# ClearOne®

**Beamforming Microphone Array Systems**
Group Microphone for Professional Conferencing

# Wall Mount Installation Guide
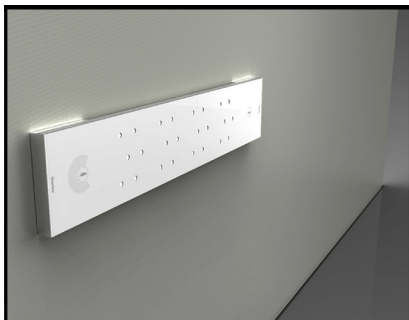
# Table of Contents

# GETTING STARTED

Congratulations on purchasing your Beamforming Microphone Array (BFM) product. BFM units feature 24 microphones with beamforming and adaptive steering technology designed specifically for use with the CONVERGE® Pro or CONVERGE® Pro 2 (CP2) systems.

> **IMPORTANT:** The BFM1 only can be used with the first generation CONVERGE Pro system; likewise, the BFM2 is compatible only with the CP2 system.

Instructions for updating CONVERGE Pro or CP2 firmware and BFM firmware are included in each BFM model's Quick-Start Guide, found on the ClearOne website:

**http://www.clearone.com/resources#professional_microphones**

The BFM1 connects with the CONVERGE Pro through an Expansion Bus (E-bus) port: 3 arrays per supported CONVERGE Pro and up to 16 arrays can be daisy-chained in the site. The power for the BFM1 is supplied through a Power-Over-Ethernet (PoE) connection.

> **IMPORTANT:** The Beamforming Microphone Array only can be used with CONVERGE Pro systems operating at version 4.X software and firmware.

Connect BFM2 to CP2 via either Regular 200 ft. or Long Distance 650 ft. Peripheral Link (P-Link). A single cable carries power, audio and control. Up to 3 BFM2 arrays are supported per CP2 with either Regular or Long Distance P-Link, and up to 6 BFM2s with Regular P-Link in a 2 CP2 mixer stack. Power to the BFM2 is supplied through either PoE or P-Link connection from CP2.

**BEAMFORMING MICROPHONE ARRAY**

## SKUs USED

The following assemblies or kits may be used in the BFM installation:

- 910-001-003 (white) or 910-001-003-B (black) BFM1

- 910-3200-201 (white) or 910-3200-201-B (black) BFM2

- 910-001-004 PoE Power Supply and Cable Kit for BFM1. Contains power supply, one AC power cable and two 25-foot CAT5E RJ45 Plenum cables (one used as the PoE cable and the other as an E-bus cable). If a PoE kit is not obtained, installers will need to provide their own PoE unit and all cables.

- 910-3200-202 PoE Power Supply Kit for BFM2. Contains power supply, one AC power cable and two 25-foot CAT5E or CAT6 RJ45 plenum cables (one used as the PoE cable and the other as a P-Link cable). If a PoE kit is not obtained, installers will need to provide their own PoE unit and all cables.

- 910-3200-203-12/24/36/48 (white) or 910-3200-203-12/24/36/48-B (black) Gen-2 Ceiling Mounting Kit with 12/24/36/48" Suspension Column

- 910-001-005-12/24/36/48 (white) or 910-001-005-12/24-B (black) Gen-1 Ceiling Mounting Kit with 12/24/36/48" Suspension Column

**NOTE:** All above mounting kits are compatible with both the BFM1 and BFM2, unless you choose the Long Distance P-Link option.

The Long Distance P-Link option is only compatible with BFM2 units.

