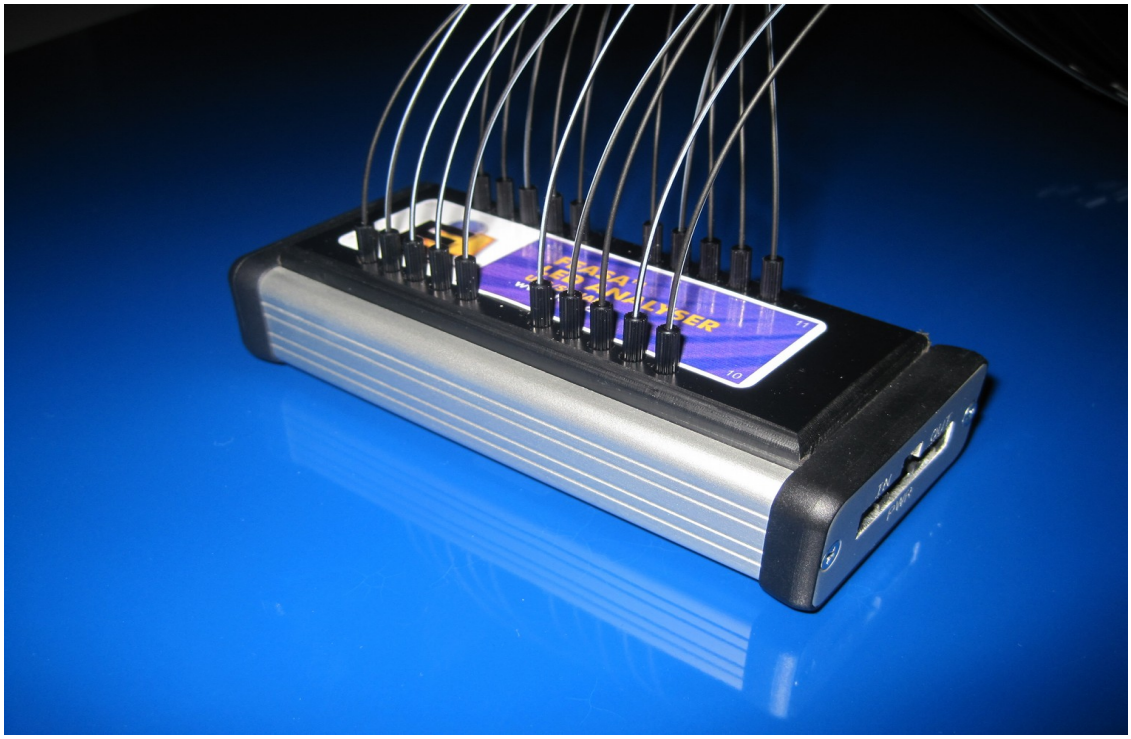
FEASA LED ANALYSER
Daisy Chain App Note

User Manual for Daisy Chain Function



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There are two options when connecting the Daisy Chain Function USB and Serial RS232 :

Daisy Chain USB Wiring Method:

The Daisy chain is a method used to communicate with multiple Led Analyser units to save connections and simplify the wiring.
The 1st Led analyser in the chain is connected to the computer using the USB cable supplied. The remaining LED Analysers are interconnected in a Daisy Chain Bus using the cables provided. The Daisy Chain OUT connector on Led Analyser No1 is connected to the Daisy Chain IN Connector on Led Analyser No2 and so on.(See Fig 9a below). Each Analyser except for No1 must be powered to 5V @220mA. This completes your wiring requirements.

