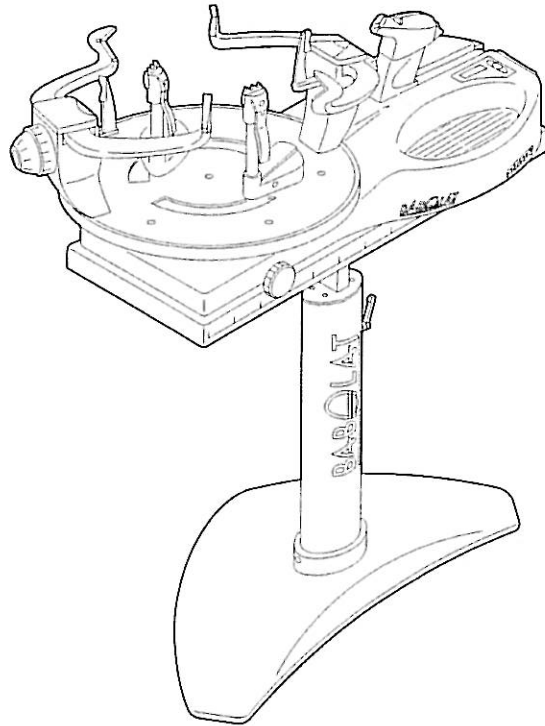


SENSOR

- ◆ mono
- ◆ dual

USER'S MANUAL



BABOLAT

INTRODUCTION

You have recently purchased a BABOLAT SENSOR stringing machine - thank you for making the right choice! This manual has been written specially to help you get used to the way the machine works and to make sure that it meets your expectations. Please READ THESE INSTRUCTIONS CAREFULLY to give yourself a good idea of the precautions to be taken when you use your new machine and to look after it in the best possible way.

Keep this manual to hand so that you can consult it at any time, and make sure that it stays with the machine if ever lent or sold.

A VHS video cassette comes with your SENSOR stringing machine. We suggest you to watch it in addition to reading this manual, so that you will have a good understanding of the main operations for setting up and using the machine, as well as the actions required for stringing.

This machine is intended for professional use and is designed for the stringing of all types of rackets - tennis, badminton, squash/ etc. - using strings made of synthetic materials or natural gut. It must be used by operators who are qualified and well-versed in the operating rules and safety instructions set out in this manual.

Your SENSOR stringing machine is "CE" certified and is in conformity with machine directive 89/392/EC. We will not assume liability if any alterations are made to the machine without our authorisation, thus undermining the safety conditions and invalidating any warranty clauses.

We also wish to draw your attention to the fact that the use of accessories or products other than those recommended by BABOLAT may present risks for which we will not be liable.

As we want you to make the most of the latest technology and new equipment, as well as to benefit from our experience, our machines may undergo technical or design changes. As a result, some of the features and information in this manual may be changed without prior notice and without any obligation to up-date it.

Should you encounter any problems or have any questions about your SENSOR stringing machine, please do not hesitate to contact your nearest BABOLAT After-Sales Service Centre.

CONTENTS

INTRODUCTION	1
CONTENTS	2
SAFETY PRECAUTIONS	3
ON RECEPTION	4
Recommendations	4
Unpacking the machine	4
DESCRIPTION	5
"Rack" concept	7
Identification	7
Characteristics	8
Options	8
Tools	8
INSTALLATION	9
Positioning	9
Assembling	10
Connecting to power supply	11
Powering-up	11
Changing voltage or fuses	11
USING THE MACHINE	13
Warnings	13
Menus and control panel	14
Control panel messages	14
Factory settings	16
Using the control panel	17
How to use the keys	17
Display	18
Positioning the racket	23
Adjusting the clamp	23
String tensioning	24
Clamp-holding system	25
Removing the racket	25
Turntable braking system	25
TROUBLESHOOTING	26
Replacing the circular turntable	26
MAINTENANCE	27

SAFETY PRECAUTIONS

The SENSOR stringing machine has been designed to provide a reliable and perfectly safe service. However, it could become a potential source of danger in the event of any incorrect or poor maintenance.

