



User Manual v1.0

Forza-bj

Single channel amplifier



Read this manual carefully before using forza-bj

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1 GENERAL DESCRIPTION

Forza-bj is an accessory present in two variants: force-b and force-j depending on whether it is used as an accessory of the Quattrocento or Sessantaquattro device. In the first case the forza-b is connected to one of the Quattrocento's auxiliary inputs by a BNC-BNC cable, in the second case forza-j is connected to the auxiliary input of Sessantaquattro adapters by J-J cable. Forza-bj is single channel load cell amplifier. This accessory has been designed to amplify and to filter differential single ended signals. The information detected from the input are conditioned and available in analog modality on the output connector that has connected to other devices (Quattrocento and Sessantaquattro) or it can be connected to a standard acquisition board or to an oscilloscope.

2 FORZA-BJ KIT CONTENT

- 1 single channel amplifier forza-bj;
- 1 USB-C connection cable to recharge internal battery
- Four-pole male binder connector
- BNC – BNC cable
- 3,5mm Jack – Jack cable

3 END USER

USER: Specialized operator

- a) Knowledge: Minimum. Basic notions about physics
- b) Languages: Italian and/or English
- c) Handicaps:
 - Maximum reduction of the hearing of 40% with residual hearing at 60%;
 - Maximum sight reduction of 40% with residual sight at 60%

3.1 Contraindications

Forza-bj has no particular contraindications when used jointly with Quattrocento or Sessantaquattro device, provided that all the electrical devices connected to it comply with safety rules and standards concerning grounding and leakage currents.

3.2 Side effects

No significant side effects are known. Forza-bj accessory has no parts in contact with the patient.

4 SAFETY PRECAUTIONS AND WARNINGS

The use of forza-bj is forbidden in the following conditions:

- Simultaneous use of electro surgery systems, shortwave or microwave therapy or near these types of devices.
- Unsound mind patient.
- The accessory is damaged.
- Near inflammable anaesthetics with air, oxygen or nitrous oxide.
- To make an electrocardiographic exam

These warnings must be followed:

- Contact immediately the manufacturer if foreign materials (liquids, etc.) come into contact with forza-bj.
- If forza-bj falls into the ground or something similar happens, check if it is undamaged. In case of doubt, contact the manufacturer.
- The forza-bj could be sensitive to electromagnetic interferences of other devices that could alter its electromyography measurements and consequently the variables calculated on the basis of the information detected. For this reason, do not use it near devices that could cause the problems described above, for example mobile phones, instruments with power transformer, etc.
- The operator must be sure that the battery of the accessory is completely charged following what is indicated in this User's Manual before to use forza-bj

- The accessory must be kept out of reach of children or unsound mind patient.
- Do not clean forza-bj using acetone, ether, freon, oil products or any other solvent.
- Do not clean forza-bj or connection cables with water, in autoclave or steam cleaning.



The forza-bj accessory must not be used in any other way than indicated in these instructions

5 SYMBOLS USED ON FORZA-BJ AND IN THE USER MANUAL



Read carefully the instruction remarks before use



Serial number



Manufacturer



Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary following the 2002/96/EC Law of the European Parliament and Council of the European Union about the disposal of e-waste.



Read the instructions of use

6 TECHNICAL SPECIFICATIONS

Forza-bj accessory is a battery system designed following the medical regulations in order to ensure the patient safety.

The signal amplified by the accessory is available in analog modality on the output connector that has connected to Quattrocento or Sessantaquattro device.

In table 1 technical specifications of the forza-bj accessory are reported.

Model	Forza-b for Quattrocento Forza-j for Sessantaquattro
Classification	Battery system
Degree of Protection	IP20
Case	Painted plexiglas case
Power Supply	3,7V Battery, rechargeable
Battery time	8 Hours (full charge)
Charging time	2 hours
Numbers of Channels	1
Bandwidth	0 ÷ 33Hz
Input Noise	< 10 μ V _{RMS}
Gain	Selectable: 100-200-500-1000 V/V
Output Dynamics	0 ÷ 5 V
A/D converter resolution	24 bits
Sampling rate	100 Hz
Dimensions	45 x 65 x 32 mm
Weight	100g

TAB. 6.1: forza-bj technical specification

7 DETAILED DESCRIPTION

Controls, indicators and connectors of the forza are shown in Fig. 1 and described in the following section.

