Clear-Com
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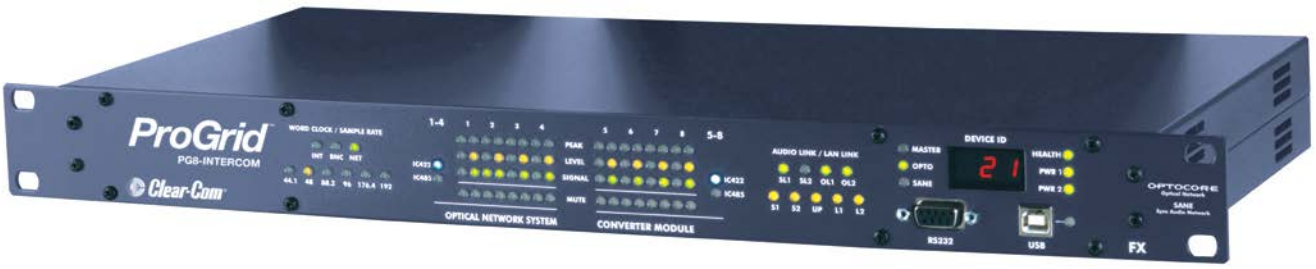
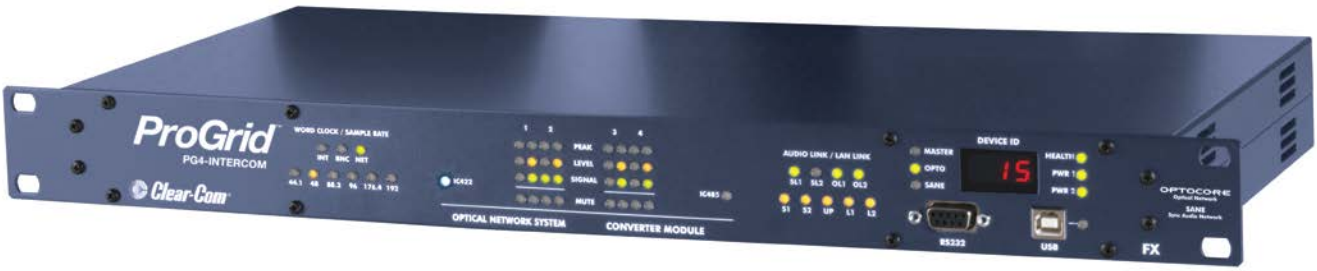
ProGrid™

PG8-INTERCOM-FX and PG4-INTERCOM-FX User Guide





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Document Reference

Clear-Com PG8-INTERCOM-FX and PG4-INTERCOM-FX User Guide

Part Number: 399G093 Revision: B

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Contents

1 Important Safety Instructions

Read these instructions.

Keep these instructions.

Heed all warnings.

Follow all instructions.

Do **not** use this apparatus near water.

Clean only with dry cloth.

Do **not** block any ventilation openings. Install in accordance with the manufacturer's instructions.

Do **not** install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Do **not** defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

Only use attachments/accessories specified by the manufacturer.

Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-cord supply or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Warning: To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

1.1 Operating and Storage Temperature

Operating temperature: -20°C …50°C ≡ -4°F … 122°F; ensure proper ventilation

Storage temperature: -20°C …60°C ≡ -4°F … 140°F

1.2 Eye Safety

This product is a Laser Class 1 product. It complies with IEC 60825-1, FDA 21 CFR 1040.10, and 1040.11.

1.3 Safety symbols

Familiarize yourself with the safety symbols in **Figure 1: Safety symbols**. These symbols are displayed on the apparatus and warn you of the potential danger of electric shock if the system is used improperly.

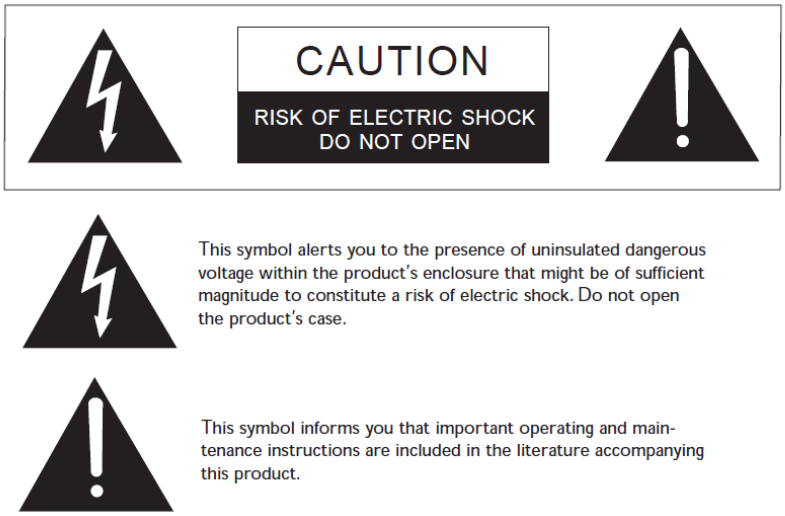


Figure 1-1: Safety symbols

2 Device Description

The PG8/PG4-INTERCOM-FX series was developed in cooperation with some of the world's leading manufacturers of intercom systems and are fully compatible with Clear-Com or RTS intercom matrixes, user key-panels and interfaces.

The PG8/PG4-INTERCOM-FX can be ordered with different quantity and types of inputs and outputs.

For Clear-Com intercom systems:

PG8-INTERCOM-CC-FX with **8** **Clear-Com** compatible four-wire intercom ports with serial control.
PG4-INTERCOM-CC-FX with **4** **Clear-Com** compatible four-wire intercom ports with serial control.

For RTS intercom systems:

PG8-INTERCOM-485-FX with **8** **RTS** compatible four-wire intercom ports with serial control.
PG4-INTERCOM-485-FX with **4** **RTS** compatible four-wire intercom ports with serial control.

For systems requiring line level I/O and GPIO:

PG8-INTERCOM-444-FX with **8** **Line Level** inputs and outputs, **8** **GPIO** and an auxiliary power output.
PG4-INTERCOM-444-FX with **4** **Line Level** inputs and outputs, **4** **GPIO** and an auxiliary power output.

What do the product names refer to?

PG4 and **PG8** refer to the channel capacity of the device.

FX specifies that the device is equipped with Optocore fibre connectivity.

CC/**485**/**444**: specifies the connectivity option of the device. The CC configuration contains IC422 module(s), the 485 is equipped with IC485 module(s), and the 444 is built with IC444 module(s).

The IC422 and IC485 provide four-wire intercom ports with line level audio inputs and outputs along with serial data links on RJ45 connectors for communication between intercom matrixes and auxiliary devices.

Serial control is routed with the audio, requiring audio to be routed to and from each port in order to establish bi-directional audio and serial communication between matrixes, user key-panels and/or interfaces.

Each IC422 and IC485 four-wire intercom port can be used as an independently routed line level input / output using an adaptor from RJ45 to a connector such as XLR.

The IC422 and IC485 RJ45 four-wire intercom ports are duplicated with reversed wiring so that either matrixes (TO MATRIX) or intercom key-panels (TO PANELS) can be connected to the unit using standard CAT cables, making cabling simple and cost-efficient.

The PG-INTERCOM-444-FX provides line level audio inputs and outputs, GPIO (General Purpose Inputs and Outputs) and auxiliary +5V DC and +12V DC power outputs, to power external circuits, on 37 pin D-Sub connectors.