In this manual, the paragraphs concerning safety are therefore drawn to your attention by the following symbols:



Warning of a risk of serious personal injury.

BE CAREFUL: Risk of damaging the machine.

It is very important that operators should be familiar with the functioning of any controls on the machine and be aware of its capacities and limits. They must strictly comply with the instructions for use and any safety precautions indicated in this manual.

ON RECEPTION

◆ Recommendations

Before opening the boxes, make sure that there is no apparent damage. If you notice that the packaging is not in perfect condition, make sure that a reservation to this effect is recorded on the carrier's delivery docket so that your rights are protected. Also verify that the specification of the machine corresponds to your order, by reading the label attached to the outside of the boxes.

◆ Unpacking the machine

We have designed packaging that is specially adapted to the transporting of your machine. We advise you to keep it carefully because it should be re-used for storage purposes or if ever you need to return it to the manufacturer.

We will not be liable for any damage caused to machines that are sent back without their original packaging.

BE CAREFUL: this operation must be carried out by two people.

- Remove any accessories from the two boxes, except for the machine itself, until you are ready to install it.

The boxes should contain the following items:

Box 1

- 1 Sensor support post, assembled with an incorporated power cable

Box 2

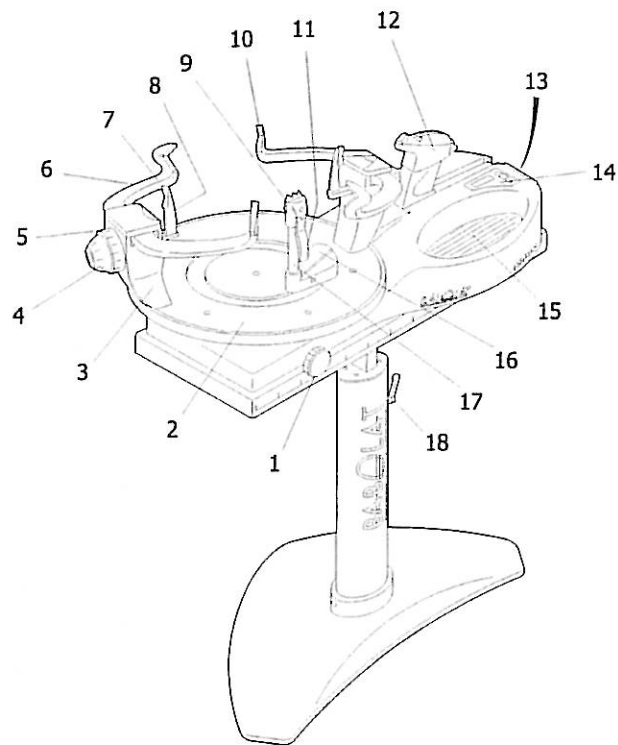
- 1 stringing machine
- 1 set of 2 billiards for tennis rackets
- 1 or 2 clamp(s) with 3 teeth, depending on the version
- 1 set of spare V-shaped polyamid pads for billiards
- 1 set of spare pads for arms
- 1 protection cover in PVC-coated fabric
- 1 set of Allen keys, sizes 4, 5 and 6
- 1 user's manual
- 1 demonstration video
- 2 spare fuses
- 1 64 mm adapter

- Make sure that you have all these items. If not, contact your BABOLAT dealer immediately.

BE CAREFUL: remove the machine from the pallet without holding it by the arms or by the pulling head. Place the machine on its support post (see the section "INSTALLATION").