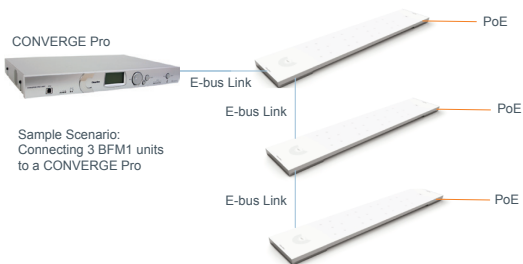| S. No. | Feature | Regular P-Link | Long Distance P-Link |
|---|---|---|---|
| 1 | Applicable to all CP2 units | YES | NO (only supports CP2 AEC units) |
| 2 | Applicable to all peripheral units  (BFM2, DIALOG 20 Receiver, USB Expander, GPIO Expander) | YES | NO (only supports BFM2) |
| 3 | Same CP2 and BFM2 hardware (no hardware changes, only software and firmware upgrades) | YES | YES |
| 4 | Applicable to already sold and installed units | YES | YES |
| 5 | Maximum distance between units | 200 feet (~60 meters) | 650 feet (~200 meters) |
| 6 | Carries power, audio, control | YES | YES |
| 7 | Maximum number of peripheral devices in one P-Link chain | 12 (3 each: BFM2, DIALOG 20, USB Expander, GPIO Expander) | 3 (3 BFM2 only) |
| 8 | Cable specification | CAT5e/CAT6, 24 AWG, solid conductor cable. Do not use Copper Clad Aluminum (CCA). | CAT6, 550 MHz, 23 AWG, solid conductor cable. Do not use Copper Clad Aluminum (CCA). |
| 9 | PoE Power Injector spec | 56V, Mode B, Midspan – For 3 BFM2 units 48V, Mode B, Midspan – For 1 BFM2 unit | 56V, Mode B, Midspan – For 3 BFM2 units 48V, Mode B, Midspan – For 1 BFM2 unit |
| 10 | No extra cost, free to upgrade | YES | YES |

# CONNECTIONS

This section explains the connections made in BFM installations.
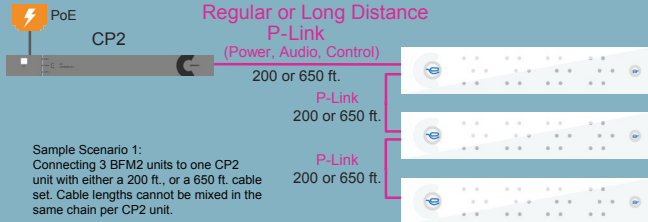
## Powering a BFM System

The BFM1 can be powered by a standard PoE switch or a PoE power supply (external or ClearOne; up to 3 BFM2 units can be powered by one ClearOne PoE Injector). The BFM2 can also be powered by a PoE power supply, or P-Link (a single cable carries power, audio and control) from CP2.

# BEAMFORMING MICROPHONE ARRAY

## CONVERGE Pro + BFM1

CONVERGE Pro

PoE

E-bus Link

E-bus Link

PoE

Sample Scenario:
Connecting 3 BFM1 units
to a CONVERGE Pro

E-bus Link

PoE

## CP2 + BFM2

PoE

CP2

**Regular or Long Distance P-Link**
(Power, Audio, Control)

200 or 650 ft.

P-Link
200 or 650 ft.

Sample Scenario 1:
Connecting 3 BFM2 units to one CP2
unit with either a 200 ft., or a 650 ft. cable
set. Cable lengths cannot be mixed in the
same chain per CP2 unit.

P-Link
200 or 650 ft.

## PoE CONNECTIONS

Use the appropriate AC cord to connect the PoE power supply to the AC power. Then plug the PoE cable into the LAN+DC connection on the power supply. Route the PoE cable where it can be fed through the mount assembly or to the conference table with the BFM1 or BFM2 unit.

Power Over Ethernet (PoE) Power Supply
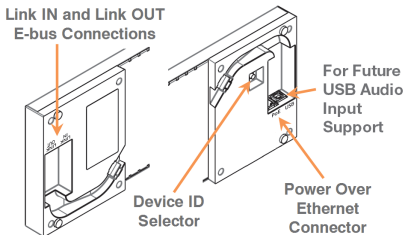(Front and Back Views)



Power Cord
to AC Power

PoE Ethernet Cable to
Beamforming Microphone Array

**NOTE:** The PoE connection is only for power, not control. There is no daisy-chain power for the BFM1, power must be supplied to individual units. For the BFM2, power only needs to be supplied to individual units if not using a ClearOne or same specification standard PoE Injector.