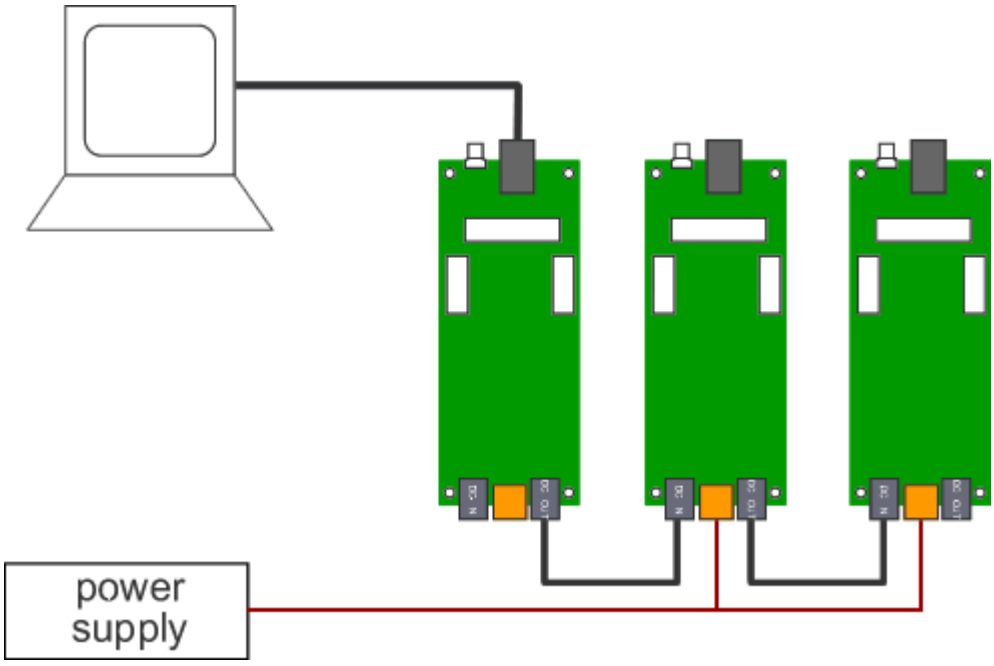

Figure 9a USB Setup

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Daisy Chain Serial RS232 Wiring Method:

The Daisy chain is a method used to communicate with multiple Led Analyser units to save connections and simplify the wiring.
The 1st Led analyser in the chain is connected to the computer using the Serial cable supplied. The remaining LED Analysers are interconnected in a Daisy Chain Bus using the cables provided. The Daisy Chain OUT connector on Led Analyser No1 is connected to the Daisy Chain IN Connector on Led Analyser No2 and so on.(See Fig 9b below). Each Analyser must be powered to 5V @220mA. This completes your wiring requirements.

Please Ensure the RS232 GND (pin3) and the PSU GND are connected together.