DESCRIPTION

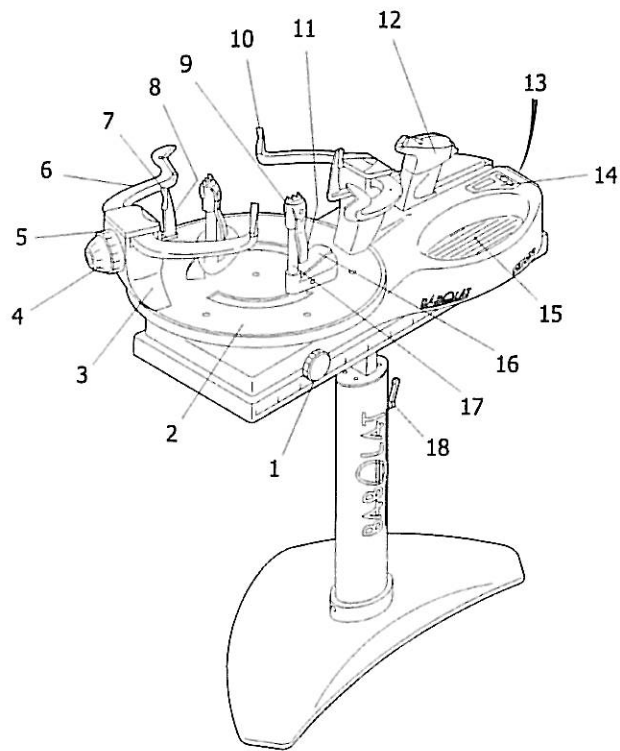
◆ SENSOR MONO



- 1 - Circular turntable locking knob
- 2 - Circular turntable
- 3 - Post
- 4 - Billiard control knob
- 5 - Profiled arm control knob
- 6 - Profiled arm
- 7 - V-shaped billiard pad
- 8 - Billiard
- 9 - 3-tooth clamp

- 10 - Arm pad
- 11 - Clamp locking lever
- 12 - Sensor pulling head
- 13 - Rack
- 14 - Control panel
- 15 - Tool bay
- 16 - Clamp-holder locking handle
- 17 - Clamp-holder
- 18 - Height adjustment handle

◆ SENSOR DUAL

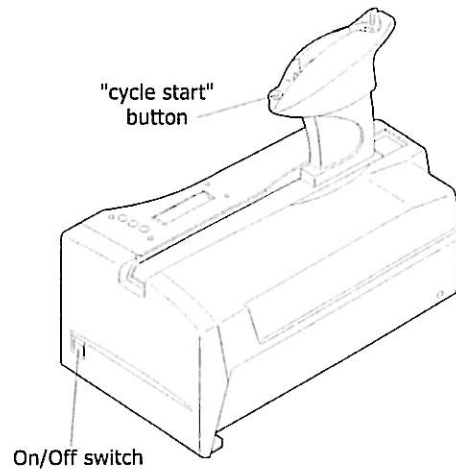


- 1 - Circular turntable locking knob
- 2 - Circular turntable
- 3 - Post
- 4 - Billiard control knob
- 5 - Profiled arm control knob
- 6 - Profiled arm
- 7 - V-shaped billiard pad
- 8 - Billiard
- 9 - 3-tooth clamp

- 10 - Arm pad
- 11 - Clamp locking lever
- 12 - Sensor pulling head
- 13 - Rack
- 14 - Control panel
- 15 - Tool bay
- 16 - Clamp-holder locking handle
- 17 - Clamp-holder
- 18 - Height adjustment handle

◆ "Rack" concept

The rack is the heart of your stringing machine. If it breaks down, you just need to take it out and replace it with the one you will receive from your BABOLAT After-Sales Service Centre (for rack removal, see the paragraph "Changing voltage or fuses").



◆ Identification

The identification plate is attached to the bottom of the machine, near the power socket.