## P-LINK AND E-BUS CONNECTIONS

**NOTE:** Firmware upgrades are performed via the E-bus or P-Link connection. Plugging the PoE cable into the E-bus or P-Link connections may cause damage to your BFM unit.

## BEAMFORMING MICROPHONE ARRAY

BFM1 units are connected to a CONVERGE Pro stack via LINK IN and LINK OUT E-bus connections using CAT5E RJ45 cables.



**Link IN and Link OUT E-bus Connections**

**For Future USB Audio Input Support**

**Device ID Selector**

**Power Over Ethernet Connector**

BFM2 units are connected to a CONVERGE Pro 2 stack via P-Link In and P-Link Out connections using CAT5E or CAT6 RJ45 cables.



(USB: for future use)

P-LINK USB OUT

P-LINK IN     PoE IN

power-source-selection switch
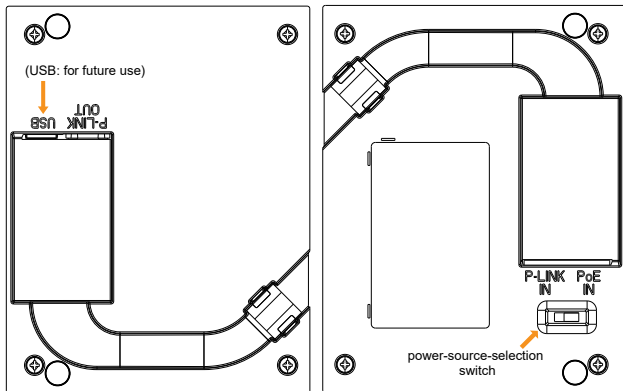
The BFM1 is connected to the CONVERGE Pro and to other BFM1 units via the E-bus in the same way multiple CONVERGE Pro units are connected together. Each unit has a LINK IN and LINK OUT E-bus connection that allows units to be "chained" together with the LINK OUT of one unit connecting to the LINK IN of the next unit.

The BFM2 is connected to the CONVERGE Pro 2 and to other BFM2 units similarly, but via the P-Link. Each unit also has a P-Link In and P-Link Out connection that allows units to be "chained" together with the P-Link Out of one unit connecting to the P-Link In of the next unit.

Verify all firmware updates, configurations and necessary connections outlined in the BFM1 or BFM2 Quick-Start Guides and CONVERGE Pro CONSOLE or CONVERGE Pro 2 CONSOLE online help are made, and then proceed to the installation of the Wall Mount.
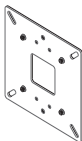
## WALL MOUNT INSTALLATION
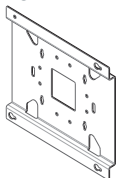
### Parts Received

The following parts are delivered with the Wall Mounting Kit:



A
QTY 4
M3 x 6mm Phillips Pan Head
Requires #1
Phillips Screwdriver Bit

B
QTY 1
Wall Mounting Plate

C
QTY 1
Mic Mounting Plate

# BEAMFORMING MICROPHONE ARRAY

Verify that you have all the parts required to complete your installation.

When you open the shipping package(s) for the first time, please check that all items purchased are included. If any of the items (according to your customer order) are missing or damaged, contact your ClearOne distributor immediately.

## Tools Required

The following tools may be required for Wall Mount installation of the Beamforming Microphone Array. You will also need other tools for installing fasteners (not included in the kit) to hold the Wall Mounting Plate to the wall where the Beamforming Microphone Array is to be installed.)

