Masterlink Gateway

Installation Manual

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Introduction

Masterlink Gateway provides communication between Bang & Olufsen products and 3rd party control equipment through an RS232 serial interface.

Masterlink Gateway thus allows an external controller to send commands to, and receive status information from, Bang & Olufsen products attached to a Masterlink network.
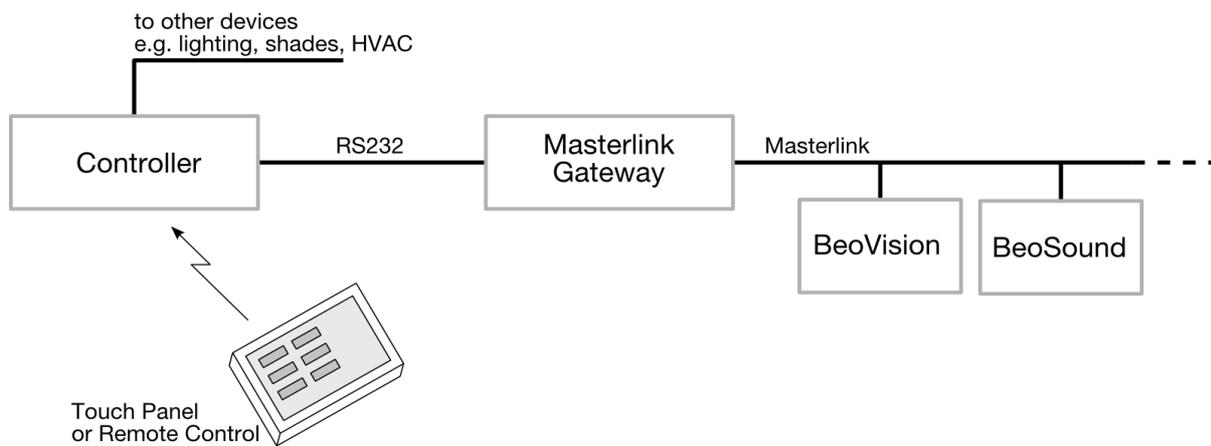
Please refer to the glossary on page 17 for naming conventions used in this document.
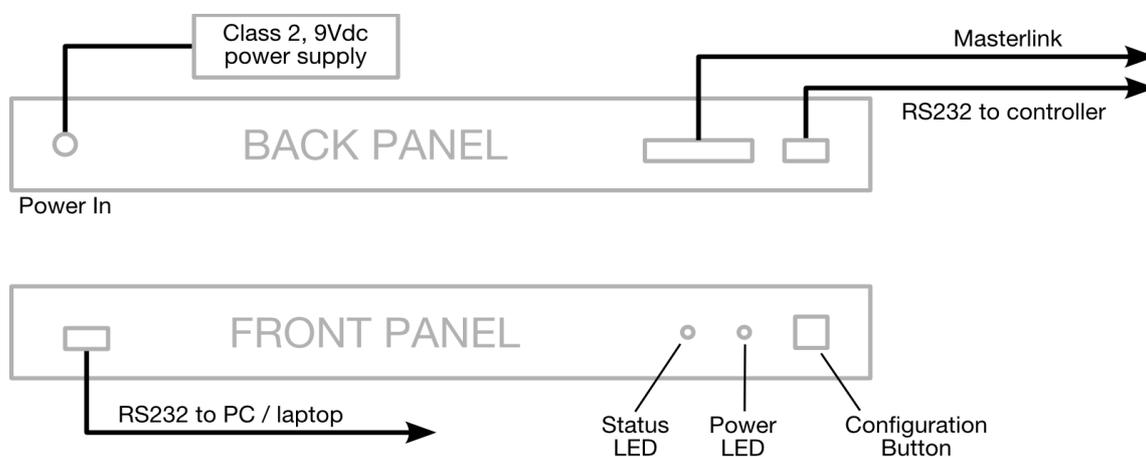
Read and follow the safety requirements in the next section before installation.

Installation and safety instructions

Power supply

A DC power supply is required for MLGW.

Use a UL Listed power supply marked 'Class 2' or ' LPS'.

Output rated 9 to 12 Vdc, 200 mA minimum.

The power supply selected shall be suitable for the installation site's ambient temperature condition (see specifications on page 18).

The polarity of the connector is irrelevant.

Rack Mount

When installing MLGW in a rack assembly, the following precautions must be considered:

Elevated Operating Ambient

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature specified for the product (see specifications on page 18).

Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.

