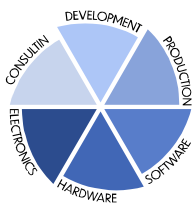


Major 4b + Major 5b

User Manual



Table-Top Consoles
with Numeric Keypad
for Analogue and DMR Radios
(VOIP connection optional)



FunkTronic
Radio Control Systems & more

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1. Major 4b + Major 5b

Major 4b and **Major 5b** are **table-top radio control panels with an alphanumeric LC-Display**. These control panels are ideally suited for use with analogue and digital (DMR) radios (currently supported DMR radios: Motorola MOTOTRBO und Kenwood NEXEDGE series). A combination of a numerical keypad and several function keys allows for the usage of private calls, group calls, channel selection and more.

The extended number keypad of **Major 4b** with 8 additional buttons for special functions enables convenient one-touch handling of pre-defined actions. **Major 4b** also comprises a handset with a PTT button for a more private conversation and to avoid environmental disturbance. **Major 5b** as the more basic model does not share the aforementioned features.

Furthermore, **Major 4b/5b** provides connectors for **headsets and a PTT foot switch** and its ethernet connector can optionally be equipped with **power-over-ethernet(PoE)** capability (hardware selling feature). The **Option VOIP** (selling feature) enables the direct VOIP connection of the Major 4b/5b. Hence, all functions can directly be exerted via IP connection (usually to an FT636B IP interface located at the radio site). The two latter features are novelties of Major 4b/5b and have not been available for its predecessor models.

For the configuration of the Major 4b/5b we now provide a **self-explanatory web interface**.

2. Order Information

FT Article No.	Name
681500	Major 4b
681510	Major 4b incl. VOIP option
714500	Major 5b
714510	Major 5b incl. VOIP option
	Accessories:
900012	Power supply unit for Major 4a/4b/5a/5b/6a
640011	PoE option – power supply via IP connector
636510	VOIP option for later upgrade
900020	Audio USB Interface for Major 4a/4b/5a/5b for MOTOTRBO connection
001530	PTT foot switch with connection cable
001555	Headset without volume control, cable with 6-pin modular connector
001556	Headset incl. Inline volume control, cable with 6-pin modular connector
	Anschlusskabel:
900920	Connection cable: Audio USB Int. to DM4xxx (digital), length: approx. 1 m
900921	Connection cable (2 parts): FT636b to Audio USB Int., length: approx. 1 m
900922	Connection cable (2 parts): Major 4b/5b to Audio USB Int., length: approx. 2 m
900925	Connection cable: FT636b/635/634a (analog) to DM4xxx, length: approx. 1 m
900930	Connection cable: Kenwood Nexedge to Audio USB Int., length: approx. 1 m
900931	Connection cable: Kenwood Nexedge to Major 4b/5b, length: approx. 2 m
900932	Connection cable: Kenwood Nexedge to FT636b, length: approx. 0,5 m

3. Control Elements

3.1. Control Elements Major 4b



- 1 – gooseneck microphone
- 2 – LC display
- 3 – status LEDs
- 4 – handset with PTT button
- 5 – function buttons F1-F4
- 6 – special buttons S1-S4
- 7 – PTT button
- 8 – call button
- 9 – short call button
- 10 – loudspeaker (LS) button
- 11 – loudspeaker (LS)

3.2. Control Elements Major 5b

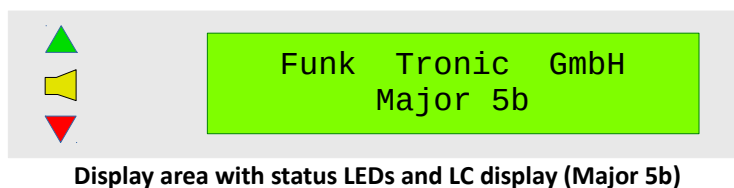
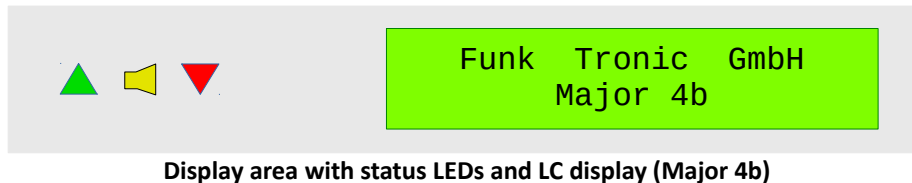


- 1 – gooseneck microphone
- 2 – LC display
- 3 – status LEDs
- 4 – loudspeaker (LS)
- 5 – PTT button
- 6 – call button
- 7 – short call button
- 8 – loudspeaker (LS) button
- 9 – volume button

3.3. Description of the Control Elements

LC Display

All alphanumeric informations are shown on the Major's LC display. It comprises 2 display lines with 24 characters each, and a backlight.



Status LEDs

The **squelch indication (incoming transmission)** ▼ can be triggered by voice (vox), by DC current or pilot-tone (2-wire / 4-wire) and via the designated squelch input.

The **PTT indication** ▲ is on whenever the Major actively transmits via the linked radio, initiated by e.g. the the red PTT button of the Major, the PTT button of the handset, external PTT button or an outgoing call sequence.

The **loudspeaker or call indication** ■ is active if the loudspeaker is switched on. It flashes in case of an incoming call request.

