DHD

Digital Mixing and Routing System

RM4200D

— Manual —

Part 1

System Overview and Module List

Latest Revision: August 30th, 2005

Contents

I. System Overview

About this Book

This volume of the RM4200D manual contains the following information:

1. An overview about the key features and the main applications of the system (including examples).
2. The basic design principles of the system.
3. A list of the currently available modules and other parts of the RM4200D.
4. A list of other accessories and services offered to DHD customers.

This manual is for you if you want to learn about “ The Big Picture” of the RM4200D system and if you want to know what modules are available. If you already know the RM4200D system and need to look up some product information quickly, you may skip the first text part and use the lists in the second half for quick reference.

This book was last changed on August, 30th 2005.

1. Applications

1.1 Key Features

The Digital Audio Mixing and Routing System RM4200D is especially designed for applications in Broadcasting. It has been designed from the ground up to be a reliable and easy to use tool for a broad range of users. No matter if journalists in self operating studios or engineers in complex control rooms or OB vans are using the RM4200D – they will find that it lets them concentrate on the job at hand without having to worry about operating the equipment.

The RM4200D is a highly modular system with versatile hard- and software options. Its powerful Audio Engine and its flexible Control Engine are fully configurable with an easy to use configuration software. Thus, the system can be adapted to many different applications without sacrifying reliability and ease of use.

It can equally be used for:

- On Air and Continuity studios; both for self operation or control room operation, with one ore more studios.
- Routing, networking, On Air switching and talk-back applications.
- Pre production units for newsrooms, recording, editing, video post production, dubbing.
- OB-Van and other field applications.

The RM4200D uses a high-performance Audio Engine with enough capacity for routing and processing many channels even in complex situations. A fully configured RM4200D system provides the following audio resources:

- 48 stereo summing buses.
- 768 internal routing channels.
- Up to 192 discrete input channels and 192 discrete output channels, either analog or digital.
- Up to 6 MADI ports, depending on the actual configuration of the system. Each MADI port can use 64 input channels and 64 output channels simultaneously.

If desired, the RM4200D can provide both input microphone processing as well as output processing for the On Air signal. Therefore there is no need for separate outboard gear any more.

A very powerful clean feed system provides up to 30 clean feeds with additional functions like talk back, pre fader conference mode (preperation mode) and flexible output routing.

The RM4200D is the first digital audio mixer of this class where the internal signal processing uses 32bit Floating Point DSPs (Analog Devices SHARCs). Internal over modulations sometimes occurring in devices with fixed point processors are almost impossible, since the available dynamics range is greater than 1000 dB(!).

All digital inputs use asynchronous sample rate converters. Thus, digital consumer devices and non-synchronizable professional devices can be digitally connected to the system.

The RM4200D uses a special real-time operation system running on several micro controllers. There is no PC-based system inside and it works completely without any PC.

The configuration software runs on standard Windows(TM) based PCs. However, this PC is not needed to run the RM4200D from day to day – it is only needed for setting it up.

1.2 Mixer Applications

A RM4200D mixer consists of two main parts, which are coupled via an industry standard CAN-bus connection (see figure 1-1). These parts are:

- *The DSP Frame.*This unit includes all input and output modules, the DSP Audio Engine, the Control Engine and the power supply.
- *The Mixing Console.*This is the user interface of the mixer with all faders, control knobs, push buttons and displays.

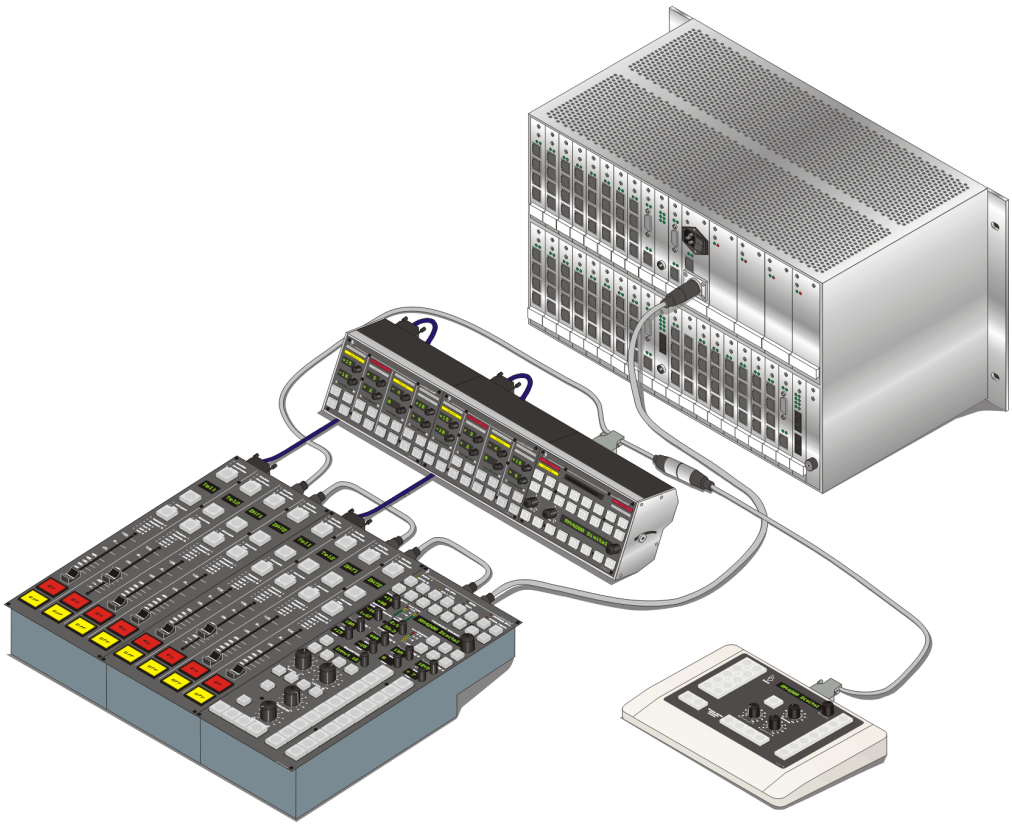


Figure 1-1: DSP-Frame, Control Desk and Studio Panel coupled via CAN-Bus.

The mixing console has a modular design, which allows to combine different modules for different applications. All modules are linked to each other and to the DSP frame via CAN-bus cables. Modules can be located apart from each other, as long as the specifications for cable length and power supply are met. The total length of all CAN-bus cables may reach up to 60 meters.

There are two basic kinds of control modules – those containing faders and those without faders. A single fader module contains four separate faders, up to 40 faders can be used together in one single mixing console. If desired, the fader modules can be ordered with motor faders.

Several different fader modules are available, so are several different control modules. Although looking different, they can all be used to access any control function in the system. However, the number of functions a module can access *simultaneously* differs, depending on the actual module.

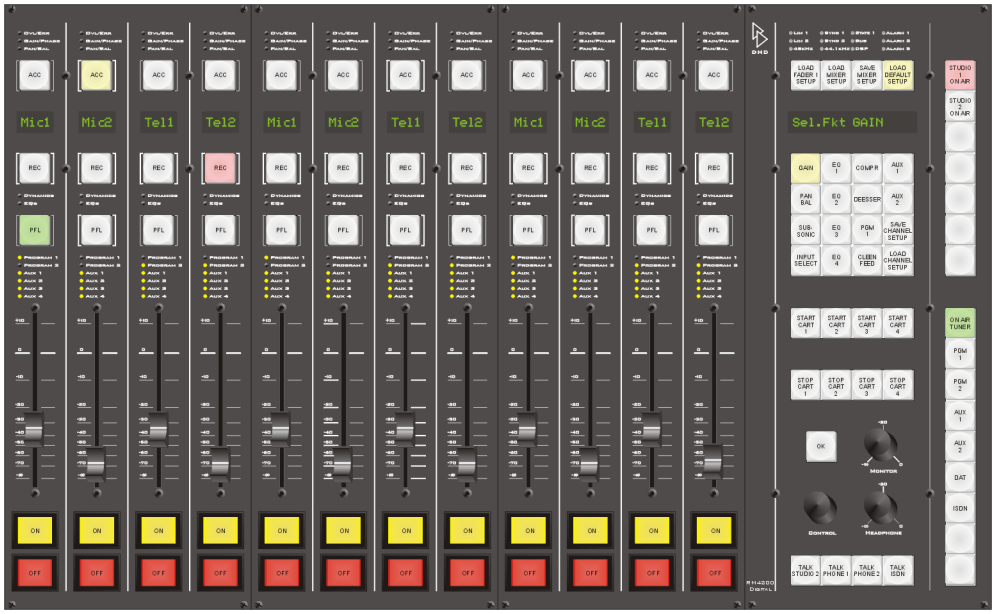


Figure 1-2: Typical Self Operating Desk Setup.

Almost all modules can be combined with each other in many possible combinations. This allows to “ tailor” a mixing console to your special needs — from simple self operation desks (figure 1-2) to full blown control room consoles with direct access to many functions (figure 1-3). However, as a user of a RM4200D system you are not limited to these traditional setups. Virtually any combination of control modules is possible. If your intended application has special requirements, please talk to your DHD sales representative.

Since all modules are coupled using CAN-bus cables, you can install them in your furniture at will instead of having the furniture built around a more traditional mixing desk. The installation depth for desk-mounted modules is only 72 mm.

The mechanical construction of all modules is designed to withstand 24/7 use. Sturdy components like Penny&Giles faders, Lumitas keys and Lexan foil covers on all front panels let the RM4200D perform for a long time.

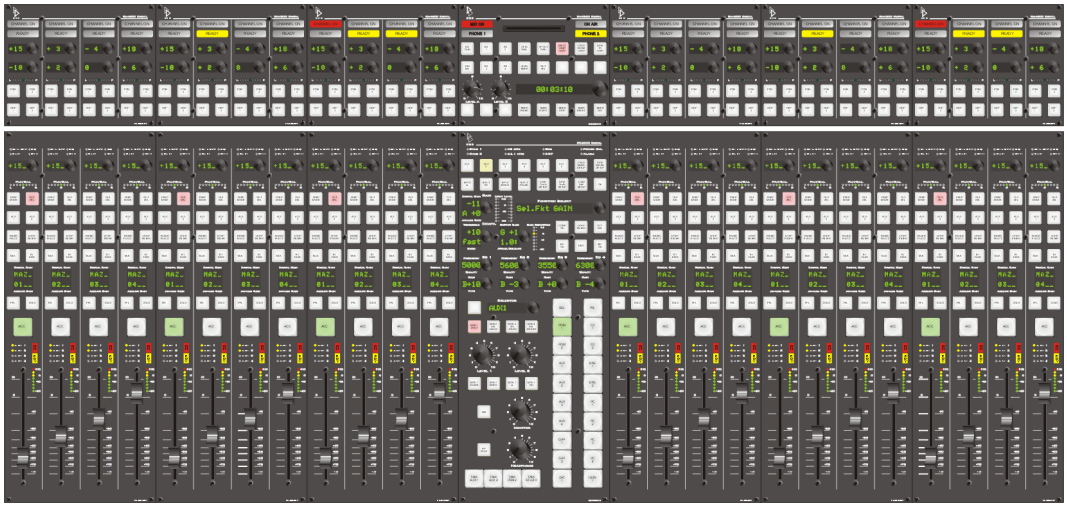


Figure 1-3: Typical Control Room Console Setup.

The typical functions for a RM4200D mixing console include (but are not limited to):

- Input routing, input processing, microphone processing and bus assignment.
- Monitoring, talkback, signalling and On Air switching.
- Providing clean feed/mix-minus signals and output routing.
- Recalling and saving user-defined setup data for microphone processing and overall mixer setup. Setups are stored in internal Flash memory or on chip cards.

With the RM4200D it is possible to control many functions not only from the control modules but from external systems as well. This is especially useful when integrating the RM4200D with playout and automation systems. These can be connected via a serial interface, Ethernet or GPIO ports.

Some possible applications of this feature include:

- Remote faderstart.
- Remote triggering of PFL controls from the playout system.
- Display of remaining time on top of currently open faders.

Of course there are many more applications possible. Please keep in mind, that the versatile design of the RM4200D might allow unconventional solutions to your problems, which often are not obvious. In these cases it pays off to consult the other parts of this documentation and to talk to your DHD sales representative. He might be able to help you to find the matching combination of RM4200D modules for your application.

1.3 Routing and Networking Applications

The RM4200D can be used as a modular, flexible and highly configurable routing system for small and medium-sized applications. Up to 768 input channels and 768 output channels can be routed *simultaneously*. Example routing applications for the RM4200D include:

- On Air switching.
- Clean feed routing.
- Split-programme operation.
- Conference and talk-back applications.

Additionally, DSP processing can be applied to any channel. Some typical DSP processing functions are:

- Input and output gain adjustment.
- Mono summing, limiter.
- FM processing and signal generator.

However, there is a trade-off between the number of available routing channels and the amount of processing in the system. Two basic configurations of the routing system are available and can be selected within the configuration software:

	Router - Mixer (half DSP processing)	Full Processing Mixer - Router
MADI input channels	384	192
Discrete analog or digital inputs	192	192
DSP processing channels	192	384
MADI output channels	384	192
Discrete analog or digital outputs	192	192

A RM4200D acting as a router system can be controlled from virtually any control module – depending on the actual application. It is possible to control the routing functions from control modules in the mixing console. A range of specially designed control panels is available as well. Thus, the router control can be adapted to different requirements – from simple X-Y operation to special integrated one-button solutions.

Figure 1-4: Control Panel with 16 LCD Push Buttons.

Optionally, routing can be controlled using the DHD Router Control Software package, which is available as a separate product. This software runs on a standard Windows PC connected to the RM4200D via a serial port or TCP/IP over Ethernet. The control protocol specifications of the RM4200D are available free of charge. This allows third party developers to integrate a RM4200D system into their system solutions. In fact, several vendors already integrated control functions for DHD systems into their products.

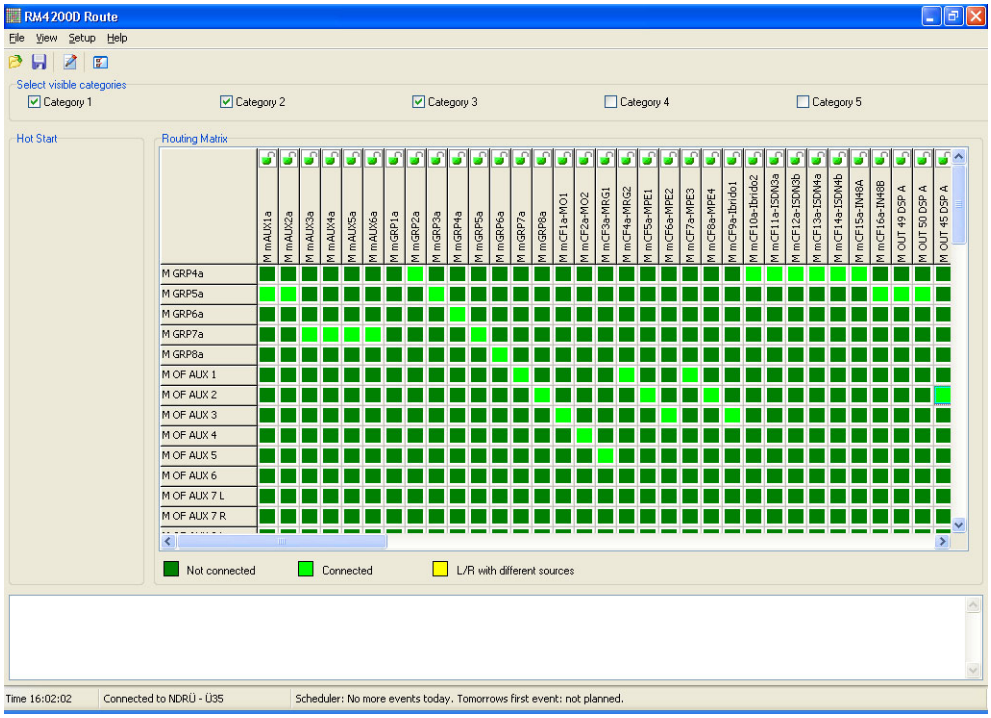


Figure 1-5: Router Control software.