GPIOs are routed with the corresponding audio inputs and outputs, requiring audio to be routed to and from each port in order to establish bi-directional audio and GPIO link.

The low latency, synchronous, ProGrid network provides the capacity to transport and route up to 1024 audio inputs into thousands of outputs over a redundant network. Redundant fibre connections are established using the two LC multimode, or single mode, 1Gbit or 2 GBit optical transceivers. The dual redundant ring topology uses the advantages of fibre optical transmission in temporary and permanent applications, especially where long distance transport and high-quality audio are required. Additionally, the ProGrid FX module includes 64 channel SANE synchronous audio ports on Cat5 connectors with Ethernet, 4 RS485/422 ports, 100Mbit Ethernet switch and a Word Clock input and output.

Extensive networks of ProGrid FX devices and SANE TP devices can be created using devices with different connectivity options to route and transport intercom, audio, serial data, composite video and Ethernet.

Word Clock input and output connectors allow the ProGrid network to be synchronized from an external source as well as for Word Clock be distributed around a facility using the ProGrid network. All ProGrid and SANE devices are capable of being system masters using their internal clock.

ProGrid devices, and complete networks, are configured and operated using the Optocore Control software. The software provides access to all configuration parameters and controls needed to operate the system, including: naming channels, setting gains and phantom power, routing as well as recall and capture of partial or full system configurations. The software can be operated offline as well as online with level meters for all channels on the network.

The PG8/PG4-INTERCOM-FX can be remotely operated and controlled over the ProGrid network using the Optocore Control software without the need for external data cabling. System control connectivity is provided with LAN, USB, or RS232 ports.

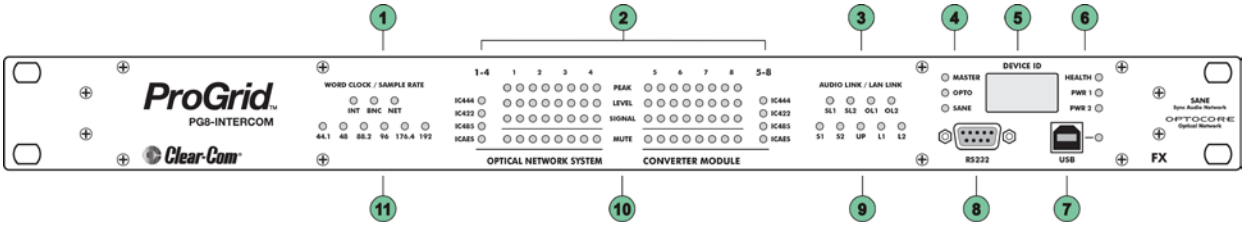
All ProGrid devices are designed and built using the latest programmable microprocessors and FPGA (field programmable gate array) logic circuitry. This allows the devices internal logic to be updated, in the field, ensuring a continual state-of-the-art device.

The PG8/PG4-INTERCOM-FX is designed for rack mounted applications.

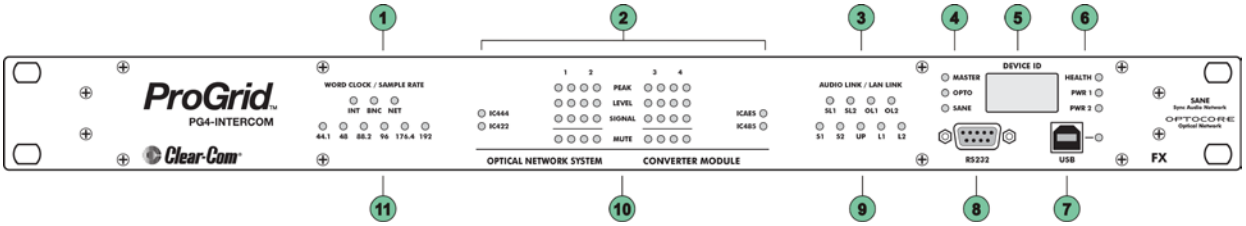
The front panel of the device is equipped with LEDs that allow instant overview of the status of each channel, indicating if audio is present, if peak level is reached and if nothing is routed to an output.

3 Front Panel

3.1 PG8-INTERCOM-(CC/485/444)-FX



3.2 PG4-INTERCOM-(CC/485/444)-FX



1 **Word Clock LED:** Indicates the selected word clock source:

INT: Internal word clock – The device is a system master
BNC: External word clock via the BNC WC input
NET: Word clock received from the network

2 **Intercom and Signal Monitor for the 8 Duplex Channels (4 Duplex Channels for V3R):**

IC422:	Four-wire intercom ports with bi-directional RS422 (for Clear-Com)
IC485:	Four-wire intercom ports with bi-directional RS485 (for RTS)
IC444:	Line Level I/O with GPIO
PEAK:	Red: Clipping. Input level exceeds the maximum input level of 0dBFS
LEVEL:	Yellow: Warning level. Input level exceeds -10dBFS
SIGNAL:	Green: Signal present ≥ -60dBFS. Brightness controlled

3 **AUDIO LINK:**

SL1:	Communication is established on the SANE 1 port (rear panel)
SL2:	Communication is established on the SANE 2 port (rear panel)
OL1:	Communication is established on the Optocore LINK 1 (rear panel)
OL2:	Communication is established on the Optocore LINK 2 (rear panel)

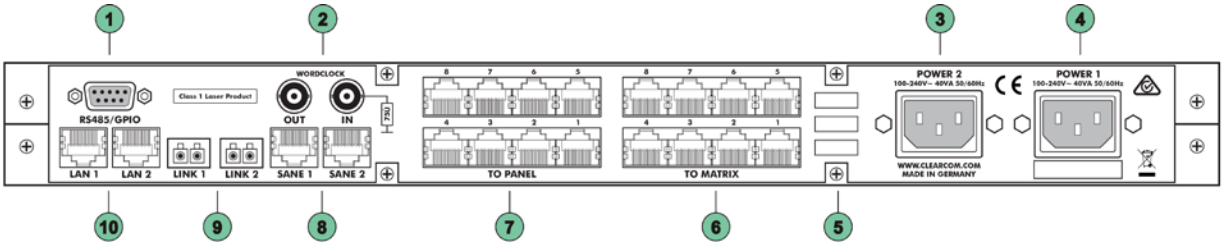
4

Master LED:	Indicates the master device in the system
OPTO LED:	Optocore communication is established
SANE LED:	SANE communication is established