SENSOR				BABOLAT Constructeur : BABTEC S.A. 25200 CHALEZEULE - FRANCE
SENSOR EXPERT				
N° de série :				
CE	Tension :	100 - 120 - 220 - 240 V		Fréquence 50/60 Hz
	Puissance :	45 VA	115 VA	

◆ Characteristics**Dimensions (overall)**

Length	1000 mm	
Width	500 mm	
Height	1080 to 1200 mm	
Weight	Sensor mono machine	43.5 kg
	Sensor dual machine	45.5 kg
	Support post	15 kg

Electrical specifications

Electrical supply	100 V, 120 V, 220 V, 240 V Single phase + earth	
Frequency	50 / 60 Hz	
Absorbed power	0.045 kW	
Voltage of control circuit	24 Vdc	
Voltage of power circuit	24 Vdc	

Noise level

< 73 dB_(A)

String tension

Range between	5 and 40 kg for pitch of 0.1 kg 11.5 and 88 lb for pitch of 0.5 lb
---------------	---

◆ Options

Stringing kit for badminton racket, made up of:

- 2 badminton billiards,
- 1 or 2 badminton clamps (depending on version, mono or dual),
- 1 "H" adapter for racket head,
- 4 interlocking V-shaped caps.

◆ Tools (sold separately)

To make your work easier, BABOLAT has designed a whole range of specific tools for stringing. They are presented in a case and available under the code number 02054.

INSTALLATION

◆ Positioning

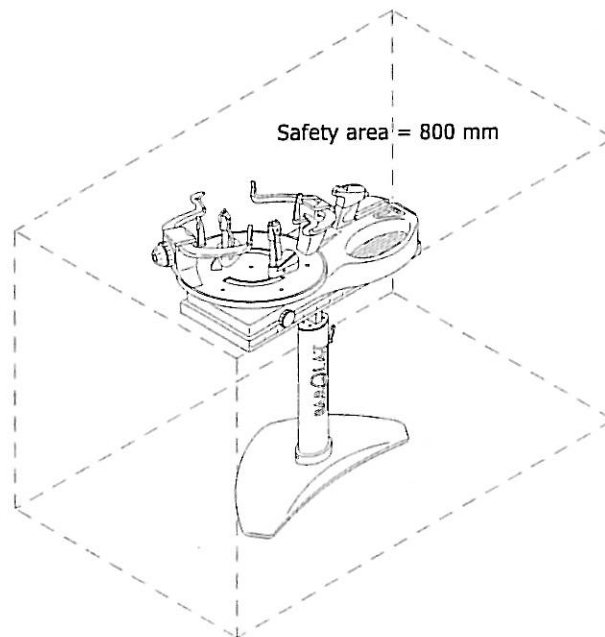
- Place the machine on a flat surface near an electricity supply and in a space that is sufficiently open to give the operator room to move, allowing for a minimum safety area of 800 mm around the machine.

The following conditions should be respected for the environment of the workstation:

- temperature: 10 to 35 °C,
- relative humidity: 30 to 70 %,
- minimum lighting: 300 lux.



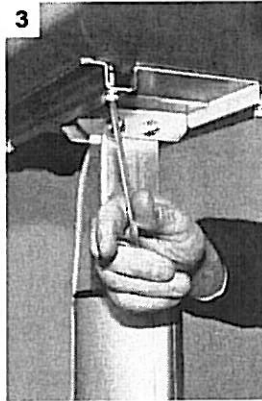
Make sure you protect the machine against splashes of water and never leave it in the rain.



◆ Assembling

BE CAREFUL: because of the weight of the machine and its support post, any operations of installation, assembly and adjustment must strictly be carried out by 2 people.

- Place the support post in the required position (1).
- Hold the stringing machine perpendicular to the fixing plate (2), making sure that the interlocking elements are aligned. Place the machine on the plate and swivel it round by 90° so that the power cable is on the same side as the power socket.



- Tighten the 4 fixing screws (3) with the size-5 Allen key.

- To obtain the most comfortable and best-adapted working height for stringing, loosen the handle on the support post whilst holding up the machine (4). Move the machine up or down until the required height is obtained and then lock the handle again.

NB: the handle lever can be repositioned. Release it by pulling, then move it to the required position.



◆ Connecting to power supply

Make sure you always connect the machine up to an earthed mains socket.



Extension cables should be carefully chosen, assembled and maintained. Your safety will obviously be protected if the insulation is in good condition. Cables should be inspected on a regular basis and replaced, rather than repaired, if found to be faulty. Adapt any electrical extension lengths and sections depending on the work at hand.

