Technical Manual

Fohhn-Net

Integration of Fohhn devices in media control systems

Content

1 Overview of the control options

Fohhn devices offer a wide range of control options. Different options are available depending on the model.

In the Appendix you will find a table of which functions are available on which devices.

1.1 Fohhn Text Protocol (Ethernet)

The Fohhn Text Protocol offers convenient control in plain text; depending on the device, via a TCP or UDP interface. Functions such as presets, volume, mute, routing standby and status query are available.

Many Fohhn devices with an Ethernet interface offer these options directly. (Note that with some devices the Ethernet interface is only for audio).

Please refer to the table in the appendix to see which devices offer which options.

Fohhn devices with an RS-485-based Fohhn-Net interface can be controlled via TCP/IP using the **NA-4** adapter. If simultaneous transmission of Dante or AES67 audio is desired, devices with Fohhn-Net RS-485 and AES/EBU audio input can be upgraded with the **ABX-5** or **ABX-6** adapters.

Control via text protocol is suitable for small to very large installations.

1.2 Switching contacts

Some Fohhn devices offer two input switch contacts for very simple control. This can be used to switch between two different presets or standby. If push buttons are connected, only one of the two functions can be used.

The switching contacts are best used with very small installations.

1.3 RS-232

Via the **FR-21** adapter, macros can be used to switch presets or standby via RS-232. Up to 32 macros are possible. For control via the **FR-21**, the Fohhn device must have an RS-485-based Fohhn-Net interface.

Control via RS-232 is suitable for small installations without Ethernet.

1.4 Fohhn-Net

The implementation of the Fohhn-Net protocol is much more complex than the other options, but offers full access to all DSP functions. The Fohhn-Net byte sequences can be transmitted via RS-485 or UDP (Ethernet).

1.4.1 Fohhn-Net RS-485

For control via RS-485, your media control must have an RS-485 interface and must be capable of sending random byte sequences.

1.4.2 Fohhn-Net UDP (Ethernet)

All Fohhn devices that are controlled via Ethernet accept Fohhn Net Byte sequences on UDP port 2101.

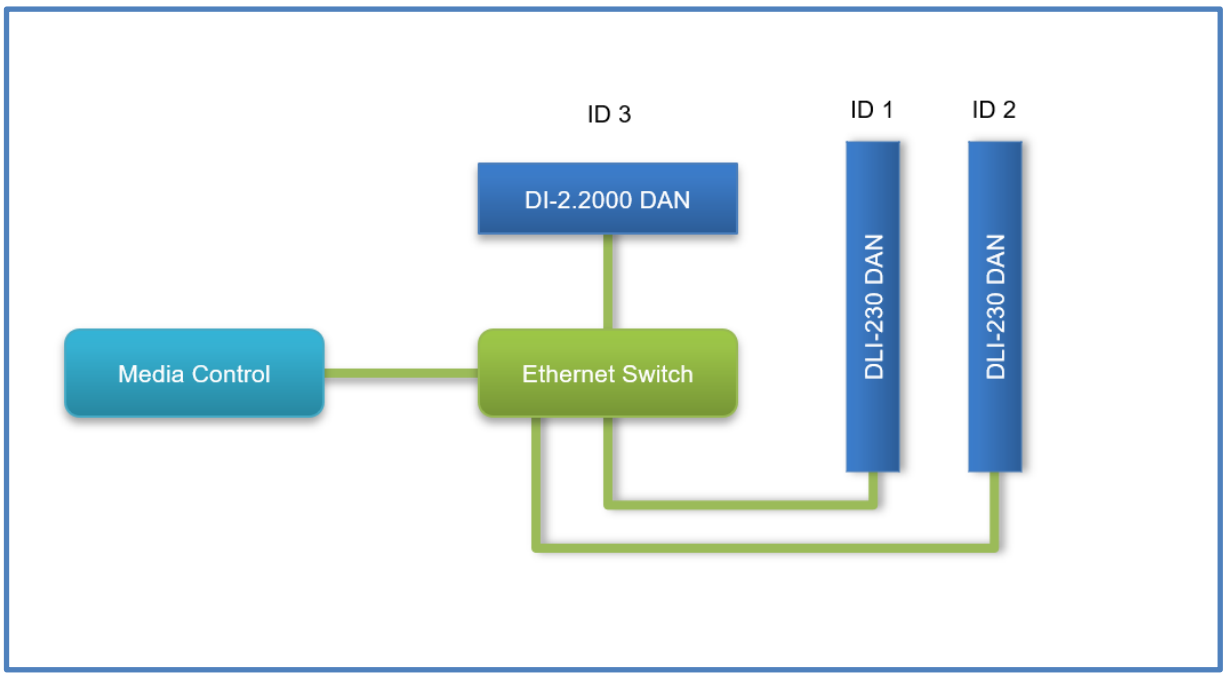
Please note that the Ethernet interface of some devices is for audio only.

2 Wiring

2.1 Ethernet

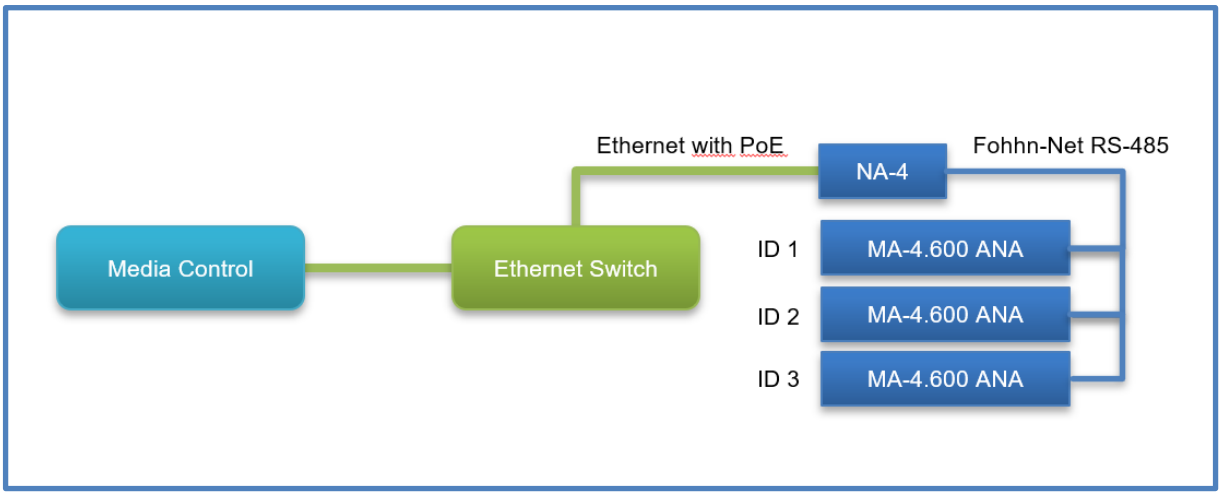
2.1.1 Control via integrated Ethernet interface

Some Fohhn devices can be connected directly to an Ethernet switch and also controlled via it.