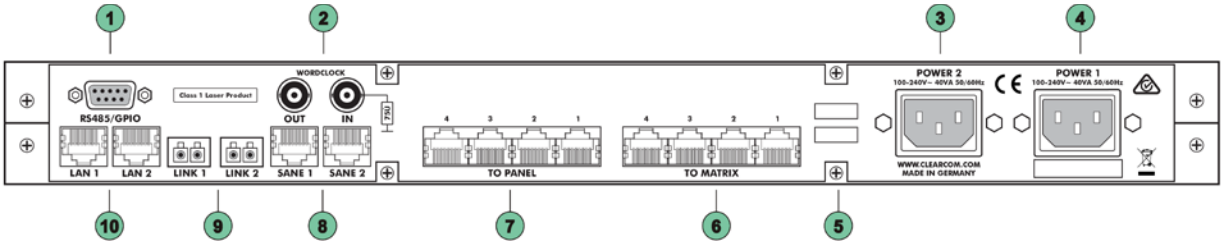
5	**Device ID Display:**	The identification number (ID) of the device
6	**HEALTH LED:**	Green: Power supply to the device works, temperature is within limits
	PWR 1 LED:	Green: Power supply 1 is operational and receiving power
	PWR 2 LED:	Green: Power supply 2 is operational and receiving power
7	**USB connector:**	USB connection for remote control from a computer
	USB LED:	Green static: Indicates physical USB connection
		Green flashing: Indicates data activity (software/server online)
8	**RS232 connector:**	RS232 (D Sub 9) connection for remote control and firmware updates
9	**LAN LINK:**	
	S1:	Ethernet communication is established via SANE 1 (rear panel)
	S2:	Ethernet communication is established via SANE 2 (rear panel)
	UP:	Another device with enabled Ethernet is on the network
	L1:	Ethernet communication is established via LAN 1 (rear panel)
	L2:	Ethernet communication is established via LAN 2 (rear panel)
10	**MUTE**	Red static: Output mute indicator. Nothing is routed to the output.
11	**Sample rate LED:**	Yellow: 44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz

4 Rear Panel

4.1 PG8-INTERCOM-(CC/485)-FX

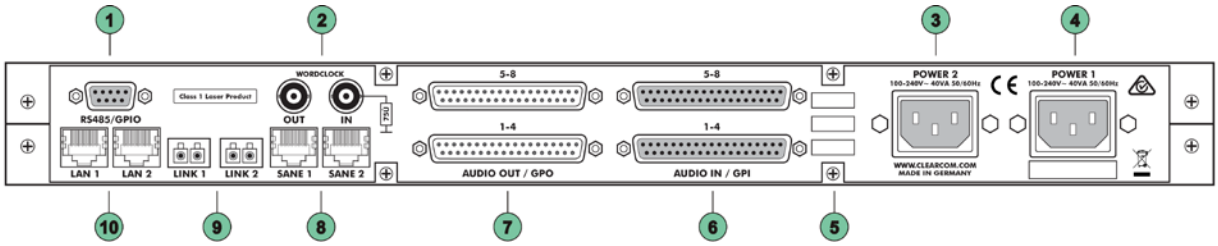


4.2 PG4-INTERCOM-(CC/485)-FX

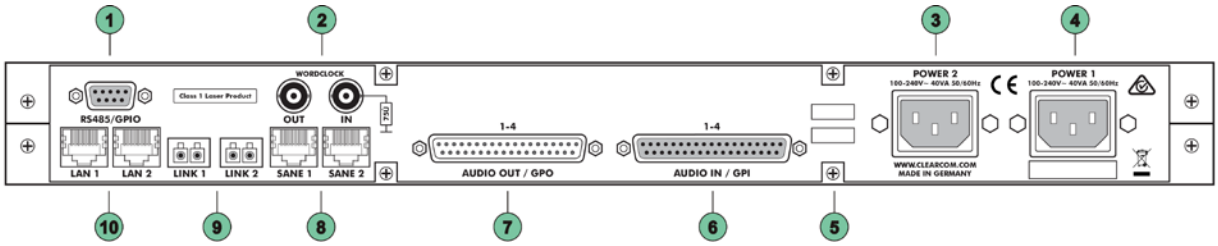


1	**RS485/GPIO:**	4 x RS485/GPIO (D-Sub-9) auxiliary port for data transmission
2	**Word Clock IN:**	BNC Word clock input allowing synchronization of ProGrid devices/network from an external word clock source
	Word Clock OUT:	BNC Word clock output for synchronization of external devices
3	**POWER 2:**	Mains input for power supply 2 (100 … 240 V)
4	**POWER 1:**	Mains input for power supply 1 (100 … 240 V)
5	**Device Label:**	I/O card type and serial number
6	**TO PANEL:**	RJ45 four-wire intercom ports wired for connection to key-panels or interfaces (8 on PG8-INTERCOM-FX, 4 on PG4-INTERCOM-FX)
	TO MATRIX:	RJ45 four-wire intercom ports wired for connection to an intercom matrix (8 on PG8-INTERCOM-FX, 4 on PG4-INTERCOM-FX)
7	**SANE 1:** **SANE 2:**	SANE RJ-45 interface for audio transmission and 100 Mbit Ethernet SANE RJ-45 interface for audio transmission and 100 Mbit Ethernet
8	**LINK 1:**	Full-duplex, full bandwidth LC-type optical interface for Optocore transmission
	LINK 2:	Full-duplex, full bandwidth LC-type optical interface for Optocore transmission
9	**LAN 1:** **LAN 2:**	100 Mbit RJ-45 Ethernet interface 100 Mbit RJ-45 Ethernet interface

4.3 PG8-INTERCOM-444-FX



4.4 PG4-INTERCOM-444-FX



1	**RS485/GPIO:**	4 x RS485/GPIO (D-Sub-9) auxiliary port for data transmission
2	**Word Clock IN:**	BNC Word clock input allowing synchronization of ProGrid devices/network from an external word clock source
	Word Clock OUT:	BNC Word clock output for synchronization of external devices
3	**POWER 2:**	Mains input for power supply 2 (100 … 240 V)
4	**POWER 1:**	Mains input for power supply 1 (100 … 240 V)
5	**Device Label:**	I/O card type and serial number
6	**AUDIO IN / GPI:**	37 pin Female D-SUB connector with: 8 (or 4) line level inputs, 4 optically isolated General Purpose Inputs (GPI) and +5V DC and +12V DC auxiliary power.
7	**AUDIO OUT / GPO:**	37 pin Male D-SUB connector with: 8 (or 4) line level outputs, 4 General Purpose Outputs (GPO) and +5V DC and +12V DC auxiliary power.
8	**SANE 1:** **SANE 2:**	SANE RJ-45 interface for audio transmission and 100 Mbit Ethernet SANE RJ-45 interface for audio transmission and 100 Mbit Ethernet
9	**LINK 1:** **LINK 2:**	Full-duplex, full bandwidth LC-type optical interface for ProGrid transmission Full-duplex, full bandwidth LC-type optical interface for ProGrid transmission
10	**LAN 1:** **LAN 2:**	100 Mbit RJ-45 Ethernet interface 100 Mbit RJ-45 Ethernet interface

5 Device Details

5.1 IC422 and IC485 - Intercom Ports

Each four-wire intercom port is complete with a line level input, line level output and a bi-directional RS422 or RS485 (device specific) serial communication link, allowing seamless integration with Clear-Com or RTS intercom systems. The intercom ports are duplicated with a reversed pinout (TO MATRIX and TO PANEL) to allow connections to intercom matrix frames, user key-panels and interfaces using straight Cat5 cables.

5.2 IC444 - Line Level I/O and GPIO

The IC444 module is populated with 37 pin male and female D-Sub connectors. The female connector has 4 line level inputs and 4 optically isolated General Purpose Inputs (GPI). The male connector has 4 line level outputs 4 General Purpose Outputs (GPO). Auxiliary +12V DC and +5V DC power is available on both connectors, allowing up to 100mA of current to be drawn from each IC444 module. The PG4-INTERCOM-FX unit can be equipped with one IC444 module, while PG8-INTERCOM-FX can be equipped with two IC444 modules.

