R+ | J1 Pin 2, Secondary network |
| 4 | T- | T/R- | J1 Pin 1, Secondary network |

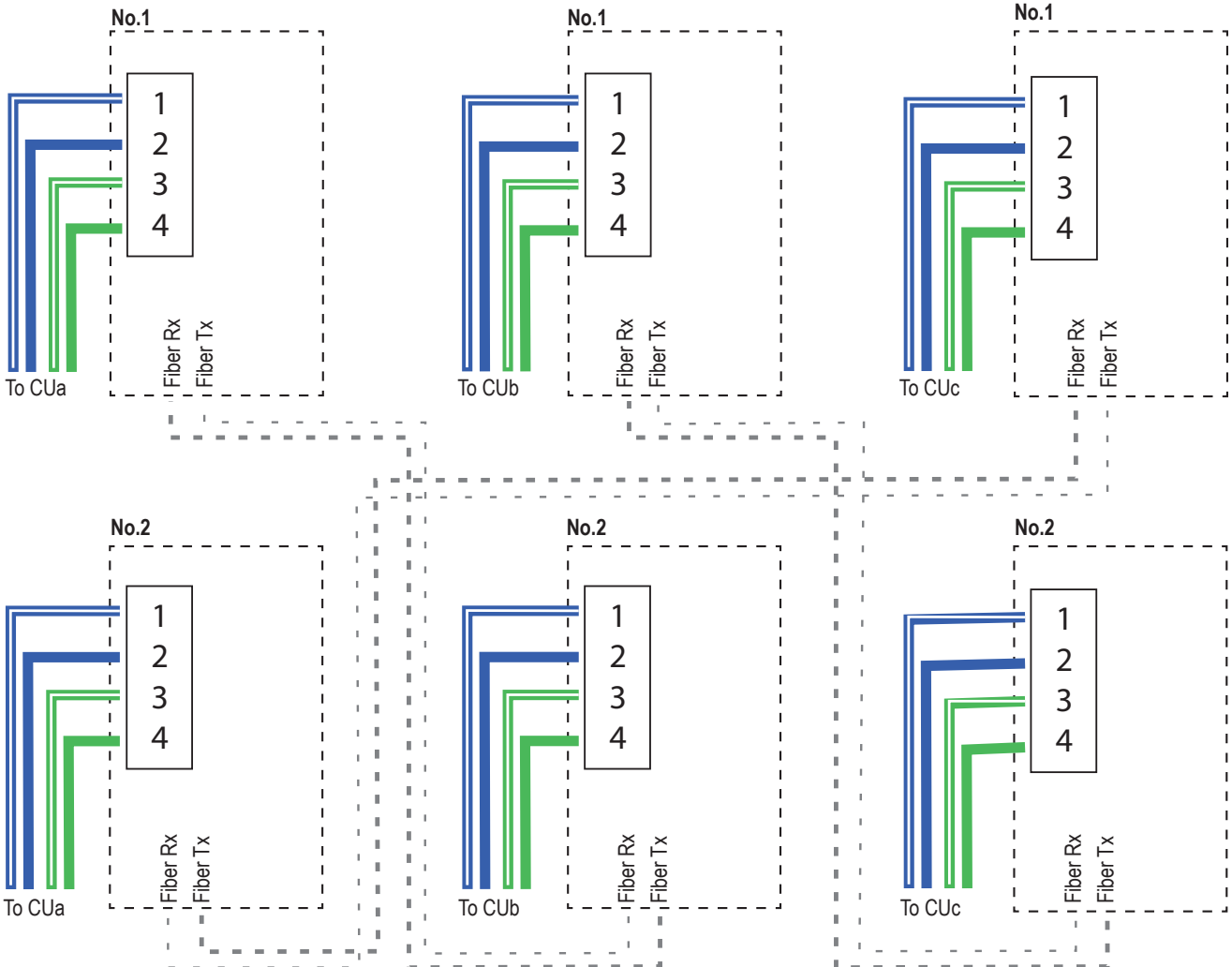
No.2

| Westermo screw terminal position | Description | Product marking | Connection in 5040 board |
|----------------------------------|-------------|-----------------|-----------------------------|
| 1 | R+ | R+ | J2 Pin 2, Secondary network |
| 2 | R- | R- | J2 Pin 1, Secondary network |
| 3 | T+ | T/R+ | J1 Pin 2, Primary network |
| 4 | T- | T/R- | J1 Pin 1, Primary network |

To connect the cables to the 5040-board, you must crimp the cables to a RJ45 connector.