Mechanical Loading

Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

RS232 connections

MLGW has 2 standard RS232 interfaces, one on the front panel for connecting the Configuration Tool, and another one on the back panel for communicating with the 3rd party controller.

The connectors are DB9 female, and the pin assignment is as follows:

PIN	RS232 signal
2	Transmit (MLGW output)
3	Receive (MLGW input)
5	Signal ground
shield	Shield ground

RS232 parameters on the configuration interface port (front panel) are fixed to 9600 bps, 8 data bits, no parity, 1 stop bit, no handshaking.

RS232 parameters on the controller interface (back panel) are 8 data bits, no parity, 1 stop bit, no handshaking. Baud rate defaults to 9600 bps, but can be configured to a higher rate by means of the Configuration Tool, or the CLI command "UART".

Checking the installation

An easy way to check the installation of MLGW without the need for the Configuration Tool is the following:

• Remove power from MLGW and connect the Masterlink plug to MLGW.

• Power up any of the products on the same BeoLink network (for example, select RADIO or TV).

• Power up MLGW.

• The Power LED should start blinking, and the B&O product should automatically go into standby mode.

This quick test checks that MLGW is working, and successfully communicating on BeoLink.

Front panel operation

The front panel has a single pushbutton, a power LED, and a status LED.

Power LED	Status LED	MLGW status
ON	OFF	Normal operation.
Flash		System startup (takes about 2 minutes).
ON	ON	Configuration startup (approx. 45 sec).
ON	Flash	Configuration MLN assignment mode.
Flash	Flash	System error.

Power LED

The green power LED should flash during MLGW power up and reset. During normal operation, this led should be continuously on.

Status LED

The status LED is used for feedback during configuration. The configuration procedure is described on page 9 of this manual.

Button functions

Front panel button	Function
Press for 5 seconds	Initiate MLN configuration mode.
Press during MLN configuration	End configuration mode, resume normal operation.

MLN configuration procedure

On the RS232 interface, Bang & Olufsen BeoLink products are identified by a number called MLN number (Masterlink Node number).

The assignment of an MLN number to each particular product on the BeoLink network is done through the configuration procedure described below.

This procedure does not require the Configuration Tool.

When is a MLN configuration required?

MLN configuration is required when installing Masterlink Gateway.

Other than that, a reconfiguration is needed on the following cases:

- When adding products to the link installation. This will require new MLN numbers for these products, plus a new software on the 3rd party controller to allow control of the new devices.

- When replacing a product. Masterlink Gateway has no way of identifying a product that has been replaced by another one.

- When one of the products has had its microprocessor replaced during service, it is probable that the product comes back with a new internal address. This may require a reconfiguration of Masterlink Gateway

Identify all products and their corresponding MLN number

The relationship between MLN numbers and actual products is determined during project development, and the 3rd party controller software is dependent on this correspondence.

In order to configure Masterlink Gateway, it is absolutely necessary to have this information at hand, which is a list of all the products with their corresponding MLN number.

Initiate MLN configuration mode

MLN configuration mode is activated by depressing the front panel button for more than 5 seconds.

Masterlink Gateway will switch the status LED on. All products will be automatically switched to stand-by.

After about 45 seconds, the status LED will start to flash. This indicates that all products have been identified and MLN assignment can start.

Assign all products in order

Go to the product corresponding to MLN 1, and switch it on (i.e. select a valid source).

Masterlink Gateway will respond by automatically switching that product to stand-by after 5 seconds.

If the product does not go to stand-by by itself, please consult the troubleshooting section in this manual on page 14.

Then proceed with the product labeled as MLN 2, and so on, until all products have been activated.

Always allow 15 seconds after a product goes to stand-by, before activating the next product.

Masterlink Gateway will automatically end the configuration mode after a 5 minute timeout since the last product was activated. So, be sure you can always reach the next product in less than 5 minutes. For example, check you have access to all rooms.

Notes on source selection

Here are some hints and considerations regarding which source to select when activating a product during configuration:

If, for example, there is a main audio product in the network, selecting RADIO responds faster than selecting CD. Similarly, if there is a main video product, then TV can be selected instead of DVD, which would take long to respond.

Also, be careful when activating products configured in BeoLink Options 1, 4 or 5. In these cases, select a source that will actually activate this product. For example, a BL3500 in option 4 has to be activated using LINK-RADIO, LINK-TV, or L.N.MUSIC (whichever corresponds to the main products available). Another example: a BV5 in option 1 will not be activated by selecting RADIO. You should select LINK-RADIO or A/V RADIO instead.