5.3 Optocore Fibre Optic Connection

The device is equipped with the Optocore FX communication module. The ProGrid Signal Transfer Solution utilizes Time Division Multiplex technology (TDM) with a Fibre Channel based 8B10B-NRZI-coding. Static time slots guarantee a synchronous transmission of all channels, at all times, without the use of dynamic bandwidth or latency. All signals connected to the intercom, audio, video, word clock and auxiliary ports of the device are transmitted simultaneously on one fibre while the second fibre of the LINK-Interface receives data from the network. The second LINK-Interface pair is identical to the first one, and can optionally be used for network redundancy.

5.4 SANE Ports

The device is equipped with two RJ45 200MBit SANE Ports, capable of transmitting 64 channels of synchronous audio and 100MBit Ethernet.

5.5 RS485/GPIO Auxiliary Ports

The auxiliary ports provide four RS485 ports to establish a maximum of four half-duplex or two full-duplex connections between devices. A wide range of bi-directional and unidirectional standards can be connected to the ports, such as RS485, CAN-Bus (bi-directional), or RS422, DMX and MIDI (unidirectional). The ports automatically sense whether they are sending or receiving control data. The ports and their destinations are configured in the OPTOCORE CONTROL software.

5.6 Word Clock

Devices with Optocore/SANE modules are equipped with an internal, high quality, low jitter clock as well as Word Clock inputs and outputs. Any device on the network can act as the master of the network and pass Word Clock to networked Optocore/SANE devices. The internal/networked Word Clock is available at the Word Clock output connector of each device on the network to synchronize non-networked devices. In standalone network configurations external synchronization is not required. The Word Clock input termination can be switched on using the OPTOCORE CONTROL software's Local Settings. External termination is not required to avoid cable reflections.

5.7 Transmission Delay

The ProGrid system delay, including the matrix, is a fixed 41.6 µs @ 48 kHz for all channels. The additional transport delay per ProGrid unit on the network (<200 ns) is insignificant in comparison. Overall system delay is dependent on the converters used and the length of network cables in the system. Assuming ‘normal’ cable lengths of <700 m per link, the additional delay is considered marginal.

The transmission delay is constant between any points in the network.

5.8 Power Supply

The device is optionally equipped with two power supplies and inputs. If the primary power supply were to fail, due to disruption of the power source or in the case of a power supply malfunction, the device will automatically switch over to the redundant power supply. In order to make the power supply to the device redundant, both power inputs must be connected to the mains supply, if possible to different phases, circuits, or by having one of the power supplies connected to an uninterrupted power supply (UPS).

The power supplies operate with mains voltage of 100 ... 240 V and frequency of 50 … 60 Hz. The device can be used throughout the world without any modifications or transformers.

Important:
The switched-mode power supplies operate at very high voltages.

Coming into contact with the power supplies can lead to considerable electric shock, which may result in death.

To prevent electric shock, do not remove any covers of the device.

6 Control

All system and device parameters are configured using the Optocore Control software.
The system can be configured and controlled centrally, over the ProGrid network, with the exception of the initial configuration of the unique identifier (ID) of the device.

The Optocore Control software is capable of running multiple instances on the same PC or by using the Optocore Control software's Client/Server mode.

> **Please note:**
> Please refer to the "Optocore Quick Start Guide" for system configuration and setup.

7 Channel Allocation

The standard bandwidth allocation of an ProGrid network is as follows:

Audio	256 Channels @ 48 kHz – 1 Gbit network 768 Channels @ 48 kHz – 2 Gbit network
RS485 Data	32 Channels
Video	3 CVBS Video Channels *
Ethernet	100 MBit Fast Ethernet *

* If the network is used for Ethernet transport the system is reduced to 1 CVBS video channel.

Please note:
ProGrid R-Series devices equipped with 2Gbit fibre transceivers are required for 2Gbit network operation.

8 SANE bandwidth allocation

The standard bandwidth allocation of a SANE link is as follows:

Audio	64 Channels @ 48 KHz
Ethernet	100 MBit Fast Ethernet

9 Connectors and Cables

9.1 Intercom Ports – CC/485

Use shielded twisted pair cable (Cat-5, Cat-5e, Cat-6) terminated with RJ-45 connectors.
Connect intercom matrix to ports labelled TO MATRIX and intercom user key-panels and interfaces to ports labelled TO PANEL.

9.2 Optical Connections

Multimode transceivers connected using a 50 μm OM3 fibre cable can be used for applications requiring cable lengths of up to 700 m (worst case).
Single mode transceivers connected using a 9 μm fibre cable can be used for applications requiring cable lengths of up to 70 km (worst case).
The total optical loss should be less than 6dB between transceivers.

For portable applications, such as touring and other temporary installations, ruggedized HMA Expanded Beam Connectors, mounted on 1 RU panels and portable cables on cable drums are available.
Please refer to the Product Brochure available at www.clearcom.com.

9.3 SANE Ports

Use shielded, fully wired, twisted pair cable (Cat 5, Cat 5e, Cat 6) terminated with RJ-45 connectors. SANE utilizes all four pairs of the Cat 5 cable, two pairs for standard Ethernet transmission and two pairs for the SANE synchronous audio transport. A SANE cable shall not exceed a total cable distance of 100 m.

9.4 Auxiliary Ports – R485/GPIO

Each of the four channels requires a shielded twisted pair cable.
If two or more channels are wired to the same cable, a common braided shield should enclose the pairs.

9.5 RS232 Connection

Use a standard shielded RS232 cable.

9.6 RS485 Connection

Shielded, cable must be used for the RS485 port.

9.7 Connector Hood Specification

Locking screws for D-Sub connectors should be compatible with 4-40 UNC. Care should be taken in selecting the right type of connector hoods in order to fulfil the requirements of EMI-radiation directives. Full metal connector hoods should be used, approved acc. to VDE 0871, FCC 20780 and EMC directive 2004/108/EG, providing attenuation > 40 dB between 30 MHz up to 1 GHz. The shield of the cable should have contact to the connector hood.

9.8 USB Connection

Use a USB-A to USB-B cable between the PC and the ProGrid device.

9.9 LAN Connection

Use a shielded twisted pair cable (Cat-5, Cat-5e, Cat-6) with RJ-45 connectors.

9.10 Word Clock Connection

Use 75 Ω coaxial cable with BNC connectors.

9.11 Power Connection

Use power cords with IEC C13 connectors.

9.12 Hardware Connection Example 1 – Remote intercom key-panels, interfaces and wireless base stations

The following example demonstrates the use of PG8/PG4-INTERCOM-FX devices with intercom matrix systems.

A PG8-INTERCOM-FX is connected to eight four-wire ports of a central intercom matrix. The four-wire ports, along with RS422 or RS485 control signals (device dependent), are distributed over the fully routable ProGrid redundant ring topology network to remote locations.

Intercom key-panels and various interfaces can be connected to the system at the remote locations.

