SUMMARY

This document is the user and installation manual of the 4EVAC IMPACT MM i-Controller, the head unit of the 4EVAC Impact Multimedia solution.

REVISION AND APPROVAL

Rev.	Date	Nature of Changes	Approved By
01	15-01-2023	Original draft	NR

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Thank you for choosing 4EVAC as your Voice Evacuation System solution.

4EVAC Impact MM is a 19" rack format, EN54-16 certified Voice Evacuation System, dedicated for medium to large installations both Commercial and security based application. The Impact MM system is capable of both standalone and network operation over IP, it has a wide selection of peripheral devices and remote extensions and ability to stream 250 digital audio streams in the network (Maze).

4EVAC Impact MM is certified in accordance with EN54-16 and EN54-4, which are harmonized standards under the Construction Products Regulation, mandatory in the European Union. The 4EVAC Impact MM system is fully compatible with the Compact 500 and IMPACT SW Voice Evacuation System.

4EVAC Impact MM uses a combination of network architecture, Existing G-Net path will be utilized for high priority messages, TCP/IP connection will be used for commercial activities. It uses Network Layers like G-NET, L-NET & ETHERNET LINK. This means that all systems can be connected to one network, running the network in peer-to-peer architecture, operating within the same space of voice evacuation zones, sharing the same audio messages, BGM broadcasts, microphone consoles, I/O extensions.

1. GENERAL INFORMATION

4EVAC Impact MM iController is the head unit of the 19" rack mounted Impact multimedia and Voice Evacuation System. The Controller covers complete EN54-16 certified functionality, as well as a variety of features essential to Public Address applications.

4EVAC Impact MM Controller incorporates 16 monitored contact inputs; 8 GPO, 4 relay outputs, 2 analogue audio inputs and 2 outputs. The i-controller can handle 256 audio streams simultaneously in the network. In addition, 2 Ethernet inbuild ports for TCP/IP link and max. 16 local peripheral devices (e.g. mic consoles) for local network interfaces for and 2 global network ports for interconnecting multiple systems in a redundant ring topology are included.

The Controller is designed to work with 4EVAC iDCA2.500 power amplifiers over IP LINK protocol.

ⓘ **Safety:** All system maintenance needs to be carried out with mains / Battery disconnected.

The factory default setting of the System Controller is general configuration – Please read the latest release notes for the version of the hardware and software you are using. With firmware (e.g. 5.4a), the first digit is a major release, second digits are changes in functionality, the last digits are for bug fixes without impact on functionality. Always use system with same firmware versions backward compatibility is not guaranteed.

2. FRONT INDICATORS

2.1. POWER

Indicates if the Controller is being powered and if the system is properly booted.

OFF	Not powered
GREEN continuous	This device is powered and operational.
GREEN blinking	This device is booting after power up / reset.

2.2. EVAC

Indicates that the system is in the Voice Alarm state, where at least one zone in the system is occupied by an emergency audio signal, i.e. a pre-recorded EVAC MESSAGE or LIVE EVAC, when a fireman mic is being used.

OFF	EVAC status is inactive (quiescent mode)
RED continuous	EVAC status is active

2.3. GENERAL FAULT

Indicates that the system is in the FAULT state (general fault indicator), where at least one device in the system is reporting a fault.

OFF	System is healthy
YELLOW continuous	Local fault is detected (failure of Impact MM controller or local IP LINK amplifiers)
YELLOW blinking	Remote fault is detected (this Impact MM controller and amplifiers are healthy and another device in the network is reporting fault state)

2.4. POWER SUPPLY FAULT

Indicates a power supply fault of the local Impact system, where at least one of following faults is reported

OFF	Power supply OK
YELLOW blinking	Battery-related fault: o Loss of battery o Loss of charger o Battery resistance too high o Temperature fault

YELLOW continuous	Mains fault

2.5. SYSTEM FAULT

Indicates a system fault of the Impact MM Controller, where:

- a CPU or program execution is stopped or malfunctioning,

- there is a corruption of storage memory containing config settings and audio files (SD card).