When activating a main product configured as link (for example, BV5 in option 6), then be sure to activate a source from BeoLink, and not a local source. In this example, select RADIO or LINK-TV, but not TV. The latter will produce no signaling in the link network.

Skipping MLN numbers

Sometimes, not all subsequent MLN numbers are present.

A product may not longer be present, and coincidentally Masterlink Gateway is reconfigured. In this case, the MLN corresponding to that product will have to be

skipped during configuration in order to maintain the original MLN for the rest of the products.

In this case, during configuration, activating a product twice will increase its MLN number by 1, leaving the previous MLN number unassigned.

For example, consider the following case:

MLN	Product
1	BS9000
2	BL Passive at swimming pool
3	BL 3500 in bedroom

BL Passive is gone for service, and Masterlink Gateway has to be configured with only MLN 1 and 3.

So the procedure would be to activate first the BS9000, which gets MLN 1; then BL3500 which gets MLN 2, and then BL3500 a second time, so it gets MLN 3, and MLN 2 becomes unassigned.

This repetition can be applied any number of times in order to skip more than one value of MLN.

Exit configuration mode

Configuration mode will terminate automatically 5 minutes after the last product was activated.

Configuration can also be finished by pressing the front panel button.

Masterlink Gateway will return to normal operation.

Configuration example

Consider configuration for the following setup:

MLN	Product
1	BeoSound 4 (main product)
2	BeoLab 3500 in dining room
3	BeoVision 9 (main product)
4	(empty)
5	BeoLab 3500 in gym
6	BeoVision 5 as link product (option 6)
7	BeoPort

Before starting the configuration, be sure that you have physical access to all products.

The configuration starts by setting Masterlink Gateway in configuration mode. Press the front panel button during 5 seconds until the status LED goes on. All products will be automatically set to stand-by mode. When the status LED starts flashing, MLN assignment can begin.

Go to BeoSound 4, and select a source. RADIO or A.MEM for example.

After 5 seconds, BeoSound 4 should automatically go into stand-by mode.

Remember to allow 15 seconds, and proceed to the BeoLab 3500 in the dining room. Select RADIO or TV and wait for stand-by.

Proceed with BeoVision 9.

MLN 4 is missing, so go to the next product, which is the BeoLab 3500 in the gym.

Activate the product, wait for stand-by. This will assign MLN 4 to this product.

Now activate the product again after 15 seconds. Now MLN 4 will be unassigned, and MLN 5 will correspond to this BeoLab 3500.

Then proceed with BeoVision 5. This is a link product, so activate it by selecting either RADIO, A.MEM, CD, LINK-TV. Do not use TV, since this will not use BeoLink.

Proceed with the last product, BeoPort. In this case, also select a source from BeoLink: RADIO, CD, A.MEM, TV, etc. Do not select local sources such as N.MUSIC, N.RADIO, PC-CD or slide show.

Now tap on the front panel button to terminate configuration mode, or wait for timeout.

Software versions and software update

The current software version of MLGW can be requested from the Configuration Tool, or by the CLI command "VERSION".

Software can be upgraded by replacing an EPROM in the product.

This can be done on-site, with the usual ESD precautions. Precise instructions will be included with the software.

Troubleshooting guide

Previous checks

Before setting up Masterlink Gateway, it is necessary to have all of Masterlink installation working and correctly configured.

Setting up and troubleshooting a Masterlink network is covered in the Masterlink Handbook.

Below is a brief checklist for basic troubleshooting of Masterlink:

- Before connecting any products to Masterlink, verify electrical conductivity using the Masterlink Tester. In particular, check the ML outlet dedicated to Masterlink Gateway, as probably you never used this outlet before.

- Connect all products to Masterlink, and set the correct option programming. Of particular importance is to have no more than one Video Master, and no more than one Audio Master in the network (master products are configured in options 0, 1 or 2). The rest of the products must be configured as link products (options 4, 5 or 6, eventually 0). Masterlink Gateway itself has no option programming.

- Check that all products are working, and that you can get audio from the master products to all link products, and between the master products.

- Connect Masterlink Gateway to the network, power it on, and wait for startup (this takes less than 2 minutes).

- Power some products on. Issue an ALL STANDBY command on Masterlink Gateway using the Configuration Tool, or CLI command "ALLSTANDBY". Check that the products go to stand-by. This command should always work, even with a non-configured Masterlink Gateway out of the box.

MLN assignment: a product won't switch on

If you are unable to switch a product on using Beo4, be aware that some products can be configured in option 0, 1, 4 or 5, so selecting a source on Beo4 will not necessarily activate such products.