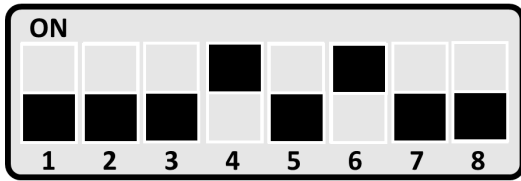
Westermo fiber connection



Westermo setup

- a) Configure the ODW-730-F1 units using DIP-switches. Set as follows:

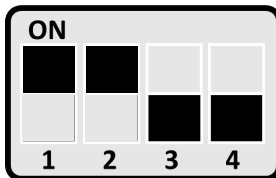
S1



S2



S3



If the DIP-switches are changed you must restart the ODW-730-F1.

- b) Connect fiber link between the ODW-730-F1 units.
- c) Connect the serial cables from the control units to respective ODW-730-F1 unit.
- d) Connect the powersupply to the ODW-730-F1 units.
- e) Check that the LED PWR and CH1 is active (green) on all ODW-730-F1 units. This indicates that the Westermo units are powered up, and that the fiber links between the connected Westermo units are intact.
- f) Check that both RD and TD flash regularly on all units. This indicates that the RS422 communication is intact.
- g) The ring network is up and running.

6.3. EXISTING TLON CABLE

In case it is possible to create a ring structure of the existing network cable, TLON-cable Belden 7703NH can also be used. Crimp the TLON-cable to a RJ45 connector. Or use a RJ45 Spring Terminal Cable Adapter.

Pins 1 & 2 on the connector are used for communication.

