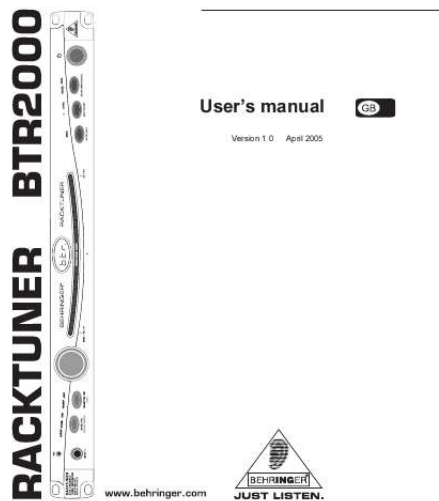




# Your PDF Guides

You can read the recommendations in the user guide, the technical guide or the installation guide for BEHRINGER BTR2000. You'll find the answers to all your questions on the BEHRINGER BTR2000 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

**User manual BEHRINGER BTR2000**  
**User guide BEHRINGER BTR2000**  
**Operating instructions BEHRINGER BTR2000**  
**Instructions for use BEHRINGER BTR2000**  
**Instruction manual BEHRINGER BTR2000**



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**Manual abstract:**

**WARNING:** To reduce the risk of fire or electric shock, do not expose this appliance to rain and moisture. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus. **DETAILED SAFETY INSTRUCTIONS:** 1) Read these instructions. 2) Keep these instructions. 3) Heed all warnings. 4) Follow all instructions. 5) Do not use this apparatus near water. 6) Clean only with dry cloth. 7) Do not block any ventilation openings. Install in accordance with the manufacturers instructions.

8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. 9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety.

If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet. 10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus. 11) Only use attachments/accessories specified by the manufacturer. 12) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13) Unplug this apparatus during lightning storms or when unused for long periods of time. 14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped. 15) CAUTION - These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operation instructions unless you are qualified to do so. 2 RACKTUNER BTR2000 TABLE OF CONTENTS 1. INTRODUCTION ....

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where it will provide optimal support in any situation. 1.1 Before you get started 1.1.1 Shipment The RACKTUNER was carefully packed at the assembly plant to assure secure transport. If the condition of the cardboard box suggests that damage may have occurred, please inspect the unit immediately and look for physical indications of damage. + + + + Damaged equipment should NEVER be sent directly to us. Please inform the dealer from whom you acquired the unit immediately as well as the transportation company from which you took delivery of the unit.

Otherwise, all claims for replacement/repair may be rendered invalid. To assure optimal protection of your BTR2000 during transport, we recommend utilizing a carrying case. If the unit needs to be shipped, please always use the original packaging to avoid damage. Never let unsupervised children play with the BTR2000 or with its packaging. Please dispose of all packaging materials in an environmentally-friendly fashion.

1.1.2 Initial operation Be sure that there is enough space around the unit for cooling. To avoid overheating, please do not place the VINTAGER near radiators and other equipment emitting heat. The BTR2000 features a shockproof housing to ensure safe operation without requiring separate grounding.

1.1.3 Online registration Please do remember to register your new BEHRINGER equipment right after your purchase by visiting [www.behringer.com](http://www.behringer.com) (alternatively [www.behringer.de](http://www.behringer.de)) and kindly read the terms and conditions of our warranty carefully. BEHRINGER warrants all items purchased against defects in material or workmanship for one year\* from date of purchase. Full terms of the warranty may be found on our website at [www.behringer.com](http://www.behringer.com).

com (alternatively [www.behringer.de](http://www.behringer.de)). Should your BEHRINGER product malfunction, our goal is to have it repaired as quickly as possible. To arrange for warranty service, please contact the retailer from whom the equipment was purchased. 4 1. INTRODUCTION RACKTUNER BTR2000 Should your BEHRINGER dealer not be located in your vicinity, you may directly contact one of our subsidiaries. Corresponding contact information is included in the original equipment packaging (Global Contact Information/European Contact Information). Should your country not be listed, please contact the distributor nearest you. A list of distributors can be found in the support area of our website ([www.behringer.com](http://www.behringer.com)).



