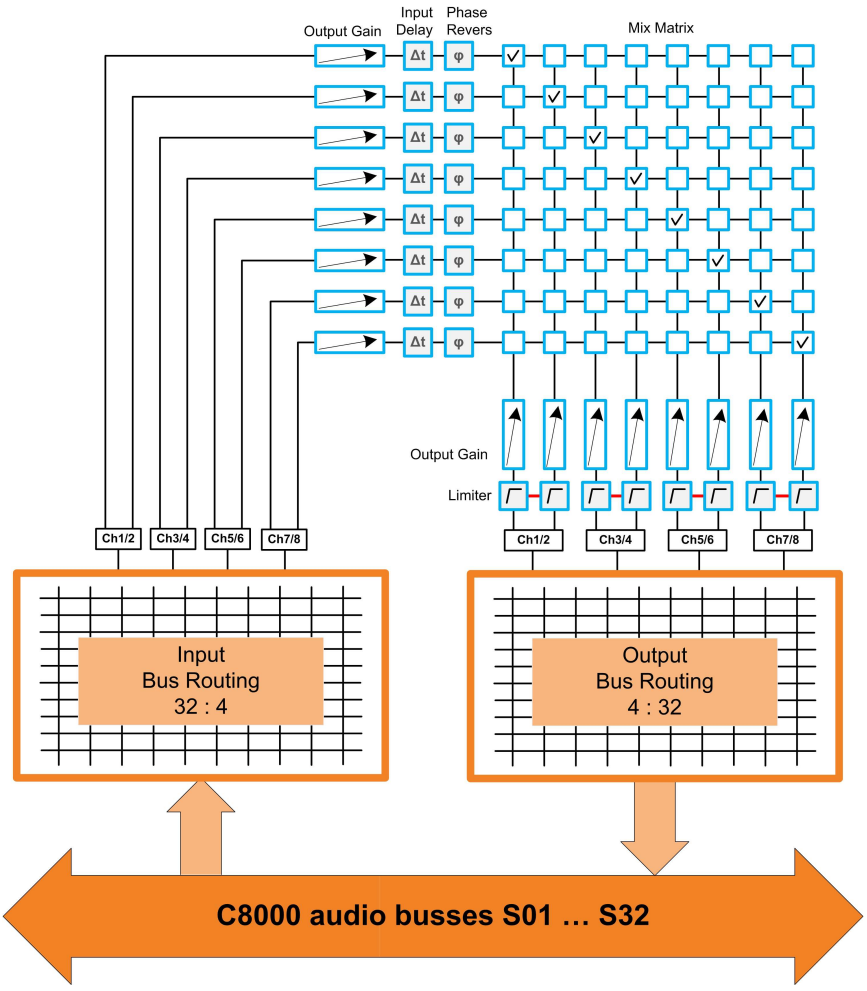
8 Channel Mix Matrix with Limiter

C8088

features

- 8 x 8 audio matrix
- Input gain control
- Input phase reverse
- Variable input delay (60ms max.)
- Output gain control
- Output limiter
- Cross fade of settings when changing presets
- Alternative set of C8k bus inputs
- Remote control via web server of the C8702 Frame Controller, EmBER+ protocol or GPI/Os

block diagram



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technical specifications

AUDIO :

resolution :	24bit			
sample rate :	44.1 or 48kHz			
audio processing :	8 x 8 mix matrix			
	Input gain	–20dB	…	+20dB
	Input delay	0ms	…	60ms
	Input phase reverse	0º	or	180º
	Cross fade time	15ms	…	5sec.
	Output gain	–20dB	…	+20dB
	Limiter Threshold	0dBFS	…	-20dBFS
	Limiter program	fixed to Junger “UNI” setting		
	Bit transparent mode	for pairs of inputs		
	Cross Fade	15ms	…	5sec.