Refer to the comments on page 10 for more information.

MLN assignment: a product won't switch back to stand-by

If, during MLN assignment, a product will not automatically switch back to stand-by, there could be an internal address conflict between 2 products, although this should be very improbable.

First of all, double check that all products are working properly, respond to Beo4, and can access sources through BeoLink.

Then, repeat the configuration procedure, and verify that this same product will not switch back to standby.

In order to determine which other product is involved in the addressing conflict, try powering down other products one by one and repeating the configuration. Start with link products (BL Passive, BL Active), and the proceed to newer products.

Once the 2 conflicting products are identified, take note of type number, item number and serial number of each, and contact your national Service Center for assistance.

How to verify the current MLN assignment

In order to verify which MLN number corresponds to a particular physical product, you can use the monitoring facilities of MLGW as follows:

- Issue an ALL STANDBY, so you don't get messages from other products.
- Enable monitoring on the Configuration Tool or CLI terminal.
- Operate the product whose MLN number you want to check. See the notes below.
- Check the monitoring information. The parameter MLN indicates the MLN number associated with the product being operated.

Notes:

- If you are checking a link product, then you can see messages from both the link product and the master product being selected.
- New products (as from BeoSystem 3) will send status information on Masterlink. For such products, simply operate them (select a source, or change the volume level). This will produce status messages.

System error

Masterlink Gateway may report a system error by alternately flashing the 2 front panel LEDs.

Possible causes of system error include:

- OS error.
- Defective EEPROM.

In any case, MLGW should be serviced.

Try to make a backup of MLGW assignment using the Configuration Tool, so it can be uploaded to a replacement MLGW unit.

Configuration backup

The Configuration Tool allows to save a backup copy of the current configuration. The configuration is automatically downloaded from MLGW to the PC, and can be saved into a file.

Save this file as a backup. The file is in XML format, so it can be examined using a text editor or a web browser.

If the MLN configuration is lost (if MLGW needs replacement, or someone tried to reconfigure MLGW), the saved information can be uploaded again to MLGW.

Glossary

Controller, 3rd party controller

The device that communicates with Masterlink Gateway via an RS232 connection. Normally this would be a home automation controller, or a dedicated computer.

The 3rd party controller should be permanently connected to the rear panel RS232 port of Masterlink Gateway.

Command Line Interface (CLI)

The protocol for setting up and monitoring MLGW.

The Configuration Tool communicates with MLGW by means of this protocol.

CLI is human oriented, so MLGW can be configured and diagnosed just by typing onto a general purpose terminal emulator. See the CLI specification manual for details, or type "help" on a terminal attached to the configuration port. Communication parameters for this port are fixed at 9600 bps, no parity, 8 data bits, 1 stop bit, no handshaking.

Configuration Tool

The software for setting up Masterlink Gateway.

This software is a graphical front-end for the command line interface, and is not needed during normal operation of MLGW.

MLGW, MLGW01

Masterlink Gateway.

Masterlink Node number (MLN number)

A MLN number identifies each node (product) attached to a Masterlink network. It ranges from 1 to 16, and is assigned during set-up of the Masterlink Gateway.

RS232 protocol

The default communications protocol between MLGW and the 3rd party controller. This protocol is fully specified on a separate document ("Masterlink Gateway RS232 Protocol Specification").

Specifications

Power	9 - 12 Vdc. 200 mA maximum. Connector: 2.5 mm, snap-in. Use only Class 2 power supply (see page 5).
Interfaces	1 RS232 interface for third party controller (on back panel). 1 RS232 interface for configuration (on front panel). 1 Masterlink interface (on back panel).
Mounting options	Side brackets included for rack mounting. Soft pads included for tabletop installation.
Dimensions	400 mm (15 3/4") W, 150 mm (5 7/8") D, 44 mm (1 3/4") H; without brackets.
Weight	3 kg
Operating ambient conditions	Temperature: 5 °C to 45 °C Humidity: 10% to 90% relative humidity, non-condensing

Package contents

Qty	Description
1	Masterlink Gateway
2	Rack-mounting brackets with screws
4	Self adhesive soft pads
1	Installation manual

Available documentation and software

The following documents and software are available as downloads:

Masterlink Gateway installation manual (this manual)
Masterlink Gateway Command Line Interface specification
Masterlink Gateway RS232 protocol specification
Configuration Tool for Masterlink Gateway
Sample Masterlink Gateway drivers for Crestron controllers

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