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behringer.com/support). Registering your purchase and equipment with us helps us process your repair claims quicker and more efficiently. Thank you for your cooperation! \*Customers in the European Union may have a different term, as such, please contact BEHRINGER Germany Support for further details.

2.

**CONTROL ELEMENTS AND CONNECTIONS** This chapter describes the different control elements of your BTR2000. All of the buttons and connectors are explained in detail with useful information on how to make the most of them. Most of the buttons on the RACKTUNER have a dual function. The different functions on each button are distinguished by how long the button is held down when pressed. The RACKTUNERs operating modetuner or metronome mode also determines button function.

There are one or two LEDs above each button. They correspond to the functions of the buttons. For example, either the 1 or 2/MIC light is always on above the INPUT SELECT button. The MUTE is pressed to turn off the sound of the unit. LED on the other hand only lights up when the MUTE button + When you switch to metronome mode, the LEDs for the tuner mode are turned off. 2.1 Front Fig. 2.1: Operating elements on the left side of the BTR2000 The built-in microphone MIC can be used to tune the instrument (chapter 4.4.

2) and calibrate the standard A pitch (chapter 4.2.2). To do this, you must select INPUT 2 and press the MUTE button. You can plug your instrument into the INPUT 1 connector on the front of the BTR2000. This connector takes priority over the INPUT 1 connector on the rear panel. If there are instruments plugged into both the front and back INPUT 1 connectors at the same time, the unit only evaluates the signal of the instrument plugged into the front. MODE/FINE [DISPLAY/MODE] button. Tuner mode: After pressing this button briefl2 outputs. Depending on the input selection and on what is connected to the outputs, the sounds generated by the unit (metronome click and reference tones) can be output from the SOUND connector or from the MAIN output connector together with the instrument signal.

You can decide whether to use two different amplifiers for the instrument sound and the BTR2000 sounds or just one. Possible connection configurations: Trs!6 Listen to instrument and BTR2000 tones utilizing qvssrrh Trs 6 Listen to instrument and BTR2000 tones utilizing urhrh Select DIQVU! (to use the integrated microphone, push MUTE as well) your amp to H6DI; may be connected to TPVI9 SelectDIQVU Select DIQVU!(to use the integrated microphone, push MUTE as well) Connect instrument amp to H6DI; Connect your amp to TPVI9 to hear metronome click signal or reference tones Connect Iuvtwhatsoever Table 3.1: Setups for working with one or two amplifiers 3. INPUT CHANNEL SELECTION 7 DEUTSCH RACKTUNER BTR2000 + To enable reference tones and the metronome, click to be output from the MAIN connector, INPUT 2 must be selected and there must be nothing plugged into the SOUND connector! Using the built-in microphone If you want to use the built-in microphone, you must select INPUT 2 and the MUTE button must be pressed. 4.

**TUNER** The BTR2000 tuner lets you control several parameters: s s s There are 11 different tuner modes. The standard A pitch can be calibrated individually. You can transpose the pitch if desired. When the BTR2000 is first switched on or when no functions are selected, the display shows the following: ---. Once a button has been pressed to select a function, the display shows the values that have been set.

This lets you set the optimal configuration for any purpose. + 4.1 Instrument tuning There are several ways to use the BTR2000 to tune your instrument: s s s 1. 2. 3. You can tune an instrument plugged into the input connector by using the tuning display. If the instrument is not connected to the BTR2000, you can tune it using the built-in microphone. You can also tune an instrument using a reference tone emitted by the BTR2000. 4.1.

**1 Tuning with an instrument plugged in** Plug your instrument into one of the INPUT connectors on the front or rear panel of the unit (see chapter 3). Press the INPUT SELECT button to select the input your instrument is plugged into. The 1 or 2/ MIC LED will light up depending on which input is selected. Select the tuner mode you wish to use (see chapter 4.2). The BTR2000 only recognizes and displays certain pitches depending on the selected tuner mode. @@Play a note on your instrument (generally an open string). The tuner is set to recognize the frequency of the pitch. The display will show the name of the note closest to the frequency you have generated. The unit displays the note that is available in this mode and comes closest to the frequency played.

In chromatic mode the BTR2000 can recognize half-tones. These are indicated by a b in the display. + 4. 5. 6.