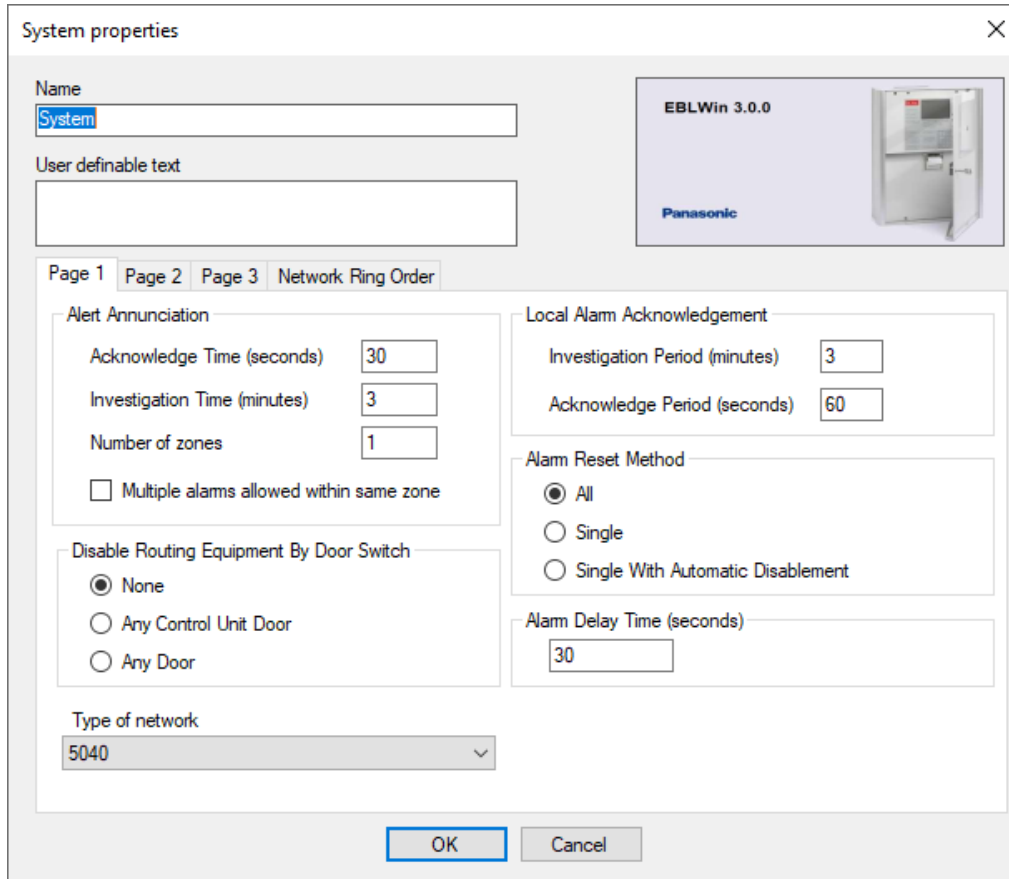


7. NETWORK PROGRAMMING

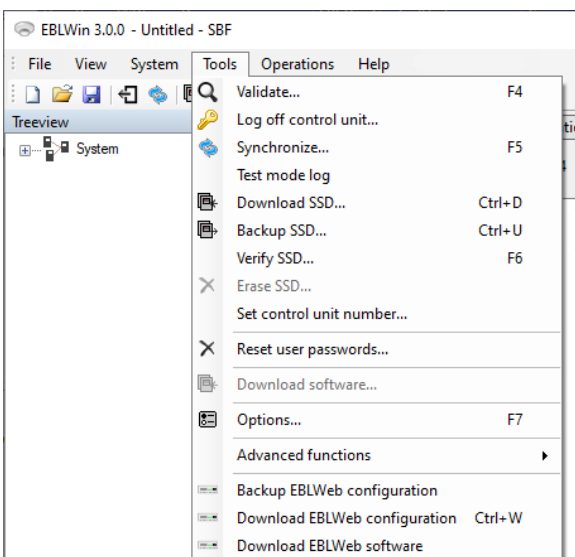
All network programming (configuration) is made in EBLWin. There are two configurations for the network that needs to be done. **Set control unit number** and **Set control unit order**.

7.1. SET THE CONTROL UNIT NUMBER

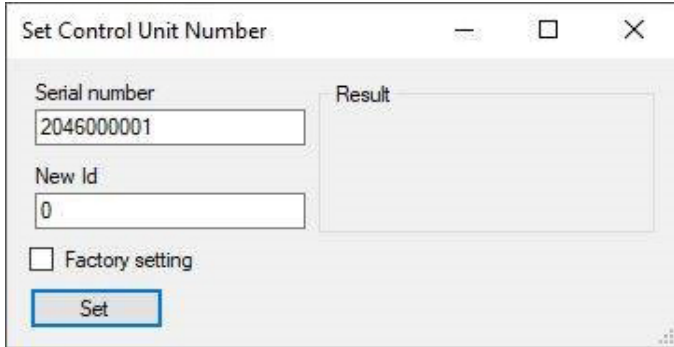
- a) Program the system in EBLWin version 3.0.X or higher.
In the System properties dialog box, 5040 is selected by default as type of network.



- b) Log on to the control unit.
- c) Select Tools menu / Set control unit number...



- d) Set the control unit number on the control units in the network.
 - Enter the main board serial number for the control unit (Sno number on the product label).
The main board serial number of the control unit EBLWin is connected to, is automatically filled in.
 - Enter the ID number. The ID number is the same as the control unit number in the EBLWin tree view.



- e) Click OK. The control unit number is now stored in the flash memory on the main board. The main board will restart, and start using the new number.
- f) Continue with the next control unit in the network until all units are given an ID. There are two ways to do this:

If the control units are not yet connected in the network. Log out from the control unit. Connect to the next control unit. Follow procedure 7.1 b) to f). (Note that there might be "Timeout" in the control unit when logging out, because EBLWin will try to log out from control unit 255, which it first connected to, but that control unit number is not existing anymore).

If all control units are connected in the network, just enter the next serial number and ID.