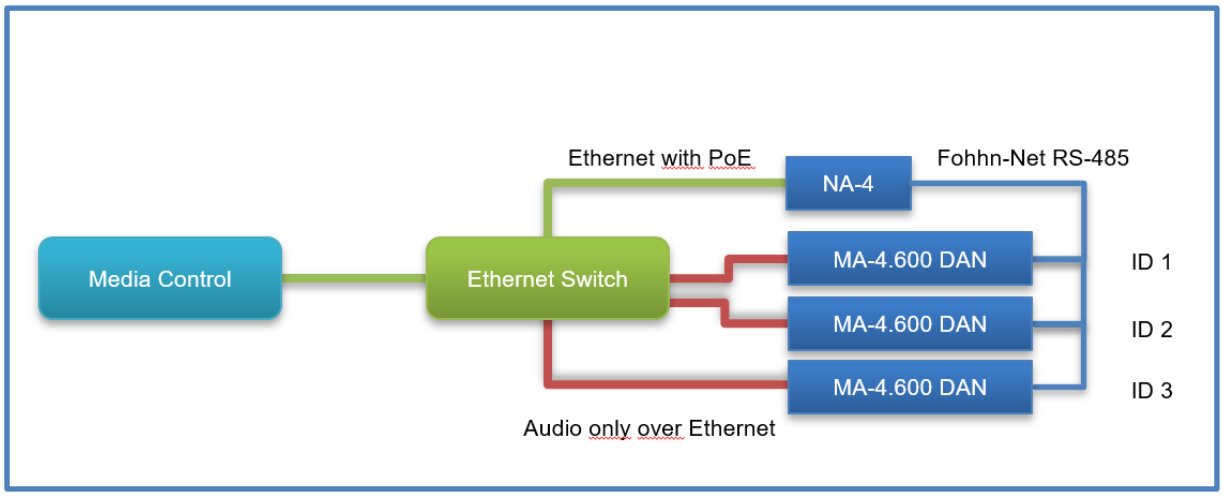


2.1.2 Control via external Ethernet adapter

Fohhn devices with Fohhn-Net (RS-485) can be controlled via Ethernet using an external adapter.



Some devices have an integrated Ethernet interface for audio, but still require an external Ethernet adapter for control:

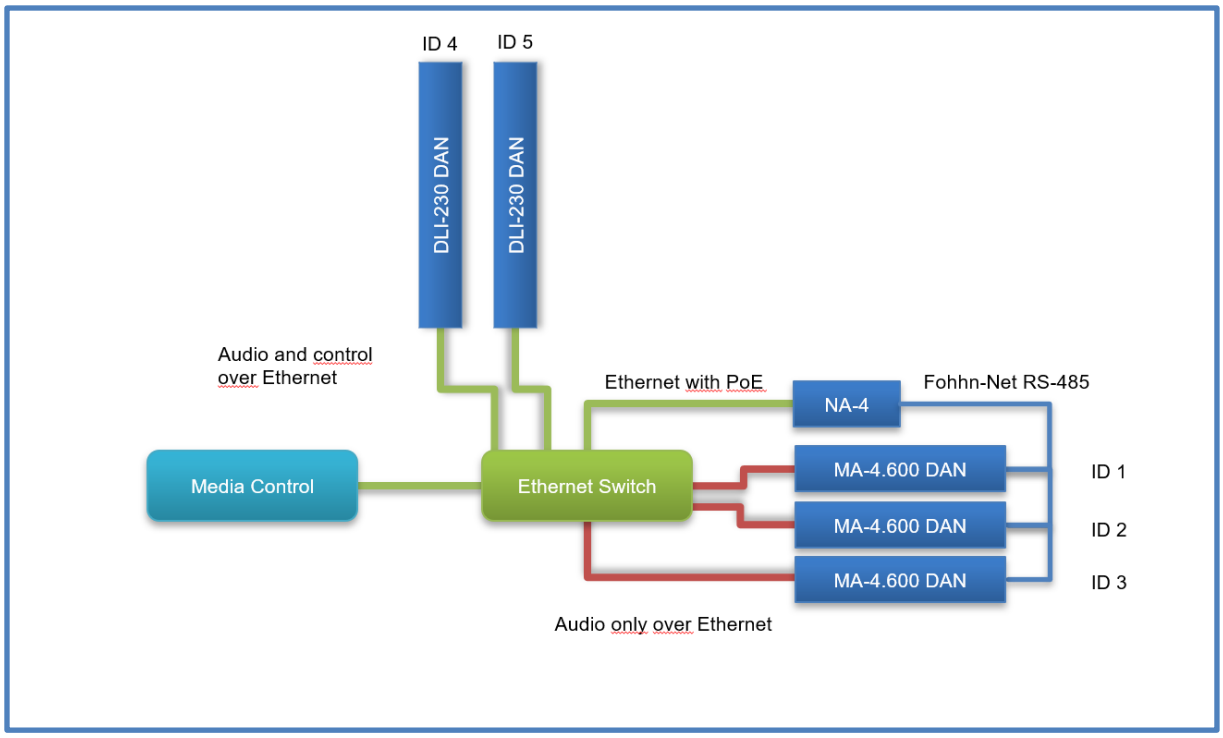


Try to keep the RS-485 sections as small as possible and use multiple NA-4s whenever feasible.