+ + 7. For example, a note that is played and identified on the display as A may deviate somewhat from the ideal pitch. The LED bar clearly indicates this deviation. Using the LED bar, you can monitor how far and in what direction your note deviates from the ideal. If the display tends to the left, the note played is somewhat flat and if the LEDs tend to the right your note is too sharp.

The LED bar on the BTR2000 can indicate deviations up to 50 cents (a quarter tone) sharp or flat. If the incoming frequency deviates more than this from the displayed note, the LED display either remains on the far left or right or jumps to the next note. @@@@9. 8 4. TUNER + 1. 2. 3. @@Select INPUT 2 with the INPUT switch on the front of the BTR2000. The 2/MIC LED lights up. @@The built-in microphone is now activated and ready for use.

Position your instrument as close as possible to the BTR2000. @@@@You can then tune your instrument by ear without an optical display. @@Select the tuner mode you wish to use (see chapter 4.2). @@@@Briefly press the SOUND/METRONOME button. @@The display shows the volume level currently set (1, 2, ... 12). @@The volume of the reference tone can be set with the wheel.

@@During this adjustment the TRANSP and SOUND LEDs are illuminated. @@@@3. 4. 5. 6.

7. @@To exit sound mode, briefly press the SOUND/METRONOME button again. @@guitar, bass, ukulele) are tuned differently. @@@@@@@ (B - E - A - D - G - B - E) 4. @@@@ (B - E - A - D - F sharp - B) Banjo (bjo) The very widely used banjo tuning is made possible with this mode.

(G - D - G - B - D) Ukulele (ule) The BTR2000 recognizes the notes of the open strings of a ukulele. (G - C - E - A) Open D (o-d) The open strings are tuned so that they create a D major chord. (D - A - D - F sharp - A - D) Open E (o-E) The open strings are tuned so that they create an E major chord. (E - G sharp - E - G sharp - B - E) Open G (o-G) All open strings create a G major chord. One good variant of this is the following tuning: G - B - D - G - B - D. Since the low strings are under very high tension in this tuning, the strings can also be tuned as follows: D - B - D - G - B - D Open A (o-A) The tuner recognizes only the notes of an A major chord.



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(E - A - C sharp - A - C sharp - E) DADGAD (dad) In this mode, the tuner recognizes the following notes: D - A - D - G - A - D. When it is switched off, the BTR2000 stores the selected tuner mode. + The names of the notes are shown on the display as follows: G899vyh @ A? A B? B C D? D >? > ?? ? @tyvuIrIhr C C#/Db D D#/Eb E F F#/Gb G G#/Ab A A#/Bb B Tab. 4.

1: Note display 4.3 Calibrating the tuner To give you every available option for tuning your instrument, you can change the setting of the standard A pitch. In order to clarify what this involves we will take a slight digression. The so-called standard A pitch has risen over time since its initial measurement: The tuning forks used by Bach, Hndel or Mozart were at 415, 420 or 421 Hz (cycles per second). Today's orchestras tune to an A of 444 Hz. The Berlin Philharmonic is right at the forefront: their standard A is 447 Hz. The pitch of the standard A on the BTR2000 is set at the factory to 440 Hz. In the event you want to play with a major orchestra that tunes to a standard A of 444 Hz, you need a function that will let you change the frequency of the A. + 10 The calibration settings are stored even if you switch the BTR2000 off. 4.

TUNER 4.3.1 Manual calibration 1. 2. 3.

RACKTUNER BTR2000 The pitch of the standard A is set to a particular frequency using the BTR2000 control panel. Depress the TRANSPOSE/REF button for at least two seconds. The 440 LED flashes. The display shows the frequency currently set for the standard A, e.g.

440. You can adjust the pitch of the standard A by up to 12 Hz higher or lower by turning the wheel. When you press the TRANSPOSE/REF button again for at least two seconds, the unit saves the frequency you set for standard A, the frequency is no longer displayed and the 440 light stops flashing. 4. 4.3.2

Automatic calibration The BTR2000 recognizes a pitch played on an instrument plugged into the unit or into the integrated microphone. The corresponding A is determined and stored. + 1. 2.