Differences Major 4b / Major 5b

Major 4b is different from Major 5b due to the following attributes:

- no function buttons or special buttons available for Major 5b
- no discrete volume button (due to the handset's spatial requirements) for Major 4b
- no handset available for Major 5b

Standard Configuration of the Buttons

Button		Major 4b	Major 5b
0-9		call input	call input
*	short:	delete input	delete input
	long:	channel selection	channel selection
#	short:	browse ID memory	browse ID memory
	long:	delete ID from memory	delete ID from memory
PTT		PTT	PTT
Call button		transmit call	transmit call
Zielruftaste		transmit short call 0-9	transmit short call 0-9
LS button	short:	loudspeaker on/off	loudspeaker on/off
	long:	set volume	set volume
Lautstärketaste		not available	set volume
F1		channel selection	channel selection

4. General Operation

4.1. Initiating a Call

There are two different ways to talk via the radio:

By **pushing the red PTT button** – possible also via an **external PTT** (e.g. foot switch) - the transmitter is switched on and the transmission LED  lights up. Now, talking to the radio is possible via the gooseneck microphone. After releasing the PTT button, the person on the radio can be heard in the loudspeaker. The loudspeaker LED  is active. If the conversation is finished, the loudspeaker can be switched off using the loudspeaker button. Instead of the gooseneck microphone and the loudspeaker, a headset can also be used (available separately).

The transmitter (and the transmission LED ) can also be switched on by **taking the handset and pushing the PTT button on the inside** (only Major 4b). Accordingly, the microphone and the loudspeaker of the handset are used for conversation in this case. The conversation is terminated by simply hanging up the hand-piece.

4.2. Switching of the Loudspeaker (on/off)

The loudspeaker is switched on after sending a call by pushing the red or the external PTT button or upon reception of a call. However, it can also be activated manually via the loudspeaker button. The loudspeaker is switched off manually (loudspeaker button) or automatically after a certain time is elapsed. This loudspeaker timer is started when the loudspeaker is turned on and is reset as long as a carrier is present or PTT is activated. If desired, this timer can also be disabled. Furthermore, the loudspeaker can be configured for open-mode.

4.3. Volume Settings

In order to set the desired volume the volume button is pushed (Major 5a) or the loudspeaker button is pressed long (Major 4a). The display now shows "volume:" and the current value (0-9). Now the new volume can be set via the keypad. The chosen value is saved permanently (also after power-off).

4.4. Short Call

Via the web interface of Major 4b or Major 5b up to 10 short calls can be configured. These can be sent by pushing the short call button followed by a number from 0 to 9.

4.5. Private Call / Group Call

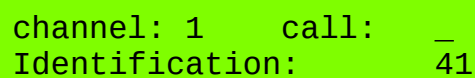
In standard mode for analogue radios the display of the Major shows "select number: ". This is followed by the most recently sent call number. On startup a flashing underscore "_" indicates that the device is ready for input. In order to send a call the variable digits of the tone sequence first have to be entered. These digits are depicted on the right side of the display (see scheme below). The transmission of the call is achieved by pushing the call button. Alternatively, calls can be sent automatically after the last free digit is entered. For the configuration of the tone call details the web interface is used.

A screenshot of a green LCD display showing the text "select number: 27". The text is in a monospaced font, with "select number:" on the left and "27" on the right.

4.6. Display of Caller ID / Channel Selection

If the display of the caller ID is configured, the desired digits of the decoded tone call are shown in the lower display line. The received ID codes can be browsed by the hash key . For deletion of the displayed ID the hash key must be pushed for a longer time (about a second).

If channel selection is used, there is two possibilities. The current channel can be displayed can be displayed permanently or only when the button for channel selection is pushed. The following scheme shows the display for permanent channel visibility and after a call was received so that the caller ID is displayed.

A screenshot of a green LCD display showing two lines of text. The first line is "channel: 1 call: _" and the second line is "Identification: 41". The text is in a monospaced font.

5. Operation in DMR

The general call handling via PTT buttons, gooseneck microphone, handset and loudspeaker also applies to the DMR mode. In the following we point out additional functions and differences of the operation in DMR. Currently supported are Motorola MOTOTRBO and Kenwood NEXEDGE radios that allow for the connection via the respective audio and data interfaces.

5.1. Display of Caller ID / Channel Selection

In analogue mode caller IDs and channels are usually displayed as a single-digit or double-digit number. In DMR, the alias names can be displayed if they are received from the radio. In most cases, more than one channel is used. Hence, permanent channel display is enabled by default. The following example scheme shows a situation where the operator uses channel "NXDN 12,5 kHz". The lower display line shows an incoming group call via group 1, initiated by the participant "Taxi 23".

```
NXDN 12,5 kHz  grp:  _  
grp:          1      Taxi 23
```

5.2. Private Call / Group Call

Depending on the configuration of Major 4b/5b the call button can be used to switch from private call ("call:") to group call ("grp:") and vice versa. After selection of the group number or the number of the participant the call can be started by one of the aforementioned means (PTT button, handset, headset, ...). In the previous scheme, group call is active but no group number has been chosen, yet. In this case, PTT will execute the radio's standard PTT function.

If private call is selected, a specific participant is called after entering its respective ID. The scheme below shows the display contents during a private call.

```
NXDN 12,5 kHz call:  23  
private call      Taxi 23
```

If you have further requirements for your DMR solution (e.g. SDS display / SDS transmission, parallel usage of analogue and digital channels, ...), please don't hesitate to contact us in order to clarify if the respective features are possible or planned already.

6. Configuration via the Web Interface

6.1. How to Reach the Web Interface

For the configuration of our table-top consoles Major 4b and Major 5b a self-explanatory web interface is used. The factory defaults of the most important network settings are given below:

User name:	m2018
Password:	radio
Local IP address:	192.168.16.181
Target IP address:	192.168.16.191
Subnet mask:	255.255.255.0
Audio/AF port :	10000, UDP protocol
Control port:	10001, TCP protocol
Web server port:	80, TCP protocol
Update port:	9999, TCP protocol

Please be aware, that all devices that have to be connected (PC, FT636B, ...) must be in the same network segment (subnet)!