Only wire devices that can be logically combined via RS-485.

2.1.3 Mixed installation

It does not matter whether the Ethernet interface is integrated in Fohhn devices or not. Often, the external adapter results in more practical and cheaper cabling options. The devices can be mixed as desired within an installation.

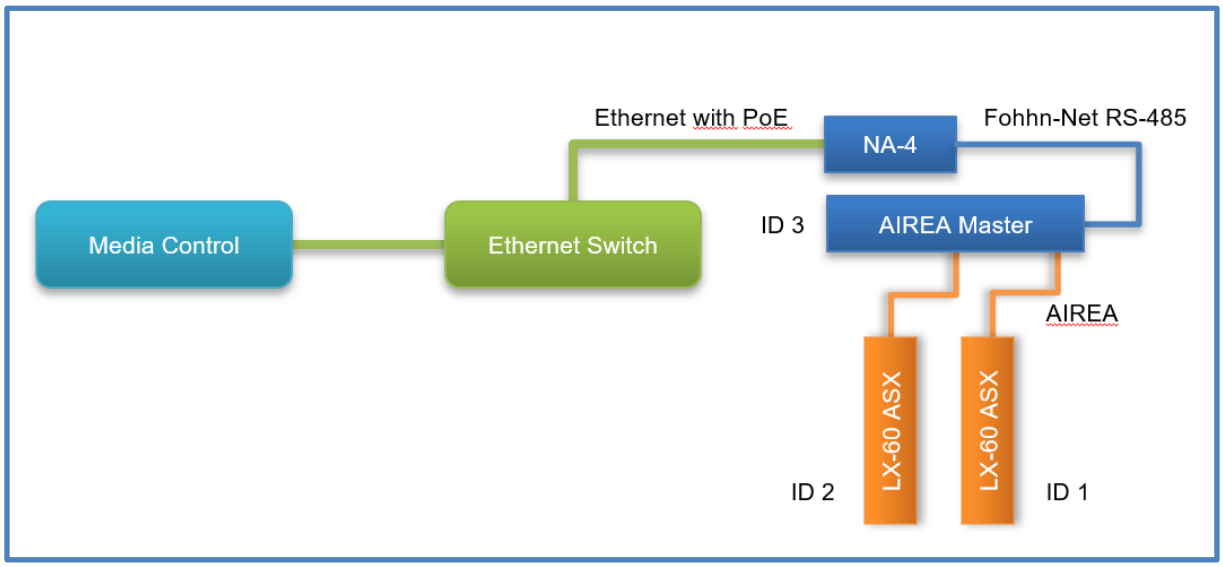


2.1.4 AIREA

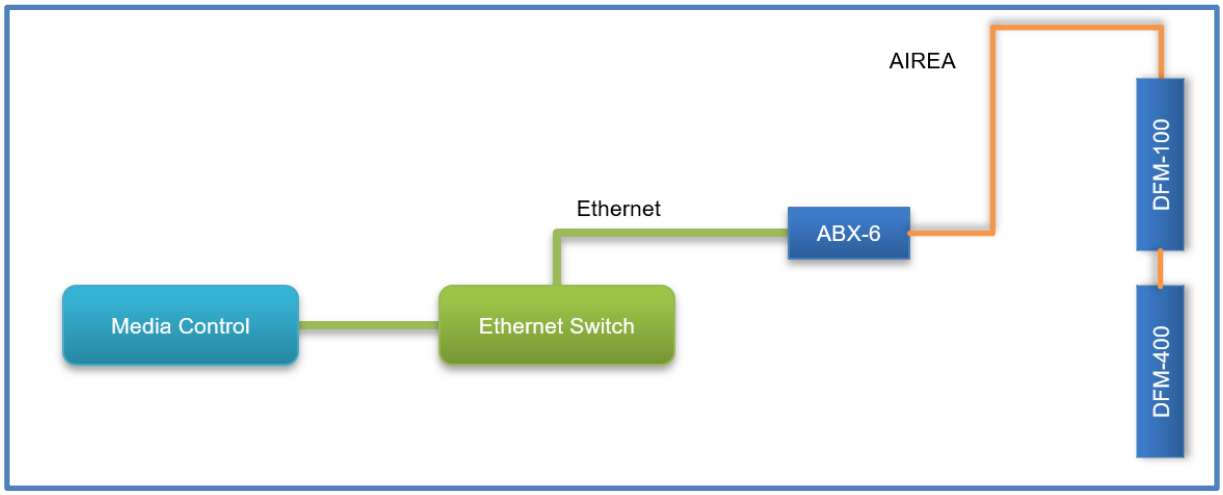
Fohhn AIREA integrates RS-485, AES/EBU and 48V in a single network cable.

AIREA devices without their own power supply must be connected via an AIREA master. An **NA-4** can be connected to the AIREA master to control the devices via Ethernet. Each AIREA master requires its own **NA-4**. Do not connect several AIREA masters to each other via RS-485.

The RS-485 is passively connected in the AIREA network. Please note that a problem anywhere or duplicate IDs will affect the entire AIREA network.

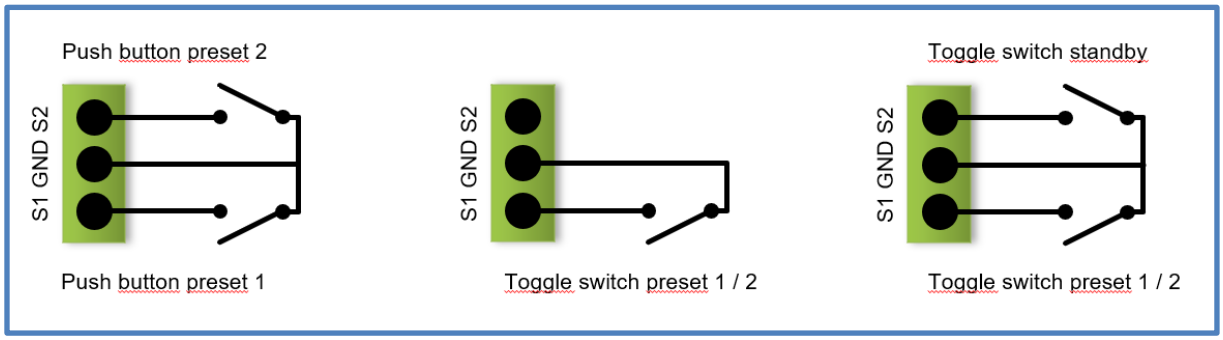


Units with their own power supply and AIREA input do not necessarily need an AIREA master; they can also be controlled via the AIREA output of an **ABX-5** or **ABX-6** and supplied with an audio signal at the same time.