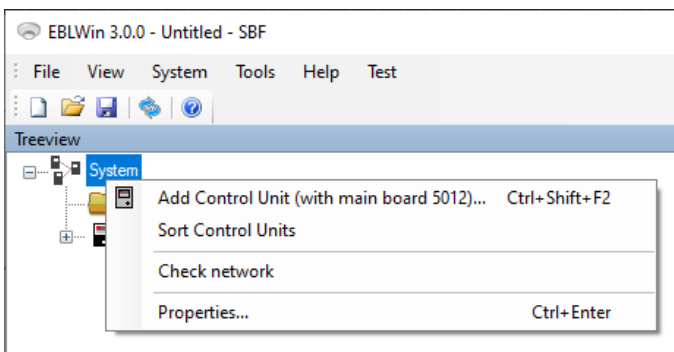
7.2. SET THE CONTROL UNIT ORDER

Before starting this procedure, all control units must be connected in the network, and the control unit numbers must be set for each control unit.

Specify the order of the control units in the primary network ring. There are two ways to do this: **Automatic** or **Manually**.

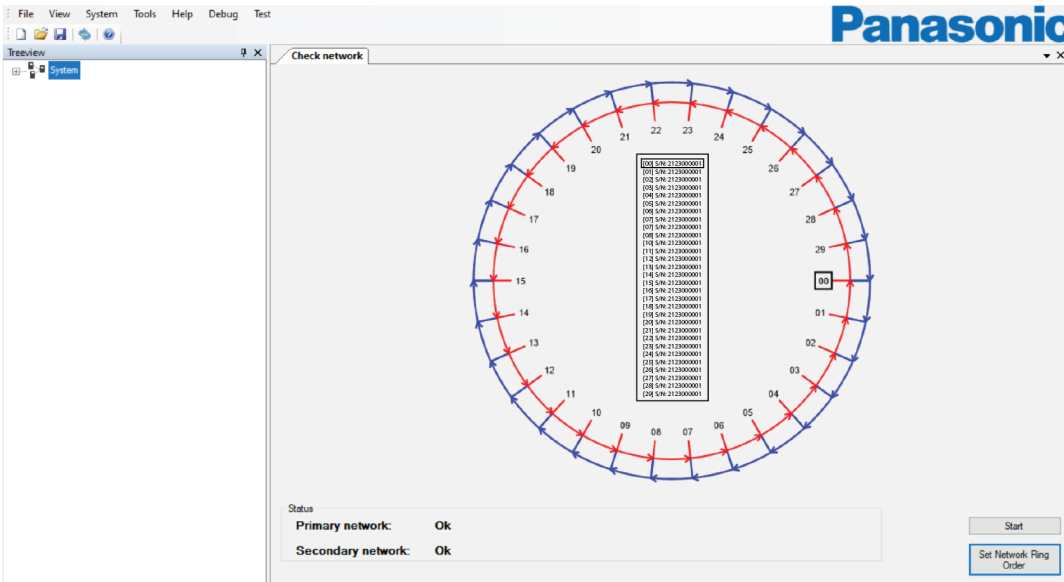
7.2.1. AUTOMATIC SETTING OF CONTROL UNIT ORDER

- a) In System pop-up menu, select Check network.