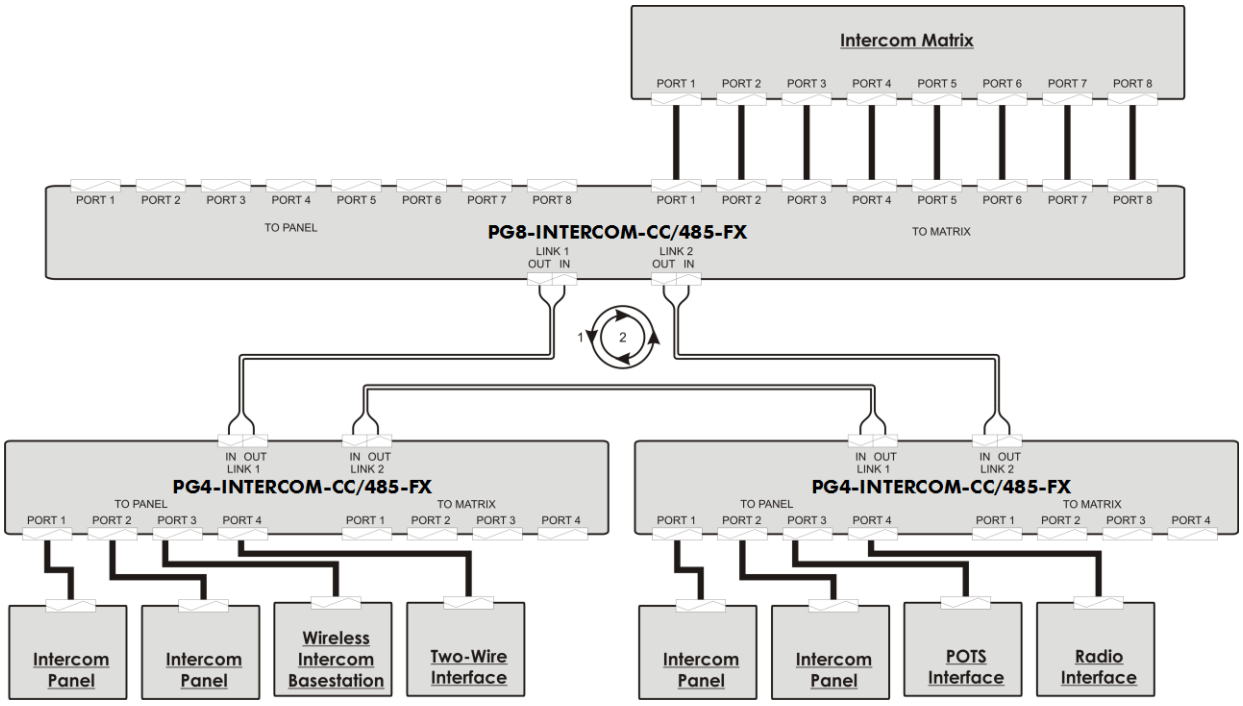


Fig. 1: Signal distribution for intercom key-panels, interfaces and wireless base stations.

9.13 Hardware Connection Example 2 – Remote line level audio and GPIO

The following example demonstrates the use of PG8/PG4-INTERCOM-FX devices with intercom matrix systems.

A PG8-INTERCOM-FX is connected to eight four-wire ports of a central intercom matrix. The four-wire ports, along with GPIO control signals (device dependent), are distributed over the fully routable ProGrid redundant ring topology network to remote locations.

Various interfaces can be connected to the system at the remote locations as shown on the diagram below, including On-Air warning lights, FOH paging systems, radio interfaces and four-wire to two-wire interfaces etc.

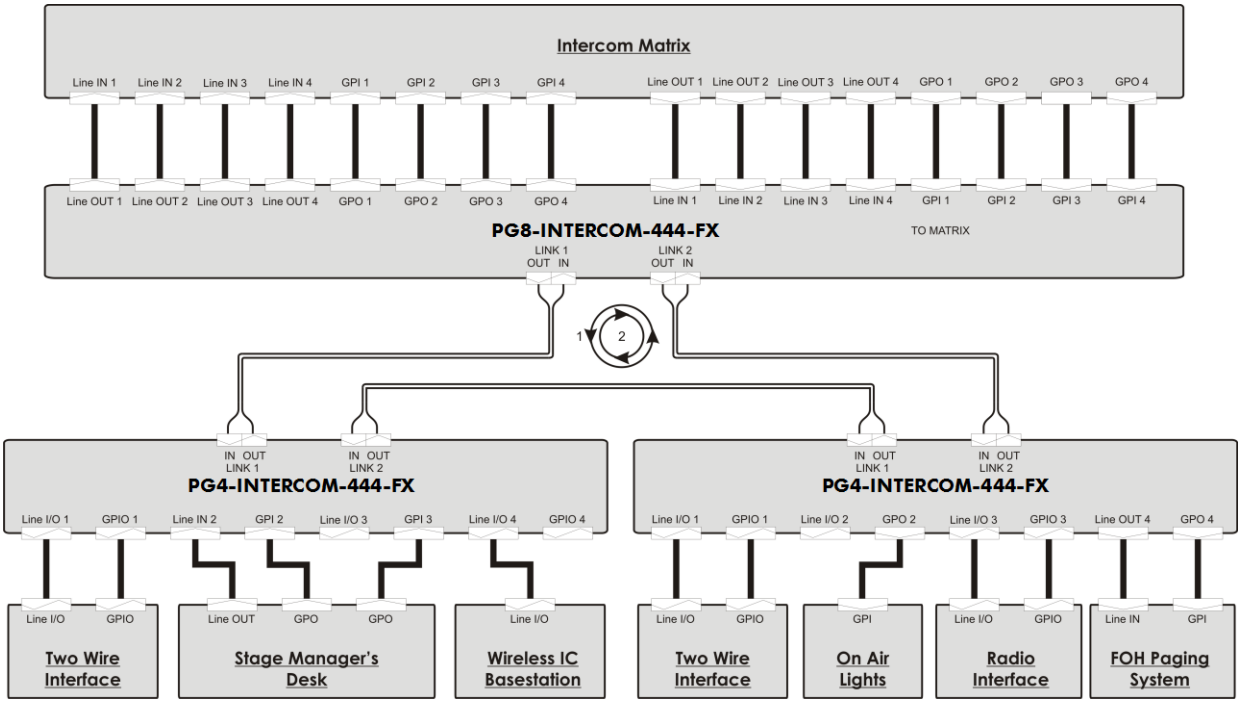


Fig. 2: Signal distribution for intercom key-panels, interfaces and wireless base stations.

9.14 Hardware Connection Example 3 – Trunking between Intercom Matrixes

The following example demonstrates the use of PG8/PG4-INTERCOM-FX devices to link intercom matrixes.

A pair of PG8-INTERCOM-FX devices is used to establish an eight channel trunk between two intercom matrixes. The four-wire ports are transported over a fully routable ProGrid redundant ring topology network. Control for both intercom matrixes are connected together using the ProGrid network's internal Ethernet switch with an optional connection to a third party trunk controller.