1.4 Examples

The following examples illustrate typical applications of the RM4200D system. Of course, many more combinations of modules and functions are possible. If you need help to define your requirements for an RM4200D, please contact your local DHD partner.

Self-Operating Mixing Desk

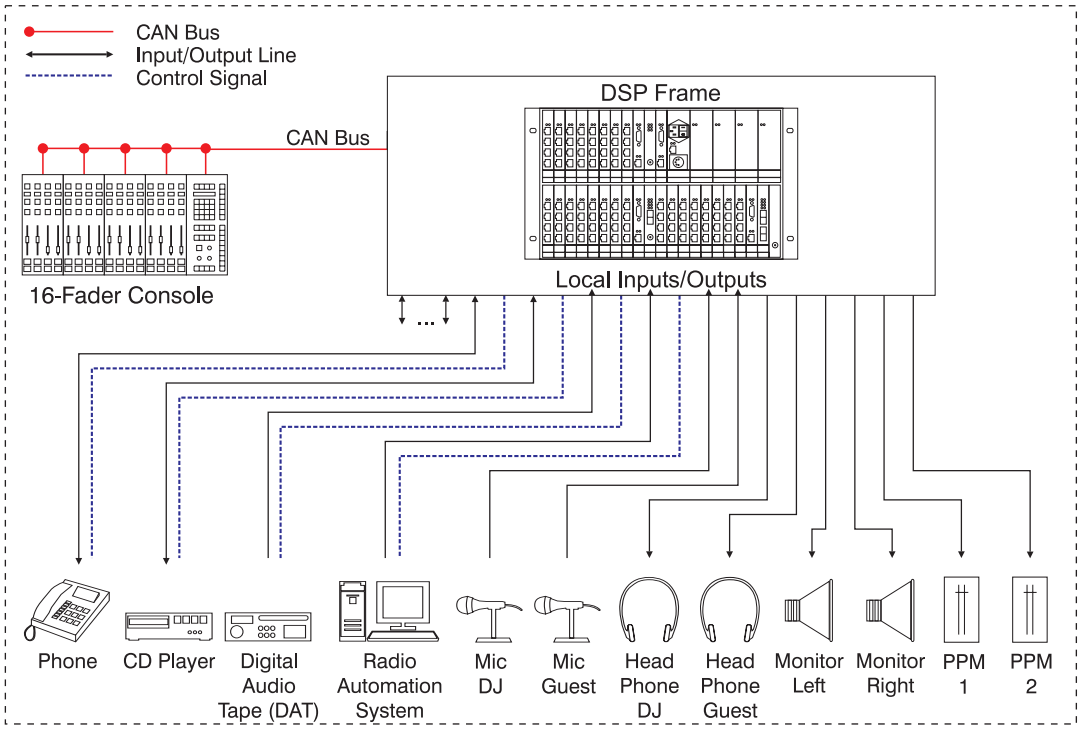


Figure 1-6: Self Operating Mixing Desk.

Self-Operating Control Room with Studio

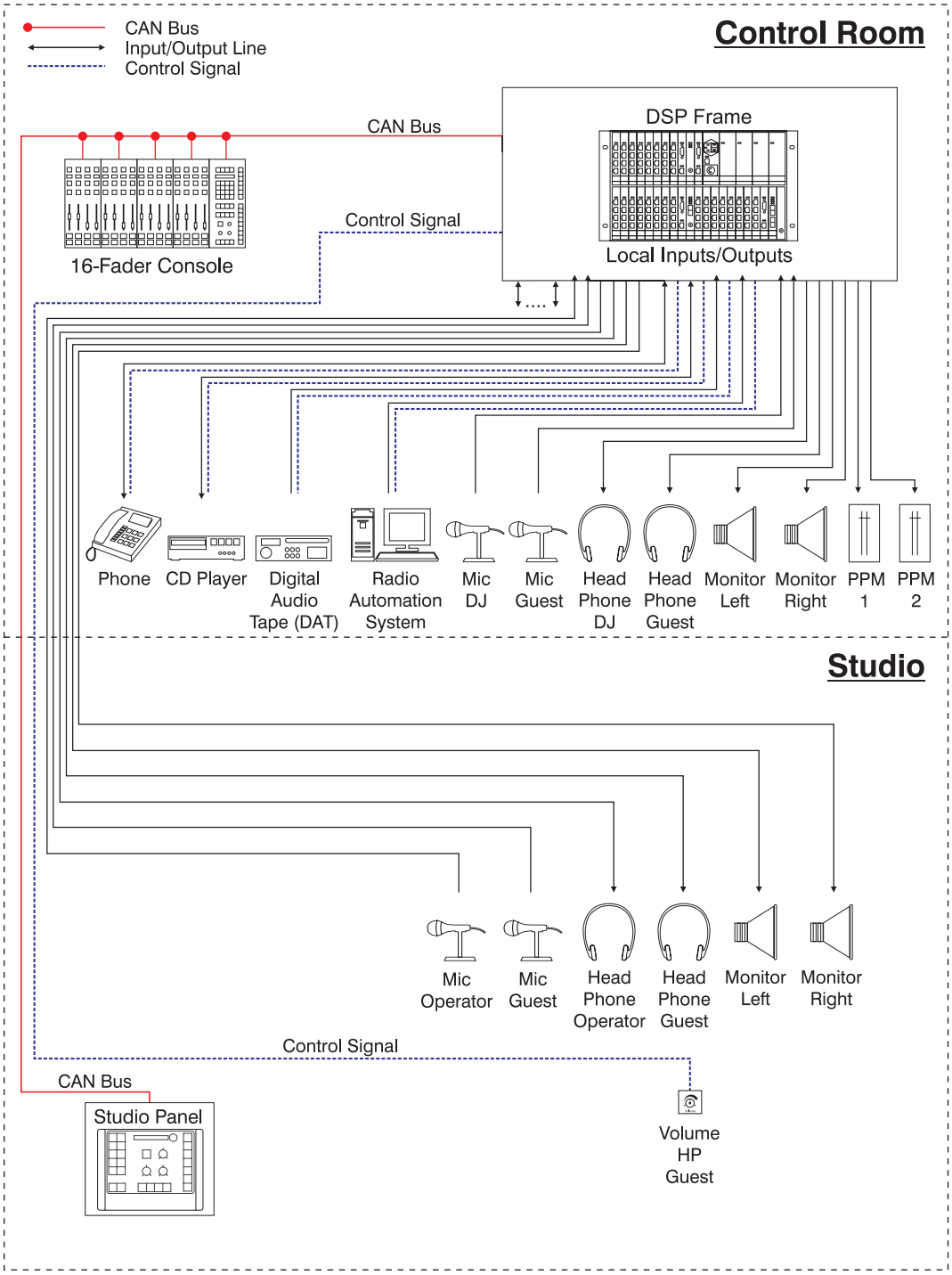


Figure 1-7: Self Operating Control Room with Studio.

Central Matrix linked to three Control Rooms

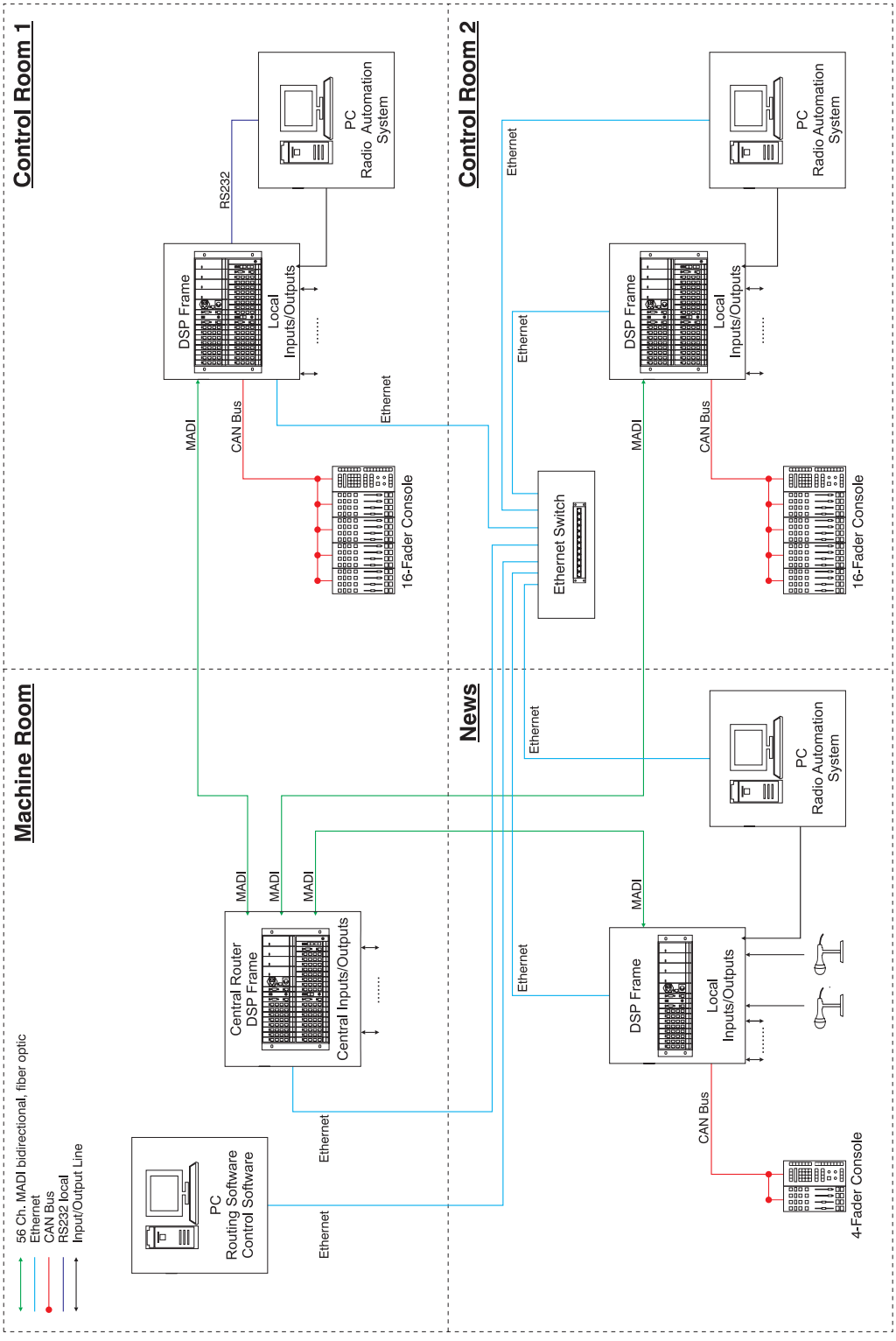


Figure 1-8: Central Matrix linked to three Control Rooms.

Large Routing Network Application

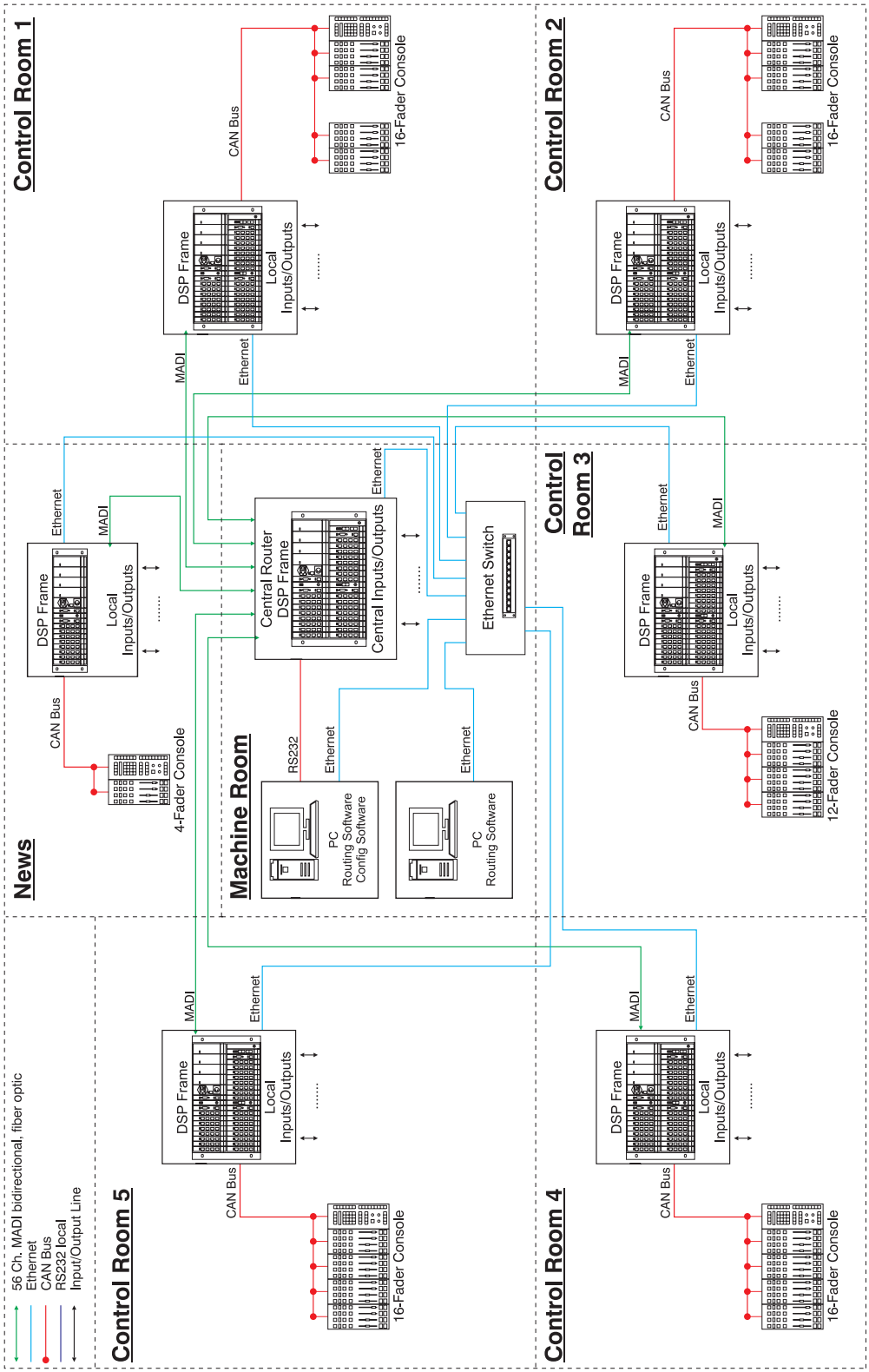


Figure 1-9: Large routing network application.

2. Principle of Operation

The RM4200D is based on a simple philosophy: The hardware modules provide a stable and powerful foundation for a special software, which in turn implements all the available functions of the system. At first this concept might be difficult to grasp, but once you understand it, a lot of things will become clear.

As an analogy, think of LEGO bricks. You can built lots of different things with them – only limited by number, size and shape of the bricks and your imagination. A RM4200D system is not as versatile as plastic bricks, but the general idea is similar: You connect a number of modules together and use *software* to configure the way the system works. This approach is the key element to the versatility of the system, because a RM4200D configuration is by no means final. It can be changed anytime, by anyone who knows how to do it. That way, a RM4200D can be adapted to changing requirements during its whole lifecycle. If you are refurbishing your studio and need to change its configuration – just do it. If you are buying more modules to extend your system, the software will easily integrate this new hardware. Of course you will always need a DSP frame and certain modules for signal input and output as well as for controlling the system. But *how* these modules work together can be changed anytime by software.

When the hardware of a RM4200D system is assembled at the factory, it is „blank“. A configuration file needs to be uploaded to the system to let it perform its tasks. What a such configuration looks like and what it does is determined by the requirements of the prospective users of a certain system. DHD and its partners assist in designing a matching configuration for the customers application. If desired, a RM4200D can be delivered without any configuration and the customer can use the included configuration software to adapt it to his requirements himself.