6.2. Structure and Handling

The web interface can be logically divided into several segments. The title part with the FunkTronic logo contains the important **system parameters**, such as serial number, network parameters, hardware version and software version.

In the main part below, you can find the parameters for configuration. There are **System** pages (language and network settings), **Applikation** pages (other application parameters) and the **Reboot** page (for reboot and factory reset). Different pages can be selected by clicking on the page numbers below. Some pages are subdivided into different tabs, which can be activated by clicking the tab names on the right side of the page title. The currently activated page number as well as the activated tab name is displayed in bold text. For an easier overview of the available (sub)pages, you can use the **Sitemap**, available next to the page numbers.

In order to save the changes you have made on a specific page, please click "**Absenden**". This results in a flashing button "**Alles speichern**". If you are finished with your configuration, click on this button and the Major is rebooting with the new settings. However, you can change settings on

several other pages before, but remember to click "**Absenden**" for each page, which parameters have been changed.

You can find **Help** texts on the right side of the configuration part. Here, most of the settings are described in a little more detail.

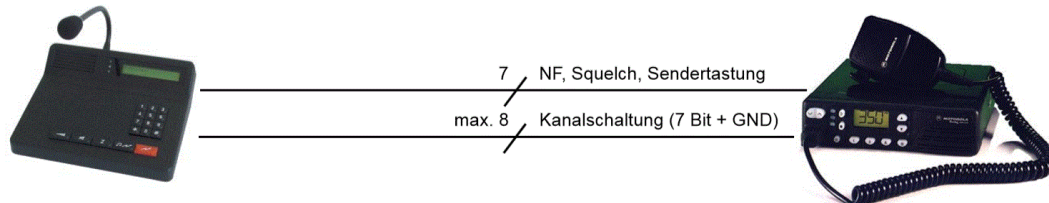
The screenshot displays the FunkTronic Major M2018 web interface. On the left, a sidebar titled "M2018 - Inhaltsverzeichnis" contains a sitemap with three main sections: "I. System" (Einstellungen lokal, Sicherheitseinstellungen, Info - System-Statusmeldungen), "II. Apps" (Allgemeine Einstellungen, Pegel, Rufgeber/Auswerter/Toene, Schalt-Ein-/Ausgaenge, LEDs, Eingangsfunktionen, Tastenfunktionen, Kanalschaltung), and "III. Reboot" (Neustart, Werksreset). The main content area is titled "FUNKTIONEN 1 - Allgemeine Einstellungen" and includes a submap (1-7) and tabs for "Konsolle", "S/E-Anschluss", and "Radio-Typ". The configuration settings are organized into sections: "Funkgeraettyp" (Analog, DMR digital), "DMR - Modus beim Einschalten" (Gruppenruf, Einzelruf), "DMR - erlaubte Modi" (Gruppenruf, Einzelruf), "DMR - max. Gesprachsdauer" (Dauer), "DMR - KW Modus" (PTT Modus, ACK Request), and "DMR - Call Alert Terminate" (Senden). The right sidebar provides detailed help text for each setting, such as "SE Schnittstelle" and "Schaltschwelle des Squelch-Eingangs". The top of the interface shows the FunkTronic logo, device information (Hersteller, Gerät, Seriennr., SW Name, SW Version), host information (Host, IP-Adresse, MAC-Adresse), and a status bar indicating "Online: 0d 0h 4min 19s".

The screenshot above shows the web interface with the sitemap activated and placed on the left side. Each of the pages and subpages can also be accessed directly via this sitemap. In this example, the web interface is active on **Applikation page 1 – subpage "Radio Type"**.

7. Example Setups - Analogue

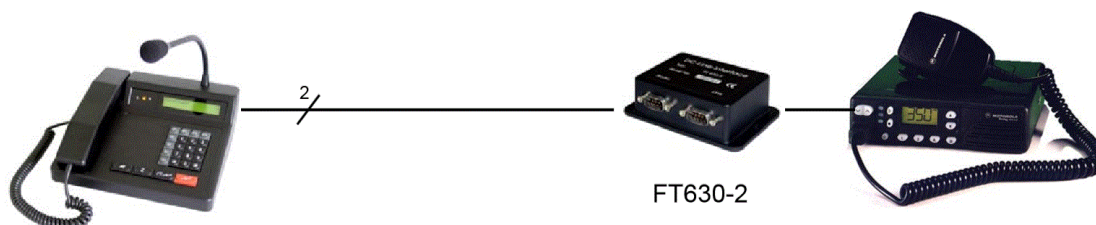
7.1. Direct Multi-Wire

The easiest and most straight-forward way to control a radio with the Major 4b/5b is depicted in the following scheme. In case no channel selection is necessary, a 7-pin line for audio, squelch and PTT is sufficient.