GENERAL :

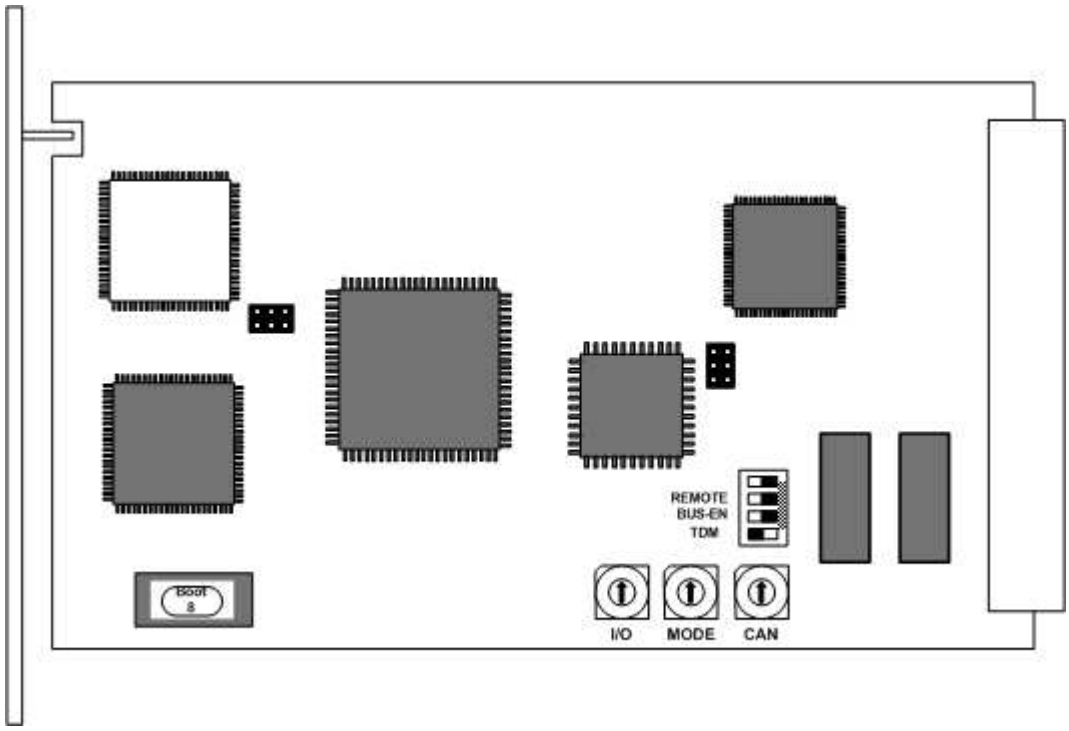
backplane connector :	ref. to DIN41612, 64pin, a+b, male
power supply :	+5V DC
power consumption :	approx. 1.000mA
dimension :	3RU, 4HP, 160mm depth
temperature :	10°C … 40°C
humidity :	90%, non condensing

hardware settings

The C8088 does not have front panel controls. It may be configured by a DIP switch and via web browser.
On the front panel there is a status LED with different display modes:

green	=	status OK
red	=	status is bad. It needs remote reading of the status via GUI. It is likely that the Frame Controller has issued a SNMP trap.
flashing	=	the module is under control of the Frame Controller.

location of switches:



Dip-switch settings

Since this type of module has an electronic output routing facility, great care must be taken when installing or exchanging a module!

NO LABEL: **ON**
CAN address range is extended by **+16** (counting from 0x10 to 0x1F)
OFF
CAN address range is standard (counting from 0x0 to 0xF) see rotary encoder settings below.

REMOTE: **must be ON**

BUS-EN: **ON**
Connects the outputs to the C8k audio buses on power up automatically. The output configuration will be taken from the **NV** (non volatile) **memory.**
OFF
Disconnects the module outputs from the C8k buses on power up.

Important note! To avoid audio bus conflicts when you replace a module or install an additional one and the configuration is unknown, the output bus drivers must be disabled by **BUS-EN=OFF** before inserting it. If all settings are done remotely and the unit fits into the bus assignment scheme of a frame, you must remove it and place the switch back into position **BUS-EN=ON**.

TDM:	**must be OFF**

rotary encoder settings

I/O	**not used**
MODE	**not used**
CAN	**0 – F** The 16 switch positions are hexadecimal numbers (0x0 to 0xF) it sets the CAN ID. Each module within a frame must be assigned a **unique** CAN bus address for proper communication with other parties of the frame, e.g. the frame controller or the GPI/O module.