BE CAREFUL: make sure that the voltage indicated on the identification plate corresponds to that of the local grid.

Powering-up

- Plug the power cable into a properly earthed mains socket.
- Switch the machine on using the On/Off switch and a welcome message will appear on the display screen. If this is not the case, please refer to the section "TROUBLESHOOTING".



Changing voltage or fuses

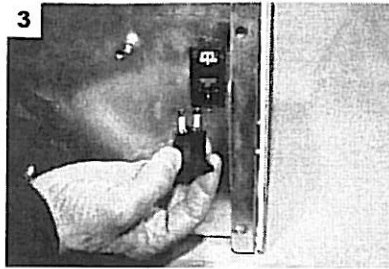
For this job you will need to remove the rack from the machine.

- Turn off the machine.
- Remove the power cable from the mains.
- Unplug the right-angle plug on the power cable from the machine.
- Loosen the 2 fixing screws (1) by two turns, using the size-4 Allen key.
- Remove the rack from the machine by pulling on the lower handle (2).



Changing voltage or fuses (next)

- Place the rack on a table to provide free access to the lower part.
- Remove the fuse-holder located under the rack (3) near the power socket, using a flat screwdriver.



Changing voltage

- Remove the voltage selector, then switch it to the required voltage.
- Then change the two fuses depending on the new voltage.

100 V and 120 V fuses = 1.25 A T

220 V and 240 V fuses = 0.63 A T

In case of doubt, call the BABOLAT After-Sales Service Centre.

Changing fuses

Type of fuse: HPC 5x20 mm ceramic

BE CAREFUL: in the event of a problem, you should change both fuses at the same time.

The warranty will be invalidated by the use of any fuses other than those recommended by BABOLAT.

USING THE MACHINE

◆ Warnings

BABOLAT will not be liable for any direct or indirect damage caused by incorrect installation, poor maintenance, alterations or improper usage. We will also be cleared of liability in the event of any failure to comply with standard requirements for the prevention of accidents and fire or for the safety of electrical installations.

Never open a stringing machine without being authorised by BABOLAT.

Never apply any varnish or paint to the string above the machine, as stains from these products may cause permanent damage to the housing and mechanical parts.

Any failure to comply with these last two clauses will render the warranty invalid.

To turn the stringing machine on or off, do not use the power cable. Press the On/Off switch to avoid any risk of electrocution or short-circuiting due to poor contacts.



Never move or open the stringing machine without unplugging it first.

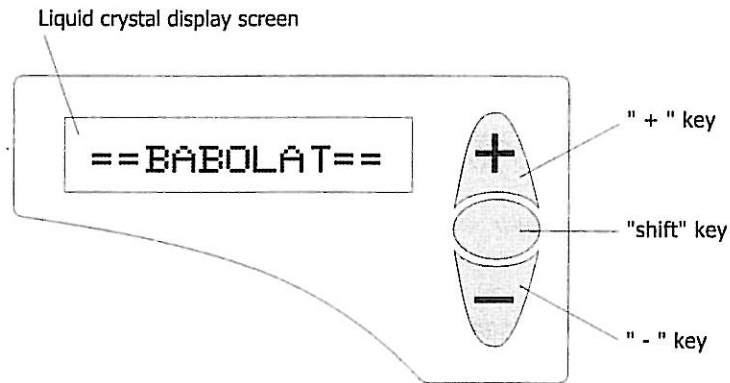
Never let the machine be used by children or persons not familiar with the instructions. Make sure that nobody enters the 800-mm safety area around the machine whilst it is in use.

Never leave your workstation before making sure that you have taken the precaution of putting it in the shield position ("shield" menu on control panel) or turning it off (at On/Off switch).