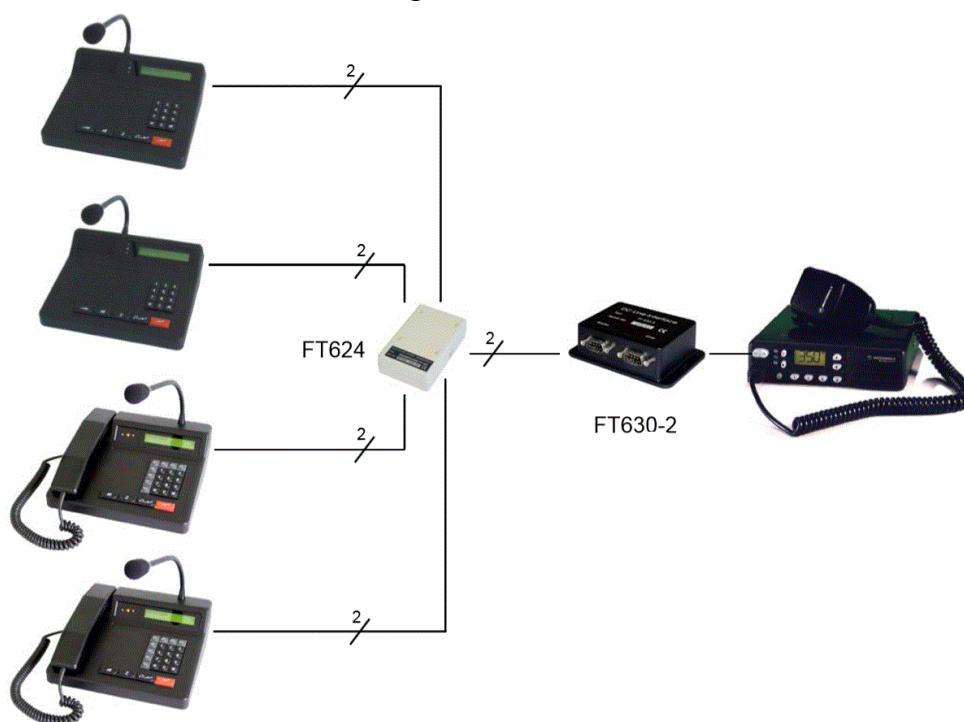


7.2. Connection Using DC Control

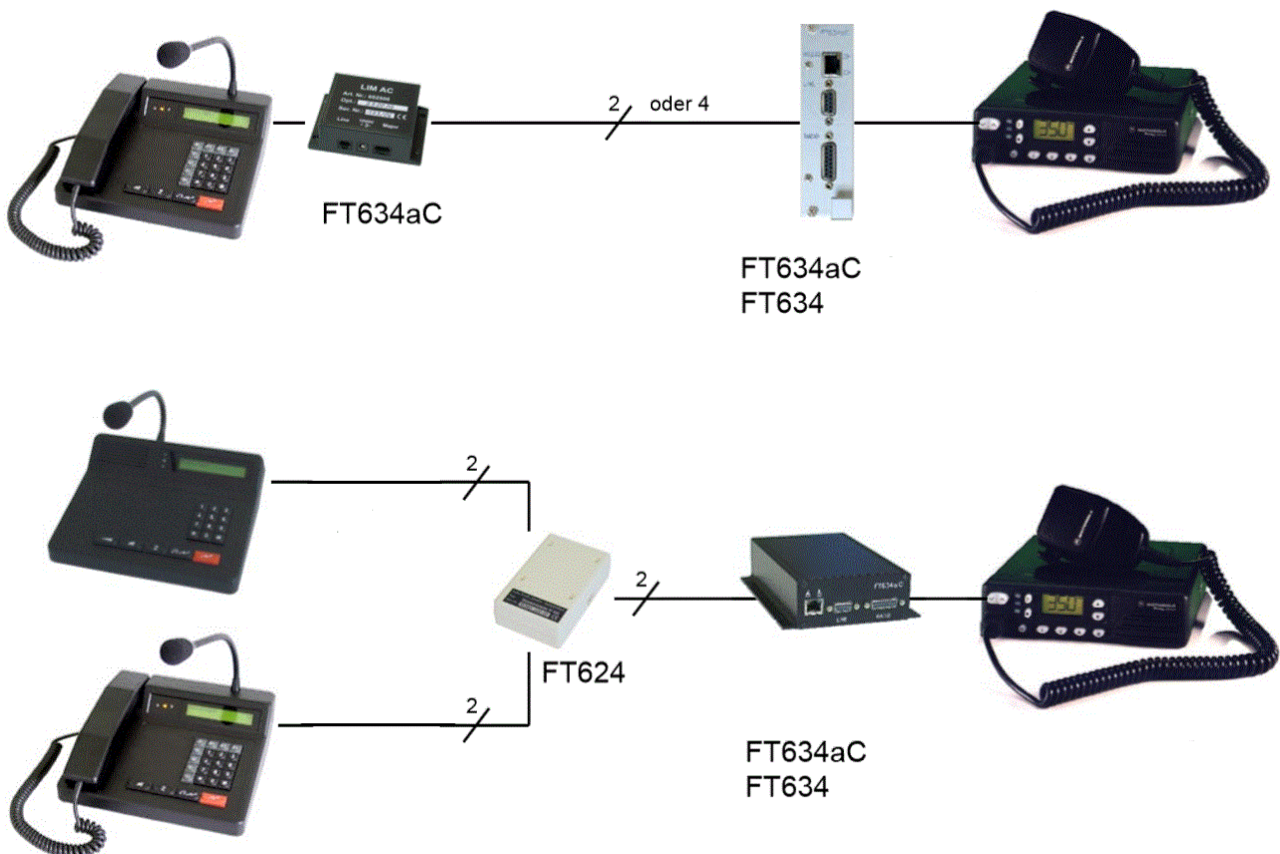
If the Major 4b/5b has to be controlled remotely via a 2-wire line, the following setup with a FT630-2 DC control unit can be used. However, no channel selection or duplex calls are possible.



Parallel connection of several consoles using an FT624 distribution frame:



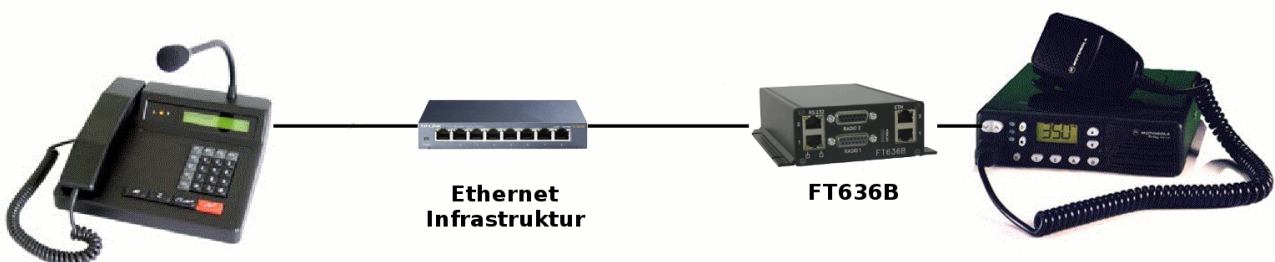
7.3. Setups with AC Control (Pilot-Tone)



For parallel connection the Major 4b/5b has to be configured to filter out the pilot-tone. If channel selection is needed, then a FT634aC must be used.