Where the system fault is caused by a CPU or memory fault, the Controller remains in its "safe state", where critical functions (including audio transmission, reaction on control inputs, etc.) are stopped until the fault is resolved.
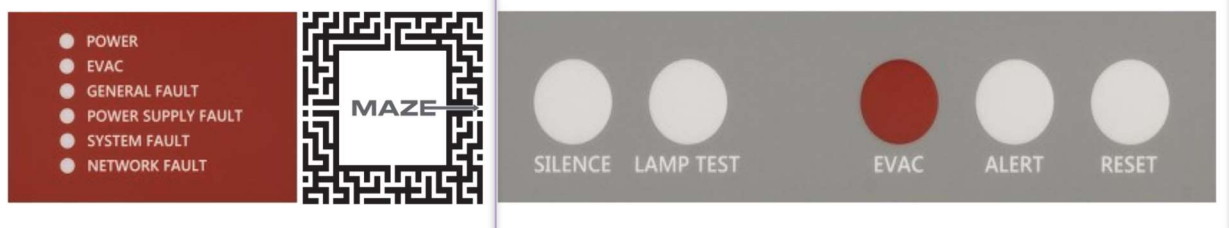
OFF	Firmware and settings OK
YELLOW continuous	CPU / program fault
YELLOW blinking	o SD card fault o Config file not compatible o Wrong ID setting

2.6. NETWORK FAULT

Indicates when any device or link in the network is missing.

OFF	Network OK
YELLOW continuous	At least one device from the network is missing.
YELLOW blinking slow	Global ring is broken (any place in the ring)

3. FRONT BUTTONS

3.1. SILENCE

Press to mute the sound of the buzzer in the entire system.

3.2. LAMP TEST

Press to verify visual (LEDs) and audible indications (buzzer) of the front panel of the local Controller and local amplifiers (connected to AMP LINK of local Controller).

3.3. EVAC

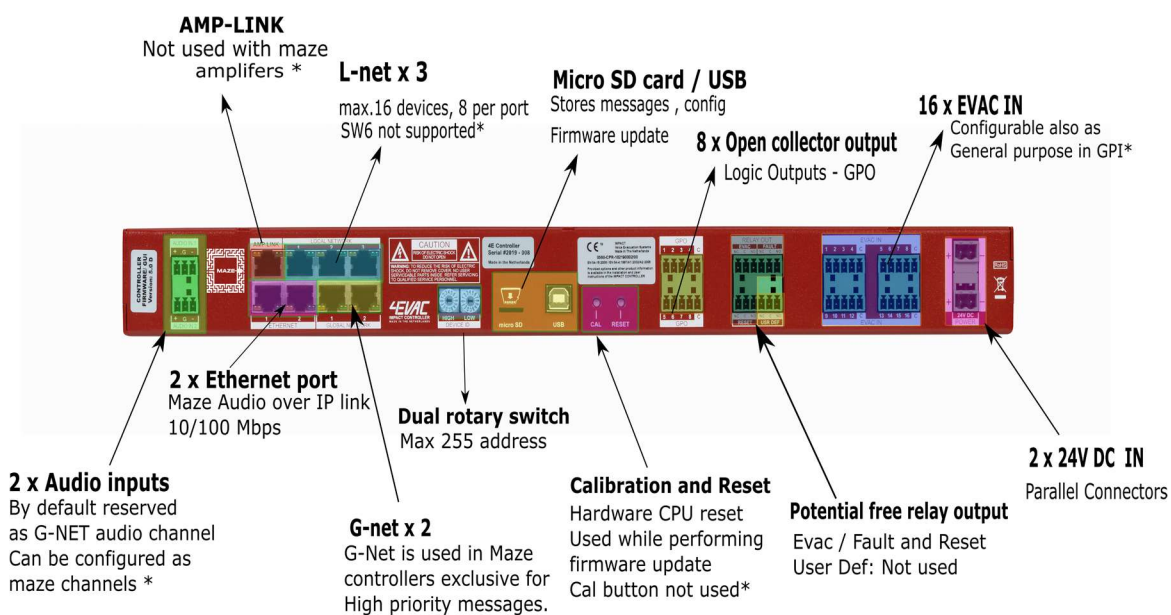Press to trigger the EVAC message in all zones in the entire system.

3.4. ALERT

Press to trigger the ALERT message in all zones in the entire system.