2.2 Switching contacts

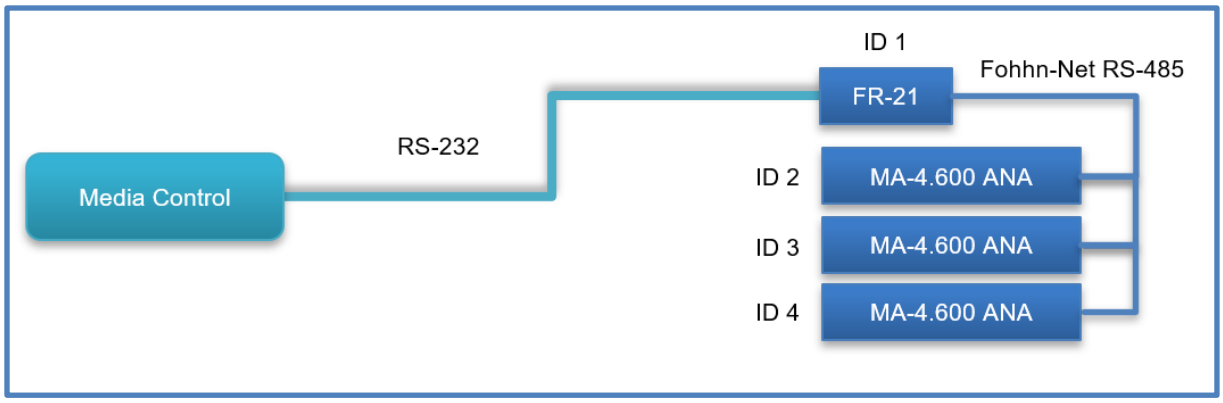
Toggle switches or push buttons can be used. It is only possible to switch between two presets. A relay can also be used instead of a switch.



The switching contacts are configured in Fohhn Audio Soft. To do this, call up the context menu in the device list by right-clicking and select "Settings".

2.3 RS-232

For connection via RS-232, the Fohhn **FR-21** is required.



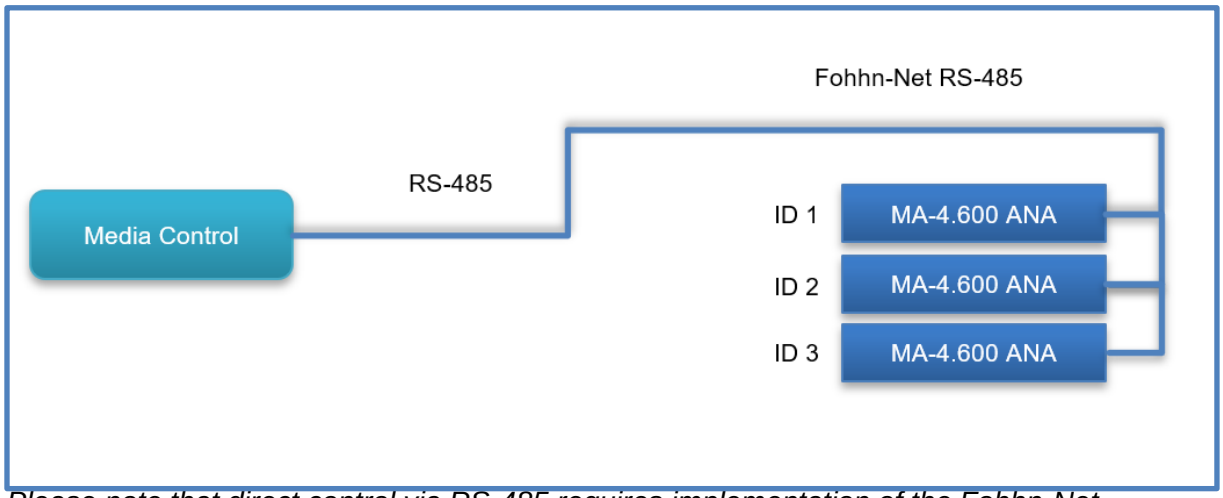
Only Fohhn devices with an RS-485-based Fohhn-Net interface can be controlled via the **FR-21**.

Up to 32 macros can be configured in the FR-21. The macros are called up via RS-232 (9600 baud) with the commands M01\r to M32\r.

The FR-21 can only be configured via the Fohhn-Net port, for which an NA-11 or NA-4 adapter is required. For more information, please read the FR-21 operating instructions.

2.4 RS-485

If your media control system has an RS-485 interface, direct control of Fohhn devices with RS-485-based Fohhn-Net interface is also possible.



Please note that direct control via RS-485 requires implementation of the Fohhn-Net protocol. Make sure that this is possible with your media control system.

For more information, see the Implementation of Fohhn-Netsection.

3 Implementation of the text protocol

Many Fohhn devices can be controlled and monitored using a simple, text-based UDP or TCP protocol. Depending on the device, the network interface accepts the text commands on **UDP port 2101** or **TCP port 8374**. For the **TCP** connection, each command must be terminated with **CRLF**; many systems send this automatically, or it must be explicitly specified with **\r\n** at the end. The answers are also terminated with **CRLF**. If the commands are transmitted via **UDP**, the line breaks **CRLF** are omitted.

The commands always have the following structure:

GET *COMMAND ID (PARAMETER) <CR><LF>*

SET *COMMAND ID (PARAMETER) <CR><LF>*

GET commands are used to fetch information from the respective device; SET commands are used to change settings on the device. The answer is always **OK** for SET commands. If the command is correct but the device does not respond, ***TIMEOUT*** is given as the answer for a **TCP** connection. If the command is invalid, the answer is ***INVALID REQUEST*** and if the parameters are incorrect, the response is ***INVALID PARAMETERS***.