Any note can be played for the automatic calibration. Connect your instrument to an input of the BTR2000. You can also use the built-in microphone (select INPUT 2 and press the MUTE button). Depress the TRANSPOSE/REF button for at least two seconds. The display shows the frequency currently set for the standard A and the 440 light flashes above the TRANSPOSE/REF button during the entire process. Turn the frequency all the way down (to the left) with the wheel. After the lowest possible frequency for the standard A (428 Hz), auT appears on the display, automatic calibration is activated and the unit waits for an input frequency. Play a note. The display shows the name of the note closest to the one you played. The LED bar indicates the deviation from the displayed note.

If this is unsatisfactory, you can play the note again. You can cancel the calibration by pressing and holding the TRANSPOSE/REF button. If the input note is too unstable or too soft, the automatic calibration cannot proceed. If the note is satisfactory and the display in the LED bar is stable, you must briefly press the TRANSPOSE/REF button. The BTR2000 stores a standard A pitch that is attuned to the note you played.

The frequency of this A is displayed. The calibration is completed by pressing and holding the TRANSPOSE/REF button. If you do not hold the button long enough, the calibration process restarts. If the pitch of the standard A is other than 440 Hz, the 440 LED above the TRANSPOSE/REF button lights up. 3.

4. + 5. 6. 7. In order to change the frequency of a stored standard A, press the TRANSPOSE/REF button for at least one second and adjust the frequency using the wheel. 4.4 Transposition For certain applications, it may be useful to shift the tuning of the instrument by a few half-tones. Easier interplay with other instruments Say a song needs to have brass accompaniment. While pieces in a flat key (such as F major (1 flat), B flat major (2 flats) and C minor (3 flats)) are especially well suited to brass, many guitarists and bassists are not very comfortable playing in these keys. There are several options for playing such pieces: s s The guitarist and bassist play the complicated fingerings of the flat keys.

These two players instruments are tuned (transposed) so that the easier fingerings of a different key (e.g. C major or G major) can be used to produce the correct chords in the actual key of the piece. Achieve a specific sound With a different tuning, the tension on the strings is different. This change creates different overtones when the strings are played, giving the instrument a different sound. The BTR2000 lets you complete such a transposition easily and accurately. 4. TUNER 11 DEUTSCH If the pitch of the standard A is other than 440 Hz, the 440 LED above the TRANSPOSE/REF button lights up.

RACKTUNER BTR2000 1. 2.

Briefly press the TRANSPOSE/REF button. The TRANSP light flashes and the display shows the transposition currently set (0, if no transposition is set). Turn the wheel to transpose up to 7 half-tones higher or lower. The display indicates the number of half-tones by which a non-transposed instrument is too high (1, 2, ..

., 7) or too low (-1, -2, ..., -7), when compared with the BTR2000 transposition.

You can exit this menu by pressing the TRANSPOSE/REF button again. When a transposition is set, the TRANSP LED above the TRANSPOSE/REF button lights up. 3. 4. Example A piece should be played in F major. This key has 1 flat, and thus it has several complex fingerings. You want to retune the guitar so that you can use G major fingerings to play F major chords. To do this, you must transpose the instrument down 2 half-tones. s s To set the transposition, briefly press the TRANSPOSE/REF button. The display still shows the number 0 (no transposition set).

Turn the wheel so that the display shows the number 2 (2 half-tones higher). Now your instrument is tuned 2 half-tones above the tuner and must be tuned down. When a transposition has been set, the TRANSP LED above the TRANSPOSE/REF button lights up. Select a tuner mode (chapter 4.2) and tune all strings of your instrument as described in chapter 4.1. When the tuning process is finished, the fingering for a G major chord plays an F major chord. The calibration settings are stored even if you switch the BTR2000 off. + s s + To turn off the transposition, press the TRANSPOSE/REF button and turn the wheel until the display indicates a transposition up/down or 0. The TRANSP light goes out.

4.5 Setting your own tempering The topic of tempering is a very interesting and extensive one. It has been much studied scientifically and this knowledge gives you many ways to work with the specific characteristics of your instrument and individual pieces. This topic can only be touched upon here. You can find more exciting information about this at our website at [www.behringer.de](http://www.behringer.de).

[www.behringer.com](http://www.behringer.com)). Equal tempering The pre-set tuner modes of the BTR2000 are all based on an equal tempering.