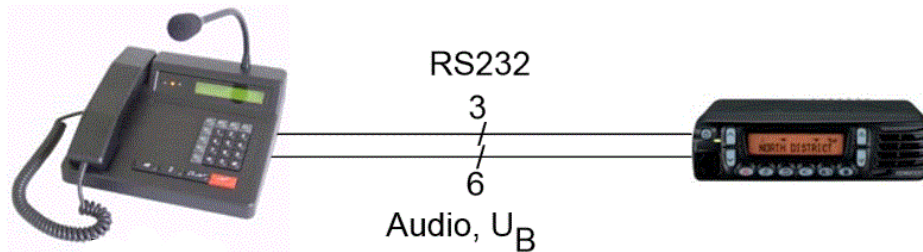
7.4. VOIP Connection

If an analogue (or digital) radio needs to be control via ethernet, the Major 4b/5b has to be equipped with **VOIP Option** (selling feature). Audio, PTT, squelch, RS232 data as well as outputs for channel selection or other purposes can be directly sent via VOIP. Usually, the recipient will an **FT636B IP Interface**, that is situated at the radio site.



8. Example Setups DMR: NEXEDGE + MOTOTRBO

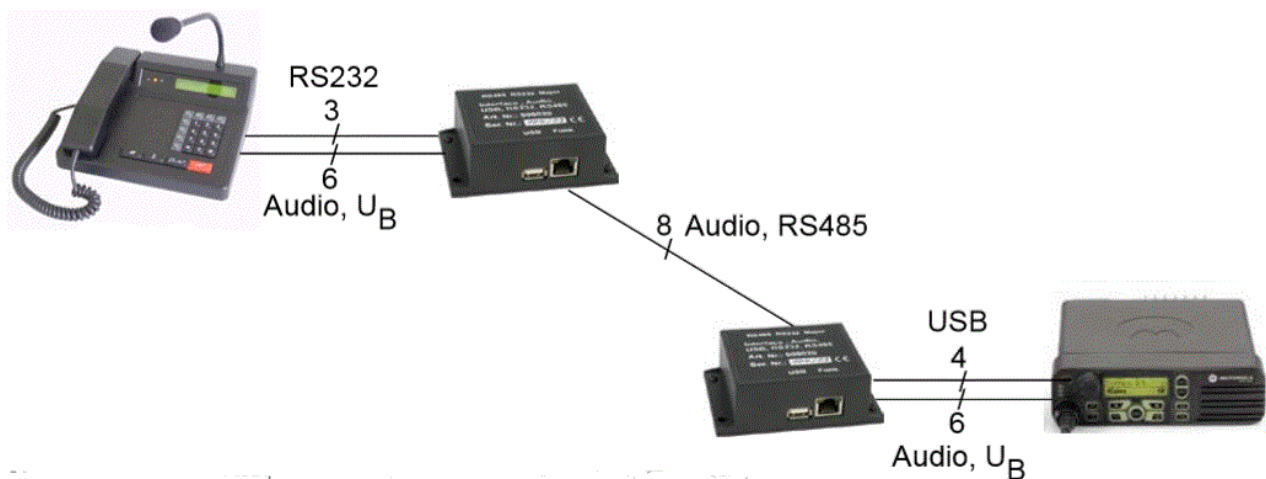
8.1. On-Site Connection Kenwood NEXEDGE



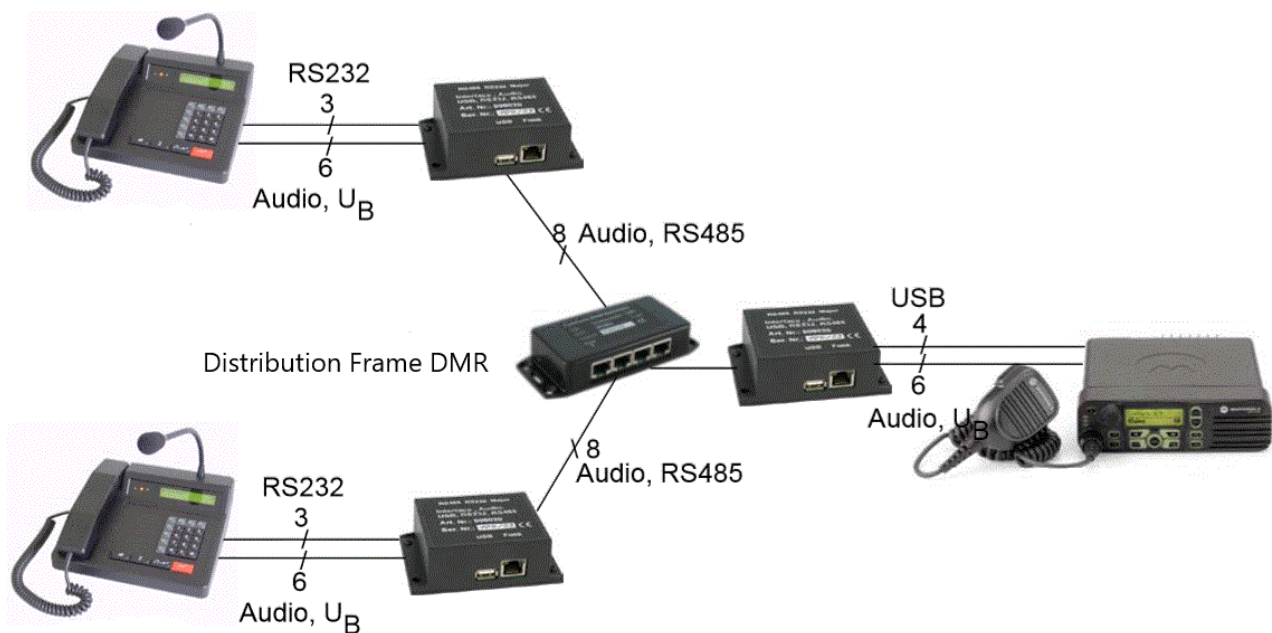
8.2. On-Site Connection Motorola MOTOTRBO