Important note! This address also sets the position of the module graphic when you control the frame via the web GUI by a C8702 frame controller. See C8k system manual for details.

remote control operation

- Web-server based remote control of parameters via frame controller C8702
- 3rd party remote control by EmBER+ protocol via frame controller C8702
- Hardware GPI/O control of preset operation and special module functions
- Remote control by the **brc8x Broadcast Remote Controller** via CAN bus

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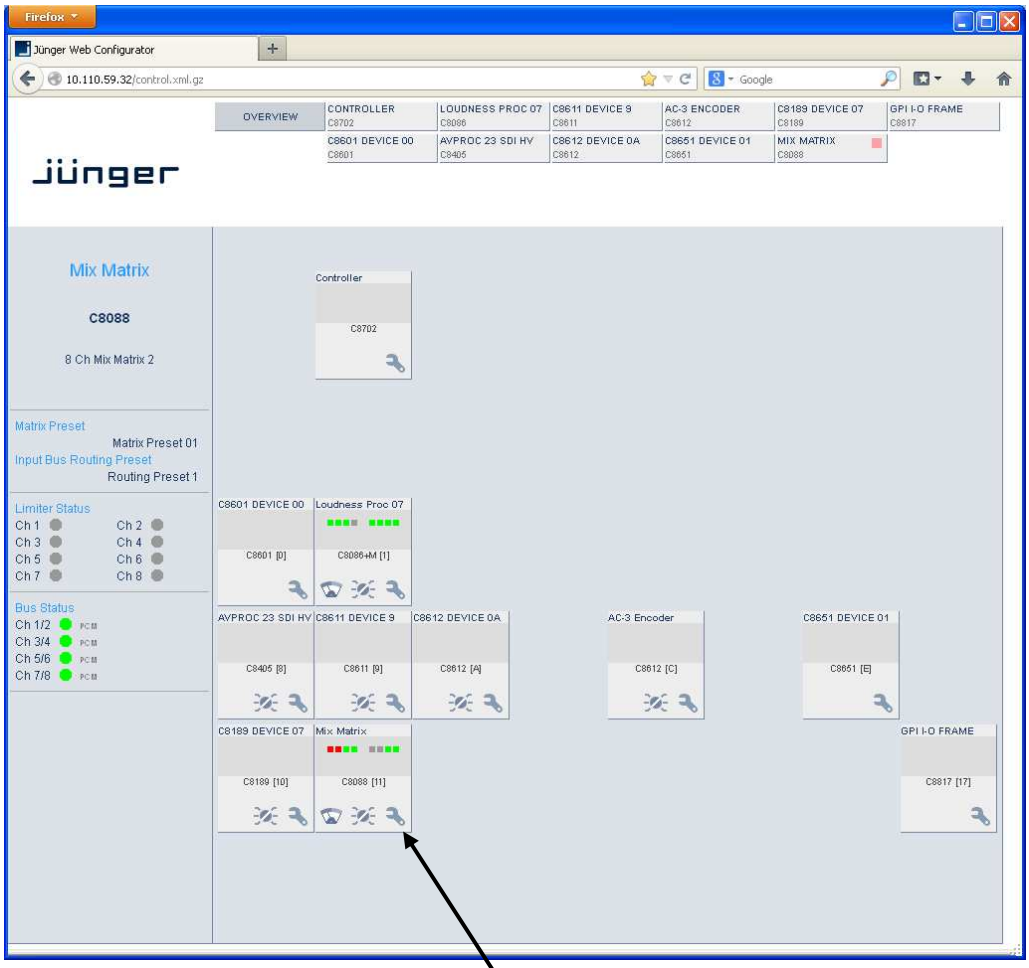
web browser based GUI

Set up of all configurations, parameters and functions via a web browser.
See also C8702 Frame Controller manual and respective firmware release notes.
Layout and functionality are related to firmware version 1.17.x of the C8702.