3.5. RESET

Press to reboot the system. In a network system this will reboot the entire network.

4. BACK PANEL

AMP-LINK
Not used with maze amplifers *

L-net x 3
max.16 devices, 8 per port
SW6 not supported*

Micro SD card / USB
Stores messages , config
Firmware update

8 x Open collector output
Logic Outputs - GPO

16 x EVAC IN
Configurable also as
General purpose in GPI*

2 x Ethernet port
Maze Audio over IP link
10/100 Mbps

Dual rotary switch
Max 255 address

2 x Audio inputs
By default reserved
as G-NET audio channel
Can be configured as
maze channels *

G-net x 2
G-Net is used in Maze
controllers exclusive for
High priority messages.

Calibration and Reset
Hardware CPU reset
Used while performing
firmware update
Cal button not used*

Potential free relay output
Evac / Fault and Reset
User Def: Not used

2 x 24V DC IN
Parallel Connectors

4.1. AUDIO INPUTS

In the left section the Controller provides 2 independent analogue audio inputs dedicated for BGM broadcast. 2 x mono, balanced, line level (0dbU / 0.775Vrms), 20kΩ input impedance.

Connect your auxiliary audio source for background music or low priority external paging microphone here.

AUDIO input

```
P   ●  +           to external audio source
GND ●    shield
N   ●  -
```
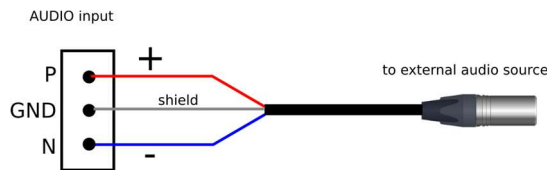
4.2. AMP LINK

4EVAC Impact MM controllers uses i-DCA amplifiers IP based hence Amplink connections are not used with i-DCA instead they utilize the ethernet ports.

4.3. LOCAL NETWORK

The L-Net daisy-chain topology is dedicated to peripheral devices of the Controller, such as AM448 modules or remote microphone stations. The L-Net is used to expand functionality of the Impact MM system to remote locations via a powered data bus. Every L-Net port is powered with 24V DC and power over L-Net is always enabled.

ℹ️ IMPACT MM is used with AM448* and not with SW6 – Zone expansion module. SW6 is supported only with IMPACT SW system. All other remote peripheral devices are supported with IMPACT MM system.

The L-Net capacity of a single Impact MM controller unit is limited to the following figures:

- ▨ Maximum 8 devices per port,
- ▨ Maximum 16 devices per Controller.

The L-Net port delivers power to remote devices. The maximum power capacity of each L-Net port is 500mA (protected with a, slow type, automatic fuse). L-Net devices of different types have different average power consumption, which may vary from 30mA up to 180mA. This implies limitations in terms of the maximum number of devices powered over the L-Net.

ℹ️

NOTE: Consider power consumption of L-Net powered devices!

4.4. GLOBAL NETWORK

G-Net is a redundant network ring where multiple Controllers may be connected into one system. It is used to reliably synchronize data between all connected devices and for multi-channel live audio transmission with very low latency. G-Net works as a redundant double ring between Controllers, which keeps the global system intact in case of single link failure.

To create a redundant G-Net ring between multiple Controllers, connect both G-Net ports between every unit in the network, so that you create a closed ring.

Power over G-Net (active by default) is dedicated to supply devices connected to the G-net port, such as fiber transceivers (FSC) or Break out Boxes.

4.5. ETHERNET NETWORK (MAZE LINK)

4EVAC Impact MM controller have 2 inbuild ethernet ports 10/100 Mbps, these ethernet ports are used for inter-connection between Maze devices (i-DCA, i Matrix and i Controller). With its ability to daisy chain between the dual ethernet ports, IMPACT MM system doesn't need any third party switches for its networking.

The ethernet link is utilized to link between i-DCA amplifiers and other maze devices like the iMatrix. A total of 3000 maze devices (iController/iDCA/Maze peripheral devices) can be connected in a single network. Ethernet link is utilized to stream audio channels both broadcast and receive.