8.3. Remote Control of a single Major 4b/5b



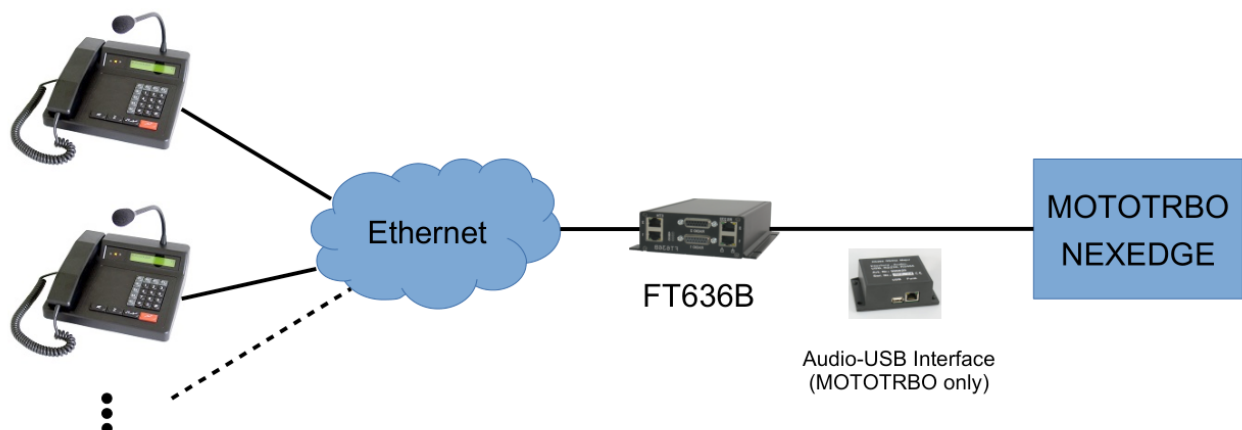
8.4. Several Consoles Control the same Radio



8.5. Remote Control via Ethernet

Mit der **Option VOIP** können genauso auch DMR-Funkgeräte abgesetzt betrieben werden. Hierbei können mehrere Major 4b/5b über eine FT636b betrieben werden (bis zu 16 Bedienkonsolen bei Anschluss eines Funkgeräts). Bei Betrieb eines Motorola MOTOTRBO Geräts muss noch unser Audio-USB-Interface zwischen FT636b und Funkgerät verwendet werden.

If Major 4b/5b consoles are equipped with the **VOIP option** (selling feature), DMR radios can also be controlled via LAN/WAN using an FT636B IP interface at the radio site (up to 16 Major consoles max per FT636B). A Kenwood NEXEDGE radio can be connected directly to FT636B. For the connection of a Motorola MOTOTRBO radio our Audio-USB Interface is needed additionally.



9. Configuration of the Radios (DMR)

9.1. Kenwood NEXEDGE

Menu Edit

→ Additional Function → Additional Functions 1 → Page 3

- COM port 1: data, normal, 2 stop bits, 9600 baud
- COM port priority: serial data
- PC interface protocol: version 2

Zusatzfunktionen 1

Allgemeine Seite 1 | Allgemeine Seite 2 | **Allgemeine Seite 3** | Allgemeine Seite 4

Batterie-/ Akku

Batterie-/ Akkusparbetrieb: Aus

Batterie-/ Akkuanzeige: LCD & LED

Batterie-/ Akkuwarnung: Immer

☒ Batterie-/ Akkuwarnton

LEDs

☒ Senden-LED

☒ Belegt-LED

☒ Monitor-LED

COM-Port-Priorität: Serielle Daten

PC-Schnittstellenprotokoll: Version 2

COM-Port-Nummer	Funktion	Polarität	Stopp-Bit	Baud-Rate
COM-Port 0	Keine	Normal	2	9600
COM-Port 1	Daten	Normal	2	9600
COM-Port 2	Keine	Normal	2	9600

CW-ID Erweiterungsschalter

Schließen Hilfe

→ Page 4

- Serial input: data priority

Zusatzfunktionen 1

Allgemeine Seite 1 | Allgemeine Seite 2 | Allgemeine Seite 3 | **Allgemeine Seite 4**

PTT-ID (Analog)

PTT-ID-Typ: DTMF

Senden Anfang:

Senden Ende:

PTT-ID-Pausendauer [s]: 1

Meine ID

Meine ID-Töne: 1 2 3 4 5 6 7 8

Meine ID:

☐ Meine ID bei Inbetriebnahme Bearbeiten

Stapel

- ☒ Statusnachrichten-Stapel
- ☒ Kurznachrichten-Stapel
- ☐ Anrufer-ID-Stapel
- ☒ Stapel zuletzt empfangener Nachrichten
- ☐ Nachrichtenspeicher
- ☐ ID-/Nachrichtenstapel mit Zeitstempel