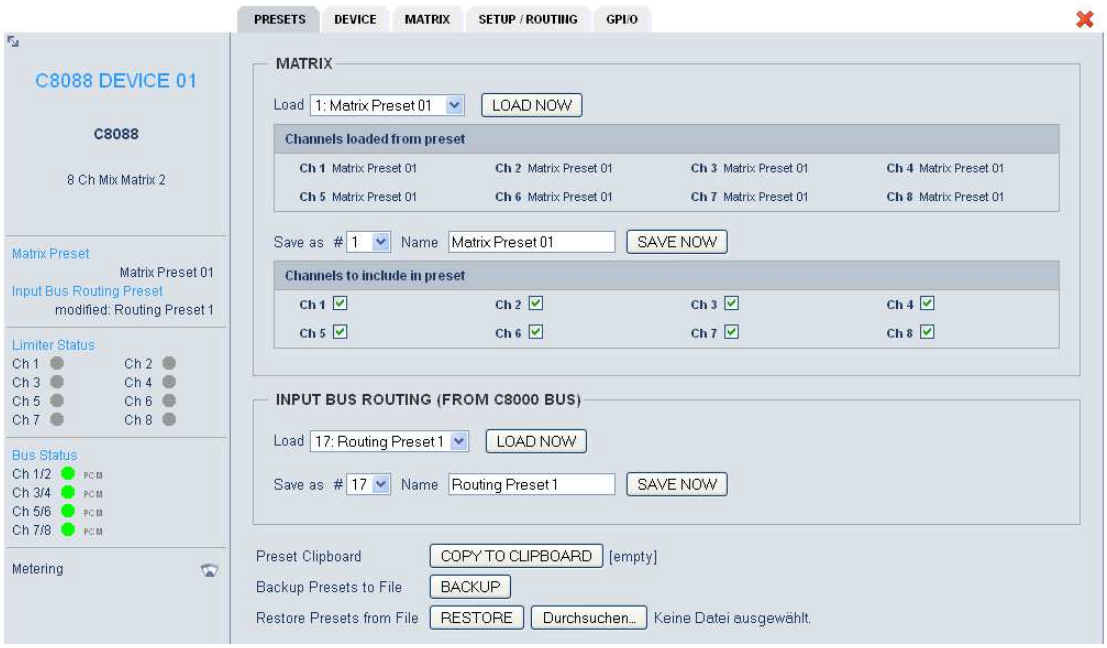
OVERVIEW

The modules overview of a frame (below the display of an example frame) :



By simply clicking on the spanner tool symbol you will get the control pages of the **C8088** and the status window on the left side, which you will also see on mouse over.
The entrance to the module setup is the **PRESET** page:

PRESETS



The **C8088** has **16 matrix presets and 8 routing presets**. The status window at the left hand side shows the names of the active presets. The phrase **"modified"** will appear in line with the Preset name, if a preset parameter was changed by the operator.

MATRIX	bank of 16 presets to recall **MATRIX** (audio) parameters.
Load	select a preset by name and press **<LOAD NOW>.** The loaded preset number and name will automatically appear in the below **Save as #** and **Name** field.
Channels loaded from preset	shows the channel number that is affected by the actually loaded preset.
Save as #	select a preset memory number where you would like to save the actual audio program parameters to.
Name	assign the preset you are about to save a name (up to 16 digits).
Channels to include in preset	tick the check box(es) for which channel the preset shall be saved and press **<SAVE NOW>.** The number and the name appears automatically in the load fields as well because they are active now.

Important Note: The channels stored in presets are related to the output channels of the C8088. This is the same way as it was implemented for the groups of presets for the predecessor C8080.

INPUT BUS ROUTING (FROM C8000 BUS)	a bank of 8 presets to recall device settings.
Load	select a preset by name and press **<LOAD NOW>.** The loaded preset number and name will automatically appear in the below **Save as #** and **Name** field.
Save as #	select a preset memory number where you would like to save the actual audio program parameters to.
Name	assign the preset you are about to save a name (up to 16 digits) and press **<SAVE NOW>.**
Preset Clipboard	copy the active preset to a **clipboard**, the data may be used by other modules inside the same frame.
Backup Presets to File	creates a backup **XML file** which may be stored to the PC.
Restore Presets from File	you can select **<browse>** a backup file from the PC.

DEVICE

INFO

Device Name	you can assign the module a **16 digit name.**
Platform	the hardware platform.
Parameter Version	parameter set which knows the frame controller to gain access to it.

FIRMWARE

Controller	display of the actual firmware of the module controller.
DSP	display of the actual DSP firmware.