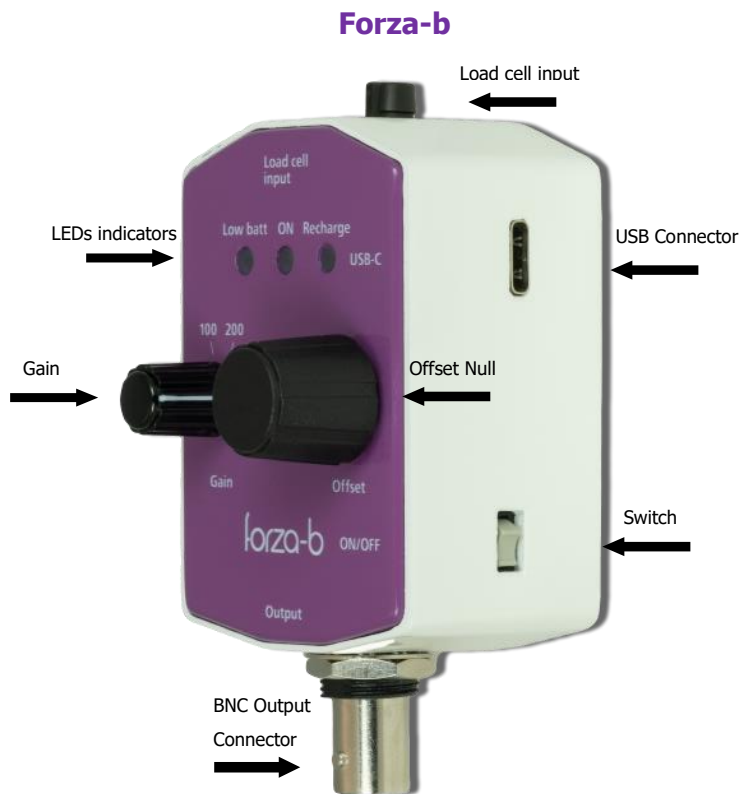


Fig. 7.1: Controls, indicators and connectors of forza-b accessory.

Forza-j



Fig. 7.2: Controls, indicators and connectors of forza-j accessory.

7.1 CONTROLS, INDICATORS AND CONNECTORS

Description of controls, indicators and connectors shown in fig.7.1, 7.2 and 7.3:

Controls:

- **Load Cell Input:** This input allows the connection of load cells.
- **ON/OFF switch:** With this switch is possible to turn off and on the forza-bj accessory.
- **Offset Null:** this wheel allows you to reset the output offset of forza-bj.
- **Gain Select:** this wheel allows you to change the system gains (100, 200, 500 or 1000 V/V).
- **Output:** At this connector (BNC in case of forza-b or Jack 3,5 mm in case of forza-j) is available the analog force signal amplified, filtered and with the possibility to delete offset (everything is after the optical isolation of the accessory).
- **USB connector:** this connector is used to recharge battery.

LEDs:

- **Battery/Error LED:** This red LED is normally off, it switches on when the battery is empty, or when there are problems' connection.
- **Status LED:** This LED flashes blue when forza-bj is working.
- **Recharge LED:** This red LED switches on to indicate that battery is under charge. It switches off when battery is fully recharged.



Fig. 7.3: LEDs indicators of the forza-bj accessory.

Adapters:

- **Forza-bj adapters:** The analog output signal of forza-bj available on the output can be sent to other systems with:
 - BNC adapter cable in case of forza-b that allows to connect to other devices with BNC input (e.g. Quattrocento otherwise other custom adapters can be developed to connect forza-b accessory to other devices that have inputs different from the classic BNC).
 - Jack 3,5 mm cable in case of forza-j that allows to connect to other devices with Jack input (e.g. Sessantaquattro).
- **USB cable - charge battery cable:** forza-bj has as accessory a USB-C cable. This cable allows charging forza-bj by its connection to a USB PC port or to a power supplier that incorporates an USB output.

7.2 BATTERY CHARGE PROCESS

Behaviour of the accessory during battery charge process:

During the battery charge process the red Recharge LED, located on the forza-bj front side becomes red till the end of the recharge process, when the battery is fully charged the red LED switches off.



Charge forza-bj for at least 2 hours before to use it.

8 USE OF FORZA-BJ

To use the forza-bj accessory properly, please follow these instructions.

8.1 INTENDED OF USE

Forza-bj has been designed to be used as a force measurement accessory for signal produced by load cells with differential output. This manual refers to the use of the Forza-bj together with Quattrocento or Sessantaquattro devices and the free OT BioLab+ software.



The accessory is not intended to be used near inflammable anesthetics.

8.2 USE OF FORZA

- connect the load cell to the forza-bj accessory using the Load Cell Input
- connect forza-bj to an acquisition system (Quattrocento or Sessantaquattro) using the BNC-BNC cable or Jack-Jack cable
- adjust the gain of the system using the Gain Select
- delete the offset using the Offset Null

8.3 FORMULA FOR THE FORCE CALCULATION

$$\text{Force [kg]} = \frac{\text{Vout measured [V]} * \text{F.S. [kg]}}{\text{Sensibility [mV/V]} * 5 [\text{V}] * \text{Gain [V/V]}}$$

Where:

F.S. = Full-Scale, it is indicated on the load cell;

Sensibility = depends on load cell;

Gain = depends on the user, it's sets with the Gain Select wheel.