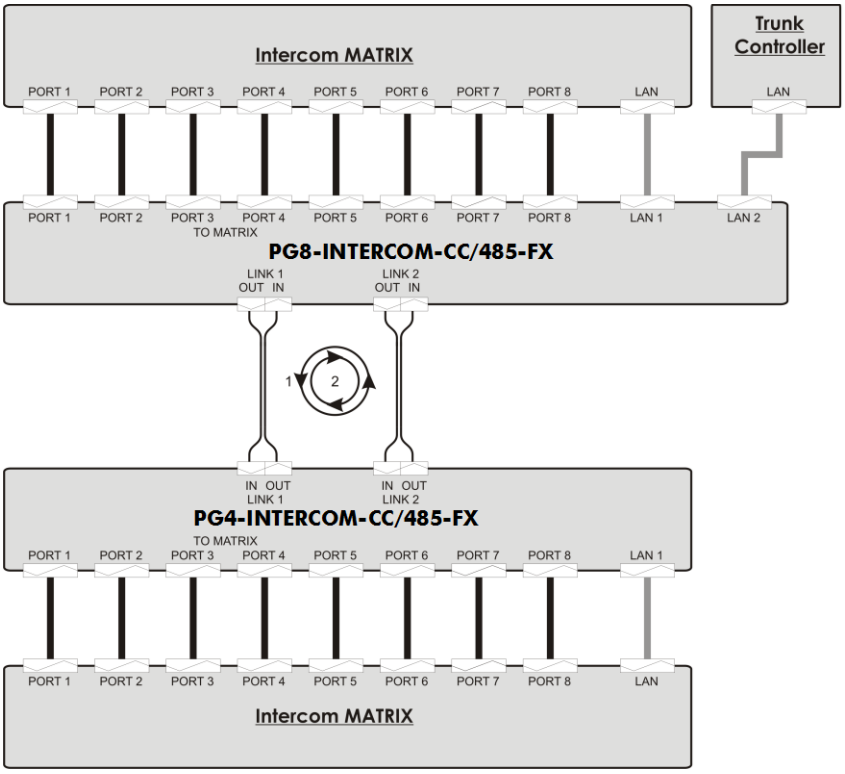


Fig. 3: Two intercom matrixes connected using ProGrid intercom devices.

9.15 Hardware Connection Example 4 – Two-wire PartyLine intercom over ProGrid

The following example demonstrates the use of PG8/PG4-INTERCOM-FX devices to distribute two-wire PartyLine intercom over ProGrid using four-wire to two-wire PartyLine intercom interfaces.

This example shows a ProGrid redundant ring topology network consisting of four PG4-INTERCOM-FX devices connected to third party four-wire to two-wire interfaces. The PartyLine is created by routing bi-directional audio between PartyLine interface A, connected to the first ProGrid device in the network, to PartyLine interface B, connected to the second ProGrid device in the network. This is repeated throughout the ProGrid network. The two-wire side of interfaces A and B are connected together at each position in the network and a PartyLine has been established over the network.

The PartyLine call lights may be transported over the ProGrid network using serial signalling (CC/485) or GPIO (444) depending on the four-wire to two-wire interfaces used.

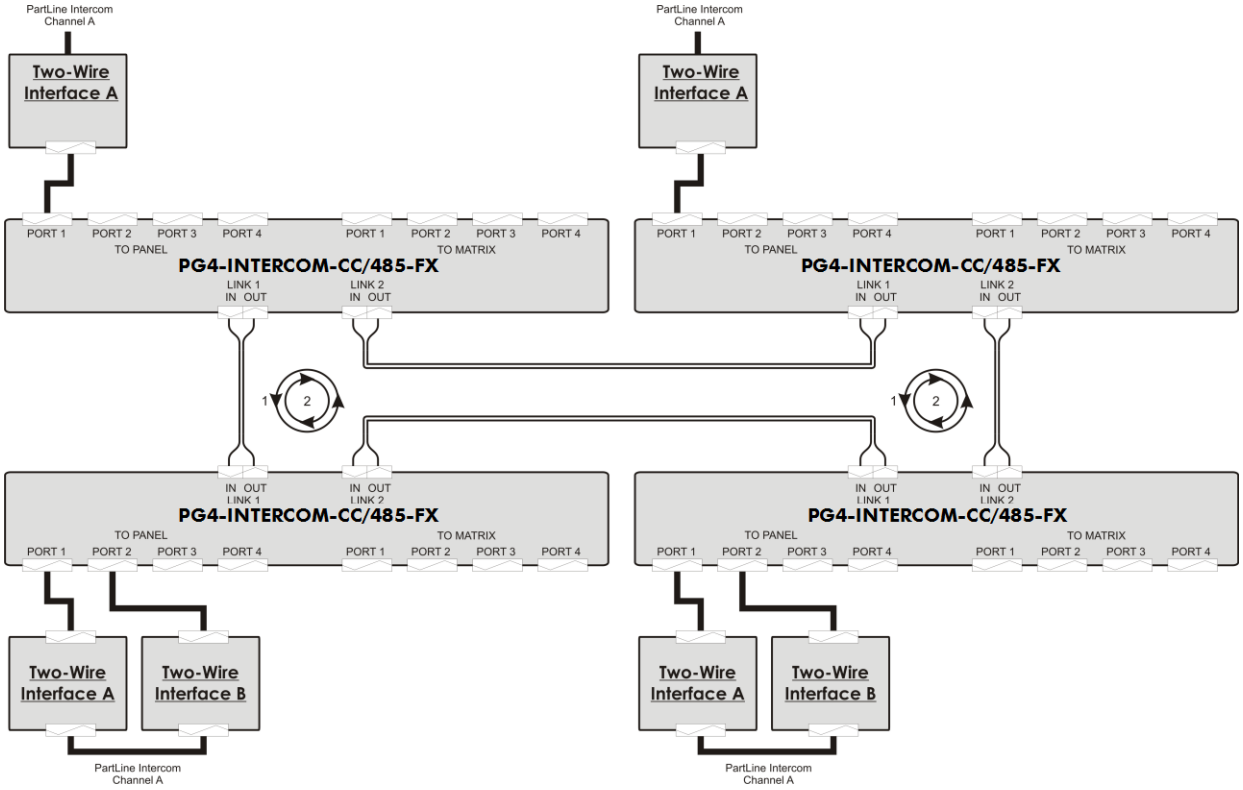


Fig. 4: Two-wire PartyLine intercom over ProGrid using PG4-INTERCOM-(CC/485)-FX.

> **Please note:**
> The four wire intercom ports are duplicated on the PG8/PG4-INTERCOM-FX devices with reversed wiring.
> This allows either matrixes (TO MATRIX) or intercom key panels (TO PANELS) to be connected to the unit using standard CAT cables, making cabling simple and cost-effective.

Please note:
Systems from these examples may be seamlessly integrated with all BroaMan DiViNe, ProGrid and SANE interfaces, such as the PG32-AES-FX, PG2-MADI-C-FX and PG2-MADI-F-FX devices, PG16-FX/TP and PG8-FX/TP networkable converters.

Please note:
Audio can be routed to and from any ProGrid device on the on the network.

Audio can be routed from an intercom device to any MADI, AES/EBU or analog output on the network.

10 Starting Up

10.1 Software Installation

Installation requirement for the software is a functioning computer system with Microsoft® Windows 2k (Requires installation of GDIplus.dll), XP 32&64Bit, Vista 32&64Bit, Server2003&2008, Windows7 32&64Bit or Mac: Intel based Macs with above OS using Bootcamp/Parallels/VMWare. The computer should be equipped with an USB interface for configuration and remote controlling, and a RS232 interface (or an appropriate USB / RS232 converter) for firmware upgrade. COM 1...4 can be used with a transfer rate of 57 600 Baud. Monitor resolutions of 800 x 600 or 1024 x 768 with 16 Bit color rendering are recommended to view the program. The installation requires approx. 2.5MB of hard-disk space and is carried out in the usual Windows-program manner.

Please note that the serial interfaces on computers are usually not capable of "Hot Plugging". Switch off the computer to avoid damage before establishing the serial connection between the ProGrid device and the computer.