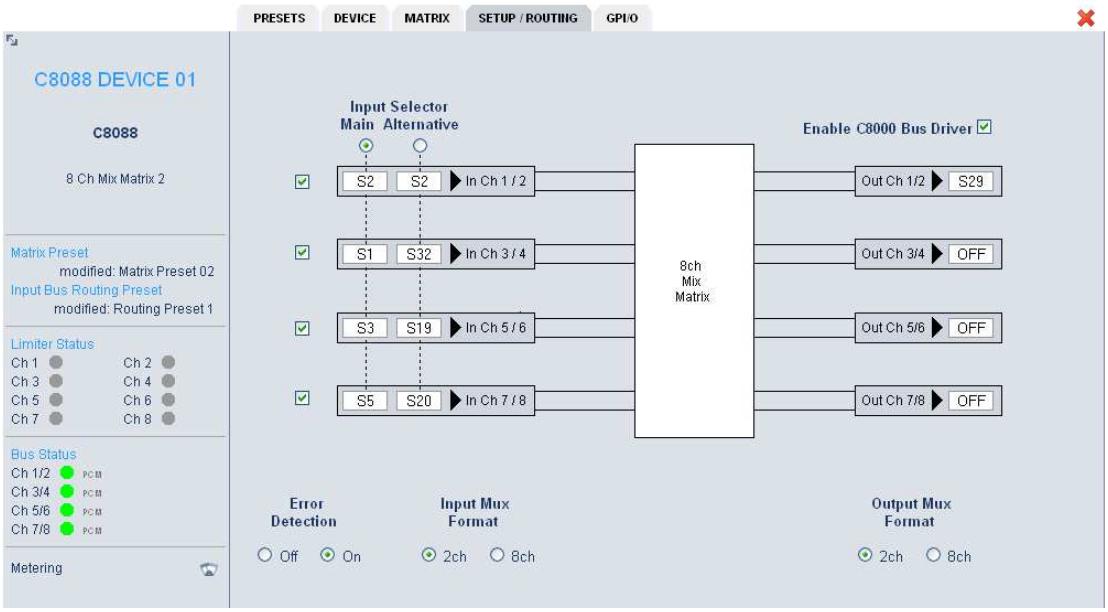
RESET

Restart Module	**<RESTART>** performs a warm start (soft reset).
Initialize and Restore	**<INITIALIZE>** restores the factory default values for all parameters.
Factory Defaults	the module including all presets. The input bus assignment will be set to S01 … S04, the outputs are turned OFF and the bus drivers will be disabled.

BACKUP / RESTORE

Backup Settings and Presets to File	**<BACKUP>** will put all active parameters and the content of all presets into an XML file. You may store such file on a PC.
Restore Settings and parameters from File	you may select a matching XML file from a PC. **<RESTORE>** will overwrite all active parameters and the content. of the presets by the content of the backup file.

SETUP / ROUTING



Input Selector	selects between two sets of inputs named **Main** and **Alternative.**
Enable C8000 Bus Drivers	turns on all module bus drivers (from tri state mode).
Main	you can select a set of 4 busses as the **main input** of the module.
Alternative	you can select a set of **4 busses** as an **alternative input bank.**
Input Mux Format	here you select if the input audio signals are **multiplexed** in **2ch** or **8ch** mode. If in **8ch** mode only the upper bus assignment field will be available because all 8 signals to the **8088** are taken from that bus.

Important Note: You may either use the A/B bank switching (if two sets of different inputs are sufficient enough) or you may change the busses of Bank A and/or B via presets,
The A/B bank switch will be stored in a routing preset as well.

Output Mux Format	here you select if the output signals are **multiplexed** in **2ch** or **8ch** mode. If in **8ch** mode only the upper bus assignment field will be available because all 8 signals from the **8088** will leave the module on that bus.
Error Detection	the serial audio data from the frame bus can be monitored for proper positioning of an **Error-Flag**. A bad **Error-Flag** is an indication that there is disturbance upstream (bad or no input signal, input module broken). The **Error Detection** can be turned **Off** and **On** for each input from the bus. You will see the status of the busses on the left hand side: **"Bus Status"**. A **grey** "LED" shows that the detection is disabled. While **green** is OK, **red** indicates an error condition. The bus status may be presented to external monitoring systems via **SNMP**. The frame controller summarizes such status information and generates **SNMP traps** for the frame as an entity or may activate GPOs. The **SNMP manager** may afterwards poll the **"modulesStatus"** for more detailed information per input (see SNMP documentation for details).