Make sure to enter the correct **Fohhn-Net ID** in the **ID** field; otherwise the device will ignore the command and the network interface will answer with ***TIMEOUT*** for a **TCP** connection. You will then receive no answer to a query via **UDP.** You can determine the (Fohhn-Net) ID via **Fohhn Audio Soft**.

Control via the text protocol only works if the **Fohhn Audio Soft** is not communicating at the same time. Close Fohhn Audio Soft or switch it offline to enable control via the text protocol.

Numerical values are always written without decimal separators and without unit:

Thus, **-32.5 dB** becomes **-325**, or **+5.0 dB** becomes **50**.

For output channels, simply use the channel number: i.e. **1** for output channel 1, **2** for output channel 2, etc.

For addressing input channels, please refer to the section Addressing input channels. Also note the section Special channel addressing for older devices.

The network interface closes the TCP connection after 30 seconds of inactivity if it has not been closed beforehand from the client side. Only one TCP connection is possible at a time.

Commands for *Info, Preset, Volume, Mute, Routing, Standby* and *Status* are available via the Fohhn-Net text protocol. These are explained in detail on the following pages.

3.1 Device information

3.1.1 Retrieve device information (identifier and firmware version)

```
GET INFO ID
```

Answer:

```
IDENTIFIER VERSION
```

Example to retrieve the info from the device with ID 1:

```
GET INFO 1
```

Answer (example for Linea Focus DLI-130):

```
0D20 3.0.5
```

Example to retrieve the info from the device with ID 2:

```
GET INFO 2
```

Answer (example for Linea Focus DLI-130):

```
0D20 3.0.5
```

The GET INFO command is also suitable as a test to see if the device responds.

3.2 Presets

3.2.1 Load preset

```
SET PRESET ID NO
```

Answer:

```
OK
```

Example to load preset 20 on the device with ID 1:

```
SET PRESET 1 20
```

Answer:

```
OK
```

3.2.2 Retrieve current preset number and preset name

```
GET PRESET ID
```

Answer:

```
NR NAME
```

Example to recall a currently loaded preset on the device with ID 1:

```
GET PRESET 1
```

Answer:

```
020 Preset Name
```

3.3 Volume

3.3.1 Set volume absolute

```
SET VOL ID CHANNEL GAIN ON [INV]
```

Answer:

```
OK
```

The last parameter [INV] is optional and must only be set if the signal on the channel is to be inverted.

Example to set the volume on channel 1 on the device with ID 1 to -20.5 dB (On):

```
SET VOL 1 1 -205 1
```

Example to set the volume on channel 2 on the device with ID 1 to 3.0 dB (On):

```
SET VOL 1 2 30 1
```

Example to set the volume on channel 1 on the device with ID 1 to -3 dB (On):

```
SET VOL 1 1 0 0
```

Example to set the volume on channel 2 on the device with ID 1 to 3.0 dB (On) and inverted:

```
SET VOL 1 2 30 1 1
```

3.3.2 Read volume

```
GET VOL ID CHANNEL
```

Answer:

```
GAIN ON INV
```

Example to read the volume on channel 1 on the device with ID 1:

```
GET VOL 1 1
```

Answer:

```
-205 1 0
```

Example to read the volume on channel 2 on the device with ID 1:

```
GET VOL 1 2
```

Answer:

```
30 1 0
```

3.3.3 Change volume relatively

```
SET RVOL ID CHANNEL GAIN
```

Answer:

```
OK
```

Example to decrease the volume on channel 1 on the device with ID 1 by -3.0 dB:

```
SET RVOL 1 1 -30
```

Example to increase the volume on channel 2 on the device with ID 1 by +1.5 dB:

```
SET RVOL 1 2 15
```

3.4 Channels

3.4.1 Switch channel on / mute (Mute)

```
SET MUTE ID CHANNEL ON
```

Answer:

```
OK
```

Example to mute channel 2 on the device with ID 1:

```
SET MUTE 1 2 0
```

Example to switch on channel 2 on the device with ID 1:

```
SET MUTE 1 2 1
```

3.4.2 Read mute status

```
GET MUTE ID CHANNEL
```

Answer:

```
ON
```

Example to read channel 2 on the device with ID 1:

```
GET MUTE 1 2
```

Answer when the channel is switched on:

```
1
```

Answer when the channel is muted:

```
0
```

Note: The mute status is also indicated when reading out the volume in the second parameter.

3.5 Routing

3.5.1 Change Routing-settings

```
SET ROUTING ID CHANNEL INPUT GAIN ON [INV]
```

Answer:

```
OK
```

The last parameter [INV] is optional and must only be set if the signal is to be inverted.

Example to set the routing from the device with ID 1 from input channel 3 to output channel 2 with a gain of -10.0 dB:

```
SET ROUTING 1 2 3 -100 1
```

Example to mute the routing from the device with ID 1 from input channel 3 to output channel 2 with a gain of -10.0 dB:

```
SET ROUTING 1 2 3 -100 0
```

3.5.2 Read routing settings

```
GET ROUTING ID CHANNEL INPUT
```

Answer:

```
GAIN ON INV
```

Example to read the routing from the device with ID 1 from input channel 3 to output channel 2:

```
GET ROUTING 1 2 3
```

Answer:

```
-100 1 0
```

3.6 Standby

3.6.1 Setting devices to standby

```
SET STANDBY ID ON
```

Answer:

```
OK
```

Example to put the device with ID 1 in standby:

```
SET STANDBY 1 1
```

Example to switch the device back on with ID 1:

```
SET STANDBY 1 0
```

3.6.2 Read standby status

```
GET STANDBY ID
```

Answer:

```
ON
```

Example to read out the standby status of the device with ID 1:

```
GET STANDBY 1
```

Answer when the device is in standby:

```
1
```

Answer when the device is switched on:

```
0
```

Note: Not all devices support reading out the standby status.