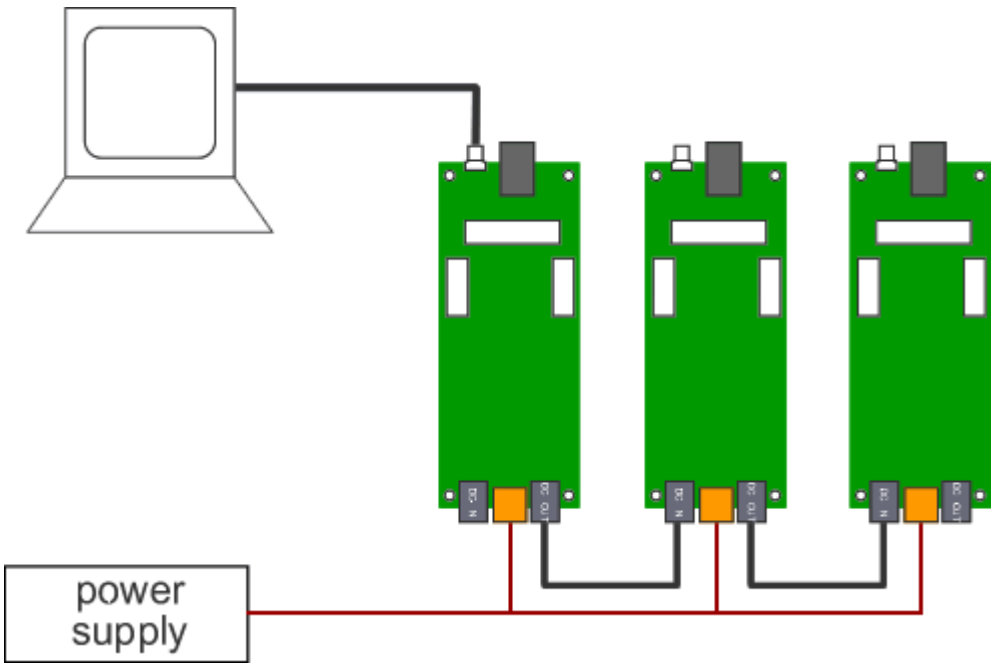

Figure 9b Serial Setup

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Daisy Chain Communication

Daisy Chain Baudrate:

The default Port settings of the Analysers are 57,600, 8 Data bits, 1 Stop bit and No Parity.
If an incompatible baud rates are selected the Analyser will not respond. Please disconnect the Analysers from the Daisy Chain and reconnect each Analyser in turn using USB or Serial RS232 port and set the required baudrate. All baudrates must be the same for communication purposes. A correct baud rate selected will remain stored in memory even after power off.
The command getbaud will return the set baud rate. It can also be seen on the comment section of the Feasa terminal window.

Test times are improved by increasing the baudrate from the default to higher values and this can be further enhanced by decreasing the latency (windows default 16) to latency of 1. Refer to the App Note in the documentation folder of the CD to carry out this.

The LED Analyser connected to the computer receives a command and this command is received by all the other LED Analysers through the Daisy Chain Bus. All Analysers in the chain are active but only the selected LED Analyser is active to give result Data. All responses received by the Computer will be from this active LED Analyser.

Daisy Chain Identification:

Each LED Analyser is identified using a unique 4-character *Serial Number*. This *Serial Number* is fixed to each Analyser or can be read out using the getSerial command.

Feasa provides a **Terminal Program** on the CD for the customers use. When you connect your 1st analyser the terminal program will detect which port you are connected to. At this time you have the option of connecting to the Standalone option or the Daisy Chain option from the drop down box. If you select the Daisy Chain option you will be asked for the serial Number of the 1st analyser in your chain.

There are a number of commands which are used to control the Analysers in the Daisy Chain. These commands are described on the following pages.

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BusFree - Deactivate any active Analysers

Transmit	Receive
busfree	**OK**

Description

This command is used to deactivate any active Analysers on the Daisy Chain Bus. This will free the Bus to allow an Analyser to be made active. This command should be issued at the start of a sequence. It is the responsibility of the Controlling Computer to issue commands and monitor the responses. If an Analyser does not respond within 500mSec then the Controlling Computer should issue a new BusFree command and report an error.

The Analyser connected to the computer will operate as a standalone unit after the command is issued.

Example:

The PC transmits **busfree** to free up the Daisy Chain Bus.

busfree
OK

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BusGet####- Activate a LED Analyser

Transmit	Receive
busget####	**OK**

Where:

represents the Serial Number of the Analyser.

Description

This command will activate the LED Analyser with the specified Serial Number.
This command should be preceded by a *BusFree* command. All the *Capture*, *Set, Get*, etc commands can now be used with the active Analyser in the chain.

It is the responsibility of the Controlling Computer to issue commands and monitor the responses. If an Analyser does not respond within 500mSec then the Controlling Computer should issue a new BusFree command and report an error.

Example:

The PC transmits **BusGet####** to the Master LED Analyser to instruct it to activate the LED Analyser with Serial Number ####.

busgetF044
OK

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BusC - Initiate Capture for all LED Analyser's

Transmit	Receive
busc	**OK**

Description

This command will cause all LED Analysers in the Daisy Chain to initiate a capture sequence using the Automatic Range Mode. To specify a Range manually see the command *BusC#* on the next page.

After the capture cycle use the command BusGet#### to activate a specific LED Analyser. All the standard commands can then be used to read back the LED Test data.

Example:

The PC transmits **busc** to instruct all LED Analysers in the Daisy Chain to initiate a Capture cycle.

busc
OK

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BusC# - Initiate Capture for all LED Analyser's

Transmit	Receive
busc#	**OK**

Where:

represents the ranges 1, 2, 3, 4, 5.