Ethernet link capacity is as below :

- Maximum 16 iDCA amplifiers can be connected per iController
- Total 32 zones standalone per iController
- Single iController can handle 32 audio streams (broadcast and receive) same time (Standalone)
- In a network maximum 250 audio streams can be simultaneously available.
- In a network maximum 254 iController can be connected.
- Each iController can be assigned with a static IP address
- Default IP address - 192.168.100.20
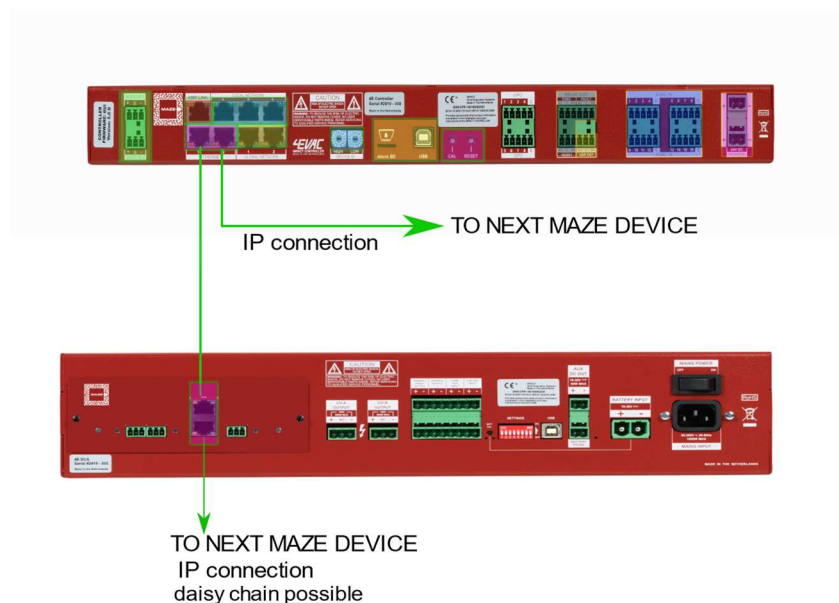
4.6. DEVICE IDENTIFICATION

Device Identification in the IMPACT MM is done using soft address (using software – Maze id) and Hard address - equipped with a rotary switch that determines the Device ID (or device address) in the network. Make sure that the Device ID set on the rotary switch and maze id set on the manager complies with the ID defined in the configuration settings for this device. Maximum number of iController in the maze network is limited to 254 devices. The default IP address for the i-controller is 192.168.100.20 and it is discovered in the Maze manger with a maze S/N available on the rear side of the controller. Each i-controller have specific maze S/N available on the rear side of the hardware.

DEV ID   Maze ID
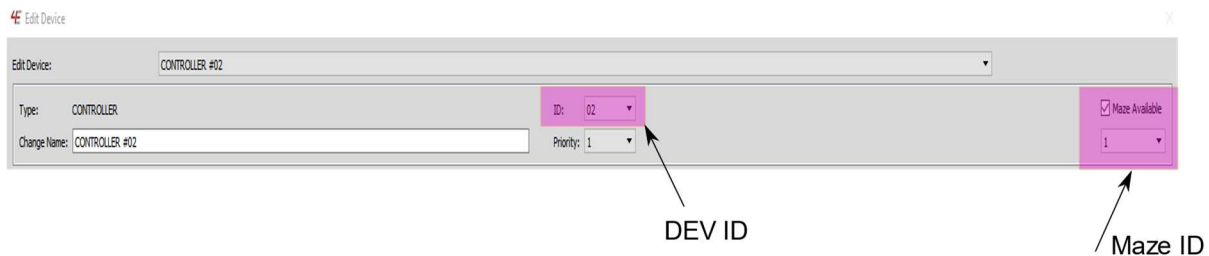
Wrong ID setting will trigger a system fault because of a configuration error.

4.7. MICRO SD CARD

The Controller is supplied with a pre-installed micro SD memory card. The memory card contains a complete system configuration file, including audio messages.

The configuration file is prepared in the 4EVAC Manager – a Windows GUI application. More information about creating configuration settings can be found in the 4EVAC Manager User Manual.

The memory card is under constant surveillance, as well as its contents. When the memory card is removed, damaged or its contents are corrupted, the Controller will report a system fault. During a system fault, caused by a memory error, it enters a safe state where the system stops all functions and requires a reboot. This state can be reset only by a manual device reset.