Drywall saw for cutting hole in wall for cable passage

#1 Phillips screwdriver

Level used to level the Wall Mounting Plate

Electric or portable drill

Drill bits appropriate to fastener type

Wall fasteners are not provided and must be appropriate to the wall material

## Wall Mounting Procedure

The wall mounted BFM must be placed on a wall facing the intended conference participants. It can be placed below a video conferencing system such as COLLABORATE, or in audio-only applications, at eye

level with the participants. The face of the BFM should be about 8 to 10 feet from the participants.

The Wall Mounting Plate has small studs projecting from the plate that fit into slotted holes on the Mic Mounting Plate to hold the BFM to the wall.



Slotted holes in Mic Mounting Plate

Studs on Wall Mounting Plate
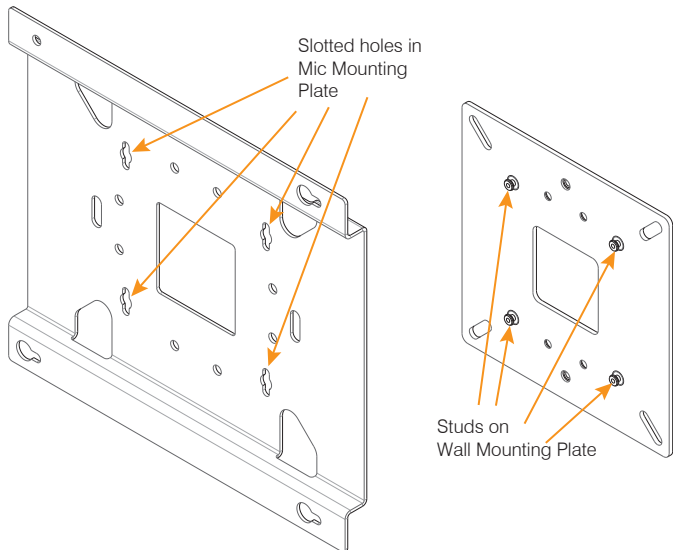
The Wall Mounting Plate can be mounted to either a solid or hollow wall. Use fasteners appropriate to the wall type to attach the plate to the wall.

## BEAMFORMING MICROPHONE ARRAY

Hollow wall mounting gives the advantage of concealed cable routing. Locate, level and mark for drill holes and the cable pass-through cut-out where the Wall Mounting Plate will attach to the wall. Use the following dimensions for the cable pass-through cut-out for a hollow wall mounting:

**WALL MOUNT CUT-OUT**

1-1/2"

1-1/2"

This page can be used as a template for the cut-out
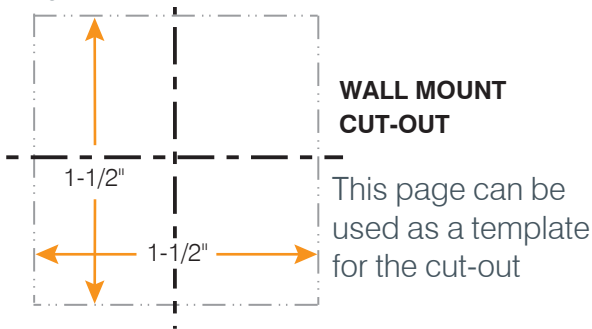
**NOTE:** Wall mounting MUST be strictly horizontal to assure proper adaptive steering of audio pickup.

Drill holes to receive the fasteners and cut out the cable pass-through.

**NOTE:** The anchors and screws used to mount the Wall Mounting Plate are not provided and must be selected by the installer for the type of wall material supporting the Wall Mounting Plate. Take care while drilling and installing the anchors so the wall material does not tear out and weaken the attachment.