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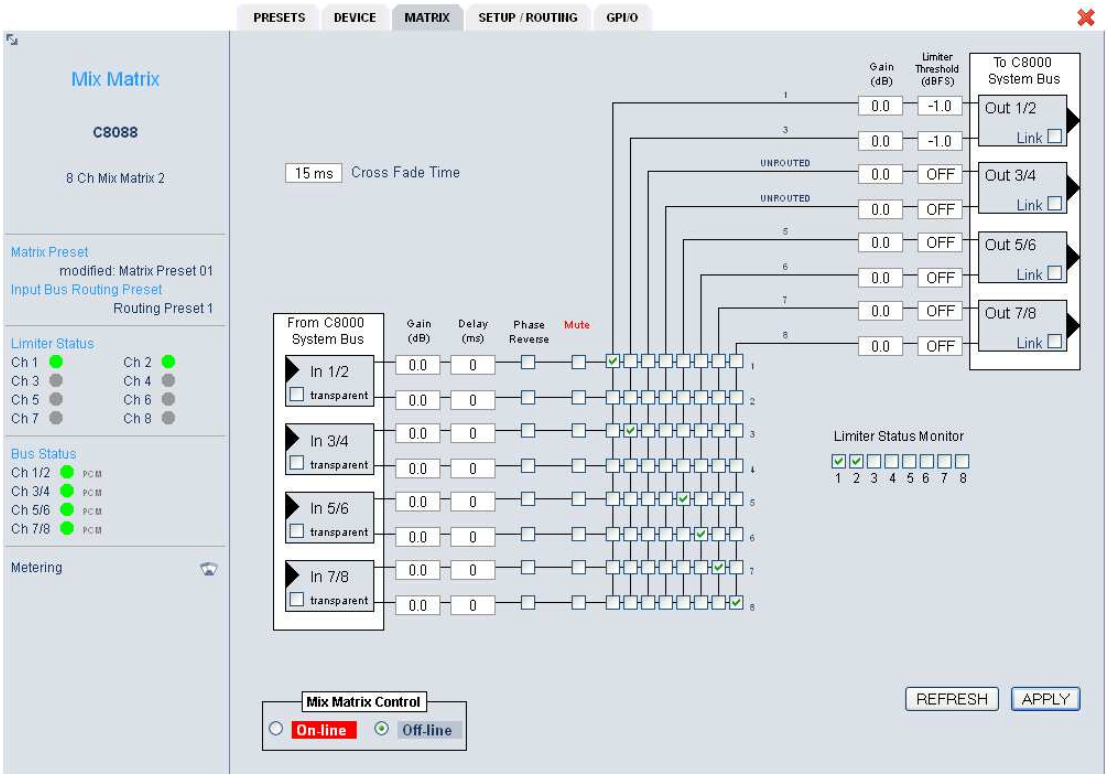
MATRIX



Cross Fade Time	the global **Cross Fade Time** parameter defines the duration when cross points are changed via presets.
From C8000 System Bus	groups the pairs of inputs for bit transparent operation.
transparent	for pairs of input signals it is possible to turn the matrix into **bit transparent** mode. This allows to pass **Non Audio** (e.g. Dolby E) signals through the matrix without destroying it.
Gain	sets the input and output gain of the individual channels by as much as +/- 20dB.
Delay	the input channels may be delayed by 60ms each.
Phase Reverse	the Phase Reverse switch will change the polarity of that particular input channel.
Mute	ticking this check box will mute that channel.
Mix Matrix	the matrix is represented by 8x8 check boxes. Each check box controls the input of a mixing node. You can assign up to 8 input channels to it and you can assign an input channel to all 8 mixing nodes in any combination.
Gain	sets the output gain of a mixing node by +/- 20dB.
Limiter Threshold	each output has a **brick wall limiter**. You can set the threshold for each limiter from 0dBFS to -20dBFS in steps of 0.1dB.

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Link

if you are using pairs of mixing nodes for stereo mixing you may link the limiter processing control and the gain settings. In this case you will do setting for both channels together.

Limiter Status Monitor

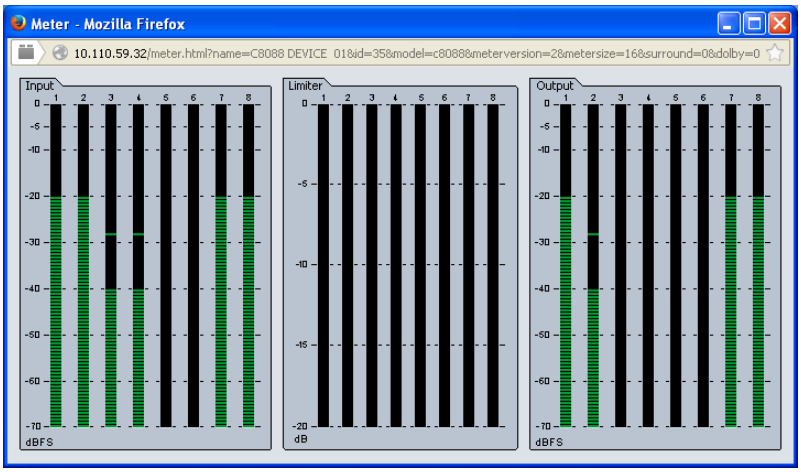
enables the monitoring of the limiter activity and the **Limiter Status** soft LED turns green as long as the Limiter Threshold is **not** set to **OFF**.
If the limiter gain reduction exceeds 6dB for a time period of 5sec. the **Limiter Status** soft LED turns red.
The activated status display may be used by an external monitoring system such as a SNMP manager to issue a warning.