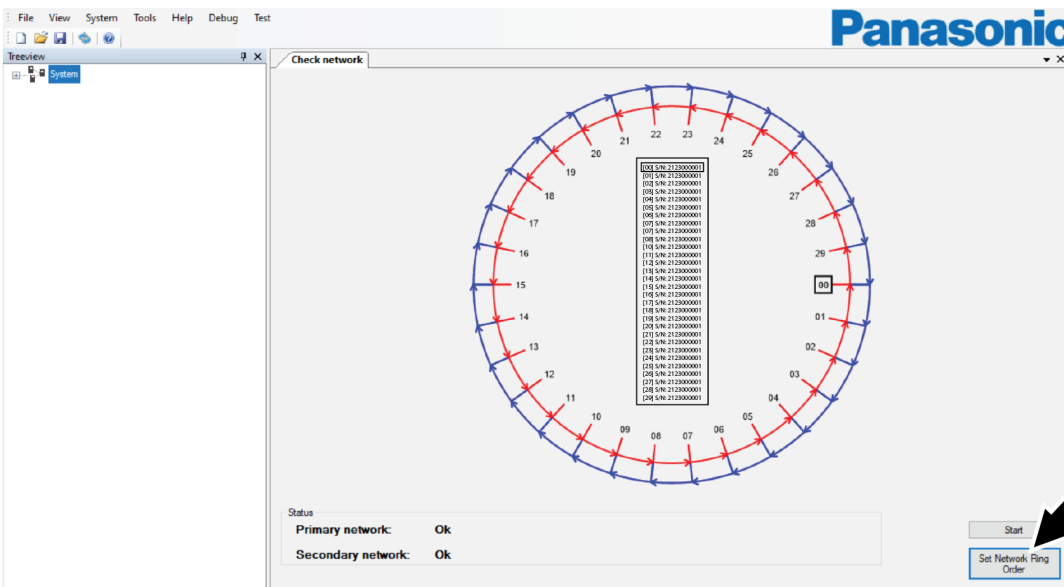


EBLWin will present the status of the network ring graphically. The control unit periodically checks the network ring status. A list of the control unit' serial numbers is displayed in the center of the ring. Use **Ctrl** + mouse scroll wheel to zoom in and out.

A fault in the network will be shown graphically with a yellow warning sign. The graphical view will also indicate, with a dotted line, within which network section the not responding control unit can be found.



- Repair any faults and click Start to resume.
- When the status of both network rings are OK, click the Set network ring order button (see arrow) to automatically apply the order of the control units.



When a change is made to the network, i.e. changing network cables or restarting/shutting down control units, it may take up to 45s before the new status of the network has been concluded. If the Check network command is used during this time the result shown may be incorrect.

7.2.2. MANUAL SETTING OF CONTROL UNIT ORDER

- a) In the System properties dialog box, manually enter the ID number (= control unit number) separated by comma (individual numbers or a range of numbers), for example 1, 2, 4-10, 3.
- b) Click OK to save.

The screenshot shows a software dialog box titled "System properties" with a close button (X) in the top right corner. The dialog is divided into several sections:

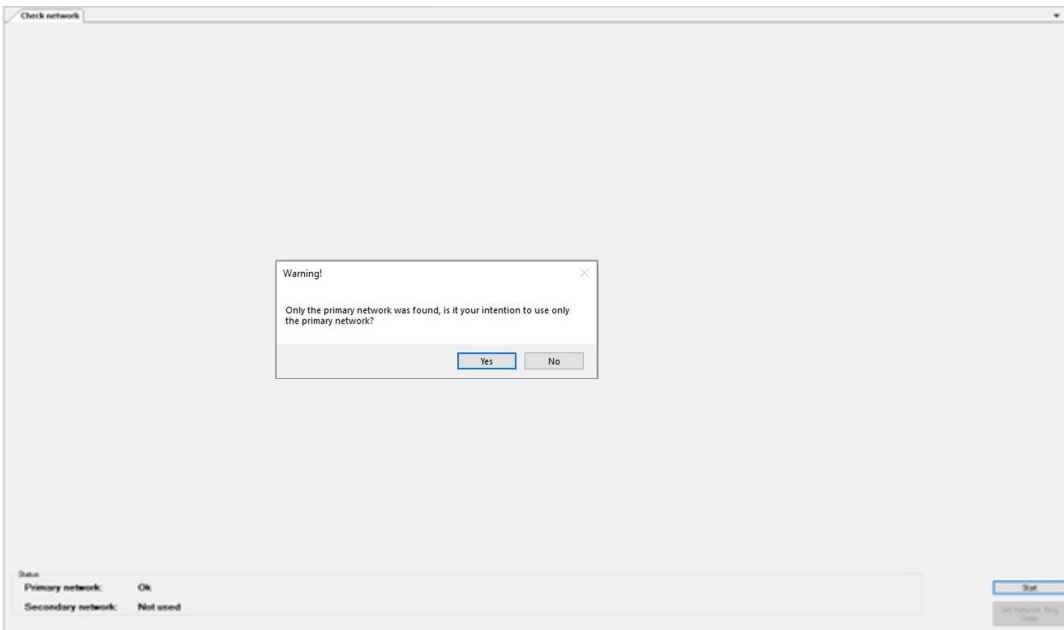
- Name:** A text input field containing the word "System".
- User definable text:** An empty text input field.
- Product Information:** A box on the right side containing the text "EBLWin 3.0.0" and the "Panasonic" logo, along with a small image of a fire alarm control panel.
- Navigation:** A row of tabs at the bottom left: "Page 1", "Page 2", "Page 3", and "Network Ring Order". The "Network Ring Order" tab is currently selected.
- Input Field:** A large, empty text input field for entering the control unit order.
- Instructions:** Below the input field, the text reads: "Enter order of Control Units comma separated and/or in sequence. Example: 3, 4, 15 - 20, 25".
- Buttons:** "OK" and "Cancel" buttons are located at the bottom center of the dialog.