9 TROUBLESHOOTING

This section describes the most common problems that may be found by forza-bj users, with some suggestions to solve them. For problems not described in this section contact the technical support service of OT Bioelettronica.

GENERAL PROBLEMS		
Problem	Possible cause	Solution
The red LED Error is switched-on	The battery is empty	Recharge it
	Data transmission error	

TAB. 10.1: Troubleshooting of the general problem that can occur using forza-bj.

10 FORZA-BJ MAINTENANCE AND STORAGE

Forza-bj has to be used, transported and stored in the following ambient conditions:

Temperature:	from 10°C to +40°C
Maximum relative humidity:	from 30% to 75%
Atmospheric pressure:	from 700 hPa to 1060 hPa

It is recommended to turn off the forza-bj at the end of every session.

Forza-bj should be stored with all the enclosed accessories on a safe place far from all conditions described in the Warnings section of this manual. The forza-bj does not need any particular maintenance procedure to work. To maintain the battery efficiency, recharge forza-bj before every use and check regularly the efficiency status of the battery.

If during the use and after the battery charging the battery lasts less than 1 hour, contact the manufacturer to check the electrical source itself.

Cleaning:



At the end of every use, please clean the forza-bj with a clean cloth.

Do not clean the forza-bj using acetone, ether, freon, oil products or any other solvent;

Do not clean the forza-bj or its cables with water, in autoclave or with steam cleaning.

Disposal: The forza-bj contains electronic parts that must be disposed of as e-waste. Dispose forza-bj and the accessories following local regulations. Follow the disposal regulations of your country in order to ensure the correct disposal of the forza-bj and its accessories. For further information about the disposal of this system, contact the Environment Department and local authority.



Warning: Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment of necessary, following the 2002/96/EC of the European Parliament and European Council on waste electrical and electronic equipment.

(WEEE) The regulation is not valid in case of corrupted product.

Life span of the accessory

The forza-bj system is produced in order to last if the use and maintenance conditions indicated in this User's manual are followed. The life span is determined by the life span of the battery (5 years). After this period it is recommended to take forza-bj to the manufacturer every two years.

11 TECHNICAL CHARACTERISTICS

Model:	forza-b and forza-j
Risk class:	I in compliance with the standard MDR 745/2017.
Classification:	IP20, Protected against solid objects over 2.5mm – Not protected against falling drops of water
Case:	Painted plexiglas case.
Power supply:	Internal Rechargeable Li-Po battery 3.7 V
Input channels:	1 independents
Bandwidth:	0 ÷ 33 Hz
Total noise (RTI):	< 10 μ VRMS
Signal gain:	100-200-500-1000 V/V (selectable)
Resolution:	24 bits
CMRR:	< 96 dB
Commands:	2 wheels and 1 switch
Dimensions:	45 x 65 x 32 mm
Weight:	100 g

12 WARRANTY



CUSTOMER SERVICE

Forza-bj has no parts that can be replaced or repaired by the user; contact the distributor for assistance so that he/she can repair or replace the products under warranty.

Maintenance and replacement of parts, modifications and/or reparations made by unauthorized Companies and/or operators by OT Bioelettronica will forfeit entitlement to warranty.

OT Bioelettronica denies any and all responsibility for damages caused directly or indirectly as a result of maintenance, replacement of parts, modifications and/or reparations made by Companies and/or operator that are not authorized by the OT Bioelettronica.

Forza-bj does not need any prior maintenance.



WARRANTY

OT Bioelettronica ensures that every new product has no defects due to materials and labour and will repair and/or replace in warranty products used following the intended use and used in the use conditions described in this manual.

Warranty lasts **2 years** only after filling and signature of the warranty application form that you find below.

Warranty conditions: the obligations of OT Bioelettronica following the warranty are limited exclusively to what follows:

- reparation will be made by and no later than 30 work days after the receipt of the product and only after the verification that the malfunctioning is not due to inadequate or inaccurate use, maintenance and /or reparation.

- If OT Bioelettronica verifies that the malfunctioning is not due to inadequate or inaccurate use or unauthorized maintenance/repair, the repair costs (materials and labour) will be invoiced only after acceptance of the budget of repair by the owner.

These warranty conditions substitute all the other warranty conditions, explicit or implicit, included, but not within limits of the general conditions specified in the international sale regulations.

OT Bioelettronica reserves the right to refuse the repair of any products sent by the user for repair; this refusal will be conveniently explained. The only obligation of OT Bioelettronica is that of returning the product to the user at its own expenses.

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