Please keep in mind, that configuring a RM4200D system is a step-by-step process. A configuration is designed using the configuration software and *than* upload to the system. After that, the system stays in the currently configured state until the upload process is repeated. The configuration software and the PC it is running on are not needed during normal operation of the system. This implies that the configuration *can not* be changed „on the fly“ during normal operation of the system.

Another consequence of the configuration process is the fact, that the RM4200D only does what it is told to do by the current configuration. If the system shall perform a certain function, it *must* be configured to do so. During configuration there are already many high-level functions available to choose from. Additionally, more complex functions can be build from within the configuration software for special applications.

Since there are so many configuration options available to choose from, it pays off to invest some time into thinking about the requirements of the desired application. If these requirements are clear, it is a good idea to discuss them with your DHD partner. He will help you to find the matching solution for your application.

If you are planning to purchase a RM4200D for the first time, you might be uncertain about the right configuration for your requirements. As a start, think about the following things:

- The number and kind (analog, microphone, digital, MADI) of the desired inputs and outputs.
- The number and kind of faders and control modules you need.
- The special functions you require for monitoring, talk-back, routing and On Air

switching.

- The number of buses and clean feeds.
- The functions you need for signalling and integration with other systems.
- Will you need more than one RM4200D? If yes, how will they be networked with each other?
- Do you require a central router or On Air switcher?
- How are you planning to install the modules mechanically?

With the help of this list DHD and its partners will be able to select the right hardware modules and the matching software configuration for you application. In case your requirements should change later on, the RM4200D can easily be adapted – during its full lifecycle.

With a RM4200D there is no need to design customer-specific firmware. However, DHD values the feedback of its partners and customers on its products. If there is growing demand for a special feature or function, DHD will of course consider this during its ongoing development efforts.

2.1 Overview

The basic structure of a RM4200D system is shown in figure 1-10 . There are three main function units: the *Audio Engine*, the *Control Engine* and the *Control Modules*. Additionally, external systems can be connected to the Control Engine.

Basically, the RM4200D works like this:

The Audio Engine provides the signal processing for all audio signals. It is connected to the audio inputs and outputs – no matter if they are analog, digital or multi channel MADI ports. The audio processing itself is done by several DSPs, which in turn are controlled by the Control Engine. It consists of several micro controllers, which handle all communication to and from the control modules and external systems.The Control Engine constantly reads all incoming data on its inputs. Depending on the configuration, it acts on these events.

As an example, if a fader is moved on a control module, it transmits this event to the Control Engine. The microcontroller in this engine reads the configuration and determines, which audio channel should be affected. After that, a control command is sent to the corresponding DSP processing unit. The signal gain is changed accordingly.

Of course this is a very simple example, in reality much more complex combinations of control functions and audio processing are used.

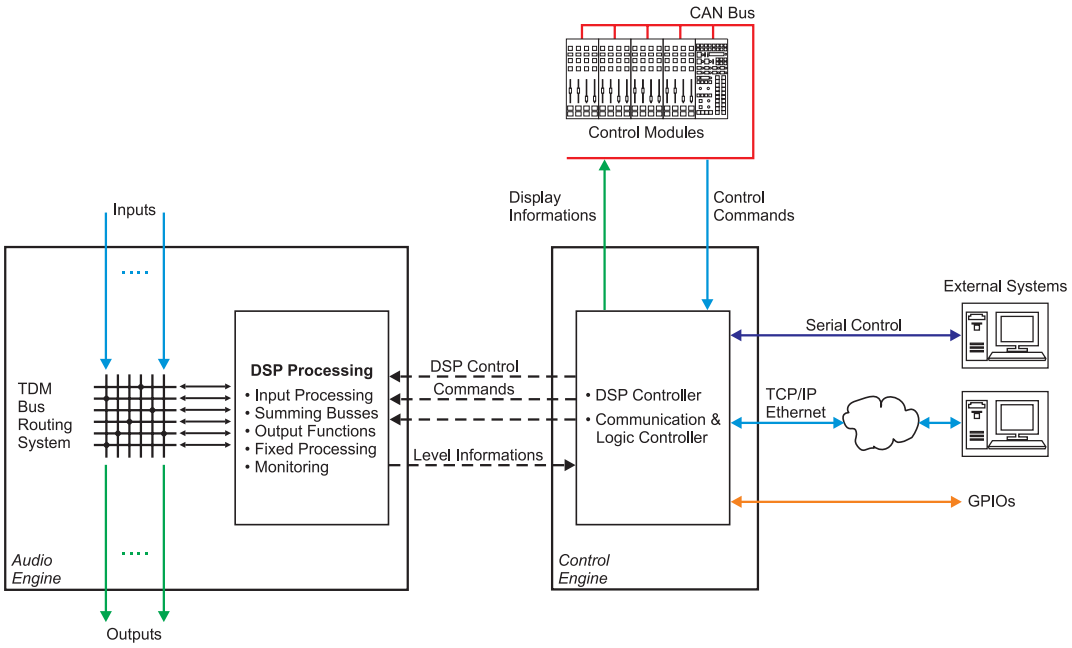


Figure 1-10: Basic structure of a RM4200D.

Audio Engine

The Audio Engine of the RM4200D is based on several high-performance DSP systems (SHARC chips from Analog Devices). They are connected to all available input and output channels and provide the necessary processing for all audio signals. Since the internal design of the system is so flexible, the Audio Engine can perform router functions and processing functions simultaneously. The way routing and processing work is determined from the current configuration. If it needs to be changed, this can easily be done using the configuration software.

It is important to know, that *all audio signals in the system are available on the internal bus simultaneously*. This applies to all input signals as well as to the results of all internal DSP processing functions. Thus, the output of any processing function can be used as input for one ore more other processing functions. The output signals of these functions are available on the internal bus system again, and so on. Additionally, any physical output port (analog, digital or MADI channel) can be configured to carry any audio signal in the system without restrictions. This approach allows for the design of very powerful signal routing and processing functions. If configured, the parameters of DSP functions can be controlled by the Control Engine. The other way round the Audio Engine can send up-to-date audio level information as input events to the Control Engine.

Control Engine

The Control Engine handles all communication between Audio Engine, control modules and external systems. It constantly monitors all control inputs – buttons, fader movements, GPIOs, external protocol commands and level information – and reacts according to its configuration. In most cases, this reaction is sending a command to the Audio Engine. However, switching on status indicators or triggering GPIO outputs are typical reactions of the Control Engine, too.

As an example, if the PFL button is pressed on a fader module, the Control Engine tells the Audio Engine to route the appropriate signal to the output port that is

connected to the headphones. At the same time, the little lamp within the PFL key is switched on to give visual feedback. This is a very basic example, in real-life applications the Control Engine can perform much more complex tasks. However, to make configuration easier, several high-level control functions are available to be used „out-of-the-box“. Additionally, special or more complex functions can be designed using the configuration software. The Control Engine treats all available inputs and outputs equally. Thus, the system is very versatile and can be adapted to the given application.

If external systems need to be integrated with a RM4200D, the Control Engine provides the necessary infrastructure. All available GPIO signals can trigger functions within the system (for inputs) and can transport signals into external systems (for outputs). Additionally, external systems can connect via the serial port or via ethernet to the RM4200D. Using the DHD Control Protocol, they can be configured to fully integrate with the Control Engine – both as source and destination of control commands.

Control Modules

The control modules are the interface between the user and the functions of the RM4200D. Many different control modules are available, each of them providing its own set of features. For instance, there are fader modules which include status displays for a single channel. Main control modules with many keys are used for monitor switching, routing and other applications, where the user needs to push buttons. Overbridge modules can be used to extend the direct access to the parameters of an audio channel and so on. For a comprehensive list of all available modules, please see the lists in this manual.

All control modules have in common that they consist of control elements – such as faders, buttons, rotary knobs – and status indicators. These are LEDs inside the buttons or alphanumeric displays for text. Additionally, some modules display level information using LED meters. Some typical applications for displaying information to the user are:

- LEDs show the active bus assignment for a given channel.
- A small alphanumeric display shows, which input signal is selected for a given channel.
- A larger alphanumeric display on the main module gives feedback to the user when he changes the parameters for audio processing functions.
- LEDs inside the push buttons are switched on or off to indicate the state of the button.

All control modules are tightly integrated with the Control Engine. It collects all events from the faders, rotary knobs and buttons and sends back the information into the status indicators and displays. Using the configuration software, the functions of all control elements and status displays can be defined according to the given application of the RM4200D. As with the Audio Engine, this configuration can be changed anytime, if desired.

To make configuration easier, the software allows to print out labels for the buttons of the control modules. These labels are slid under the key caps. If necessary, they can be changed again later to reflect changes in the configuration of the system. Additionally, special control modules containing push buttons with built-in alphanumeric LCD displays are available. They are mainly used for routing or other switching applications.

Connection to External Systems

Connecting a RM4200D to external devices is not difficult. The system provides access to its Control Engine via serial connection, TCP/IP and UDP over ethernet and via traditional GPIO ports. It is important to know, that all communication from and to external systems as well as all communication to and from the control modules are treated equally. Therefore, it makes no difference if for instance a command to the Audio Engine is triggered by the user pushing a button on a fader module or by an automation system sending a command sequence into the Control Engine. If the GPIO ports are used, their outputs can carry any output from the Control Engine and their inputs can be used to trigger any function within the Control Engine. If the serial ports or the ethernet connection are used, all commands and status information are encapsulated in the DHD control protocol. The specification of this protocol is available free of charge and allows interested vendors to integrate their products with the RM4200D.

All inputs and outputs of the Control Engine are available transparently to external systems. That way, it is possible to integrate the RM4200D with almost any other product, even in more complex studio installations. Again, the configuration software is used to set up the desired functions for the given application.

2.2 Example

To illustrate the philosophy of the RM4200D system, we will use a common example: The configuration of a fader channel and the way an audio signal may typically take through the system. Please note that the following description gives only a very simplified overview. How things are done in detail is explained in the reference part of this manual.

Setting up a fader channel is done completely within the configuration software. A fader channel can use the following functions:

- *Input Routing.* A fader channel always carries the signal of *one* audio input at the time. If a certain audio input port is assigned to one particular fader only, it is called a *fixed fader channel.* However, any fader channel can be configured to allow the user to select one of *several* input channels. To achieve this, a *pool of inputs* is defined in the configuration software. Thus, one ore more physical faders are assigned to this pool. Any fader belonging to the pool can now be used to access any input signal from the pool. These faders are called *pool faders*. To change the selected input for a fader, the user presses the **Access** button on the fader channel and rotates the **Main Function Selector** to pick the desired channel. Please note, that a channel from the pool can only be routed to one fader at the time – not to two faders simultaneously.
- *Input Processing.* Every input channel can provide processing for its signal. Available processings are equalizer, limiter, compressor, expander, noise gate, subsonic filter and others. Up to four equalizers can be cascaded if desired. All input processing is configured from the software, but all parameters for the processing can be changed using the controls on the mixer console. Please note, that the parameters for the processing stay with each input channel, no matter if it is currently linked to a fader channel or not. The total amount of processing available to all channels depends on the available DSP resources. However, in a typical RM4200D application, these resources are plenty.
- *Bus Assignment for summing, monitor and Aux buses.* Any channel can be configured to have its signal routed to one or more different buses for summing, monitoring and Aux bus processing.

- *Clean feed (mix-minus) and talkback setup.* Any input channel can be defined to provide a clean feed signal (sometimes also called mix-minus signal). This signal is available on the TDM bus an can be used for custom talk-back applications.
- *Logic Function definition.* The configuration software allows to define logic functions for any input channel. A typical example would be to switch on an On Air lamp when a microphone fader is opened. However, much more sophisticated function are possible using the RM4200D Control Engine. Using GPOs, a fader start can trigger events to external systems – like the remote start of a DAT machine. If desired, a LED in a push button of a control module can be defined to signal any condition from the Control Engine, not just **“** Fader On**”** and **“** PFL Active**”** for the given fader channel.

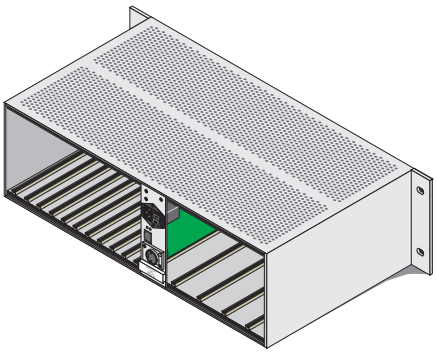
Now that the fader channel is configured properly, its signal is available on the TDM bus. The Control Engine affects the Audio Engine using *Output Functions*. This is a simple, yet powerful concept, that allows any logic condition to affect any desired audio signal in a predetermined way. It is explained in detail in the reference volume of this manual.

Finally, the audio signals on the TDM bus must be routed to physical output ports. Any audio signal on the TDM bus can be routed to one (and only one) output port. If desired, the signal can be processed once again before leaving the RM4200D system. This is called *Fixed Processing*. Typically this includes compressing, limiting and other sound improvement of the On Air signal.

3. List of Modules

3.1 RM4200D DSP Frame

RM420-061 DSP Frame 3U/19“, empty



passive DSP backplane, 10 slots for:

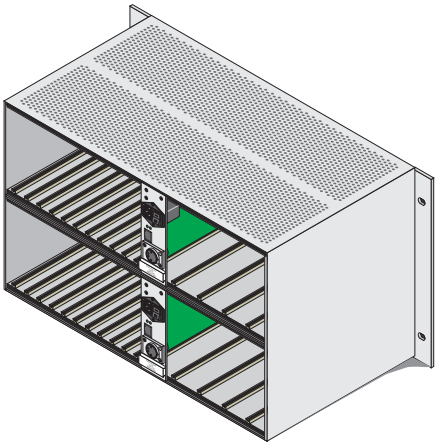
- 8 audio/GPIO modules
- 1 DSP controller module
- 1 DSP module or DSP/MADI module

passive mains backplane, 5 slots for:

- 1 communication controller module
- 4 power supplies 24V or 5V

Figure 1-11: RM420-061

RM420-062 DSP Frame 6U/19“, empty



dual mains power inlet, 20 slots for:

- 16 audio/GPIO modules
- 2 DSP controller modules
- 2 DSP modules or DSP/MADI modules

passive mains backplanes, 9 slots for:

- 1 communication controller module
- 2 x 4 power supplies 24V or 5V

Figure 1-12: RM420-062

RM420-063 DSP Frame 6U/19“, empty

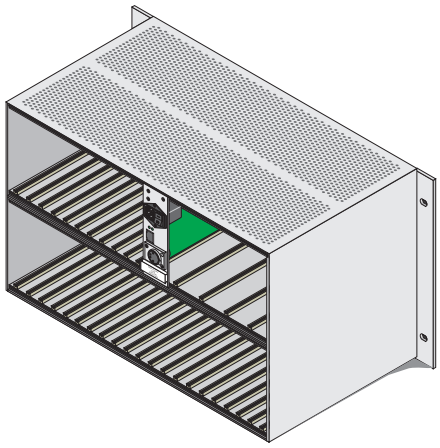


Figure 1-13: RM420-063

passive DSP backplane, 30 slots for:

- 24 audio/GPIO modules
- 3 DSP controller modules
- 3 DSP modules or DSP/MADI modules

passive mains backplane, 5 slots for:

- 1 communication controller module
- 4 power supplies 24V or 5V

RM420-064 DSP Frame 9U/19“, empty

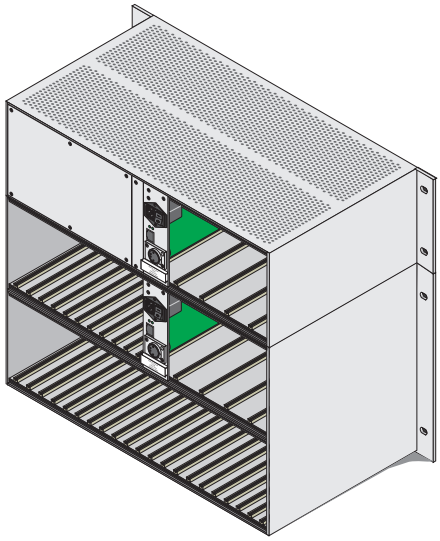


Figure 1-14: RM420-064

dual mains power inlet, 30 slots for:

- 24 audio/GPIO modules
- 3 DSP controller modules
- 3 DSP modules or DSP/MADI modules

passive mains backplanes, 9 slots for:

- 1 communication controller module
- 2 x 4 power supplies 24V or 5V

RM420-081 Power Supply Frame 3U/19“, empty

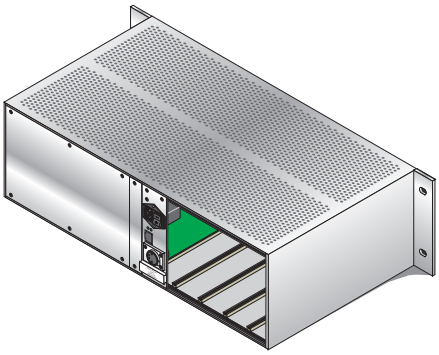


Figure 1-15: RM420-081

- for large consoles or long distances to DSP Frame
- 4 slots for 24V power supplies (RM420-084 not included!)
- CAN bus/ 24V XLR connector to console
- CAN bus RJ45 connector to DSP Frame

RM420-086 Power Supply Frame 3U/19“, empty

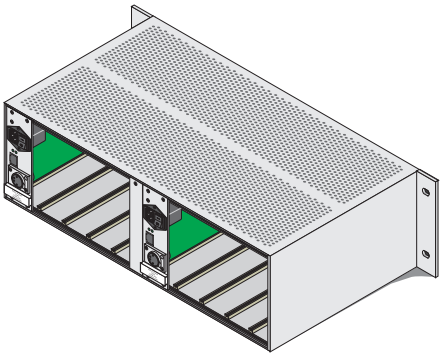


Figure 1-16: RM420-086

- for large consoles or long distances to DSP Frame, dual mains power inlet
- 2 x 4 slots for 24V power supplies (RM420-084 not included!)
- CAN bus/ 24V XLR connector to console
- CAN bus RJ45 connector to DSP Frame

RM420-083 Power Supply 5V/75W, PFC

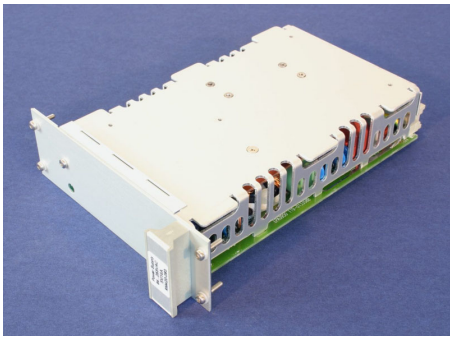


Figure 1-17: RM420-083

- suitable for redundant operation
- current share operation
- range: 94V to 253V AC, 47 to 63Hz
- necessary for operation of DSP Frame modules
- power factor >0.98
- **Do not combine with RM420-085!**

RM420-084 Power Supply 24V/75W, PFC

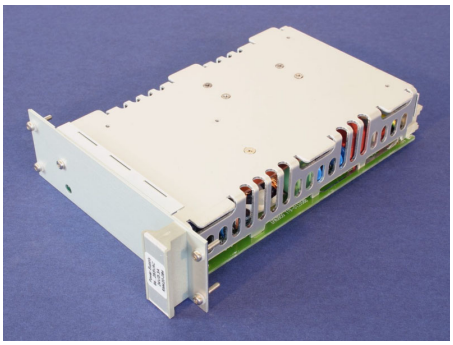


Figure 1-18: RM420-084

- suitable for redundant operation
- current share operation
- range: 94V to 253V AC, 47 to 63Hz
- necessary for operation of console
- power factor >0.98
- **Do not combine with RM420-082!**

RM420-850 Communication Controller

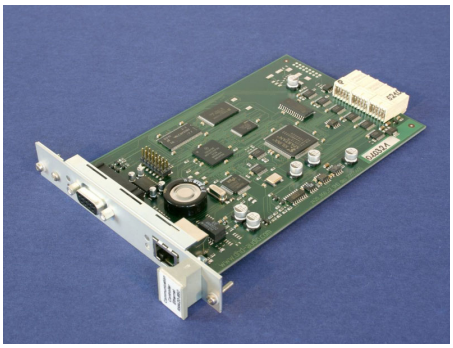


Figure 1-19: RM420-850

- 100baseTX Ethernet on RJ45
- RS232 on SubD-9 connector
- CAN bus
- provides logic functions and setup memory
- 1 module necessary for each RM4200D DSP Frame!

RM420-851 DSP Controller

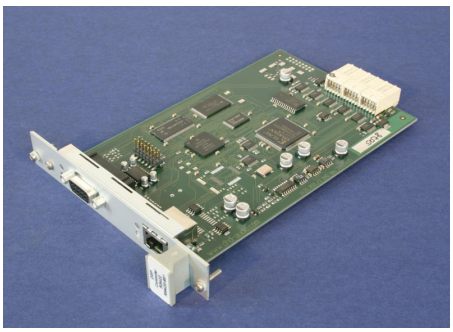


Figure 1-20: RM420-851

- RS232 on SubD-9 connector
- CAN bus
- 1 module necessary for each RM420-848 module!
- operates on slots 9, 19, 29

RM420-848L DSP Module, simple function

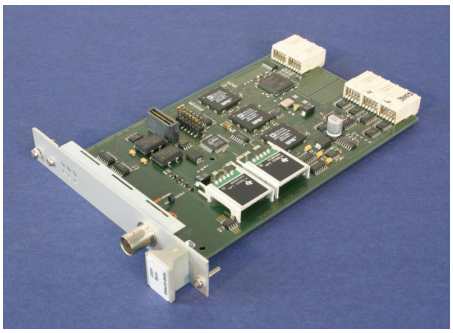


Figure 1-21: RM420-848L

- without submodule support and reduced routing channels
- mixed operation with RM420-848M in one DSP Frame **not supported**
- operates on slots 10 and 20
- operation on slot 30 **not supported**
- 48kHz or 44.1kHz internal clock

RM420-848M DSP Module, full function

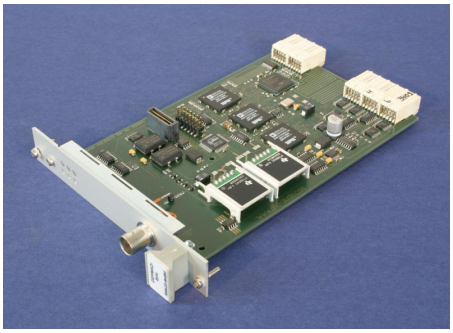


Figure 1-22: RM420-848M

- with submodule support and full routing capabilities
- mixed operation with RM420-848L in one DSP Frame **not supported**
- 1 socket for DHD Submodules
- operates on slots 10, 20, 30
- 48kHz or 44.1kHz internal clock

RM420-421S Single AES10 MADI Submodule

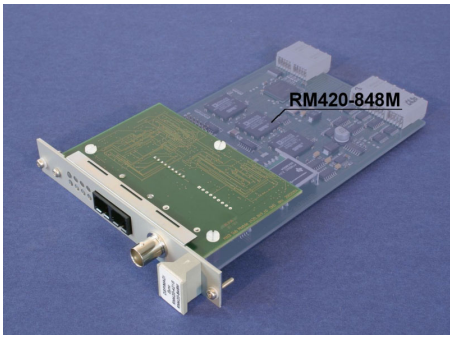


Figure 1-23: RM420-421S

- 56 or 64 input channels and
- 56 or 64 output channels
- submodule for RM420-848M
- fiberoptic receiver/transmitter
  - multimode, 50μm or 62.5μm, 1300nm
  - SC duplex connector
- BNC TTL wordclock in or out

RM420-422S Dual AES10 MADI Submodule

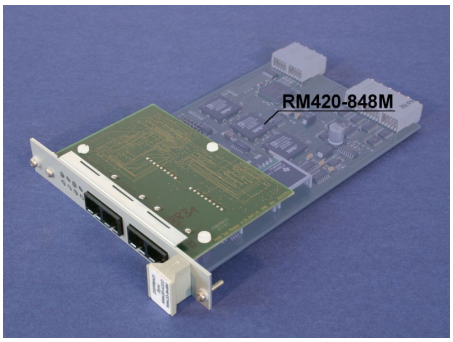


Figure 1-24: RM420-422S

- 2x 56 or 64 input channels and
- 2x 56 or 64 output channels
- submodule for RM420-848M
- fiberoptic receiver/transmitter
  - multimode, 50μm or 62.5μm, 1300nm,
  - 2x SC duplex connector
- dual or redundant MADI configurable

RM420-424S Delay Submodule,2 to 64 channels

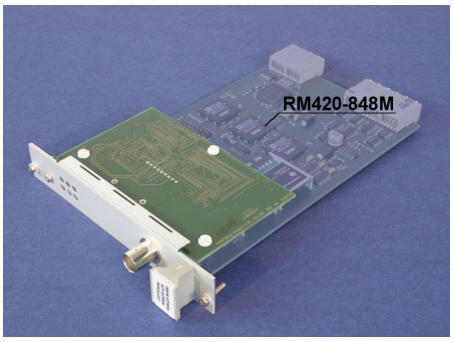


Figure 1-25: RM420-424S

- adjustable delay, number of channels selectable (2, 4, 8, 16, 32, 64)
- 2 channels, each up to 21,8sec
- 16 channels, each up to 2,7sec
- 64 channels, each up to 0,7sec
- submodule for RM420-848M

RM420-111 Digital In/Out/GPIO Module,8 ch.

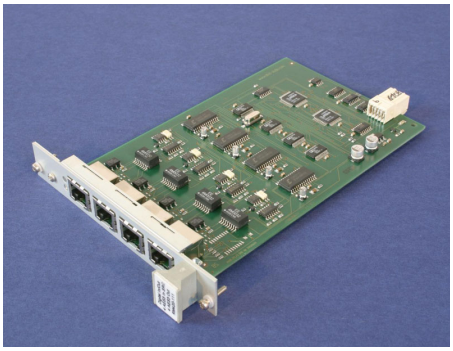


Figure 1-26: RM420-111

- 4 RJ45 connectors
- 4 AES3/EBU/SPDIF inputs
- 4 AES3/EBU/SPDIF outputs
- 4 async. sample rate converters
- 4 general purpose inputs, isolated
- 4 general purpose outputs, isolated

RM420-122 Mic/Headphone/GPIO Module, 4 ch.

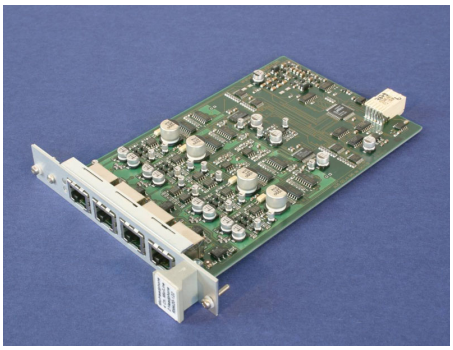


Figure 1-27: RM420-122

- 4 RJ45 Connectors
- 4 el. balanced Mic/Line inputs with preamplifier, level 18dBu max.
- phantom power 48V indiv. switchable
- 2 stereo headphone outputs
- 2 GPI, 4 GPO, 2 analog control in

RM420-123 Mic/Line/GPIO Module, 4 ch. iso.

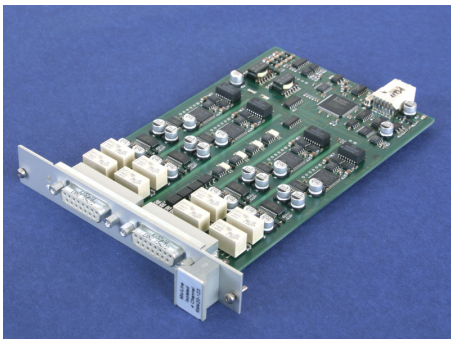


Figure 1-28: RM420-123

- 2 SubD-15 Connectors
- 4 balanced Mic/Line inputs with preamplifier, level 18dBu max.
- phantom power 48V indiv. switchable
- isolated input stages
- 4 GPI, 4 GPO

RM420-222 Analog In/Out/GPIO Module, 4 ch.

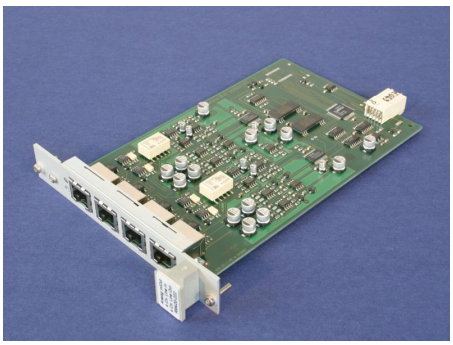


Figure 1-29: RM420-222

- 4 RJ45 connectors
- 4 line inputs, el. bal., 18dBu max.
- 4 line outputs, el. bal., 18dBu max.
- 4 general purpose inputs, isolated
- 4 general purpose outputs, isolated

RM420-223 Analog In/Out/GPIO Module, 4 ch.

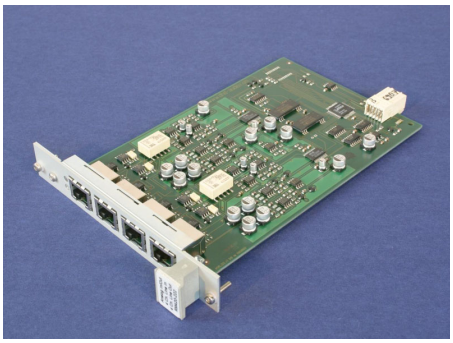


Figure 1-30: RM420-223

- 4 RJ45 connectors
- 4 line inputs, el. bal., 24dBu max.
- 4 line outputs, el. bal., 24dBu max.
- 4 general purpose inputs, isolated
- 4 general purpose outputs, isolated

RM420-311 GPIO Module, 12 Relays, 4 GPI

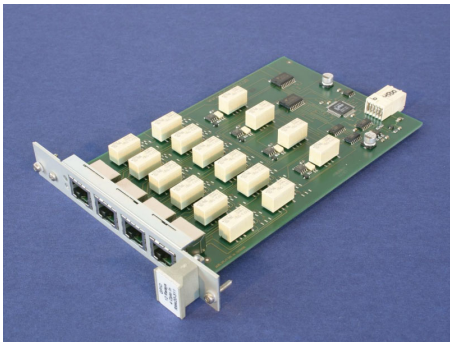


Figure 1-31: RM420-311

- 12 general purpose outputs, isolated with electro-mechanical relay
- max. current 1A, max. voltage 30V
- 4 general purpose inputs, isolated
- 4 RJ45 connectors

RM420-XLR-AA RJ45/XLR Adapter Panel 1U/19“

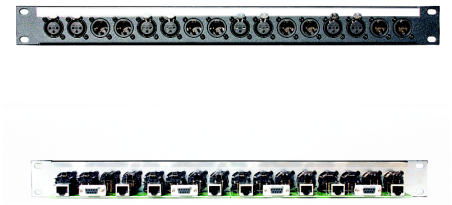


Figure 1-32: RM420-XLR_AA

- for 8 RJ45 connections to 2 analog modules
- 8 male XLR and 8 female XLR connectors stereo-paired
- 4 SubD-9 GPIO connectors on the rear
- 8 RJ45 connectors on the rear
- 8 CAT5 patch cables 1m included