Serieller Ausgang

- ☒ Statusnachricht an Serieller Ausgang
- ☒ Kurznachricht an Serieller Ausgang
- ☒ Geräte-ID an Serieller Ausgang
- ☐ J-Befehl an Serieller Ausgang
- ☐ Transparenter Kopf

Serieller Eingang

- ☒ Datenvorrang

Status Halten:

Schließen Hilfe

Menu Edit → Advanced Functions → Modulation Line

- Mic-PTT: MI2-line: Connect

Erweiterte Funktion

Zusatzkarte | AUX | Entfernte Zone-CH/GID | **Modulationsleitung** | Mobilfunktion

PTT	Mit Modulationsleitung Verbinden			Mit QT/DQT	Mit STE
	Mik-Leitung	MI2-Leitung	DI-Leitung		
Mik-PTT	Verbinden	Verbinden	Freigeben	Ja	Ja
Externe PTT (Sprache)	Freigeben	Verbinden	Freigeben	Ja	Ja
Externe PTT (Daten)	Freigeben	Freigeben	Verbinden	Ja	Ja
Daten-PTT	Freigeben	Freigeben	Verbinden	Ja	Ja

Modulationsleitung durch Mik-PTT

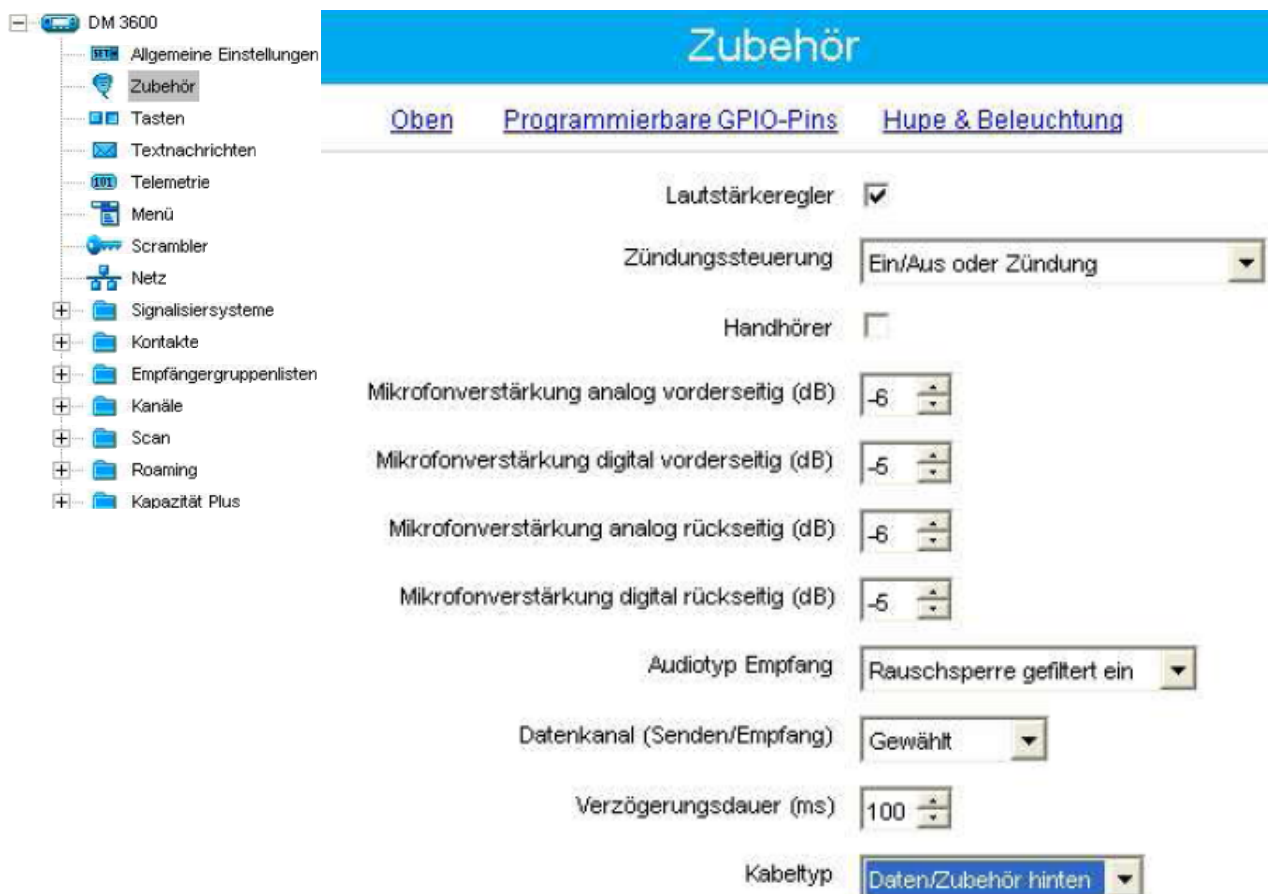
9.2. Motorola MOTOTRBO

For proper functionality of the Major 4b/5b two configurations have to be made at the Motorola MOTOTRBO radio using the MOTOTRBO Customer Programming Software .

- **Language: German or English** (in the table of contents – **General Settings**)
- **Cable Type: Rear Data/Accessory** (in the table of contents – **Accessories**)

Remark: You have to switch the view to expert mode in order to change these settings. Got to the menu View and check the box for "expert".

The following screenshot shows the preferences for the cable type.