4.8. CAL BUTTON

Not used

4.9. RESET button

Press to trigger a hard reset of the Controller (different from the RESET button on the front panel – soft reset). This button will trigger a hardware reset of the local Controller only.

4.10. GPO

8 x general purpose output (open collector) with common ground.

GPOs are programmable in the configuration settings. The GPO can be linked to any system events to follow system events and various zone states.

NOTE: Each output can accept max. 110mA and max. 24V open circuit voltage.

4.11. RELAY OUTPUTS

The Controller features 4 potential-free relay outputs to external devices. Each output has individual 3 pins:

- normally open,
- normally closed,
- common.

4.11.1. EVAC

Activated (closed) during EVAC mode, where at least one zone of the voice evacuation system is transmitting an automatic EVAC message or LIVE EVAC signal from a fireman microphone.

4.11.2. FAULT

Activated (closed) while the fault status is reported by the voice evacuation system. Also activated when the Controller is not powered.

4.11.3. RESET

Activated (closed) immediately after a manual reboot of the system is triggered on the front panel. The active pulse length of the reset signal is configurable from 0 (disabled) to 5000ms in the configuration settings.

4.11.4. USER DEF

This relay output is not in use.

4.12.   EVAC inputs

There are 16 monitored inputs dedicated to triggering signals for evacuation, silence and reset instructions from an external fire detection system, as well as any other events, including commercial activities.

Each of these inputs has 1 triggering pin, with a common ground level for all inputs. EVAC inputs have built-in DC monitoring which requires two resistors of 4.7kΩ + 10kΩ in order to detect input active/inactive states as well as short and open faults. The EOL resistors must be located directly at the triggering output inside of the external device (i.e. fire detection system) to provide reliable surveillance of the entire link.

EVAC inputs must receive an activation signal of at least 100ms in order to trigger events. Pulses shorter than 100ms will be ignored.

5. CONNECTIONS AND RECOMMENDED CABLES

	How many	Connector type	Signal type	Additional information	Recommended cable (minimum)	Max. length
Analog audio in	2	pluggable screw terminal block 3.5 mm	Analog balanced mono audio, 0dBu	n/a	Balanced shielded microphone cable, typ. 2 x 0.25mm^2	100m
EVAC in	16		Pull-down input with fault detection (open/short)	EOL resistors 10kΩ + 4.7kΩ in series	Depends on length, typ. N x 0.75~1.5mm2 (N – number of individual triggering signals from / to fire detection system)	1000m
EVAC / FAULT/ RESET out	3		Potential-free relay output	n/a		1000m
GPI	8		Pull-down input	n/a		1000m
GPO	8		Open collector output max. 24V max. 110mA	n/a	Depends on length, typ. N x 0.75~1.5mm2 (N – number of individual triggering signals to external devices)	1000m
Ethernet port	1	RJ-45	Digital audio signal + IP (ethernet) data.		UTP CAT6	100m
G-Net port	2		Full duplex RS-422	Redundant ring with power delivery	FTP CAT5e crossover	250m (between devices) Power limitations apply
L-Net port	3			Daisy chain with power delivery		
DC Power in	1	Pluggable screw terminal block 5.08mm	24~30V DC	n/a	2 x 1.5mm^2	10m