The set-up software *785G041X_PROGRID_CLIENT_SERVER_X_XX.EXE* can be downloaded from www.clearcom.com or provided by the Clear-Com support team. OPTOCORE CONTROL for configuration and remote controlling, and OPTOCORE UPGRADE for firmware upgrading are installed on a PC or Laptop by double-clicking on the *785G041X_PROGRID_CLIENT_SERVER_X_XX.EXE.* The set-up executable program is self-extracting and provides the OPTOCORE CONTROL SETUP WIZARD. It will establish the necessary directories, a desktop icon for the OPTOCORE CONTROL and firmware upgrade software.

The uninstall procedure of OPTOCORE CONTROL can be carried out with the *ADD OR REMOVE PROGRAMS* tool of Windows, which is usually found under *START / CONTROL PANEL*.

For details about features and handling of OPTOCORE CONTROL please refer to the *HELP* menu of the software. It is strongly recommended to familiarize yourself with the OPTOCORE CONTROL software.

10.2 ProGrid Network Setup

Before connecting a PG8-INTERCOM-FX or PG4-INTERCOM-FX to any other device and before establishing the optical LINK connection make sure that all devices have a basic set-up in order to be able to operate correctly. For operation safety reasons, some settings (e.g. "ID") may only be made when locally connected to a device.

All devices in the network must operate with the same firmware version. The firmware version can be revised under *SET / LOCAL SETTINGS.* The update of the firmware is done with the OPTOCORE UPGRADE software under *START / PROGRAM /* OPTOCORE/ *UPGRADE*. Please refer to the *HELP* Menu for further information. For firmware update the PC has to be connected via the RS232 or USB Port on the front of the device.

The best approach to check the settings is to connect locally to every single device of the ProGrid network with a PC using either RS232 or USB connection, run the OPTOCORE CONTROL software and enter menu *SET / LOCAL SETTINGS*. This dialog enables the definition of the ID, ports, etc.

- **General:** Set each device in the optical network to a unique ID. Device IDs must be unique in the entire ProGrid network. Usually the device with the lowest ID and a word clock input will determine the clock of the network. It is advisable to assign ID 1 to the device with word clock input connected to the most important console, e.g. the FOH console.

  Master Priority allows forcing a device to act as word clock master of the network. The device with the lowest ID, a checked Master Priority and a word clock input will act as master.

  Devices with a word clock input such as PG8-INTERCOM-FX, PG4-INTERCOM-FX, PG16-FX, PG8-FX, PG16-TP, and PG8-TP always have priority prior to devices without word clock input. Thus even if the Master Priority is checked in the local settings of a device without word clock input, the device with the

lowest ID and word clock input acts as word clock master of the network, when present.

- **Clock Setup:** All devices in the network must work with the same sample rate. *CLOCK SOURCE* allows the selection of Auto (BNC priority), *INT* (internal) or *BNC* (external) word clock signal.
- **RS485 Ports:** The *RS485 SETUP* is used to define, which signal is given out at the specific port of the device. There are 32 data channels available in the network. It is necessary to allocate physical inputs as the 4-channel bank. Four output it is possible to choose one of 32 channels per each port.
- **Video / Ethernet setup:** In order to use ProGrid for Ethernet transport, the option System Ethernet should be enabled globally. In PG8-INTERCOM-FX and PG4-INTERCOM-FX Local Setting it is possible to enable or disable Local Ethernet as well. While System Ethernet is enabled it is possible to use only the first video channel. Video setup can be done by allocating video input in a proper channel. This channel can be outputted on every device which is equipped with video output.
- **Port Setup:** The GPIO/AUXILLARY PORTS ports can be configured under *PORT SETUP* while locally connected to the device. The settings can be changed only in *OFFLINE* Mode with *LOCAL SETTINGS* or with the *ACTION* / *SEND ALL* command.

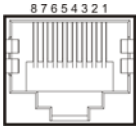
Click on *WRITE* first, confirm with *OK*, and then click *CLOSE* to exit the dialog.

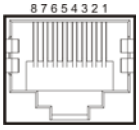
You may now connect the optical LINK cables between all ProGrid devices.

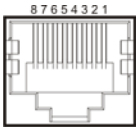
Check your setup by connecting to any device using either RS232 or USB connection, running the OPTOCORE CONTROL software and starting *ONLINE MODE* in the *SET* menu. The entire network at its current state is now displayed in the control software. Check the *LOG WINDOW* for any error messages. All ProGrid devices memorize the current setup, even if they are switched off or disconnected from the power supply.

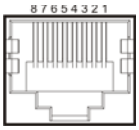
Never switch on power amplifiers before the complete system is stable and the OPTOCORE CONTROL level meters indicate a normal level.

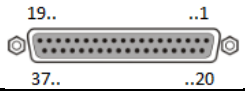
11 Connection Tables

Pin-out	Four-Wire Intercom port - TO PANEL – Clear-Com (IC422)						
	Channel		Audio In	Audio Out	RS422 In	RS422 Out	Use this pin-out only for devices loaded with Clear-Com modules (IC422)
	Pin	+	3	4	1	7	
		-	6	5	2	8	
RJ-45							

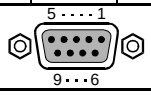
Pin-out	Four-Wire Intercom port - TO MATRIX – Clear-Com (IC422)						
	Channel		Audio In	Audio Out	RS422 In	RS422 Out	Use this pin-out only for devices loaded with Clear-Com modules (IC422)
	Pin	+	4	3	7	1	
		-	5	6	8	2	
RJ-45							

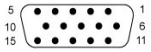
Pin-out	Four-Wire Intercom port - TO PANEL – RTS / Telex (IC485)					
	Channel		Audio In	Audio Out	RS485*	Use this pin-out only for devices loaded with RTS / Telex modules (IC485) * Shows the standard pinout for RS485 on the IC485 module. Other pinouts may be specified at the time of order.
	Pin	+	4	3	7	
		-	5	6	2	
RJ-45					RJ45 is physically compatible with RJ11 and RJ12 connectors commonly used for RTS/Telex panels and matrices.	

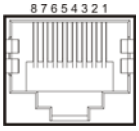
Pin-out	Four-Wire Intercom port - TO MATRIX - RTS / Telex (IC485)					
	Channel		Audio In	Audio Out	RS485	Use this pin-out only for devices loaded with RTS / Telex modules (INTERCOM-485) * Shows the standard pinout for RS485 on the 485 module. Other pinouts may be specified at the time of order.
	Pin	+	3	4	7	
		-	6	5	2	
RJ-45						RJ45 is physically compatible with RJ11 and RJ12 connectors commonly used for RTS/Telex panels and matrices.