10. Pin Layouts of the Connectors

10.1. Rear View Major 4b/5b



10.2. Pin Layouts

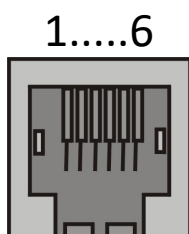
Voltage Supply

+12V DC, max. 1,5 A

inside: U+, outside: GND

Socket RS232

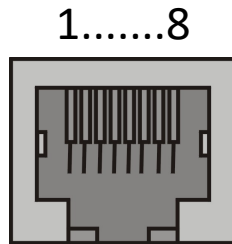
Data connector for local connection of MOTOTRBO or NEXEDGE radios



1	NC
2	NC
3	TXD
4	RXD
5	GND
6	NC

Socket I/O

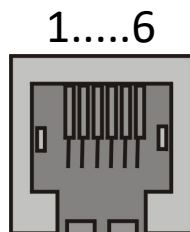
Programmable in/outputs, e.g. for channel selection of an analogue radio



1	IN/OUT 1
2	IN/OUT 2
3	IN/OUT 3
4	IN/OUT 4
5	IN/OUT 5
6	IN/OUT 6
7	IN/OUT 7
8	GND

Socket PTT

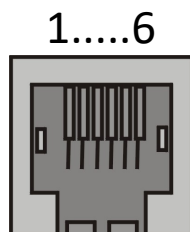
Connection of an ext. PTT (e.g. foot switch)



1	GND (PTT HS2 GND)
2	GND AF in (mic -)
3	AF out HS (earphone +)
4	GND AF out (earphone -)
5	AF in HS (mic +)
6	PTT HS2 in

Socket HS

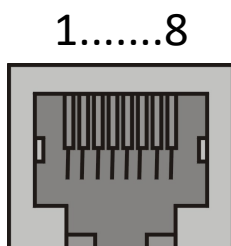
Connection of a headset



1	GND (PTT HS1 GND)
2	AF in HS (mic +)
3	AF out HS (earphone +)
4	GND AF out (earphone -)
5	GND AF in (mic -)
6	PTT HS1 in

Socket S/E

Analogue 8pin socket connection of the radio



1	AF in B
2	AF in A
3	SQL in S/E (with pullup)
4	GND
5	+BATT out (not for the radio!)
6	PTT S/E (in/out)
7	AF out A
8	AF out B

Zum Anschluss über 2-Drahttechnik müssen hier Pins 7 und 8 verwendet werden.

Socket USB

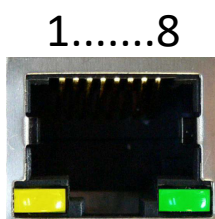
Not in use



1	+5V
2	DATA -
3	DATA +
4	GND

Socket ETH

Ethernet connector, optionally with power-over-ethernet capability (**hardware selling feature!**)



1	TX +
2	TX -
3	RX +
6	RX -

11. Technical Data

Dimensions (w/o gooseneck)	245 x 220 x 90 mm (W x D x H)
Weight	ca. 1500 g
Operating Voltage	+12V / -15% +25%
Current Consumption	max. 800 mA

Input Level (S/E)

Input Level 4-Wire	50 mV (-24dBm) to 775 mV (0dBm)
Input Level 2-Wire	70 mV (-21dBm) to 1050 mV (+2,5dBm)
Input Impedance	600 Ohm

Output Level (S/E)

Level w/o additional pilot-tone	30 mV (-28dBm) to 550 mV (-3dBm)
Level with additional pilot-tone	30 mV (-28dBm) to 450 mV (-5dBm)
Output Impedance	600 Ohm

Earphone Output Level (RX out, to headset)

Ex Factory Set to	0 dB (at 200 Ohm)
Adjustment Range	-99 dB to +26 dB
Output Impedance	ca. 150 Ohm

Microphone Input Level MIC 2 (TX in, from headset)

Ex Factory Set to	0 dB
Adjustment Range	-99 dB to +26 dB
Input Impedance	ca. 700 Ohm

12. General safety instructions

Please read the manual carefully before installation and setup of your device.

The relevant regulations must be complied to when working with 230V line voltage, two-wire-lines, four-wire-lines and ISDN-lines. It is also very important to comply to the regulations and safety instructions of working with radio installations.

Please comply to the following safety rules:

- All components may only be mounted and maintained when power is off.
- The modules may only be activated if they are built in a housing and are scoop-proof.
- Devices which are operated with external voltage – especially mains voltage – may only be opened when they have been disconnected from the voltage source or mains.
- All connection cables of the electronic devices must be checked for damage regularly and must be exchanged if damaged.
- Absolutely comply to the regular inspections required by law according to VDE 0701 und 0702 for line-operated devices.
- Tools must not be used near or directly at concealed or visible power lines and conductor paths and also not at and in devices using external voltage – especially mains voltage – as long as the power supply voltage has not been turned off and all capacitors have been discharged. Electrolytic capacitors can be still charged for a long time after turning off.
- When using components, modules, devices or circuits and equipment the threshold values of voltage, current and power consumption specified in the technical data must absolutely be complied to. Exceeding these threshold values (even if only briefly) can lead to significant damage.
- The devices, components or circuits described in this manual are only adapted for the specified usage. If you are not sure about the purpose of the product, please ask your specialized distributor.
- The installation and setup have to be carried out by professional personnel.

13. Returning of old equipment

According to German law concerning electronic devices, old devices cannot be disposed off as regular waste. Our devices are classified for commercial use only. According to § 11 of our general terms of payment and delivery, as of August 2015, the purchasers or users are obliged to return old equipment by us free of cost. FunkTronic GmbH will dispose of this old equipment at its own expense according to regulations.

Please send old equipment for disposal to:

FunkTronic GmbH
Breitwiesenstr. 4
36381 Schlüchtern
GERMANY

>>> Important: Freight forward deliveries cannot be accepted by us!

Subject to change, errors excepted!

14. Release Notes

- 01.11.19 - Creation of first English version from German manual
- 13.05.20 - Option VOIP no longer "not fully implemented"
- 23.06.20 - example for DMR VoIP connections added, available accessory cables added