Wall fasteners not included in the kit.
Select fasteners appropriate to wall material.
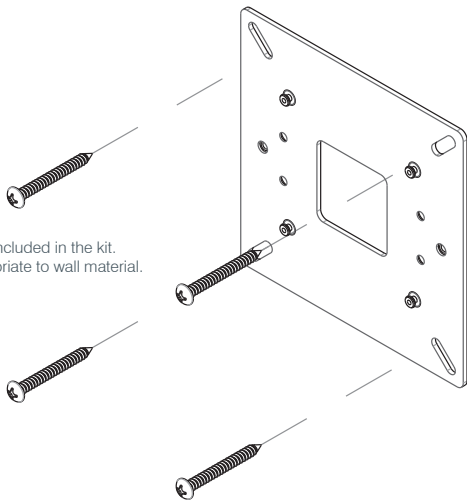
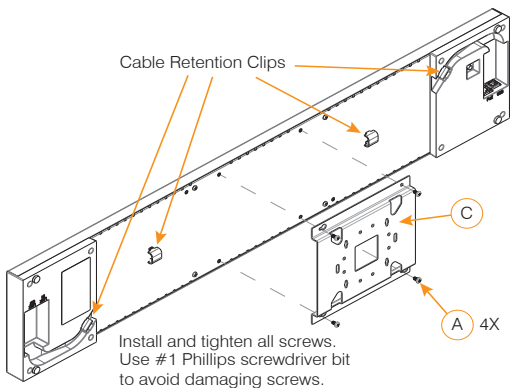Attach the Wall Mounting Plate to the wall with fasteners.

If you have attached the Wall Mounting Plate to a hollow wall, thread the cables for Link In, Link Out and PoE through the wall space and out through the hole in the center of the plate.

**NOTE:** Allow enough extra cable length to pass through the hole to easily run under the Mic Mounting Plate when it is attached to the microphone array and to the ends where they are to be connected.

## BEAMFORMING MICROPHONE ARRAY

Notice that the Mic Mounting Plate (C) has four holes used for mounting to the back of the Beamforming Microphone Array. There are three slotted keyholes big enough for screw heads to pass through and one hole that is not slotted.

Place the Mic Mounting Plate on the back of the Beamforming Microphone Array and insert the screws (A) into the Beamforming Microphone Array corresponding to the holes in the Mic Mounting Plate. Tighten all screws with the #1 Phillips screwdriver.



Cable Retention Clips

C

A 4X

Install and tighten all screws.
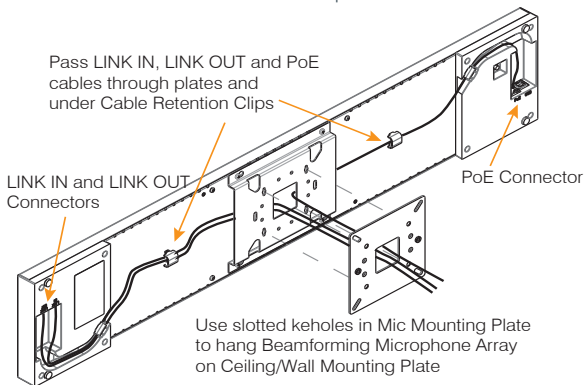Use #1 Phillips screwdriver bit
to avoid damaging screws.

For mountings with the cables coming through the wall, hold the Beamforming Microphone Array with the Mic Mounting Plate attached, route the E-bus and PoE cables under the Mic Mounting Plate to the ends where they will be connected.

Connect the LINK IN, LINK OUT (if needed) and PoE cables and secure the cables under the Cable Retention Clips.



Pass LINK IN, LINK OUT and PoE cables through plates and under Cable Retention Clips

LINK IN and LINK OUT Connectors

PoE Connector

Use slotted keholes in Mic Mounting Plate to hang Beamforming Microphone Array on Ceiling/Wall Mounting Plate