BE CAREFUL: *Never insert any objects into the orifices around the turntable.
Your stringing machine has been adjusted in the factory using precision instruments. Except in the case of accident, the factory adjustments should not be altered throughout the life of the machine, otherwise you will have to return the rack to the manufacturer.*

◆ Menus and control panel

The control panel allows you to communicate with the machine. It has a liquid crystal display screen with one 16-character line and 3 selection keys. The control panel allows you to change the user settings on the machine and to find out its status. The factory settings and those entered by the user are stored in an EEPROM memory so that they are not deleted when the machine is turned off.



Using the 3 keys on the control panel you can shift between the various menus and change the options or values associated with them in order to adapt the machine's functions to your demands.

There are 3 ways of changing the machine data:

- by activating/deactivating a setting,
- by changing a digital setting,
- by selecting an option on a menu.

It is very straightforward to use the control panel and change the options or values assigned to the menus. Read the following paragraphs carefully and try it out for yourself. Do not worry about making a mistake as there is no danger for the machine - you will just need to start again from scratch.

Control panel messages

The digital screen displays 3 types of information:

- status messages that keep you constantly informed of the machine's status when in use,
- programmable menus allowing you to change option or modify the user settings,
- machine configuration messages (read only).

Status messages when you turn the machine on

BEFORE USING . .	Welcome message on starting up
BABOLAT	Welcome message
TENSION	1 - Display of pre-set tension (factory or previous setting) 2 - Change of displayed value to nearest 100 g (0.5 lb) Tension range: 5 to 40 kg (11.5 to 88 lb)
PRESTRETCH	Display of pre-set prestretch (previously-used value)

Status messages during traction

ACTUAL	Display of actual tension applied to string
KNOT	Display of tension applied to string during "knot" traction cycle (tension value + pre-set KNOT value)

Programmable menus

MENUS	FUNCTIONS	OPTIONS AND VALUES
SHIELD	Makes the machine safe by locking the functions and pulling head	Locking Unlocking
UNIT	Selection of measurement unit for the display of values on the control panel	kg or lb
KNOT	High tension to make up for the loss of tension in the knot (command only valid for a traction cycle)	Selection by pitch of 0.1 kg or 0.5 lb Selection by pitch of 1 kg or 5 lb
PRESTRETCH	Assignment of a modification expressed as a % of the TENSION value. Its purpose is to create a prestretch at the beginning of the traction cycle to prevent certain types of string losing their tension too quickly	Selection by pitch of 5 % (limited to 20 %)
BIP	Buzzer sounds when equilibrium is found for each traction	YES or NO
LANGUAGE	Selection of language for display of messages	FRENCH - GERMAN ENGLISH - SPANISH ITALIAN

Machine configuration messages

VERSION	Program version number
RACKETS	Number of rackets strung by machine (approximate value calculated according to number of tractions)
TRACTIONS	Number of tractions completed by machine
SERIAL NR	Serial number of machine
RACK NR	Serial number of rack
CHECK	Machine status
WORK. TIME	Length of time for which the machine has been on (in hours)

Buzzer

The buzzer goes off whenever:

- the pulling head comes to its end of travel,
- the "shift" key is held down for long press,
- the pulling head reaches the equilibrium value, provided the BIP function is activated.

Factory settings

The factory settings are the current settings when you start the machine up for the first time. They will remain programmed until you decide to change them.

The factory settings are as follows:

- TENSION: 25.0 kg,
- PRESTRETCH: 0 %,
- KNOT: + 2.0 kg,
- LANGUAGE: depends on the machine's destination country,
- BIP: yes.

◆ **Using the control panel**


With the three keys you have various possibilities depending on the type of action or series of actions that you wish to carry out.