The LED brightness level for each range is as follows:-

Range 1 = Low
Range 2 = Medium
Range 3 = High
Range 4 = Super
Range 5 = Ultra

Description
This command uses a pre-selected exposure time designated Range1, Range2 etc. For low light or dim LED's use Range 1 and for brighter LED's use higher ranges. The higher ranges lead to faster test times because the exposure time is shorter.
This command should be preceded by a *BusFree* command.

This command instructs all LED Analyser's in the Daisy Chain to capture and store the Colour and Intensity of all the LED's positioned under the fibers using a fixed range.

The range setting must be specified. The data is stored until the power is removed or another capture command is issued. When completed the Analyser will transmit the character OK on the receive line to the transmitting device (i.e. the PC).Example:

The PC transmits **busc#** to instruct all LED Analysers in the Daisy Chain to initiate a Capture cycle.

busc2
OK

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BusC#pwm@@ - Store PWM LED Data for a specific Range

Transmit	Receive
Busc#pwm **Busc#pwm@@**	**OK** **OK**

Where:

\# represents the exposure Range 1 – 5.
@@ represents an averaging factor in the range 1 - 15.
@@ If the @@ digits are omitted then a default setting of 07 is used.

Description

This command allows the User to specify the *exposure range* **#** and an *averaging factor* **@@** when testing PWM LED's. Select the *exposure range # (1-5) to match the* ***Intensity*** *of the LED's.* The Analyser tests these LED's by taking a number of readings and averaging the results. A larger Averaging factor will lead to more stable results but increased Test Times. The *averaging factor* @@ is a number in the range 1-15. If this number is omitted from the command the default value is 07.

This command instructs the LED Analyser to read and store the Colour and Intensity of all the LED's positioned under the fibers. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

busc1pwm10
OK

There are 5 manual capture ranges each with an intensity output range of 0 to 99,999. Feasa recommends that the UUT readings should be in the 55K to 85K range for the best stability.

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BusCE#### - Poll each LED Analyser to verify a capture is complete

Transmit	Receive
busce####	**0 or 1**

Where:

represents the Serial Number of the Led Analyser.

If reply is 1 Then Capture is complete
If reply is 0 No Capture
No reply Led Analyser is busy - Timeout 10mS

Description

This command is used to verify that after a busc (global capture) each Analyser in the chain has complete its capture.

The PC transmits **busce####** to chech each LED Analysers in the Daisy Chain has complete a Capture cycle.

BusceF123 **(Where F123 is the s/n of the Analyser)**
1

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Ports Description and Wiring.

Figure 10

The Daisy Chain Connectors are shown on the right-hand side of figure 10.
The D_OUT connector is connected to the D_IN connector of the next Analyser in the chain.

The Power Connector is used to supply +5V DC to each Analyser in the chain.
Allow 220mA @5V for each Analyser and ensure the wiring is adequate to supply the current without incurring large voltage drops. **For reliable operation it is necessary to have 5V at the Power Connector of each Analyser**. Do not exceed 6V for a prolonged period as this will damage the Analyser.

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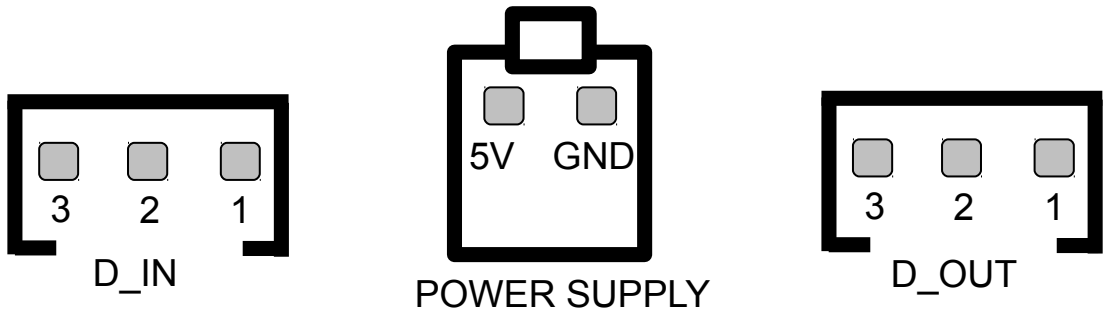
Daisy Chain Pinout