Mix Matrix Control

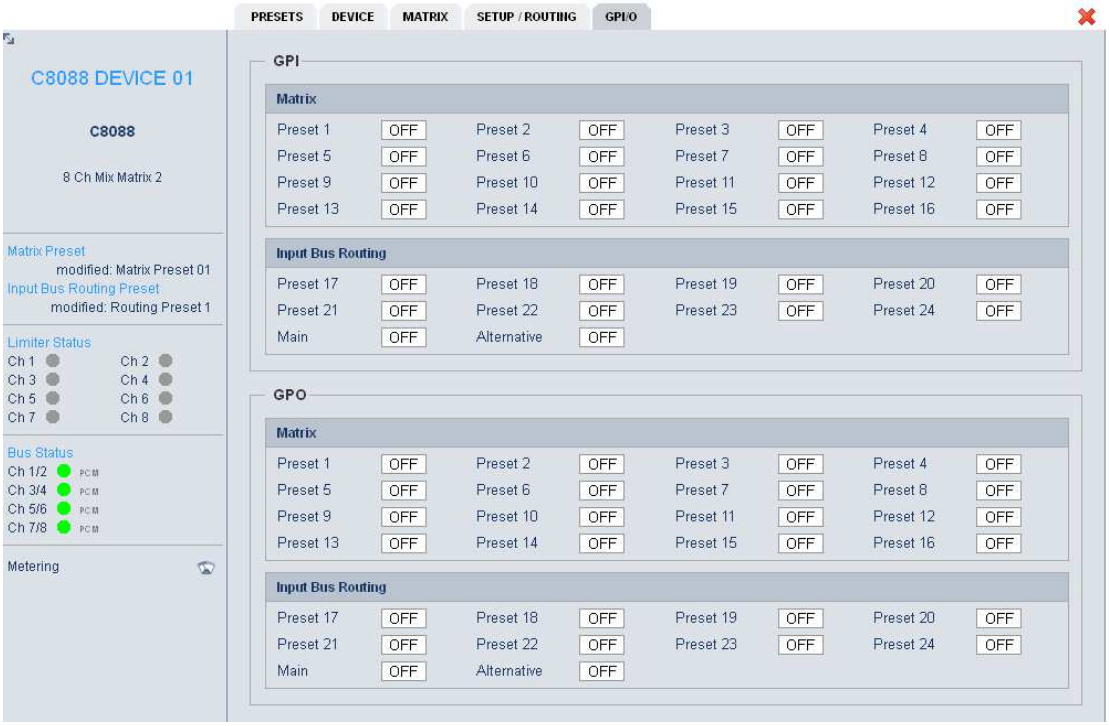
the mix matrix can either operate in **On-line** or **Off-line** mode.
If in **On-line** mode all settings will be sent immediately to the module.
If in **Off-line** mode you may change several settings and send it as a whole to the module by pressing **<APPLY>**.
If in **Off-line** mode you may use the **<REFRESH>** button to gather an updated display of the settings of the mix matrix.

Bar graph meter

when you click on the **Metering** symbol  either in the status display or on the module graphic in **OVERVIEW** the browser will launch a **Java** applet that shows the meter bar graphs of the **8088** :



GPI/O



GPIs are useful if you want to recall settings remotely (e.g. by presets). The C8k frame can handle **127** different **GPIs**. You must assign a unique number to the respective function. Such numbers will be generated by the **brc8x** Broadcast Remote Controller or by a **GPI/O** interface module. If the **C8088** receives such a number via the CAN bus, it will load the respective preset for example.
An external entity may load such presets as well by use of the EmBER+ protocol (see frame controller manual).

GPOs (Tallies) may signal the status of a module. It may be tally lights of the brc8 or relays of a GPI/O module. If an event occurs the **C8088** puts the assigned number on the CAN bus so a C8817 **GPI/O** module may turn on a relay or the **brc8x** may turn on a button LEDs
(see brc8 and C8817 manuals for details).