RM420-XLR-DD RJ45/XLR Adapter Panel 1U/19“

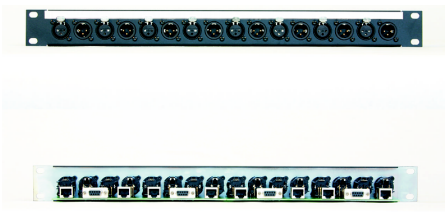


Figure 1-33: RM420-XLR-DD

- for 8 RJ45 connections to 2 digital modules
- 8 male XLR and 8 female XLR connectors on the front
- 4 SubD-9 GPIO connectors on the rear
- 8 RJ45 connectors on the rear
- 8 CAT5 patch cables 1m included

RM420-XLR-AD RJ45/XLR Adapter Panel 1U/19“

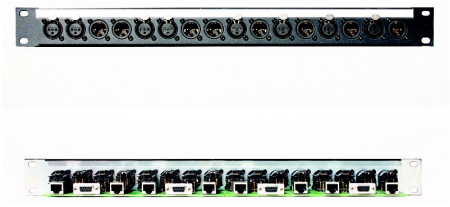


Figure 1-34: RM420-XLR-AD

- for 8 RJ45 connections to 1 analog and 1 digital module
- 8 male XLR and 8 female XLR connectors on the front
- 4 SubD-9 GPIO connectors on the rear
- 8 RJ45 connectors on the rear
- 8 CAT5 patch cables 1m included

RM420-XLR-TR-AA RJ45/XLR Adapter Panel 1U/19“

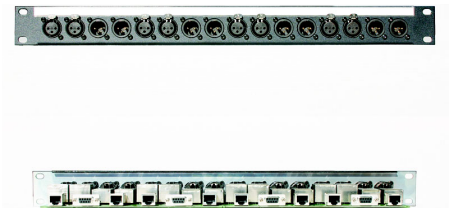


Figure 1-35: RM420-XLR-TR-AA

- for 8 RJ45 connections to 2 analog line level modules
- 8 male XLR and 8 female XLR connectors stereo-paired
- Lundahl Transformers LL2811, LL1545A
- 4 SubD-9 GPIO connectors on the rear
- 8 RJ45 connectors on the rear

3.2 RM4200D Control Modules

RM420-010 Main Module

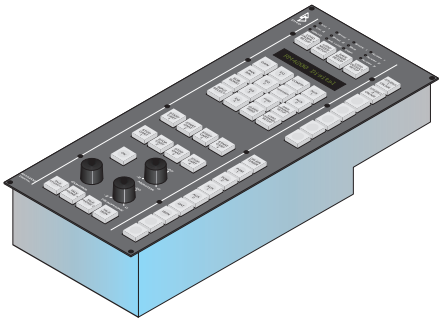


Figure 1-36: RM420-010

- 49 pushbuttons, 2 volume controls
- 1 rotary optical encoder
- 16-character ASCII LED display
- CAN bus, RS232
- 160mm x 399mm x 72mm

- *front panel colour RAL 7024 (graphite grey)*

RM420-011 Studio Panel

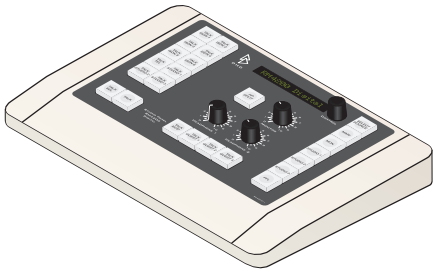


Figure 1-37: RM420-011

- for monitor selection, talk back etc.
- table-top device
- 24 pushbuttons, 3 volume controls, 1 rotary optical encoder
- CAN bus interface on SubD-15
- 300mm x 225mm x 62mm

- *front panel colour RAL 7024 (graphite grey), cabinet colour RAL 7035 (light grey)*

RM420-012 Central Module

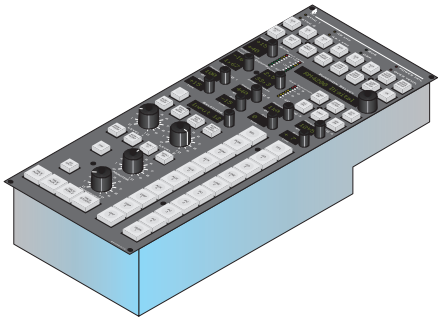


Figure 1-38: RM420-012

- 57 pushbuttons, 4 volume controls
- 12 rotary encoders, 1 optical enc.
- 20 4-character ASCII LED displays
- CAN bus, RS232
- 160mm x 399mmm x 72mm

- *front panel colour RAL 7024 (graphite grey)*

RM420-013 Central Overbridge Panel

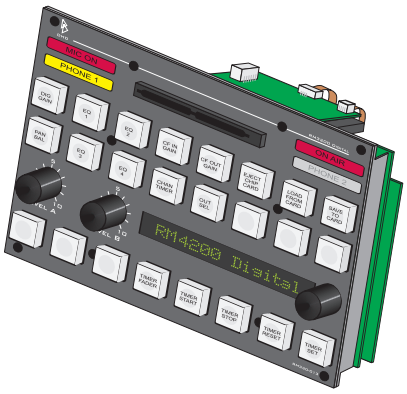


Figure 1-39: RM420-013

- 24 pushbuttons
- 2 volume controls
- 1 rotary optical encoder
- 16-character ASCII LED display
- chip card reader
- 2 chip cards 128kBit included

- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-013L Central Overbridge Panel

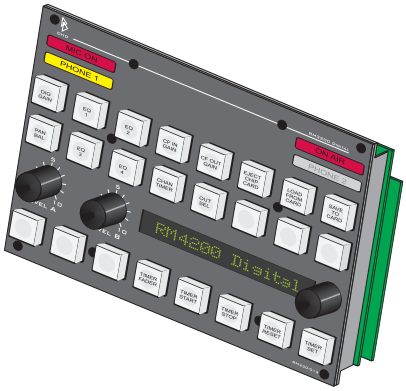


Figure 1-40: RM420-013L

- 24 pushbuttons
- 2 volume controls
- 1 rotary optical encoder
- 16-character ASCII LED display
- No chip card reader!

- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-014 Extended Central Module

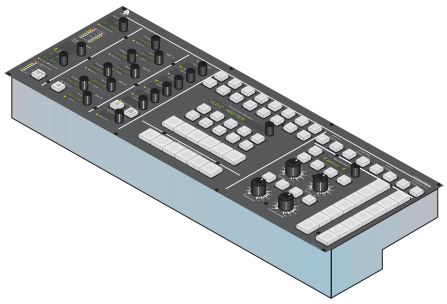


Figure 1-41: RM420-014

- 73 pushbuttons, 4 volume controls
- 20 rotary encoders
- 1 optical rotary encoder
- 27 4-character ASCII LED displays
- CAN bus, RS232
- 480mm x 206mm x 72mm

- *front panel colour RAL 7024 (graphite grey)*

Note: *Table-installation frame not included! Please order RM420-033-B.*

RM420-020 Fader Module

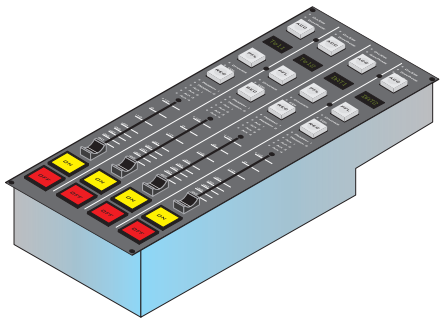


Figure 1-42: RM420-020

- 4 fader channels, each with:
  - 5 pushbuttons
  - 4-character ASCII LED display
  - 100mm P&G fader
- CAN bus, RS232
- expansion conn. for RM420-023/028
- 160mm x 399mm x 72mm

- *front panel colour RAL 7024 (graphite grey)*

RM420-020M Motor Fader Module

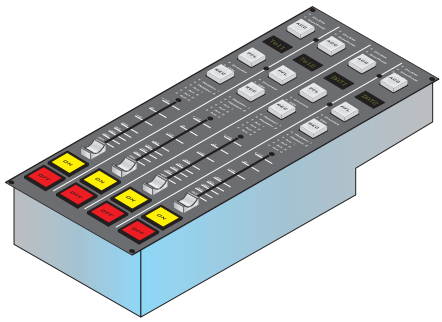


Figure 1-43: RM420-020M

- 4 fader channels, each with:
  - 5 pushbuttons
  - 4-character ASCII LED display
  - 100mm motorized P&G fader
  - touch sensitive knob, silver col.
- CAN bus, RS232, RM420-023/028 conn.
- 160mm x 399mm x 72mm

- *front panel colour RAL 7024 (graphite grey)*

RM420-023 Fader Overbridge Panel

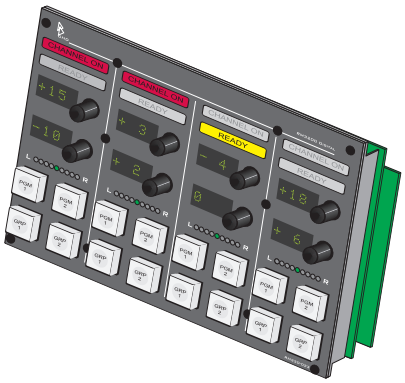


Figure 1-44: RM420-023

- 4 channels, each with:
  - 4 pushbuttons
  - 2 rotary encoders
  - 2 4-character LED displays
  - ON and READY LED displays
  - panorama/balance LED array
- for RM420-020 / RM420-029 extension
- *front panel colour RAL 7024 (graphite grey)*

Note: *The RM420-023 is identical with the RM330-023 and is labelled „RM330-023“ on the front panel!*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-025 40 Pushbutton Panel

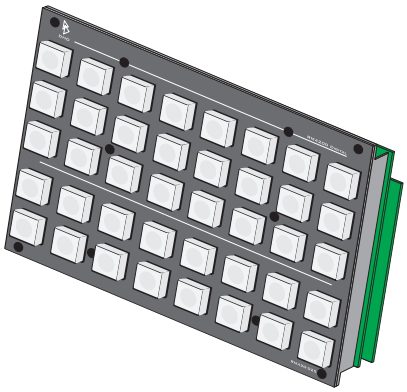


Figure 1-45: RM420-025

- for monitoring selection, routing and other control functions
- CAN bus on SubD-15 connectors
- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-026 32 Pushbutton Panel

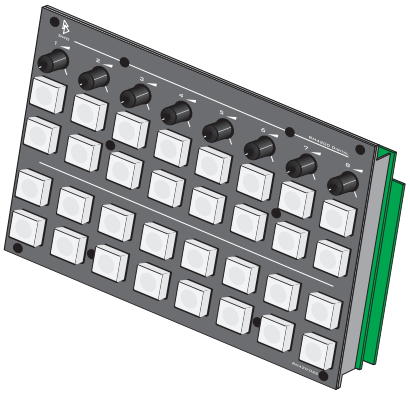


Figure 1-46: RM420-026

- for monitoring selection, routing and other control functions
- 8 potentiometers for monitor mix, Aux send level and other control functions
- CAN bus on SubD-15 connectors

- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-028 Extended Fader Overbridge Panel

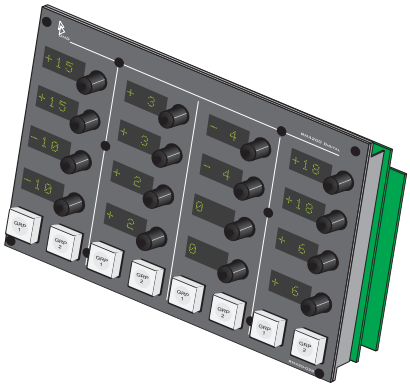


Figure 1-47: RM420-028

- 4 channels, each with:
  - 2 pushbuttons
  - 4 rotary encoders
  - 4 four-character LED displays
- for RM420-020 / RM420-029 extension

- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-029 Extended Fader Module

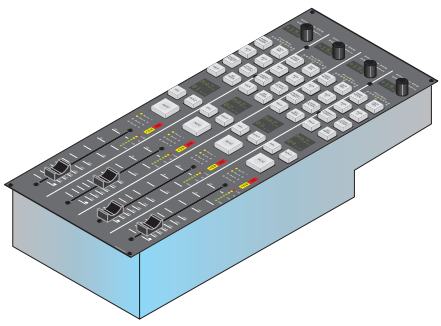


Figure 1-48: RM420-029

- 4 fader channels, each with:
  - 11 pushbuttons
  - 8-character ASCII LED display
  - 100mm P&G fader
  - 1 rotary control, 4-char. display
- CAN bus, RS232, RM420-023/028 conn.
- 160mm x 399mm x 72mm

- *front panel colour RAL 7024 (graphite grey)*

RM420-029B Extended Fader Module, PFL

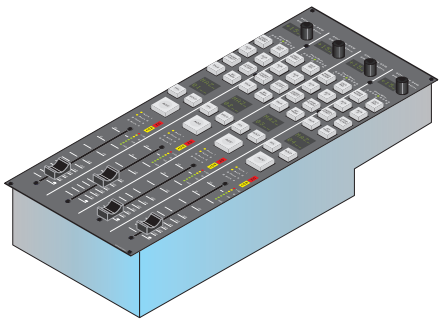


Figure 1-49: RM420-029B

- 4 fader channels, each with:
  - 11 pushbuttons
  - 8-character ASCII LED display
  - 100mm P&G fader **with PFL Back-press**
  - 1 rotary control, 4-char. display
- CAN bus, RS232, RM420-023/028 conn.
- 160mm x 399mm x 72mm
- *front panel colour RAL 7024 (graphite grey)*

RM420-029M Extended Motor Fader Module

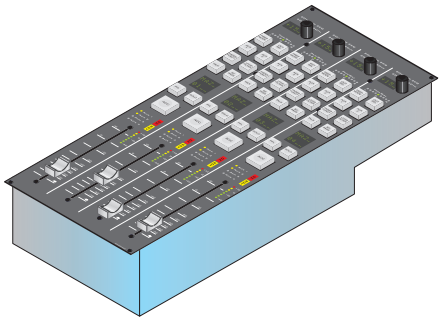


Figure 1-50: RM420-029M

- 4 fader channels, each with:
  - 11 pushbuttons
  - 8-character ASCII LED display
  - 100mm motorized P&G fader
  - 1 rotary control, 4-char. displays
- CAN bus, RS232, RM420-023/028 conn.
- 160mm x 399mm x 72mm
- *front panel colour RAL 7024 (graphite grey)*

3.3 RM4200D Router and Talkback Control Modules

RM420-018 Router Control Panel AES3 1U/19“

Figure 1-51: RM420-018

- AES3/EBU in/out to Router on RJ45
- AES3/EBU in/out local on XLR
- analog stereo in/out local on XLR
- LCD display, rotary control for selection of up to 50 sources of an RM4200 or RM3200 DSP Frame
- 5 pushbuttons

RM420-027 Talkback Panel

Figure 1-52: RM420-027

- Ethernet control interface
- 2 analog line in, 1 analog line out
- microphone XLR input
- for dynamic or electret microphones
- 1 Watt loudspeaker
- 12 pushbuttons (small)
- 2 LCD keys, 1 rotary control

- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-TB-HUB RJ45 Adapter Panel 1U/19“

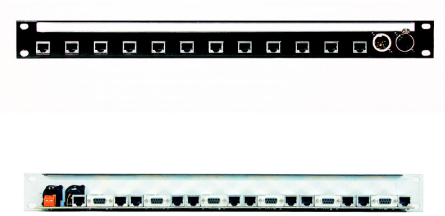


Figure 1-53: RM420-TB-HUB

- for up to 12 RM420-027 Talkback Panels connected to 3 RM420-222 analog In/Out modules
- +24V power supply insertion
- 12 RJ45 for RM420-222 on the rear
- 4 SubD-9 for GPIOs on the rear
- 12 RJ45 for RM420-027 on the front