PIN	D_IN	D_OUT
1	RX_in	RX_out
2	TX_out	TX_in
3	GND	GND

Figure 11

Figure 11 shows the layout of the Connectors viewed from the edge of the board.
The *GND* line of *D_OUT* is connected with the *GND* line of *D_IN*, the *RX_out* of *D_OUT* is connected to *RX_in* of *D_IN* and the line *TX_in* of *D_OUT* is connected to the line *TX_out* of *D_IN*.

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Step-by-Step method for Daisy Chaining

To sucessfully implement Daisychaining the following steps are recommended:-

1. Decide how many Analysers are to be daisychained.

2. Make a list of the Serial Numbers of the Analysers and note the order in which they will be interconnected. For example we have 4 analysers as follows:

Chain Order	Serial No	Comments
1	F304	Tests D40 – D59 Connected to PC
2	F461	Tests D60 - D69
3	F201	Tests LED01 – LED20 All White
4	F006	Tests LED21 – LED40 All Red

3. Set the required baud rate on each Analyser (All baudrates must be the same).

4. Locate the Daisy Chain cables and connect the Daisy_Out of s/n F304 to the Daisy_In of s/n F461. Connect Daisy_Out of s/nF461 to Daisy_In of s/nF201. Connect Daisy_Out of s/nF201 to Daisy_In of s/nF006.

5. Next locate the 2-pin Power cable supplied to s/n F461, s/n F201 and s/n F006 Analysers. It is necessary to apply 5V @220mA to each of these Analysers in the chain. The green power Led should be visible on these 3 analysers.

6. Connect s/n F304 to the PC using the usb cable. The green power led should come on. If you don't have a usb port available and only a Serial port please connect the s/n F304 to the PC using the Serial Cable provided **AND** connect the 2 pin power connector to the 5V 220mA supply.

7. The supplied Terminal Program can be used to verify the operation of the Daisy Chain. Connect to the port on which the 1st Analyser is installed. See USB Port Control

8. Send **capture** to verify the communications with the 1st Analyser. The response should be **OK**.

9. Send **getserial** and the response should be **F304**.

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10. To connect to Analyser 2 (s/n F461) send:-

busfree
OK Response from the Analyser
busgetF461
OK Response from the Analyser

The host computer is now connected to Analyser 2 (s/n F461).
This can be verified by requesting the Serial Number:-

getserial
F461 Response from the Analyser

All the LED Analyser commands can now be directed to Analyser 2.

11. To connect to Analyser 3 (s/n F201) send the following:-

busfree
OK Response from the Analyser
busgetF201
OK Response from the Analyser

12. It is possible to instruct all Analysers in the chain to capture LED data simultaneously. This makes programming easier and saves time. There are six capture commands in total but only one can be used at a time. The commands are ***busc, busc1, busc2, busc3, busc4 and busc5***. ***Busc*** uses the automatic capture range whereas ***busc1 – busc5*** use pre-selected manual ranges.

13. If you are have difficulty reading from Analysers at the end of your chain please verify your voltage to each of these units is 5V.

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Example

```
Busfree              'free the bus
OK
busc3                'All Analysers capture using range 3 High
OK
busceF304            'poll the analyser F304
1
busgetF304           'Connect to the Analyser F304
OK
getserial            'Confirm s/n of the Analyser
F304
gethsi01             'Get the Data for Fiber 1
000.51 100 36491
gethsi02
     .
     .
gethsi20
120.51 100 66542     'Data for Fiber 20
busfree
OK
busceF461
1
busgetF461           'Connect to the next Analyser F461
OK
getserial            'Confirm to Analyser
F461
gethsi01             'Get the Data for Fiber 1
000.51 100 36491
gethsi02


gethsi20             'Get the Data for Fiber 20
```

.
Repeat this sequence for all Analysers in the chain.