3.7 Status

3.7.1 Read status

```
GET STAT ID
```

Answer:

```
F1 F2 F3 F4 F5 F6 F7 F8
```

Example to read out the status of the device with ID 1:

```
GET STAT 1
```

Answer:

```
0 1 0 0 0 0 0 0
```

Note: The answer must be evaluated differently depending on the device. Flags that are not used must be ignored. 0 means "ok", 1 means an error.

Fohhn devices	***F1***	***F2***	***F3***	***F4***	***F5***	***F6***	***F7***	***F8***
DLI-130 *DLI-230* *DLI-330* *DLI-430*	*Fault*	*Audio (AES)*	*Pilotton*					
FV-100 *FV-200*	*Fault*	*Audio (AES)*						
LFI-120 *LFI-220* *LFI-350* *LFI-450*	*Fault*	*Pilotton*						
FMI-100 *FMI-110* *FMI-400*	*Fault*	*Pilotton*						
DI-2.2000 *DI-2.4000*	*Protect 1*	*Protect 2*						
DI-4.1000 *DI-4.2000*	*Protect 1*	*Protect 2*	*Protect 3*	*Protect 4*				
DFM-100 *DFM-110* *DFM-400*	*Fault*	*Audio (AES)*	*Pilotton*					
MA-4.100 *MA-4.600*	*Protect 1*	*Protect 2*	*Protect 3*	*Protect 4*				

3.8 Troubleshooting when connecting media control systems

If TCP communication functions normally but there is no change to the device, it may be that it is locked. Check the settings using **Fohhn Audio Soft**.

Fohhn Audio Soft must not communicate at the same time. Close Fohhn Audio Soft or switch it offline before sending commands via the TCP interface.

Listing of other possible sources of error:

- Was correct **Fohhn-Net ID** been entered?
- Was the correct **IP address** specified?
- Was the correct **TCP port 8374** specified?
- Was the correct **UDP port 2101** specified?
- Is the text command correctly terminated with **CRLF (\r\n)** for a **TCP** connection?
- Are all parameters of the command correct?
- Are all parameters within valid ranges?
- Did you wait to send the next request via **TCP** until there was an answer? The system can only process one request at a time: Wait until you receive an answer before sending a new request.
- Did you wait to send the next request via **UDP** until there was an answer? If there is no answer, you must wait for a timeout of at least **350ms**.
- Was the **TCP** connection closed before trying to re-establish it? Otherwise, it requires 30 seconds of inactivity until the network interface closes the connection by itself.

3.9 Addressing input channels

If input channels are to be addressed, the number of output channels must always be added up. For a device with one output channel, the first input channel has channel number **2** and the second input channel has channel number **3**. For a device with four output channels and four input channels, the first input channel has channel number **5**.

The routing command is an exception: Here, the input channels for the input parameter always start at 1.

DSP functions on input channels are not available on all devices.

3.10 Special channel addressing for older devices

If an FC-8, FC-9 a D-4.750 or D-4.1200 is controlled via an **NA-4**, you must pay attention to a different channel addressing. These devices have DSP functions only on the output channels; each output channel is addressed via a specific value.

Output channel 1	1
Output channel 2	2
Output channel 3	4
Output channel 4	8
Output channel 5	16
Output channel 6	32

4 Implementation of Fohhn-Net protocol

The Fohhn-Net byte sequences can be sent to Fohhn devices via **RS-485 (19200 baud, half-duplex)** or via **UDP (port 2101).**

4.1 Structure of a Fohhn-Net command

A command consists of at least seven bytes: a header of six bytes and at least one data byte.

The header starts with the start byte <SB>, followed by the device ID, number of data bytes, the command byte and two address bytes.

```
1. Byte Startbyte       <SB>
2. Byte Device ID       <ID>
3. Byte Databyte Count <COUNT>
4. Byte Command Byte    <CMD>
5. Byte Address MSB     <ADR_MSB>
6. Byte Address LSB     <ADR_LSB>
7. Byte Databyte 1      <DATA>      // min. one databyte
N. Bytes
```

The device answers with at least two bytes: its device ID and the start byte <SB> as the end.

Depending on the command, the device answers with a few data bytes before the last two bytes.

If the answer is not sent within 350 ms, a timeout can be assumed. The media control system must always wait for the timeout time before the next command can be sent.

The media control system must work fault-tolerantly and should only assume an error after three attempts at a command.

4.2 Coding of reserved bytes

The Fohhn-Net protocol has a start byte <SB> and a control byte <CB>. These two bytes must never be included in the user data.

- The value of the start byte <SB> is 0xF0.
- The value of the control byte <CB> is 0xFF.

If one of the values is required in the user data, it must be coded with the control byte. One byte then becomes two bytes.

- <CB> + 0x00 = 0xF0
- <CB> + 0x01 = 0xFF

The control byte is not counted in <COUNT>. The answers from the devices are coded in the same way.

4.3 Loading a user preset

Fohhn-Net command to load a user preset:

```
Startbyte         0xF0
Device ID         0x01 .. 0xFE
Databyte Count    0x01
Command Byte      0x05
ADR_MSB           0x01
ADR_LSB           0x01 .. 0x64          // preset nr.
Databyte 1        0x00
```

Answer from device:

```
Device ID 0x01 .. 0xFE
Startbyte 0xF0
```

Examples: Load presets 20–24 on the device with ID 1:

```
0xF0 0x01 0x01 0x05 0x01 0x14 0x00       // preset 20
0xF0 0x01 0x01 0x05 0x01 0x15 0x00       // preset 21
0xF0 0x01 0x01 0x05 0x01 0x16 0x00       // preset 22
0xF0 0x01 0x01 0x05 0x01 0x17 0x00       // preset 23
0xF0 0x01 0x01 0x05 0x01 0x18 0x00       // preset 24
```

Examples: Load presets 20–24 on the device with ID 2:

```
0xF0 0x02 0x01 0x05 0x01 0x14 0x00       // preset 20
0xF0 0x02 0x01 0x05 0x01 0x15 0x00       // preset 21
0xF0 0x02 0x01 0x05 0x01 0x16 0x00       // preset 22
0xF0 0x02 0x01 0x05 0x01 0x17 0x00       // preset 23
0xF0 0x02 0x01 0x05 0x01 0x18 0x00       // preset 24
```