7.3. NETWORK PROGRAMMING - SINGLE NETWORK

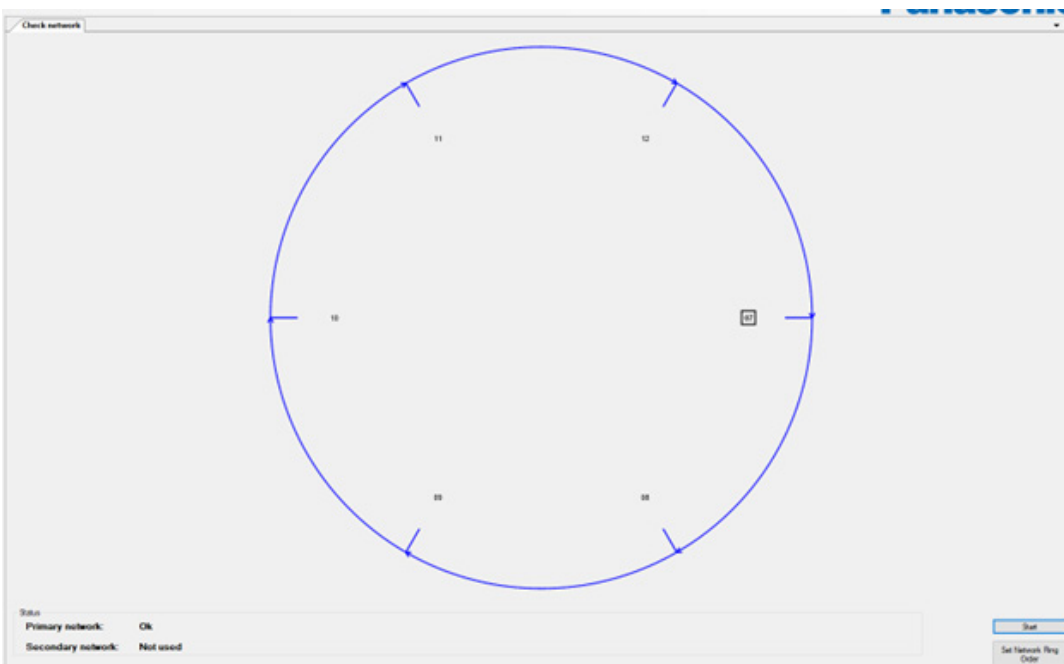
This procedure is used when only one 5040 board is mounted and connected in each CIE.

In EBLWin/System properties, the check box "Redundant Network" is checked by default. This is how to get it unchecked.