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This means that only the octave interval is exactly right (frequency doubling); to generate other intervals, the octave is divided into 12 equal half steps, which make up the individual intervals (e.g. a fourth = 5 half steps). However, the resulting intervals do not correspond entirely to the ideal intervals (intervals of a natural scale); each interval is slightly out of tune. At any rate, these deviations are barely audible and are thus not perceived as dissonant. This type of tuning is nevertheless a compromise, but it enables all keys to be played with just one tuning. Custom tempering The BTR2000 tuner makes it possible to tune using different temperings, whether existing or customized. This means that some strings are tuned a few cents higher or lower according to a certain system. The scale of the LED bar can be changed from 50 cents to 10 cents. This enables extremely precise tunings since each light in the bar corresponds to exactly 1 cent.

+ 1. 2. Before starting fine tuning, you should first tune your instrument as described in chapter 4.1. To change the scale of the LED bar, press and hold the MODE/FINE button. If the 10 Cent display is selected, the FINE light above the MODE/FINE button lights up. Tune your instrument as described in chapter 4.1. Now you can see the smallest deviations from the pre-set pitch on the LED bar and adjust them with complete confidence. 12 4.

TUNER 5. METRONOME RACKTUNER BTR2000 The integrated metronome in the BTR2000 has a range of 30 beats per minute (BPM) to 240 BPM. There are essentially 2 ways to use the metronome: s s 1. 2. 3.

You can pre-set a tempo (e.g. 60 BPM). The BTR2000 can pick up a tempo set by you. Press and hold the SOUND/METRONOME button for 2 seconds. Briefly press INPUT SELECT; the click and the optical display of the metronome start up. The metronome values set most recently (BPM, type of graphic display, click volume, MUTE) are stored when the BTR2000 is turned off. To use the metronome, the BTR2000 must be in metronome mode: The metronome function is selected when the METR light above the button is lit. + 5.1 Setting the BPM rate 1. 2. 3. 4. 5. Set the BTR2000 to metronome mode (press and hold the SOUND/METRONOME button for 2 seconds).

The selected BPM rate appears in the display. You can adjust the BPM rate using the wheel. Briefly press the INPUT SELECT button. The metronome starts up. The selected tempo appears in the display and is indicated optically and acoustically. 5.2 Using the TAP function 1. 2. 3. Set the BTR2000 to metronome mode (press and hold the SOUND/METRONOME button for 2 seconds).

Press the TAP button at least 4 times in succession in the desired tempo. During your entry, the letters tap appear in the display. The BTR2000 metronome takes this tempo and displays it in BPM. If the TAP button is pressed fewer than four times, the metronome returns to the last set value after 2 seconds. If necessary, the tempo can be readjusted after setting using the wheel.

Briefly press the INPUT SELECT button. The metronome starts up. The detected tempo is indicated visually and acoustically. + 4. 5.

6. 5.3 Acoustic and visual BPM indicator Visual display The BTR2000 has two ways of indicating the selected tempo on the LED bar: s s A flashing light indicates the tempo. A light moves constantly from one side to the other with the beat. This simulates the needle of a standard mechanical metronome. Set the BTR2000 to metronome mode (press and hold the SOUND/METRONOME button for 2 seconds). Start the metronome by pressing the INPUT SELECT button.

Briefly press the MODE/FINE button to toggle between the two display types. You can toggle between these two display types as follows: 1. 2.

3. 5. METRONOME 13 DEUTSCH RACKTUNER BTR2000 Acoustic indicator The selected tempo is also output at the SOUND or MAIN connector. + If your instrument is plugged into INPUT 1, the metronome click is output only through the SOUND connector. If it is plugged into INPUT 2, and the SOUND output is not in use, the metronome click is output together with the instrument signal from the MAIN connector. You can change the volume of the click at any time and thus control the volume ratio between instrument and click if you are listening to both using one amp. 1. 2. Briefly press the SOUND/METRONOME button. The SOUND LED above the button lights up.

With the wheel you can adjust the volume of the click with 12 volume levels. Even at the lowest volume level (1), the metronome click is still audible. The click can be shut off with the MUTE button. If the volume is not changed for some time or if the SOUND/METRONOME button is pressed again, the SOUND light goes out. Press the MUTE/LIGHT button.