4.4 Setting to standby

Fohhn-Net command for standby:

```
Startbyte   0xF0
Device ID   0x01 .. 0xFE
Count       0x01
Command     0x0C // command Standby
ADR_MSB     0x00
ADR_LSB     0x00.
Flags       0xXX // Standby
```

Answer from device:

```
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

Example to change the standby on the device with ID 1:

```
0xF0 0x01 0x01 0x0C 0x00 0x00 0x01 // Standby
0xF0 0x01 0x01 0x0C 0x00 0x00 0x00 // On
```

4.5 Read standby

(Is not available for all devices.)

Fohhn-Net command to read out standby:

```
Startbyte   0xF0
Device ID   0x01 .. 0xFE
Count       0x01
Command     0x0A // command Readback
ADR_MSB     0x00
ADR_LSB     0x00.
DATA        0x0C // get Standby
```

Answer from device:

```
Flags       0xXX // Standby Flag
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

4.6 Query device identifier in firmware version

Fohhn-Net info command:

```
Startbyte   0xF0
Device ID   0x01 .. 0xFE
Count       0x01
Command     0x20 // command GetDeviceInfo
ADR_MSB     0x00
ADR_LSB     0x00.
DATA        0x01
```

Answer from device:

```
CLASS_H     0xXX
CLASS_L     0xXX
VERSION0    0xXX
VERSION1    0xXX
VERSION2    0xXX
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

4.7 Protect and query temperature

Fohhn-Net status command:

```
Startbyte   0xF0
Device ID   0x01 .. 0xFE
Count       0x01
Command     0x07
ADR_MSB     0x00
ADR_LSB     0x00.
DATA        0x00
```

Answer from device:

```
PROTECT     0xXX
TEMPH       0xXX
TEMPL       0xXX
OPT         0xXX
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

The individual bits in the protect byte contain the information about the amp channels; some devices also contain AES/EBU status and pilot tone polling. Bits that are not used must be ignored.

Fohhn devices	***Bit 0***	***Bit 1***	***Bit 2***	***Bit 3***
DLI-130 *DLI-230*	*Fault*	*Audio (AES)*	*Pilotton*	

DLI-330 *DLI-430*				
FV-100 *FV-200*	*Fault*	*Audio (AES)*		
LFI-120 *LFI-220* *LFI-350* *LFI-450*	*Fault*	*Pilotton*		
FMI-100 *FMI-110* *FMI-400*	*Fault*	*Pilotton*		
DI-2.2000 *DI-2.4000*	*Protect 1*	*Protect 2*		
DI-4.1000 *DI-4.2000*	*Protect 1*	*Protect 2*	*Protect 3*	*Protect 4*
DFM-100 *DFM-110* *DFM-400*	*Fault*	*Audio (AES)*	*Pilotton*	
MA-4.100 *MA-4.600*	*Protect 1*	*Protect 2*	*Protect 3*	*Protect 4*

4.8 Set volume absolute

Fohhn-Net command for volume:

```
Startbyte   0xF0
Device ID   0x01 .. 0xFE
Count       0x03
Command     0x87        // command SetVolume
Channels    0xXX        // channels
Index       0x01
VolumeH     0xXX        // volume
VolumeL     0xXX        // volume
Flags       0xXX        // flags
```

Answer from device:

```
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

Examples to set the volume on channel 1 on the device with ID 1:

```
0xF0 0x01 0x03 0x87 0x01 0x01 0x00 0x00 0x01          // 0.0 dB On
0xF0 0x01 0x03 0x87 0x01 0x01 0x00 0x00 0x00          // 0.0 dB Mute
0xF0 0x01 0x03 0x87 0x01 0x01 0xFF 0x01 0xB5 0x01     // -7.5 dB On
0xF0 0x01 0x03 0x87 0x01 0x01 0x00 0x3C 0x01          // +6.0 dB On
0xF0 0x01 0x03 0x87 0x01 0x01 0xFE 0x70 0x01          // -40.0 dB On
```

The volume is a 16-bit signed value (value * 10). +6.0 dB has the value 60, in hexadecimal notation 0x003C.

4.9 Set volume relative and mute

Fohhn-Net command for relative volume changes

```
Startbyte   0xF0
Device ID   0x01 .. 0xFE
Count       0x03
Command     0x96 // command SetVolumeRelative
Channels    0xXX // channels
Index       0x01
VolumeH     0xXX // volume
VolumeL     0xXX // volume
Flags       0xXX // flags
```

Answer from device:

```
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

Examples to change the volume on channel 1 on the device with ID 1:

```
0xF0 0x01 0x03 0x96 0x01 0x01 0xFF 0x01 0xF6 0x01    // -1.0 dB On
0xF0 0x01 0x03 0x96 0x01 0x01 0x00 0x0A 0x01         // +1.0 dB On
```

Examples to change the mute status on channel 1 on the device with ID 1:

```
0xF0 0x01 0x03 0x96 0x01 0x01 0x00 0x00 0x05   // On ( Unmute )
0xF0 0x01 0x03 0x96 0x01 0x01 0x00 0x00 0x00   // Off ( Mute )
```

4.10 Routing

Fohhn-Net command for routing:

```
Startbyte         0xF0
Device ID         0x01 .. 0xFE
Count             0x03
Command           0x81 // command SetRouting
Channels          0xXX // channels
Index             0x0X // input channel
GainH             0xXX // gain
GainL             0xXX // gain
Flags             0xXX // flags
```

Answer from device:

```
Device ID   0x01 .. 0xFE
Startbyte   0xF0
```

Examples to set the routing for output 1 on the device with ID 1:

```
0xF0 0x01 0x03 0x81 0x01 0x01 0x00 0x00 0x01 // Input 1 0.0 dB On
0xF0 0x01 0x03 0x81 0x01 0x02 0x00 0x00 0x01 // Input 2 0.0 dB On
0xF0 0x01 0x03 0x81 0x01 0x01 0x00 0x00 0x00 // Input 1 0.0 dB Off
0xF0 0x01 0x03 0x81 0x01 0x02 0x00 0x00 0x00 // Input 2 0.0 dB Off
```