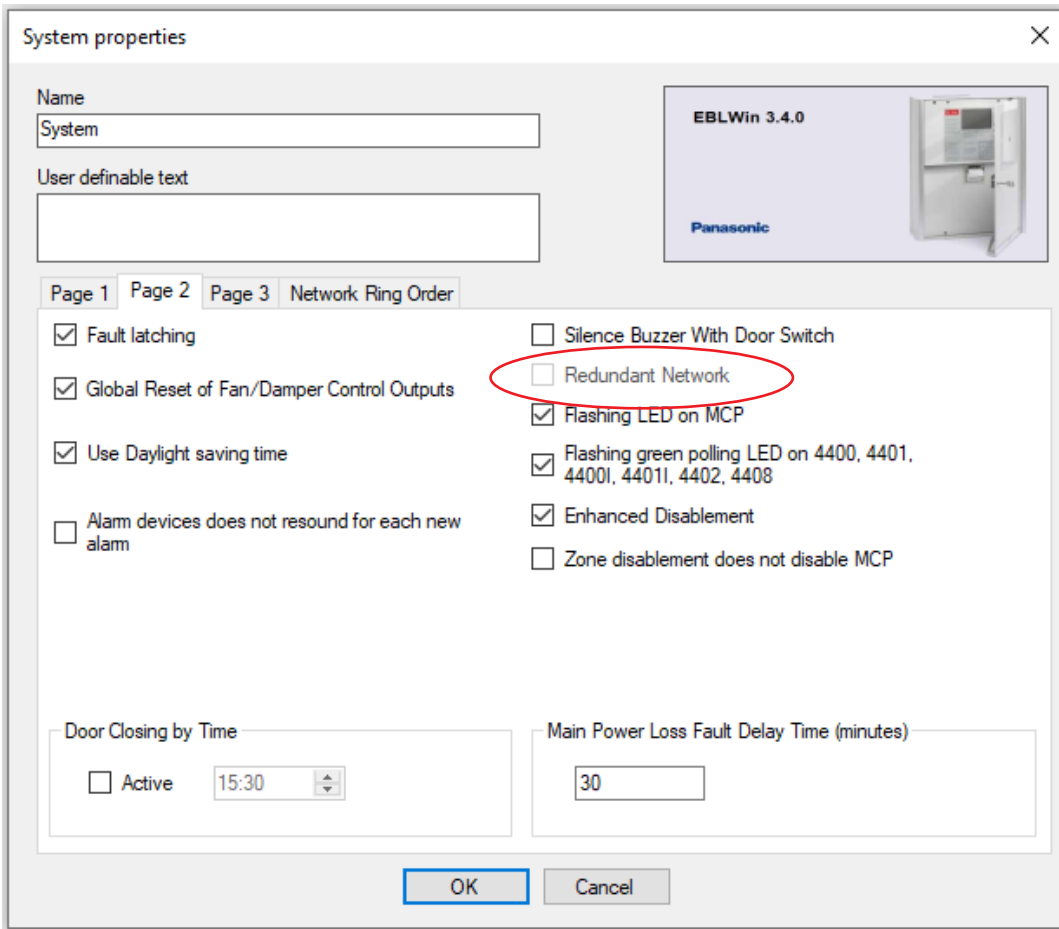
- a) First, follow all steps from [7.1. SET THE CONTROL UNIT NUMBER](#) on page 16 to [7.2.1. AUTOMATIC SETTING OF CONTROL UNIT ORDER](#) on page 17.
- b) When "Check network" is selected the system will find the single network.
There will be a popup window: "Warning. Only the primary network was found, is it your intention to use only the primary network?"
Select "Yes".



- c) This window will appear.



d) In EBLWin / System properties, the check box "Redundant Network" is automatically updated to un-checked.



e) Also, read the information on page 18.

To make the system redundant, you must connect 5040 boards to the secondary position in all CIEs, and connect the ring network. Then press "check network". When the system is updated, the graphical view in EBLWin will show two network rings, and System Properties will automatically be updated.

8. MAINTENANCE

8.1. REPLACE MAIN BOARD

If the Main board is replaced, you must also replace the Main board serial number in the network configuration. Perform all steps in section [7.1. SET THE CONTROL UNIT NUMBER on page 16](#) Note that the ID number shall remain the same.

8.2. REPLACE 5040 NETWORK BOARD

The 5040 network board is "transparent" and no information about the network is stored in the pcb. No change in the configuration is needed. Replace the 5040 board according to section [3.2. MOUNT NETWORK BOARD 5040 on page 7](#).

9. TROUBLESHOOTING

9.1. TYPE OF FAULT

FAULT: Low performance on primary network, CU xx

Control unit xx has detected several bit faults and/or low signal strength on the incoming primary network.
Check cables, connections, etc.

FAULT: Low performance on secondary network, CU xx

Control unit xx has detected several bit faults and/or low signal strength on the incoming secondary network.
Check cables, connections, etc.

FAULT: Primary network, CU xx <-> CU xx,
Detected by CU xx

Control unit xx has detected a network fault on the primary network between the two control units listed.
Check cables, connections, etc. This could also mean a faulty 5040 board in either of the two control units listed.
If the secondary network is ok, the messages will be sent on the secondary network.