For mountings with the cables coming through the wall, hold the Beamforming Microphone Array with the Mic Mounting Plate attached, route the E-bus and PoE cables under the Mic Mounting Plate to the ends where they will be connected. Connect the LINK IN, LINK OUT (if needed) and PoE cables and secure the cables under the Cable Retention Clips.
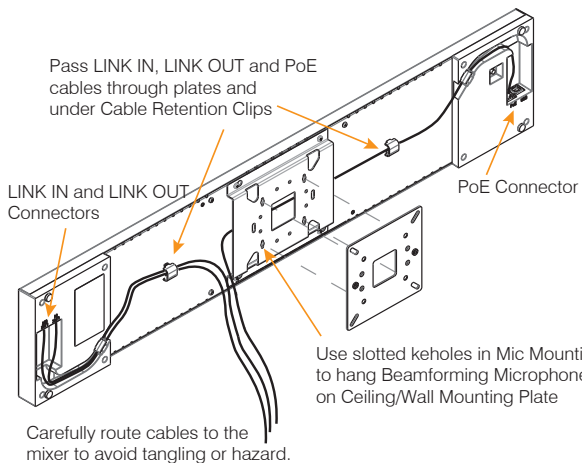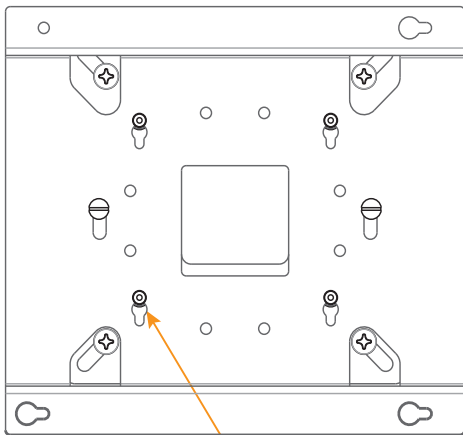
# BEAMFORMING MICROPHONE ARRAY

Pass LINK IN, LINK OUT and PoE cables through plates and under Cable Retention Clips

LINK IN and LINK OUT Connectors

PoE Connector

Use slotted keholes in Mic Mounting Plate to hang Beamforming Microphone Array on Ceiling/Wall Mounting Plate

Carefully route cables to the mixer to avoid tangling or hazard.

Move the Beamforming Microphone Array forward onto the Wall Mounting Plate with the studs passing through the slotted keyholes. Then slide the assembly down slightly to firmly seat the studs into the tops of the slots. If the cables are outside of the wall, carefully route them to the mixer to avoid tangling or hazard.

Front View of Mic Mounting Plate over Wall Mounting Plate
(Beamforming Microphone Array and cables not shown)



Wall Mounting Plate stud through
slotted keyhole in Mic Mounting Plate

When the Wall mounting of the Beamforming Microphone Array is completed, use the CONVERGE Console software to configure the array for the proper pickup pattern.

**NOTE:** Wall mounting MUST be strictly horizontal and with the "C" logo on the left-hand side to assure proper adaptive steering of audio pickup.

**Wall Mounting Procedure     15**

# BEAMFORMING MICROPHONE ARRAY

## Muting

On the wall, the Mute On/Off buttons are available for use when conferencing. When the microphone array is active, the microphone icons in the buttons illuminate blue. If either button is pressed, the Beamforming Microphone Array mutes and the buttons illuminate red. If pressed again, the array un-mutes and is active again.
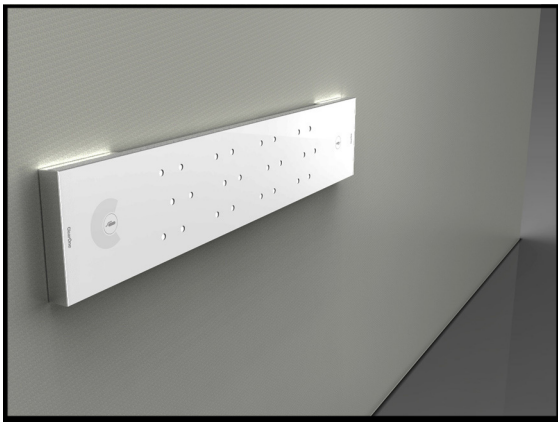
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