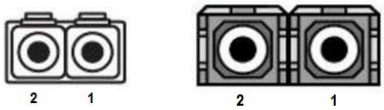
Pin-out	Line Level Inputs / General Purpose Inputs (IC444)											
			Line Level Input				General Purpose Input				Aux. Power		GND
			1	2	3	4	1	2	3	4	+5V	+12V	
	Pin	+	21	23	25	27	29	31	33	35	19	37	30, 32, 34, 36
		-	3	5	7	9	11	13	15	21	-	-	
		GND	22	24	26	28	-	-	-	-	-	-	
D-Sub-37- female													Locking system acc. to 4-40 UNC

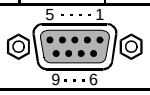
Pin-out	Line Level Outputs / General Purpose Outputs (IC444)											
			Line Level Output				General Purpose Output				Aux. Power		GND
			1	2	3	4	1	2	3	4	+5V	+12V	
	Pin	+	21	23	25	27	29	31	33	35	19	37	30, 32, 34, 36
		-	3	5	7	9	11	13	15	21	-	-	
		GND	22	24	26	28	-	-	-	-	-	-	
D-Sub-37- male													Locking system acc. to 4-40 UNC

Pin-out	Auxiliary Port - 4 x RS485							
	Channel		RS485				GND	Please verify the correct polarity of adaptors. Software configurable for duplex (RS485) or simplex (RS422) operation. An adaptor must be constructed for connectivity to MIDI, GPIO and CAN interfaces.
			1	2	3	4		
	Pin	+	1	2	3	4	5	
		-	6	7	8	9		
D-Sub-9- female								Locking system acc. to 4-40 UNC

Pin-out	Auxiliary Port - 4 x GPIO – Factory Fitted Option										
	Channel		GPI				GPO				GND	Electro Isolated. Available as a factory fitted replacement option for the serial ports.
			1	3	3	3	1	2	3	4		
	Pin	+	3	6	10	13	1	3	11	14	7, 8, 9	
		-	GND	GND	GND	GND	2	4	12	15		
D-Sub-15- female												Locking system acc. to 4-40 UNC

Pin-out	SANE – Synchronous Audio and Ethernet						
			SANE / “MADI” In	SANE / “MADI” Out	Ethernet In	Ethernet Out	A device compatible with 10/100MB Fast Ethernet can be connected to a SANE port for Ethernet data communication.
	Pin	+	7	4	3	1	
		-	8	5	6	2	
RJ-45							

Pin-out	Optical Fibre-Port							
		Optocore		MADI		SDI*		* Assumes standard Input / Output transceiver. Non-standard Input / Input and Output / Output transceivers for SDI video I/O are available
		RXD	TXD	RXD	TXD	RXD	TXD	
	Pin	2	1	2	1	2	1	
LC and SC connectors								

Pin-out	RS232 - Port						
	Channel	RS232		Internally bridged		Power		Use standard RS232 cable, male – female, to connect to PC
		RXD	TXD			+5VS	GND	
	Pin	3	2	1, 4, 6	7, 8	9	5	
D-Sub-9- female								Locking system acc. to 4-40 UNC

Pin-out	USB - Port					
	Channel	USB			GND	**USB B – device connector**
		VBUS	D -	D +		
	Pin	1	2	3	4	

Pin-out	DC Input – Factory Fitted Option				
			12V	GND	
	Pin	+	4	1	
XLR 4 Pin male					

12 Technical Specifications

Intercom	Hardware standard: CC/485: FCC-RJ45 444: D-SUB 37 Female, D-Sub 37 Male	
Analog Line Input	Impedance	10kΩ
- **IC422/IC485/IC444**	Maximum input level	+18 dBu
	SNR	115 dB (A-weighted)
	THD+N @ -1dBFS	≥ 100dB
Analog Line Output	Impedance	45kΩ
- **IC422/IC485/IC444**	Maximum output level	+18 dBu
	SNR	115 dB (A-weighted)
	THD+N @ -1dBFS	≥ 98dB
Serial I/O		
- **IC422**	EIA / TIA – 422	
- **IC485**	EIA / TIA – 485	
General Purpose Inputs – GPI	Optically isolated	3…48V DC, 5…7mA
- **IC444**		
General Purpose Outputs – GPO	Relay contacts	DC 30V 2A (resistive load)
- **IC444**		AC 125V 0.6A (resistive load)
Auxilary Power	+5V DC	≥ 100mA combined per IC444 module
- **IC444**	+12V DC	

Conditions	Reference 0dBFS ≡ 18dBu, Input / Output Termination 150R / 600R, Sample Rate 48kHz. Specs noticed as typical, if not otherwise stated

Word clock	Hardware standard BNC - 75 Ω	
Data rate	Depending on selected sample rate	Up to 192 kHz
Impedance	Output	≤ 5 Ω
	Input	75 Ω
Drive level	Output	≥ 1 V_{pp}
Zero level	Referring to GND	+ 1.7 V
Sense level	Input	≥ 400 mV_{pp}

Remote Control	Convention	
RS232	EIA / TIA – 232	57 600 Baud
USB	USB 2.0 – Device	12 Mbit/s
LAN	IEEE - 802.3	10/100 Mbit/s

SANE, LAN	Convention	
Audio	TIA - 568A/B, Optocore	200 Mbit/s
LAN	TIA - 568A/B, IEEE - 802.3	10/100 Mbit/s

Optical Connection	Complies with 21 CFR 1040.10 and 1040.11

Power supply	
Type	Switch-mode, universal input
Mains voltage	100 … 240 V
Frequency	50 … 60 Hz
Power consumption	Depending on the configuration of the device, 32VA - Max
Security classification	Class 1: basic insulation, connected to the protective grounding conductor
Security regulations	Harmonised European standard EN60065
Mains connector	acc. to IEC-950
Cooling	Passive, via surface and ventilation-slits on both sides of the device

13 Dimensions and Weight

Front panel: width 483 mm / 19 inch
height 44 mm / 1.73 inch
depth 200 mm / 7.87 inch

Rear panel: width 438 mm / 17.25 inch

Weight

2.7 kg ≡ 4.41 lbs

Modifications that serve the purpose of technical improvement of the device may be carried out without prior notification.

14 Compliance

FCC notice

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by Clear-Com, LLC, an HM Electronics, Inc. company could void the user's authority to operate this equipment.

IC Notice:

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne peut pas provoquer d'interférences, et (2) cet appareil doit supporter toute interférence, y compris des interférences qui pourraient causer un mauvais fonctionnement de l'appareil.

Industry Canada Compliance Statement

This Class[A] digital device complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la class[A] est conforme à la norme NMB-003 du Canada.

The PG8-INTERCOM-FX and PG4-INTERCOM-FX products comply with the following specifications:

EN55022 Emissions

EN55024 Immunity

Electromagnetic Compatibility Directive 2004/108/EC

Low Voltage Directive 2006/95/EC

Warning:
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Waste Electrical And Electronic Equipment (WEEE)

The European Union (EU) WEEE Directive (2002/96/EC) places an obligation on producers (manufacturers, distributors and/or retailers) to take-back electronic products at the end of their useful life. The WEEE Directive covers most Clear-Com products being sold into the EU as of

August 13, 2005. Manufacturers, distributors and retailers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging which indicates that this product was put on the market after August 13, 2005 and must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the user's waste equipment by handing it over to a designated collection point for the recycling of WEEE. The separate collection and recycling of waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local authority, your household waste disposal service or the seller from whom you purchased the product.

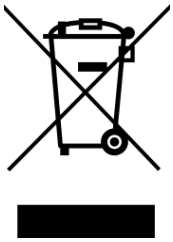


Figure 14-1: WEEE Symbol

15 Warranty and Liability

The Clear-Com product that you have purchased is covered by the Clear-Com Standard Limited Warranty, the terms and conditions of which can be found at www.clearcom.com/support/warranty-support-policies. We encourage you to review the Standard Limited Warranty to determine its coverage, exclusions from coverage and duration.

EXCEPT AS SET FORTH IN THE STANDARD LIMITED WARRANTY, CLEAR-COM MAKES NO WARRANTIES REGARDING THE PRODUCT, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT OF THIRD PARTY RIGHTS, OR FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED.

NOTE: Warranty of the ProGrid devices will be invalidated by the use of fiber transceivers not approved or supplied through Clear-Com or its approved dealers.