The metronome click is muted and no longer output through the MAIN connector. + 3. The metronome can naturally be muted without affecting the visual display. 1. 2.

6. USING A FOOTSWITCH Single footswitches can be plugged into the MUTE and SELECT connectors (not included). + Use only non-latching footswitches! The BEHRINGER DUAL A/B SWITCH AB200 is ideally suited. The following functions are available with the footswitch: ORGH TUNER METRONOME To mute MAIN output Activate/deactivate metronome 6ZLWFK MUTE SELECT To mute MAIN output Toggle between INPUT1 and INPUT2/MIC inputs Table 6.1: Options overview If you have a double footswitch such as the BEHRINGER FS112, it must be connected to the SELECT connector! Both functions (MUTE and SELECT) are then transmitted over a stereo connection and can be controlled using the two buttons. 14 6. USING A FOOTSWITCH RACKTUNER BTR2000 7. APPLICATION EXAMPLES The following sample configurations should give you an idea how the BTR2000 can be integrated in a more or less complex environment. @@@@ @@@@ APPLICATION EXAMPLES 15 DEUTSCH RACKTUNER BTR2000 MAIN RACKTUNER BTR2000 8. INSTALLATION 8.

1 Rack installation The BTR2000 requires one height unit (1 HU) for installation in a 19" rack. Be certain to leave an additional 10 cm free in the back for the connectors. For installation in a rack, M6 machine screws and nuts should be used. Ensure a sufficient air supply and to not place your BTR2000 on an end, for example, to prevent the unit from overheating. 8.2 Audio inputs and outputs All audio inputs and outputs on the BEHRINGER BTR2000 are laid out as mono TS connectors. Fig. 8.1: 1/4" TS connector 8.3 Footswitch wiring If a double footswitch is plugged into the SELECT connector on the back of the BTR2000, the MUTE function is transmitted on the ring and SELECT is transmitted on the tip.

Fig. 8.2: 1/4" TRS connector plug of a double footswitch + 16 Always make sure that only technically qualified people install and operate your RACKTUNER. During and after the installation, all those handling the equipment need to be sufficiently grounded in order to avoid the potentially damaging electrostatic discharge or similar damage that could have a permanent adverse effect on your equipment.



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INSTALLATION RACKTUNER BTR2000 9. SPECIFICATIONS AUDIO CONNECTORS INPUT 1 Input impedance INPUT 2 Input impedance SOUND Output impedance MAIN Output impedance CONNECTOR FOR FOOTSWITCH MUTE SELECT TUNER Scale Frequency range Reference tone for manual or automatic calibration Display scale Display resolution METRONOME Tempo range RACKLIGHT Illumination POWER SUPPLY Power range USA/Canada China Europe/U.K./Australia Japan 9W 120 220 240 100 V~, V~, V~, V~, 60 50 50 50 Hz Hz Hz - 60 Hz 4 x LED, 5 mm, white 30 BPM - 240 BPM 12 equally tempered notes 27.5 Hz to 4186 Hz 440 Hz 12 Hz 50 Cent ( 0.

5 half steps) 1 cent, 5 cents 1/4" TS connector 1/4" TRS connector 1/4" TS connector on the front and back 1 M, relay hard bypass 1/4" TS connector 1 M, buffered 1/4" TS connector 4.5 k 1/4" TS connector 500 Power consumption DIMENSIONS/WEIGHT Dimensions (W x H x D) Weight approx. 19" x 4 1/3" x 1 3/4" (483 mm x 110 mm x 44 mm) approx. 2 1/3 lbs (1.2 kg) BEHRINGER is constantly striving to maintain the highest professional standards. As a result of these efforts, modifications may be made from time to time to existing products without prior notice. Specifications and appearance may differ from those listed or shown. Technical specifications and appearance subject to change without notice. The information contained herein is correct at the time of printing. The names of companies, institutions or publications pictured or mentioned and their respective logos are registered trademarks of their respective owners.

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Tel. +49 2154 9206 0, Fax +49 2154 9206 4903 9. TECHNICAL DATA 17 DEUTSCH RACKTUNER BTR2000 SHORT INSTRUCTIONS 18 SHORT INSTRUCTIONS .



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