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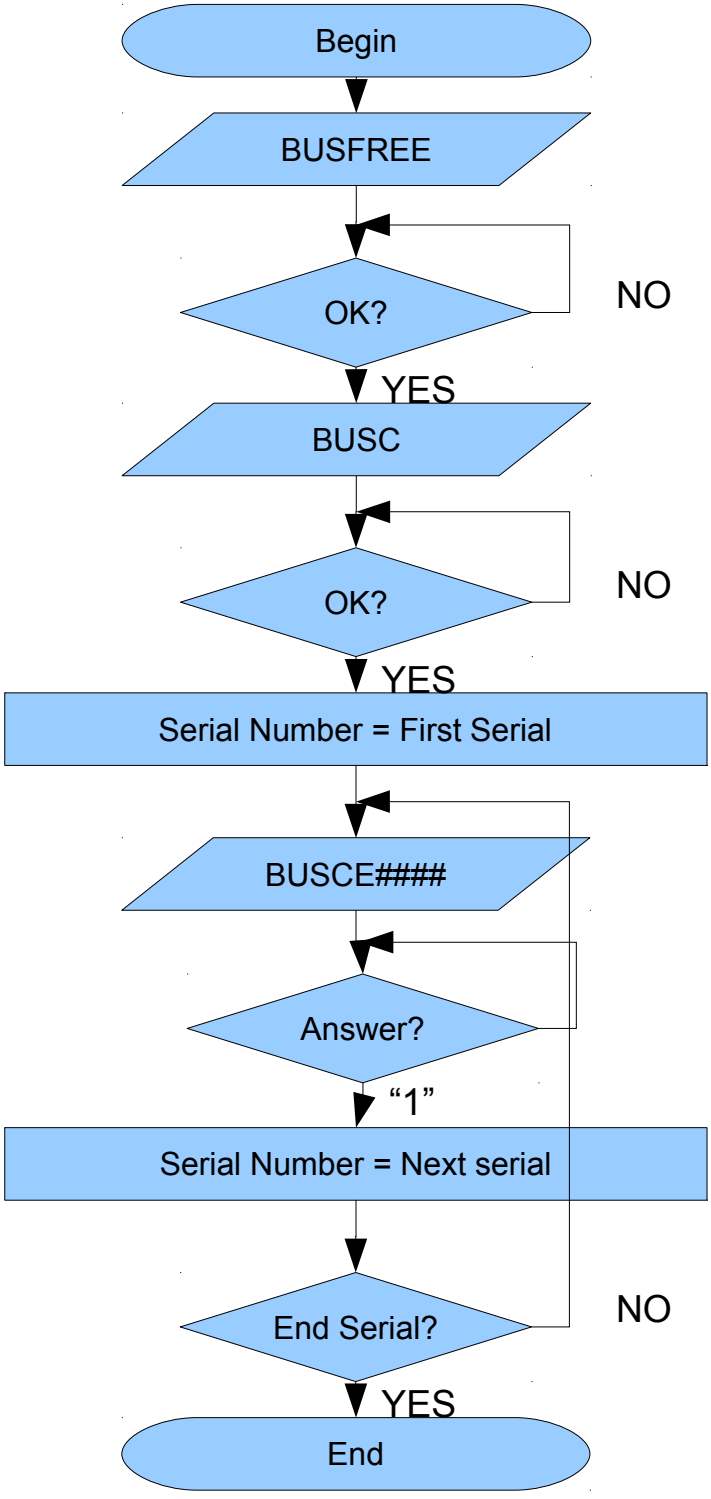
Begin
BUSFREE
OK?
NO
YES
BUSC
OK?
NO
YES
Serial Number = First Serial
BUSCE####
Answer?
“1”
Serial Number = Next serial
End Serial?
NO
YES
End