RM420-078 8 LCD Pushbutton Panel

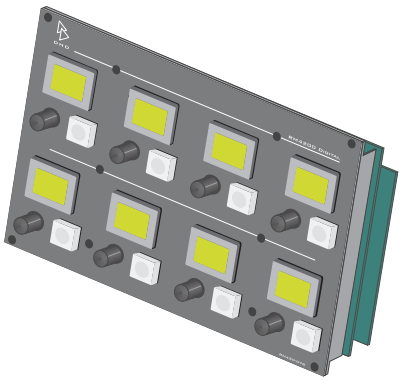


Figure 1-54: RM420-078

- 8 LCD pushbuttons
- 8 pushbuttons (small)
- 8 rotary controls
- for Talk Back, Conference, Preparation, Routing
- 100baseTX Ethernet

Note: *Please ask factory about available functions before ordering!*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM420-079 16 LCD Pushbuttons 1U/19“

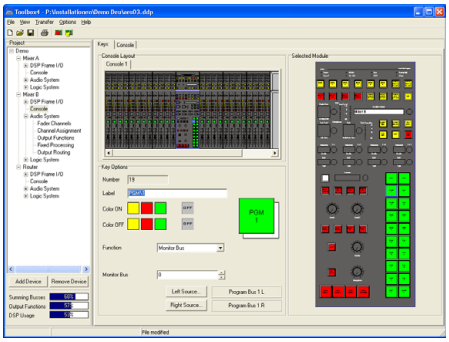
Figure 1-55: RM420-079

- for Routing, On-Air Switching, Talk Back and other special functions
- 100baseTX Ethernet
- no compatible replacement for RM420-019

Note: *Please ask factory about available functions before ordering!*

3.4 Software

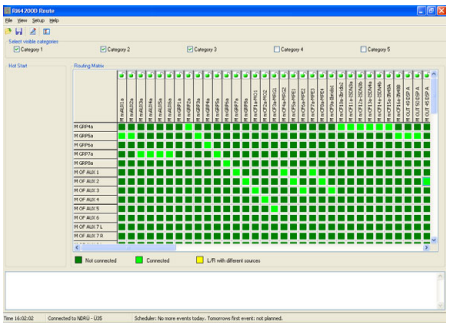
Toolbox 4



- configuration and maintenance software
- included in each RM4200D shipment
- TCP/IP or RS232 connection to one or more RM4200D
- for operation on Windows XP

Figure 1-56: Toolbox 4

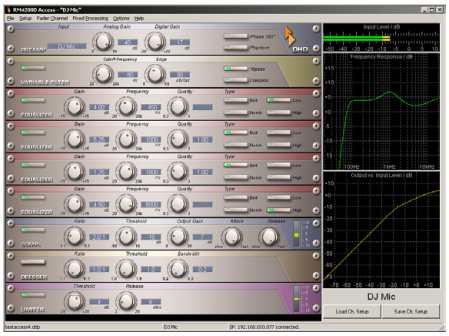
RM420-550 Routing Software



- sets crosspoints on the RM4200D
- matrix and list view
- hot-start keys for script processing
- simple scheduler (routing scripts)
- connection via TCP/IP to RM4200D
- for operation on Windows XP, license for 1 RM4200D or 1 PC MAC address

Figure 1-57: RM420-550

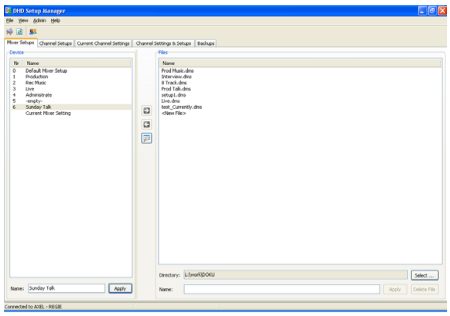
RM420-551 DSP Control Software



- controls input processing of selected channel (ACCESS)
- controls fixed processing
- RS232 or TCP/IP connection
- runs on Windows XP
- license for 1 RM4200D MAC address or for 1 PC MAC address

Figure 1-58: RM420-551

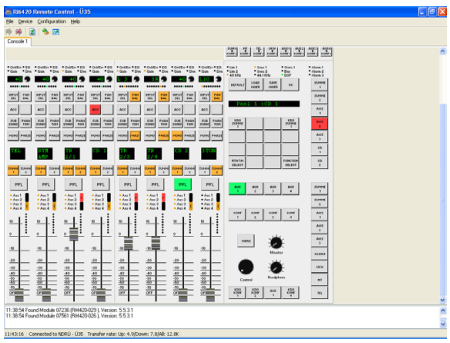
RM420-552 Setup Manager



- for storing, backup and copying of mixer and channel setups
- RS232 or TCP/IP connection
- runs on Windows XP
- included in each RM4200D shipment (no license, free download)

Figure 1-59: RM420-552

RM420-553 Remote Control Software



- controls RM4200D mixer via TCP/IP or RS232
- runs on Windows XP
- license for 1 RM4200D MAC address or for 1 PC MAC address

Figure 1-60: RM420-553

RM420-554 MIDI Protocol Converter Software

- controls RM4200D mixer via TCP/IP
- for operation on Windows XP, license for 1 RM4200D or 1 PC MAC address
- Ask factory for available functions before ordering!
- tested with Sequoia 7
- no MIDI interface included

RM420-561 Enhanced DSP Fixed Processing

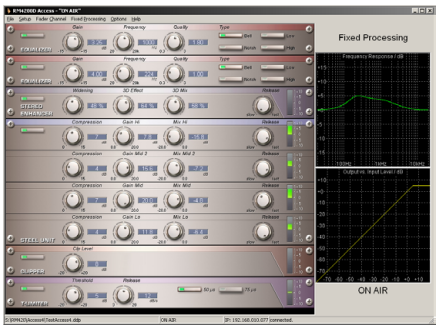


Figure 1-61: RM420-561

- Stereo Enhancer
- 3-band and 4-band compressor
- Soft Clipper
- Adaptive Preemphasis for FM Limiter
- 90 degree filter for mono summing
- license for 1 RM4200D MAC address
- RM420-551 necessary for operation

3.5 Engineering Services

RM330-500 Configuration

- 1 engineer day at DHD GmbH in Leipzig

RM330-502 Training

- 1 engineer day at DHD GmbH in Leipzig

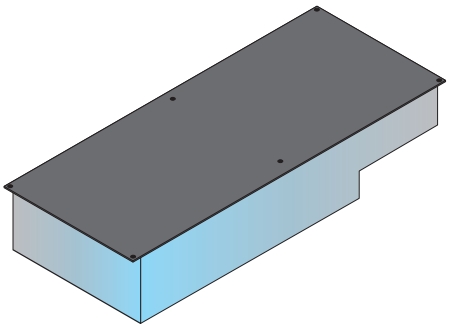
RM330-503 Acceptance Test

- 1 day at DHD GmbH in Leipzig

4. List of Accessories, Mechanical Parts and Cables

4.1 Blank Panels

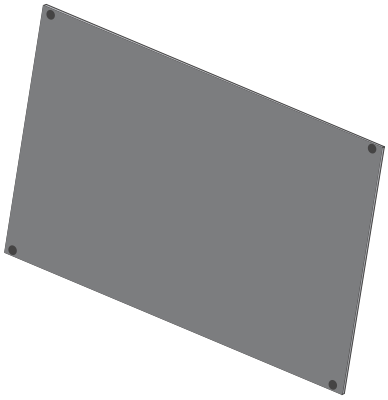
RM420-022 Blank Module, grey coating



- place holder or for customer-specific machining
- 160mm x 399mmx 72mm
- prepared hole for SubD-37 connector and SubD-15 connector on the rear
- *front panel colour RAL 7024 (graphite grey)*

Figure 1-62: RM420-022

RM420-022-O Blank Panel, grey coating



- place holder or for customer-specific machining
- width 160mm
- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

Figure 1-63: RM420-022-O

4.2 Meter Panels and Meters

RM330-024S Single Peak Meter Cabinet Panel

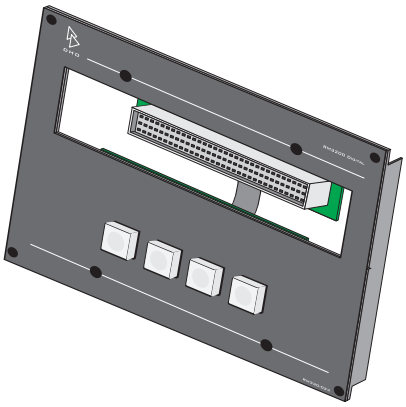


Figure 1-64: RM330-024S

- for installation of 1 RTW meter 1000, 1002, 1035 or 1052 -40 in a DHD overbridge cabinet
- 4 free pushbuttons
- SubD-15 and RJ45 connectors
- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

RM330-024D Dual Peak Meter Cabinet Panel

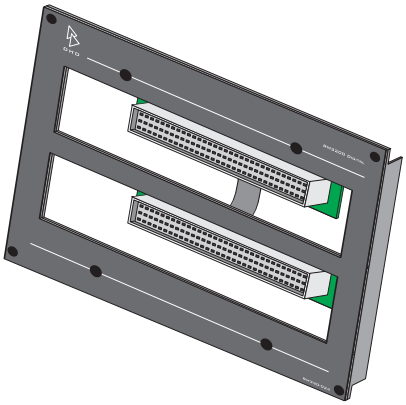


Figure 1-65: RM330-024D

- for installation of 2 RTW meters 1000, 1002, 1035 or 1052 -40 in a DHD overbridge cabinet
- SubD-15 connector
- *front panel colour RAL 7024 (graphite grey)*

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

OEM-RTW1002-40 RTW Analog Peak Meter

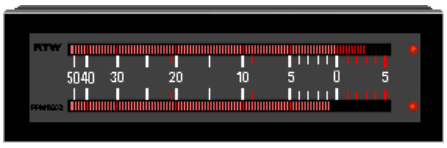


Figure 1-66: RTW 1002-40

- RTW 1002-40
- 100mm analog peak program meter
- DIN scale: +6dBu = 0
- *** only for use with DHD mixer ***

OEM-RTW1052-40E RTW Digital Peak Meter, EBU

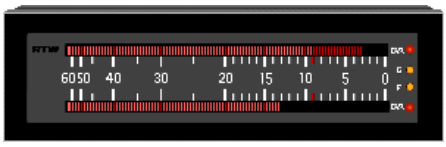


Figure 1-67: RTW 1052-40EBU

- RTW 1052-40EBU
- 100mm digital peak program meter
- EBU scale:
  0 = upper scale limit
  -9 = normal level
- *** only for use with DHD mixer ***

OEM-RTW1052-40D RTW Digital Peak Meter, DIN

Figure 1-68: RTW 1052-40D

- RTW 1052-40
- 100mm digital peak program meter
- "analog" DIN scale:
  +5 = upper scale limit (-4dBFS)
  0 = normal level (-9dBFS)
- *** only for use with DHD mixer ***

OEM-RTW10690DHD RTW Master Monitor, 160mm

Figure 1-69: OEM-RTW10690DHD

- RTW Master Monitor 10690 DHD
- 2 analog channels (1 stereo)
- 1 AES3/EBU input
- correlation meter and vectorscope
- 160mm width fits in DHD overbridge
- several display options see manual
- *** only for use with DHD mixer ***

Note: *Cabinet not included! Please order RM330-03n-T or RM330-03n-O.*

Other RTW displays also available.

4.3 Table-Installation Frames

Example Table-Installation Frame

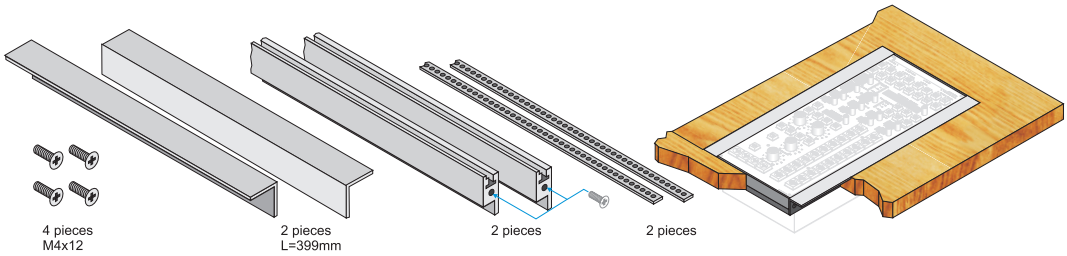
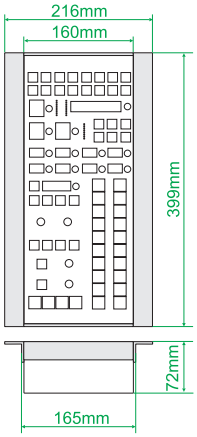


Figure 1-70: Example Table-Installation Frame

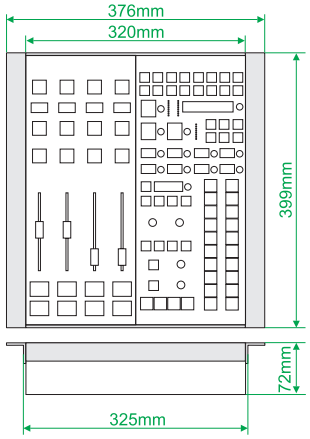
RM330-031 Table-Installation Frame



- aluminium profile frame for 1 module
- total width 160mm+56mm, depth 399mm

Figure 1-71: RM330-031

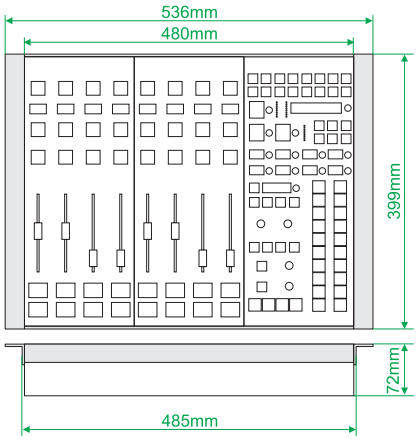
RM330-032 Table-Installation Frame



- aluminium profile frame for 2 modules
- total width 320mm+56mm, depth 399mm

Figure 1-72: RM330-032

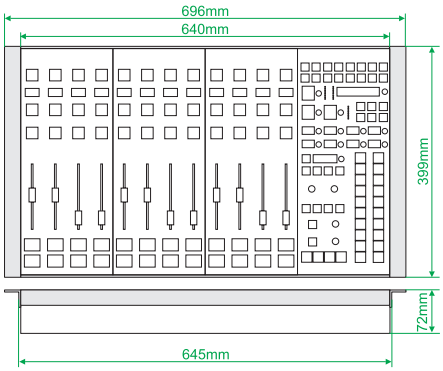
RM330-033 Table-Installation Frame



- aluminium profile frame for 3 modules
- total width 480mm+56mm, depth 399mm

Figure 1-73: RM330-033

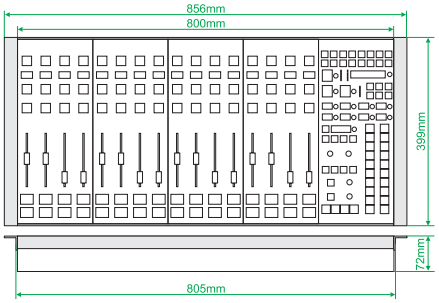
RM330-034 Table-Installation Frame



- aluminium profile frame for 4 modules
- total width 640mm+56mm, depth 399mm

Figure 1-74: RM330-034

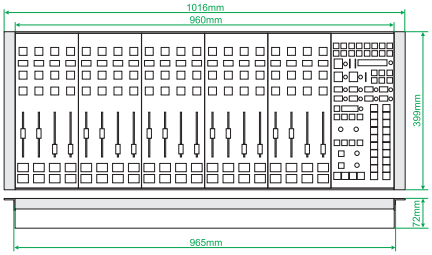
RM330-035 Table-Installation Frame



- aluminium profile frame for 5 modules
- total width 800mm+56mm, depth 399mm

Figure 1-75: RM330-035

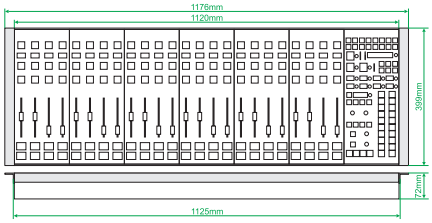
RM330-036 Table-Installation Frame



- aluminium profile frame for 6 modules
- total width 960mm+56mm, depth 399mm

Figure 1-76: RM330-036

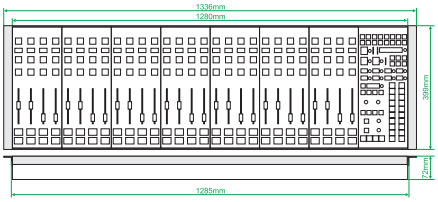
RM420-037 Table-Installation Frame



- aluminium profile frame for 7 modules
- total width 1120mm+56mm, depth 399mm

Figure 1-77: RM420-037

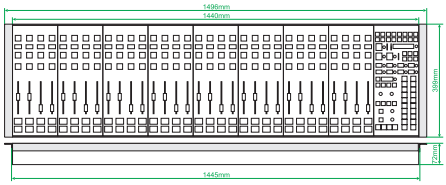
RM420-038 Table-Installation Frame



- aluminium profile frame for 8 modules
- total width 1280mm+56mm, depth 399mm

Figure 1-78: RM420-038

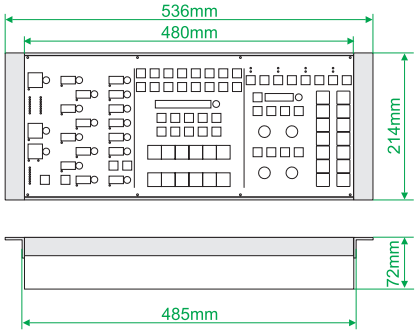
RM420-039 Table-Installation Frame



- aluminium profile frame for 9 modules
- total width 1440mm+56mm, depth 399mm

Figure 1-79: RM420-039

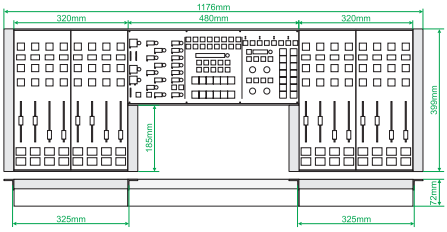
RM420-033-B Table-Installation Frame



- for separate installation of the RM420-014 extended central module
- aluminium profile frame for 1 module
- total width 480mm+56mm, depth 214mm