FAULT: Second network, CU xx <-> CU xx,
detected by CU xx

Control unit xx has detected a network fault on the secondary network between the two control units listed.
Check cables, connections, etc. This could also mean a faulty 5040 board in either of the two control units listed.
If the primary network is ok, the messages will be sent on the primary network.

FAULT: Wrong connections, secondary network, detected by CU xx

The order of the control units in the secondary network ring doesn't match the order specified in the SSD data.

Check cables and the SSD data programming.

Note that the secondary ring must run in the opposite order of the primary ring.

The connection order must be correct, to get the correct fault messages, but this fault has no impact on the system function.

FAULT: Wrong connections, primary network, detected by CU xx

The order of the control units in the primary network ring doesn't match the order specified in the SSD data.

Check cables and the SSD data programming.

The connection order must be correct, to get the correct fault messages, but this fault has no impact on the system function.

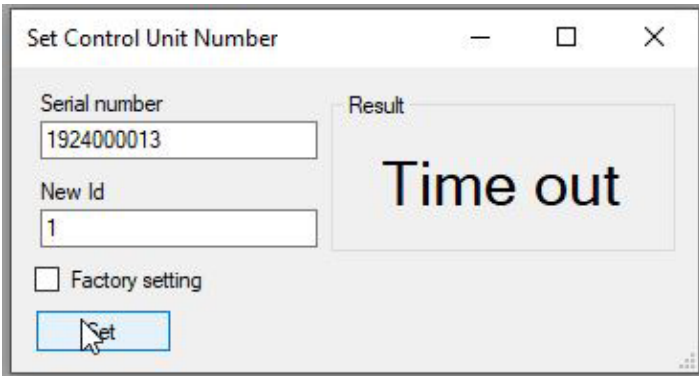
9.2. CUT OF ON BOTH NETWORKS

If there are faults on both Primary network and Second network, messages will automatically be sent on both networks.

This makes it possible for all control units to send messages to each other, even in situations where one control unit is shut down or out of order. This functionality is also the reason why the network rings must be connected in opposite directions.

9.3. TIME OUT DURING PROGRAMMING

During network programming, this can be the result:



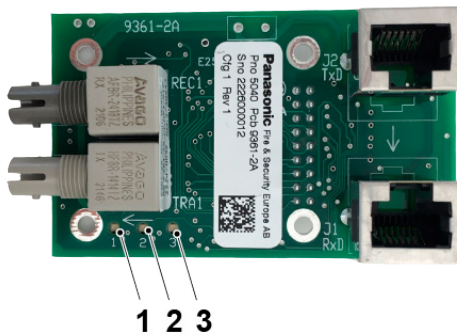
Check the following:

- Network board correctly mounted
- Network board broken
- Network cable cut off
- Not logged in to the control unit

9.4. CHECK COMMUNICATION

The three LEDs on the 5040 board will flash/not flash as follows:

1. LED 1, Flashing (short pulse) when receiving (Rx)
2. LED 2, Flashing (short pulse) when transmitting (Tx)
3. LED 3, Normally OFF. Turns steady ON when nothing has been received for 30 s (Fault)



10. RECOMMENDED PRODUCTS

For correct installation in the network, refer to the manual of each of the products below.

10.1. WESTERMO - FIBER OPTIC MODEM

Westermo Fiber Optic Modem ODW-730-F1.

RS 422/485 screw terminal

Rated voltage: 12 to 48 VDC and 24 VAC

Operating voltage: 10 to 60 VDC and 20 to 30 VAC

10.2. COMMFRONT - FIBER OPTIC CONVERTER

CommFront Fiber Optic Converter FBR-SERIAL-2 (SM/SC).

RS 422/485 screw terminal

Rated voltage: 9 to 30V DC (External AC to DC power adapter included)

External AC/DC Power Adapter: 9V DC / 500mA (Input: 100~240V AC 50/60Hz, US type A plug)

Current consumption: Approximately 100mA

11. TECHNICAL DATA

All current consumptions are valid by nominal voltage and by 25 °C.

| | |
|---------------------------------------------------|------------------------------|
| Current of the 5040 board: Quiescent Active | 5 mA 5 mA |
| Data transmission speed of network modul 5040: | 115.2kbaud |
| Communication protocol via copper cable | Galvanically isolated RS-422 |

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