4.11 Further Fohhn-Net commands

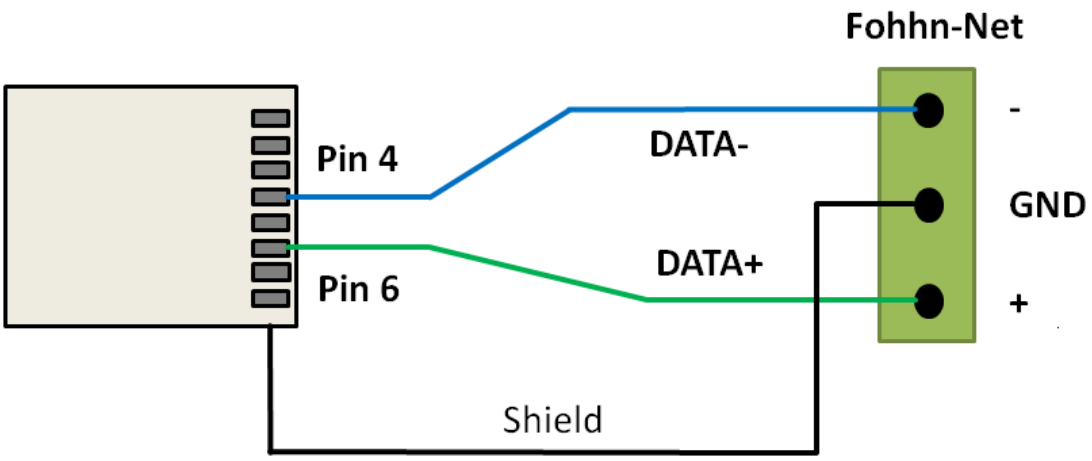
A list of other Fohhn-Net commands is available on request.

5 Pin allocations

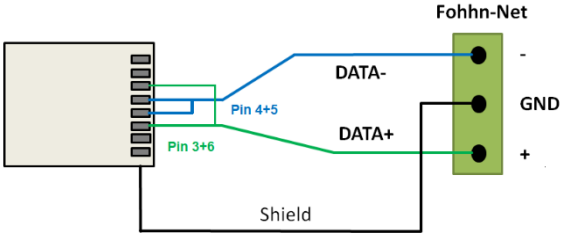
5.1 Fohhn-Net RS-485

The Fohhn-Net RJ-45 socket is assigned as follows:

RJ-45 pin	Signal
1	not assigned
2	not assigned
3	**DATA+**
4	**DATA-**
5	**DATA-**
6	**DATA+**
7	not assigned
8	not assigned



Pins 4+5 are assigned with Data- and pins 3+6 are assigned with Data+. Since the pins are simply connected in parallel, it is sufficient to use only pin 4 for Data- and pin 6 for Data+. The pins can also be combined, see the image below:



6 Appendix

Device	Brooklyn II	Ultimo UXT	1x 100 Mbit	2x 1 GBit	2x SFP	Dante redundancy	Dante Audio	AES67	Fohhn-Net UDP	UDP text protocol	TCP text protocol	Fohhn-Net RS-485	Fohhn-Net USB	Switching contacts
ABX-5	x			x		x	x	x	x		x			
ABX-6	x			x	x	x	x	x	x		x			
AM-4.4 ANA												x	x	x
AM-4.4 DAN		x	x				x	x				x	x	x
DFM-100												x		
DFM-110												x		
DFM-400												x		
DI-2.2000 AES												x	(x)	x
DI-2.2000 ANA												x	(x)	x
DI-2.2000 DAN	x			x		x	x	x	x		x		(x)	x
DI-2.2000 DBF	x			x	x	x	x	x	x		x		x	x
DI-2.2000 DUC		x	x				x	x	x	x			x	x
DI-2.4000 AES												x	x	x
DI-2.4000 ANA												x	x	x
DI-2.4000 DAN	x			x		x	x	x	x		x		x	x
DI-2.4000 DBF	x			x	x	x	x	x	x		x		x	x
DI-2.4000 DUC		x	x				x	x	x	x			x	x
DI-4.1000 AES												x	(x)	x
DI-4.1000 ANA												x	(x)	x
DI-4.1000 DAN	x			x		x	x	x	x		x		(x)	x
DI-4.1000 DBF	x			x	x	x	x	x	x		x		x	x
DI-4.1000 DUC		x	x				x	x	x	x			x	x
DI-4.2000 AES												x	x	x
DI-4.2000 ANA												x	x	x
DI-4.2000 DAN	x			x		x	x	x	x		x		x	x
DI-4.2000 DBF	x			x	x	x	x	x	x		x		x	x
DI-4.2000 DUC		x	x				x	x	x	x			x	x
DLI-130 AES	x											x		x
DLI-130 ANA	x											x		x
DLI-130 DAN	x			x		x	x	x	x		x			
DLI-130 DBF	x			x	x	x	x	x	x		x			
DLI-130 DUC		x	x				x	x	x	x				
DLI-230 AES	x											x		x
DLI-230 ANA	x											x		x
DLI-230 DAN	x			x		x	x	x	x		x			
DLI-230 DBF	x			x	x	x	x	x	x		x			
DLI-230 DUC		x	x				x	x	x	x				
DLI-330 AES	x											x		x

DLI-330 ANA	x											x		x
DLI-330 DAN	x			x		x	x	x	x		x			
DLI-330 DBF	x			x	x	x	x	x	x		x			
DLI-330 DUC		x	x				x	x	x	x				
DLI-430 AES	x											x		x
DLI-430 ANA	x											x		x
DLI-430 DAN	x			x		x	x	x	x		x			
DLI-430 DBF	x			x	x	x	x	x	x		x			
DLI-430 DUC		x	x				x	x	x	x				
FV-100												x		
FV-200												x		
MA-2.1200 ANA												x	x	x
MA-2.1200 DAN		x	x				x	x				x	x	x
MA-4.100 ANA												x	x	x
MA-4.100 DAN		x	x				x	x				x	x	x
MA-4.600 ANA												x	x	x
MA-4.600 DAN		x	x				x	x				x	x	x
NA-4			x						x		x			

6.1 Disclaimer and copyright

6.1.1 Disclaimer

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