Figure 1-80: RM420-033-B

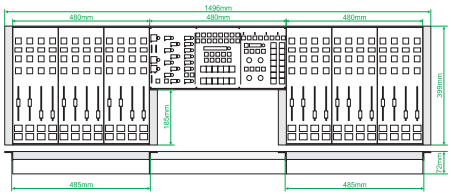
RM420-037-M Table-Installation Frame



- for seamless installation of 1 RM420-014 and 4 fader modules

Figure 1-81: RM420-037-M

RM420-039-M Table-Installation Frame



- for seamless installation of 1 RM420-014 and 6 fader modules
- larger sizes not available

Figure 1-82: RM420-039-M

4.4 Overbridge Installation Frame

Example Overbridge Installation Frame

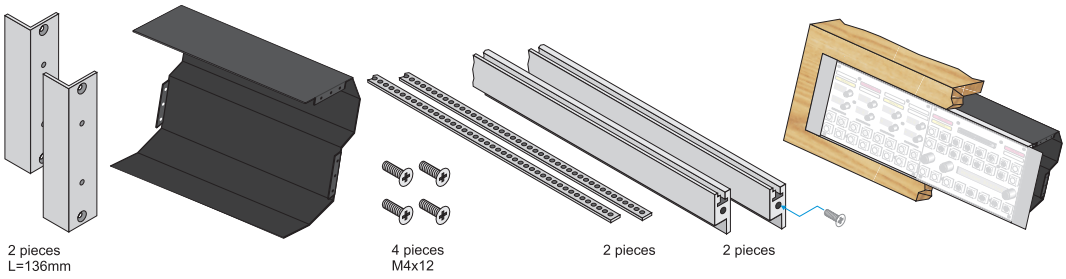
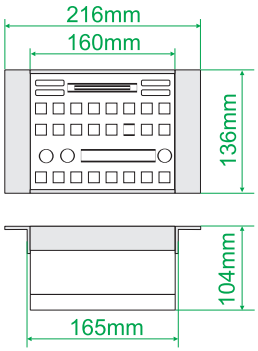


Figure 1-83: Example Overbridge Installation Frame

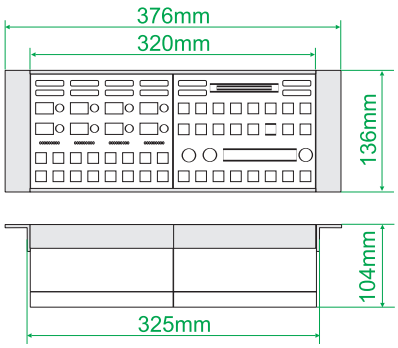
RM330-031-O Overbridge Installation Frame



- aluminium profile frame with cabinet for 1 panel
- total width 160mm+56mm, depth 136mm

Figure 1-84: RM330-031-O

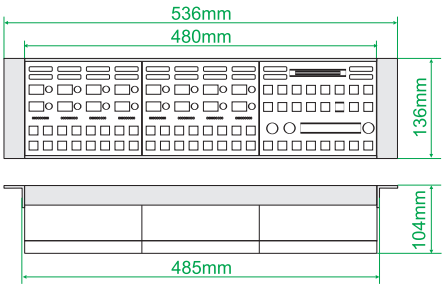
RM330-032-O Overbridge Installation Frame



- aluminium profile frame with cabinet for 2 panels
- total width 320mm+56mm, depth 136mm

Figure 1-85: RM330-032-O

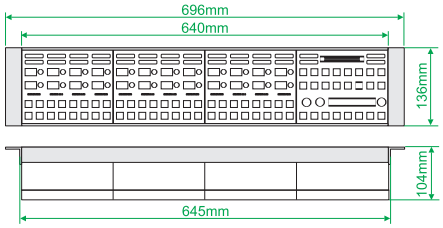
RM330-033-O Overbridge Installation Frame



- aluminium profile frame with cabinet for 3 panels
- total width 480mm+56mm, depth 136mm

Figure 1-86: RM330-033-O

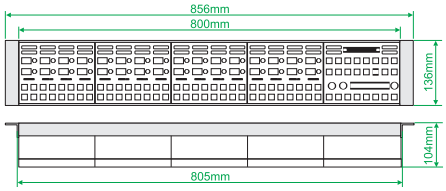
RM330-034-O Overbridge Installation Frame



- aluminium profile frame with cabinet for 4 panels
- total width 640mm+56mm, depth 136mm

Figure 1-87: RM330-034-O

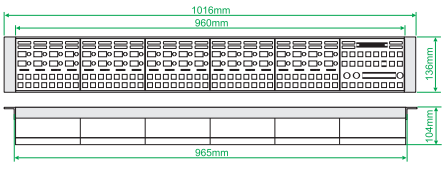
RM330-035-O Overbridge Installation Frame



- aluminium profile frame with cabinet for 5 panels
- total width 800mm+56mm, depth 136mm

Figure 1-88: RM330-035-O

RM330-036-O Overbridge Installation Frame



- aluminium profile frame with cabinet for 6 panels
- total width 960mm+56mm, depth 136mm

Figure 1-89: RM330-036-O

RM420-037-O Overbridge Installation Frame

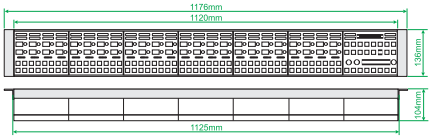


Figure 1-90: RM420-037-O

- aluminium profile frame with cabinet for 7 panels
- total width 1120mm+56mm, depth 136mm

RM420-038-O Overbridge Installation Frame

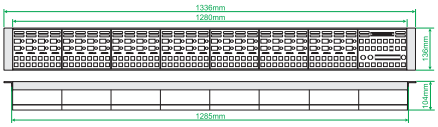


Figure 1-91: RM420-038-O

- aluminium profile frame with cabinet for 8 panels
- total width 1280mm+56mm, depth 136mm

RM420-039-O Overbridge Installation Frame

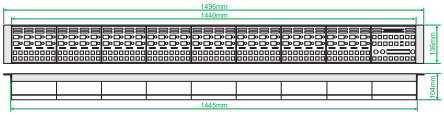


Figure 1-92: RM420-039-O

- aluminium profile frame with cabinet for 9 panels
- total width 1440mm+56mm, depth 136mm

4.5 Overbridge Table-Top Cabinet

Example Overbridge Table-Top Cabinet

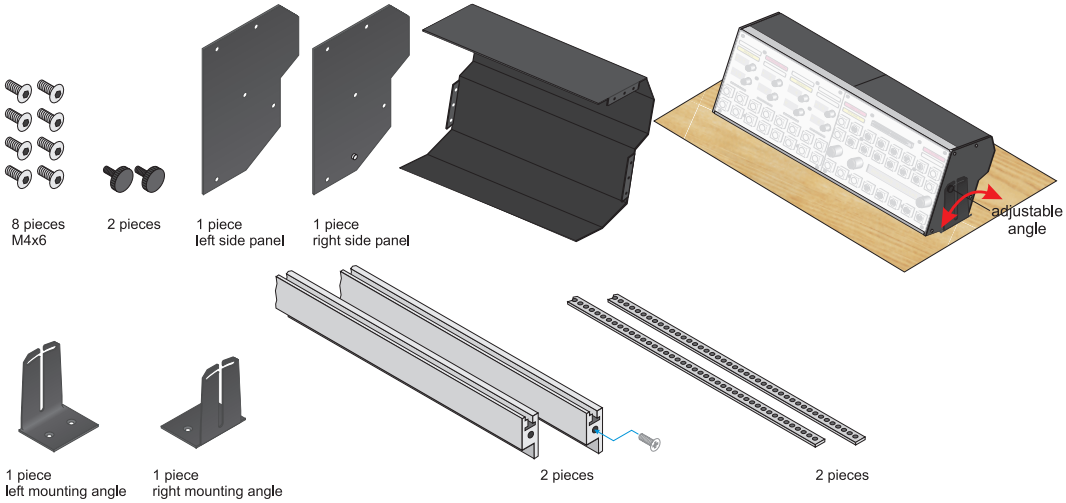


Figure 1-93: Example Overbridge Table-Top Cabinet

RM330-031-T Overbridge Table-Top Cabinet

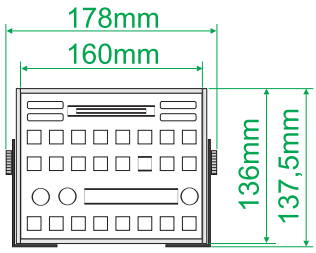


Figure 1-94: RM330-031-T

- aluminium profile frame with cabinet for 1 panel
- side panel with adjustable angle
- total width 160mm+18mm, depth 137.5mm

RM330-032-T Overbridge Table-Top Cabinet

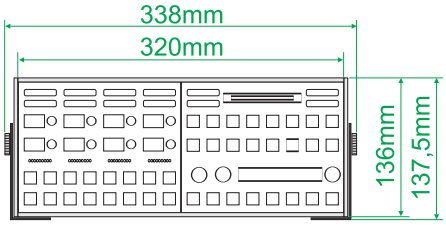


Figure 1-95: RM330-032-T

- aluminium profile frame with cabinet for 2 panels
- side panel with adjustable angle
- total width 320mm+18mm, depth 137.5mm

RM330-033-T Overbridge Table-Top Cabinet

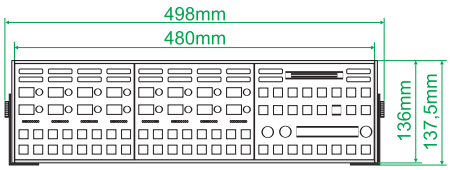


Figure 1-96: RM330-033-T

- for 3 panels
- adjustable angle
- total width 480mm+18mm, depth 137.5mm

RM330-034-T Overbridge Table-Top Cabinet

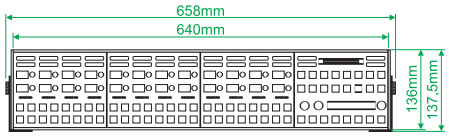


Figure 1-97: RM330-034-T

- for 4 panels
- adjustable angle
- total width 640mm+18mm, depth 137.5mm

RM330-035-T Overbridge Table-Top Cabinet

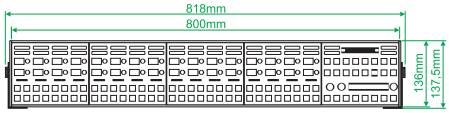


Figure 1-98: RM330-035-T

- for 5 panels
- adjustable angle
- total width 800mm+18mm, depth 137.5mm

RM330-036-T Overbridge Table-Top Cabinet

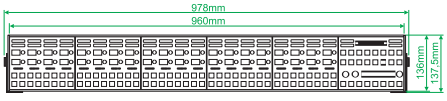


Figure 1-99: RM330-036-T

- for 6 panels
- adjustable angle
- total width 960mm+18mm, depth 137.5mm

RM420-037-T Overbridge Table-Top Cabinet

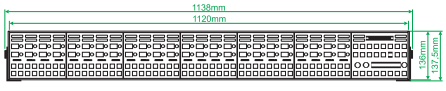


Figure 1-100: RM420-037-T

- for 7 panels
- adjustable angle
- total width 1120mm+18mm, depth 137.5mm

RM420-038-T Overbridge Table-Top Cabinet

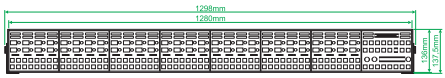


Figure 1-101: RM420-038-T

- for 8 panels
- adjustable angle
- total width 1280mm+18mm, depth 137.5mm

RM420-039-T Overbridge Table-Top Cabinet

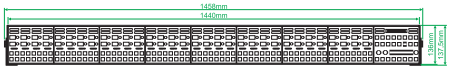


Figure 1-102: RM420-039-T

- for 9 panels
- adjustable angle
- total width 1440mm+18mm, depth 137.5mm

4.6 Cables

RM420-701 CAN bus cable 1m XLR

Figure 1-103: RM420-701

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-702 CAN bus cable 2m XLR

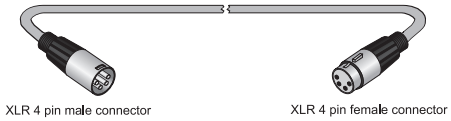


Figure 1-104: RM420-702

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-703 CAN bus cable 0,3m XLR

Figure 1-105: RM420-703

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel hous
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)
- included in RM420-020 and RM420-029

RM420-705 CAN bus cable 5m XLR

Figure 1-106: RM420-705

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel hous
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)
- included in RM420-010 and RM420-012

RM420-710 CAN bus cable 10m XLR

Figure 1-107: RM420-710

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-711 CAN bus cable 1,5m SubD15f-XLRm

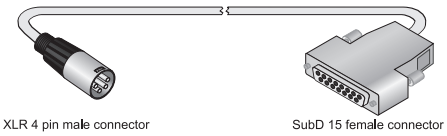


Figure 1-108: RM420-711

- CAN bus and 24V power cable
- XLR 4 pole male cable connector
- SubD 15 female cable connector with 110 Ohm termination resistor inside
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-712 Termination resistor 110 Ohm

Figure 1-109: RM420-712

- inside XLR 4 pin male connector between pin 2 and pin 3
- Mandatory for all unused XLR CAN bus connectors!