6. TECHNICAL SPECIFICATION

Standalone system (single i controller)	
General	
DC supply input	24 – 30V DC (from iDCA2.500)
Power consumption	140 mA @24V DC
Power supply	PSE integrated within iDCA2.500 (EN 54-4 certified)
Number of zones	max. 32 local zones
Speaker Lines	32 A/B lines or 64 B Lines
Maximum total output power	16000 W
Dedicated power amplifiers	iDCA2.500 2 x 500 W, max. 32 x 500W (max. 16 x iDCA2.500)
Standby power amplifiers	500W per backup channel
Matrix	4 x 8
Loudspeaker line monitoring	
AM448	4 in- 4 A/B or 8 class B out 100V - 20kHz AC monitoring with EOL module, short/open/impedance deviation
LOOPDRIVE	loop DC monitoring with short-circuit isolators, short/open/earth leakage, EN54-17 certified
Voice messages	
Storage	max. 22 audio files x 5 minute each, micro-SD card with content monitoring
Audio streams	Max. 32 streams broadcast / receive simultaneously
Message player	Max. 2 simultaneous local message playback, priority control
Controls and indications	
General controls / indications	Lamp test button, silence button, power, evac, general fault LED indicators
Fault indications	Power supply, system fault, network
Evac manual control	EVAC message, ALERT message, SILENCE, RESET
Inputs	
2 x BGM	2 x balanced analogue audio mono input, 0dBu, input impedance 20kΩ
16x EVAC in	monitored analogue inputs, 4.7kΩ +10kΩ EOL resistors
Outputs	
EVAC out, FAULT out, RESET out	Potential-free relay output (configurable NO/NC) max. 1A
GPO	8 x Open collector output (configurable NO/NC) max. 24V / 110mA
Amplifiers (on IP link)	
Type iDCA2.500	Class D, transformer-less, direct output
PSE	integrated power supply equipment, EN54-4 certified
DC output	2A auxiliary purpose DC output
Charger	4A charger output, max. 100Ah (>80% in 24h according to EN54-4)
Protection	over load shutdown, over temperature shutdown
Backup amplifiers	auto backup at end stage failure, auto restore
Efficiency	96% @ rated power (DC-powered)
Output voltage	max. 100V RMS
Rated power	500W per channel
Bandwidth	50 Hz – 20 kHz
SNR	>80 dB
THD + N	<0.1% @ rated power
Audio	
Frequency response	20Hz – 20KHz, +/- 1 dB
Sampling Frequency	48 KHz
Dynamic Range	A->D (-93dB) / D->A (-97dB)
Distortion	-95dB +/- 5dB (in/out)

A->D Converter	24 bits
D->A Converter	24 bits
Messages, network streaming	100 Hz – 24 kHz compressed
Analog input- output latency	< 10 ms (stand-alone system)
Message file input format	.wav, .dat, .raw, .mp3, .ogg, .flac (max. 5 minutes)
EQ/Filter	5-point parametric EQ with predefined IIR filters
Delay	Max. 30 seconds per channel
Volume control	-24...+9dB
Dynamics	Gate with adjustable Threshold -60....0dB
No. of output audio channels (Maze)	32
Recorded Messages	Maximum 16 audio files, 5 Minute each
Mechanical	
Dimensions (HxWxD)	4.4 x 44 x 34 cm (1U)
Weight	4 kg
Housing material	Steel
IP rating	IP 30
Mounting	19" rack mounting
Operating conditions	
Temperature (Ambient)	-5 ~ 40°C
Max. Temperature (Device)	65°C
Relative humidity	max. 90% (non condensing)
Storage temperature	-40 ~ 70°C
Network system	
Max. number of iController in the network	254
Maximum number of Maze devices in the network	3000
Max. number of zones	255
Number of simultaneous network audio channels	250
Network audio transmission latency	0.3 ms per device
Ethernet network	
Architecture	IP network 10/100Mbps – All devices in same LAN
Connection	2 x Build in ethernet ports daisy chain
Cabling	Cat 6 or higher (shielded)
Max. length of ethernet link (node-to-node)	
default	100 m
with fibre extenders	2500 m
Local network	
Architecture	Master-slave, up to 16 slave devices per Controller
Connection	3 x L-Net port, RJ-45, powered daisy chain, digital audio & control data
Cabling	X-over FTP CAT5e (or higher)
Current consumption	max. 500 mA per L-Net port
Max. length of local link (node-to-node)	
default	250 m
with twisted-pair extenders	500 m

with MM fibre extenders	2500 m
Global network	
Architecture	Peer-to-peer, up to 254 Controllers
Connection	2 x G-Net port, RJ-45, powered redundant ring, digital audio & control data
Cabling	X-over FTP CAT5e (or higher) / multimode optical fibre
Current consumption	max. 500 mA per port, reserved only for network extenders
Max. distance between devices	
default	250 m
with twisted-pair extender	500 m
with MM fibre extenders	2500 m

All information provided in this document is subject to change without notice. 4EVAC may also make improvements and/or changes in the products described in this information at any time without notice.

4EVAC

M A D E   I N   T H E   N E T H E R L A N D S

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