RM420-713 CAN bus cable 2m SubD15f-2XLR

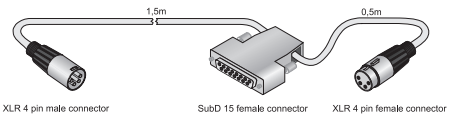


Figure 1-110: RM420-713

- T - CAN bus and 24V power cable
- XLR 4 pole male cable connector
- SubD 15 female cable connector
- XLR 4 pole female cable connector
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-715 CAN bus cable 15m XLR

Figure 1-111: RM420-715

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-715X Thick CAN bus cable 15m XLR

Figure 1-112: RM420-715X

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG16)
- cable type: Belden 3086A (thick)

RM420-720 CAN bus cable 20m XLR

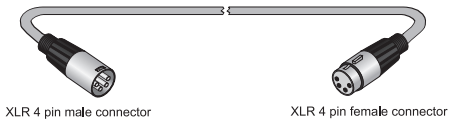


Figure 1-113: RM420-720

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-720X Thick CAN bus cable 20m XLR

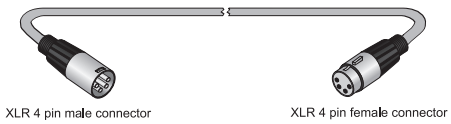


Figure 1-114: RM420-720X

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG16)
- cable type: Belden 3086A (thick)

RM420-723 Fader Overbridge Cable

Figure 1-115: RM420-723

- SubD 15 connectors male and female
- shielded data cable 0,5m
- for link between RM420-020/029 and RM420-023/028
- included in RM420-023/028

RM420-730 CAN bus cable 30m XLR

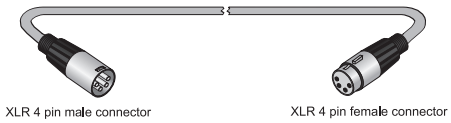


Figure 1-116: RM420-730

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)

RM420-730X Thick CAN bus cable 30m XLR

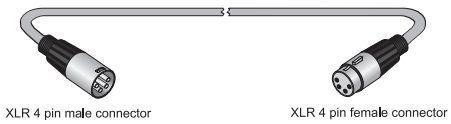


Figure 1-117: RM420-730X

- CAN bus and 24V power cable
- XLR 4 pole cable connectors male and female, silver contacts, nickel housing
- two pair cable containing a shielded data and power pair (2x AWG16)
- cable type: Belden 3086A (thick)

KCANCABLETHICK CAN bus and 24V power cable, m

- two pair cable containing a shielded data and power pair (2x AWG16)
- cable type: Belden 3086A (thick)
- XLR 4 pole cable connectors NOT included
- Must follow assembly instructions!
- price by the meter

KCANCABLETHIN CAN bus and 24V power cable, m

- two pair cable containing a shielded data and power pair (2x AWG22)
- cable type: Belden 3087A (thin)
- XLR 4 pole cable connectors NOT included
- Must follow assembly instructions!
- price by the meter

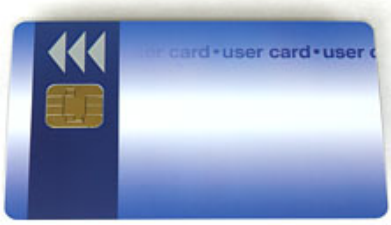
4.7 Tools and Spare Parts

RM420-771 Tool kit RM4200D

- 4 screw drivers
- cap and LED/lamp remove tools
- 2 small and 2 large push button caps
- 2 fuses 6,3A slow blow
- 6 screws
- included in RM420-061, RM420-062, RM420-063 and RM420-064

Figure 1-118: RM420-771

CHIPCARD32KBYTE Chipcard for RM4200D



- I2C EEPROM 32kByte (256kbit)
- Chip AT24C256
- 85,7mm x 54mm x 0,81mm ISO Format
- stores one single mixer setup

Figure 1-119: CHIPCARD32KBYTE

SW95CAP12MM 12mm lens, flat

- for small push buttons
- transparent
- EAO series 95 part no. 95-703.720

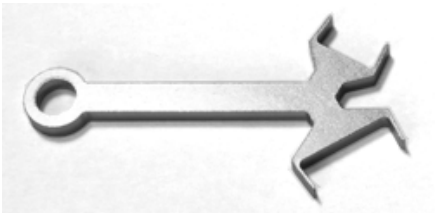
Figure 1-120: SW95CAP12MM

SW95CAP19MM 19mm lens, concave

- for large push buttons
- transparent
- EAO series 95 part no. 95-704.740

Figure 1-121: SW95CAP19MM

SW95CAPTOOL Lens remover



- Druckhaubenzieher
- for small and large push buttons
- EAO series 95 part no. 95-900.005

Figure 1-122: SW95CAPTOOL

SW95DIF12MMWS Diffuser 12mm, WHITE (standard)

- for small push buttons
- EAO series 95 part no. 95-803.920

Figure 1-123: SW95DIF12MMWS

SW95DIF19MMWS Diffuser 19mm, WHITE (standard)

- for large push buttons
- EAO series 95 part no. 95-804.920

Figure 1-124: SW95DIF19MMWS

SW95DIF12MMRD Diffuser 12mm, RED

- for small push buttons
- EAO series 95 part no. 95-803.220

Figure 1-125: SW95DIF12MMRD

SW95DIF12MMYE Diffuser 12mm, YELLOW

- for small push buttons
- EAO series 95 part no. 95-803.420

Figure 1-126: SW95DIF12MMYE

SW95DIF19MMRD Diffuser 19mm, RED

- for large push buttons
- EAO series 95 part no. 95-804.220

Figure 1-127: SW95DIF19MMRD

SW95DIF19MMYE Diffuser 19mm, YELLOW

- for large push buttons
- EAO series 95 part no. 95-804.420

Figure 1-128: SW95DIF19MMYE

SW95DIF19MMGN Diffuser 19mm, GREEN

- for large push buttons
- EAO series 95 part no. 95-804.520

Figure 1-129: SW95DIF19MMGN

FADER100MM10KPG Fader 100mm 10kOhm lin P&G

- Penny & Giles PGF8110/D/M/----/A
- for RM330-020, RM420-020, RM420-029

Figure 1-130: FADER100MM10KPG

FADER100MM10KSW Fader 100mm 10kOhm lin P&G, PFL

- Penny & Giles PGF8110/D/M/O---/A
- PFL backpress switch
- for RM420-029B

Figure 1-131: FADER100MM10KSW

FADER100MM10KMO Motorfader 100mm 10k lin P&G

- Penny & Giles PGFM8100/D/M/----/F
- for RM420-020M, RM420-029M

Figure 1-132: FADER100MM10KMO

FADERKNOB-BC11 BLACK 11mm width for P&G fader

Figure 1-133: FADERKNOB-BC11

FADERKNOB-BL11 BLUE 11mm width for P&G fader

Figure 1-134: FADERKNOB-BL11

FADERKNOB-GN11 GREEN 11mm width for P&G fader

Figure 1-135: FADERKNOB-GN11

FADERKNOB-GR11 GREY 11mm width for P&G fader

Figure 1-136: FADERKNOB-GR11

FADERKNOB-RD11 RED 11mm width for P&G fader

Figure 1-137: FADERKNOB-RD11

FADERKNOB-WH11 WHITE 11mm width for P&G fader

Figure 1-138: FADERKNOB-WH11

FADERKNOB-YE11 YELLOW 11mm width for P&G fader

Figure 1-139: FADERKNOB-YE11

FADERKNOB-BC16 BLACK 16mm width for P&G fader

Figure 1-140: FADERKNOB-BC16

FADERKNOB-BL16 BLUE 16mm width for P&G fader

Figure 1-141: FADERKNOB-BL16

FADERKNOB-GN16 GREEN 16mm width for P&G fader

Figure 1-142: FADERKNOB-GN16

FADERKNOB-GR16 GREY 16mm width for P&G fader

Figure 1-143: FADERKNOB-GR16

FADERKNOB-RD16 RED 16mm width for P&G fader

Figure 1-144: FADERKNOB-RD16

FADERKNOB-WH16 WHITE 16mm width for P&G fader

Figure 1-145: FADERKNOB-WH16

FADERKNOB-YE16 YELLOW 16mm width for P&G fader

Figure 1-146: FADERKNOB-YE16

LED-24V-GREEN T1-3/4 24V LED lamps

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51 part no. 10-2312.1065

Figure 1-147: LED-24V-GREEN

LED-24V-RED T1-3/4 24V LED lamps

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51

Figure 1-148: LED-24V-RED

LED-24V-YELLOW T1-3/4 24V LED lamps

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51

Figure 1-149: LED-24V-YELLOW

SWLAMP51-28V bulb T1-3/4 28V 1,12W

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51
- LED lamps also available!

Figure 1-150: SWLAMP51-28V

SW51CAP-CL push button cap series 51 CLEAR

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51 part no. 51-903.7
- cap and diffusor

Figure 1-151: SW51CAP-CL

SW51CAP-GN push button cap series 51 GREEN

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51 part no. 51-903.5
- cap and diffusor

Figure 1-152: SW51CAP-GN

SW51CAP-RD push button cap series 51 RED

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51 part no. 51-903.2
- cap and diffusor

Figure 1-153: SW51CAP-RD

SW51CAP-YE push button cap series 51 YELLOW

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51 part no. 51-903.4
- cap and diffusor

Figure 1-154: SW51CAP-YE

SW51LAMPTOOL lamp removing tool series 51

- Lampenzieher Serie 51

Figure 1-155: SW51LAMPTOOL

SW51-1S30X24PB push button EAO series 51

Figure 1-156: SW51-S30X24PB

- for RM420-020, RM330-020 push buttons below faders
- EAO series 51 part no. 51-425.036

MSHALSM2.5X11SW BLACK screw for console modules

Figure 1-157: MSHALSM2.5X11SW

- Halsschraube schwarz M2,5x11
- neck collar screw

MSISO7380M3X6SW BLACK screw for faders

Figure 1-158: MSISO7380M3X6SW

- Linsenschraube M3x6 schwarz zur Fadermontage

RPKNOB-10MM4MM knob for ALPS encoder 10mm BLACK

Figure 1-159: RPKNOB-10MM4MM

- for RM420-012/014/018/023/027/028
- for RM420-029/078, RM330-012/023
- without cap
- OKW part no. A2510040

RPKNOB-CAP10BC cap for encoder knob 10mm BLACK

Figure 1-160: RPKNOB-CAP10BC

- for RM420-012/014/018/023/027/028
- for RM420-029/078, RM330-012/023
- without line
- OKW part no. A4110000

RPKNOB-CAP10BL cap for encoder knob 10mm BLUE

Figure 1-161: RPKNOB-CAP10BL

- without line
- OKW part no. A4110006

RPKNOB-CAP10GN cap for encoder knob 10mm GREEN

Figure 1-162: RPKNOB-CAP10GN

- without line
- OKW part no. A4110005

RPKNOB-CAP10GR cap for encoder knob 10mm GREY

Figure 1-163: RPKNOB-CAP10GR

- without line
- OKW part no. A4110007

RPKNOB-CAP10RD cap for encoder knob 10mm RED

Figure 1-164: RPKNOB-CAP10RD

- without line
- OKW part no. A4110002

RPKNOB-CAP10YE cap for encoder knob 10mm YELLOW

- without line
- OKW part no. A4110004

Figure 1-165: RPKNOB-CAP10YE

RPKNOB-15MMBC knob for optical encoder BLACK

- for RM420-010/011/012/014
- without line
- without cap
- Sibalco part no.0160/S 150 250 black

Figure 1-166: RPKNOB-15MMBC

RPKNOB-CAP15BC cap for encoder knob 15mm BLACK

- for RM420-010/011/012/014
- without line
- Sibalco part no. 0160/C 150 black

Figure 1-167: RPKNOB-CAP15BC

RPKNOB-15MMBCL knob for potentiometer BLACK

- for RM420-010/011/012/013/014/027
- with white line
- without cap
- Sibalco part no.0160/DC151 006 black

Figure 1-168: RPKNOB-15MMBCL

RPKNOB-CAP15BCL cap for pot. knob 15mm BLACK

- for RM420-010/011/012/013/014/027
- with white line
- Sibalco part no. 0160/C 151 black

Figure 1-169: RPKNOB-CAP15BCL

RPKNOB-CAP15RDL cap for pot. knob 15mm RED

- with white line
- Sibalco part no. 0160/C 151 red

Figure 1-170: RPKNOB-CAP15RDL

RPKNOB-11MMBCL knob for potentiometer BLACK

- for RM420-026
- with white line
- without cap
- Sibalco part no.0160/DR111 006 black

Figure 1-171: RPKNOB-11MMBCL

RPKNOB-CAP11BCL cap for pot. knob 11mm BLACK

- for RM420-026
- with white line
- Sibalco part no. 0160/C 111 black

Figure 1-172: RPKNOB-CAP11BCL

RP10K-RK11K114 Potentiometer for level control

- RM420-010/011/012/013/014/026
- RM330-012, RM330-013
- for PCB mounting

Figure 1-173: RP10K-RK11K114

SWIGALPSEC11B15 Encoder ALPS 4mm axis

Figure 1-174: SWIGALPSEC11B15

- RM420-012, RM420-014, RM420-029
- RM420-018, RM420-027, RM420-078
- RM330-012, RM330-013
- for PCB mounting

Z420-845 Mains Power Inlet Module

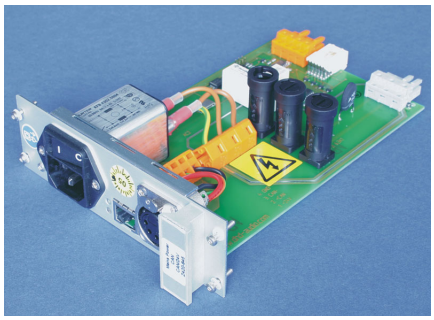


Figure 1-175: Z420-845

- spare part, included in each DSP Frame or Power Supply Frame
- note different jumper settings when using in a DSP Frame (master) or in a Console Power Supply Frame RM420-081, RM420-086 (slave)
- CAN bus connectors RJ45 and XLR-4

RM420-082 Power Supply 24V/75W

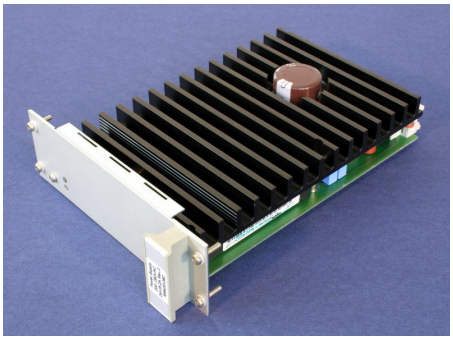


Figure 1-176: RM420-082

- suitable for redundant operation
- current share operation
- range: 200V to 250V AC
- necessary for operation of console

Note: Old model, only available as spare part.

RM420-085 Power Supply 5V/75W

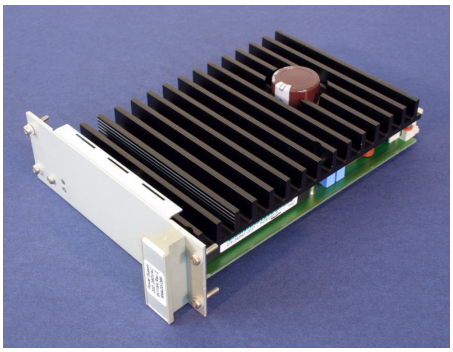


Figure 1-177: RM420-085

- suitable for redundant operation
- current share operation
- range: 200V to 250V AC
- necessary for operation of DSP Frame modules

Note: Old model, only available as spare part.

Z420-814 Front Panel for empty slots, 4TE

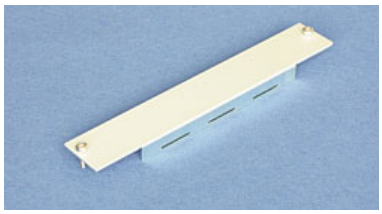


Figure 1-178: Z420-814

- 20.32mm, 3U

Z420-818 Front Panel for empty slots, 8TE

Figure 1-179: Z420-818

- 40.64mm, 3U

DHD Deubner Hoffmann Digital GmbH
Haferkornstrasse 5
04129 Leipzig
— Germany —

Phone: +49 341 5897020
Fax: +49 341 5897022

For online manuals, support and updates please visit:

www.dhd-audio.com