How to use the keys

"Step by step" mode

Press once on  or  keys

Normal step-by-step selection



Example with  key:

25.0 kg ⇒ 25.1 kg ⇒ 25.2 kg

Press at the same time

on  and  keys


Quick "step-by-step" selection

Example with  and  keys:

or on  and  keys

25.0 kg ⇒ 26.0 kg ⇒ 27.0 kg

"Scrolling" mode



Hold down the  or  keys

Normal selection by scrolling

Hold down at the same time

the  and  keys

Quick selection by scrolling

or the  and  keys

Display

Convention

The possibilities offered by the control panel are presented on the following pages in the form of logic diagrams. To make it easier to understand we will be using the following symbols to represent the pressing of keys:

 key

Quick press "shift"



Long press "long shift"



Long press followed immediately by quick press



 key

Press



Press together with "shift" key

 key

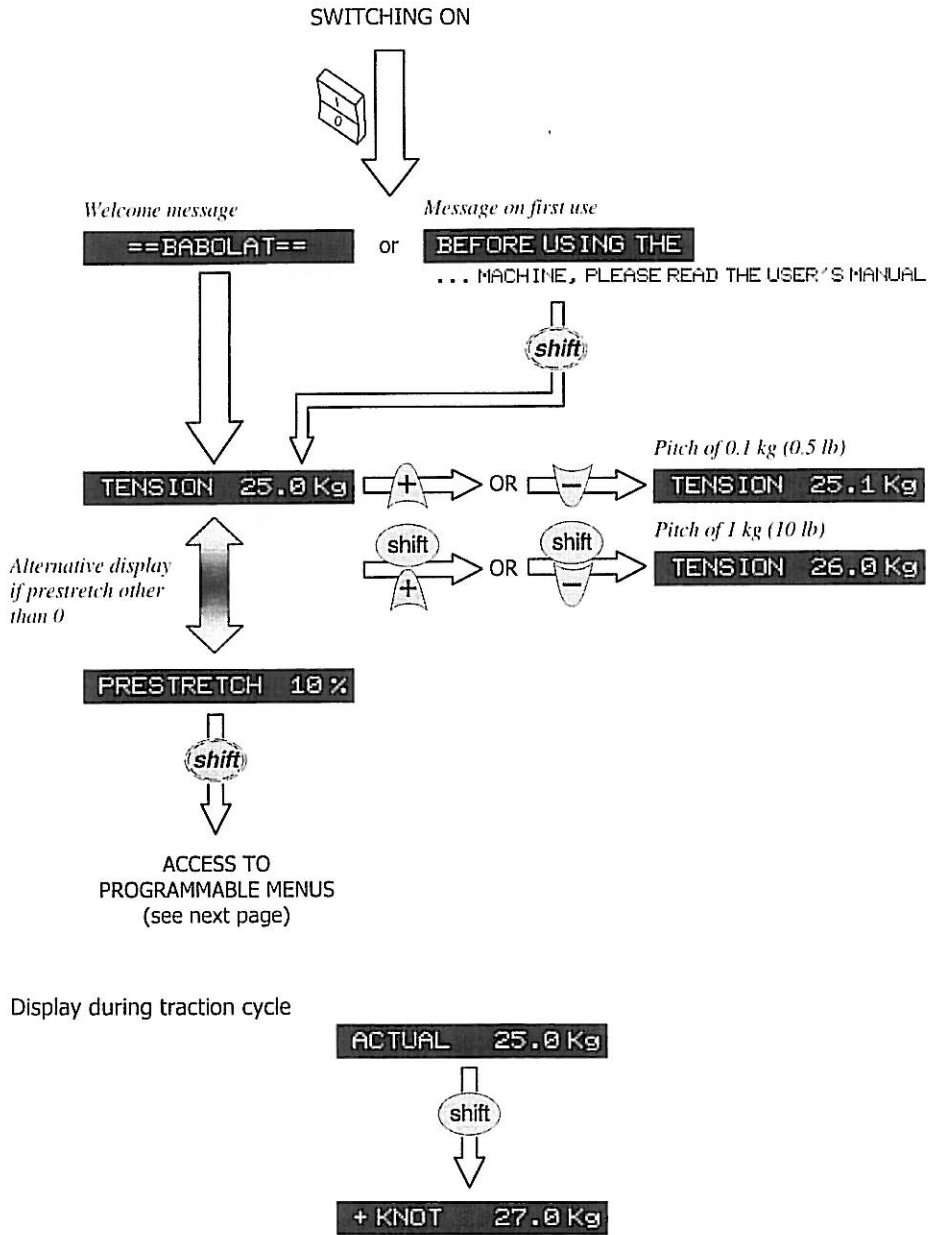
Press



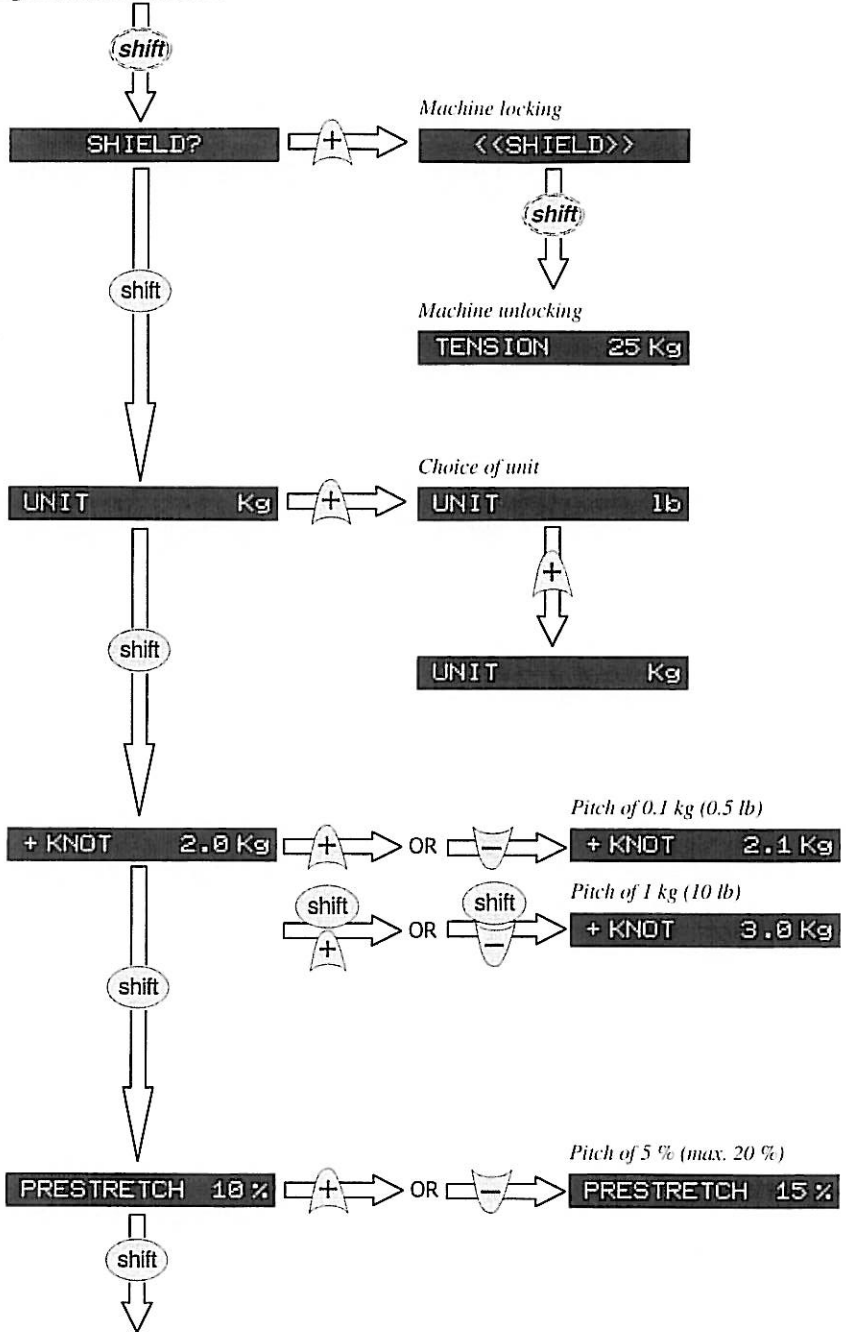
Press together with "shift" key

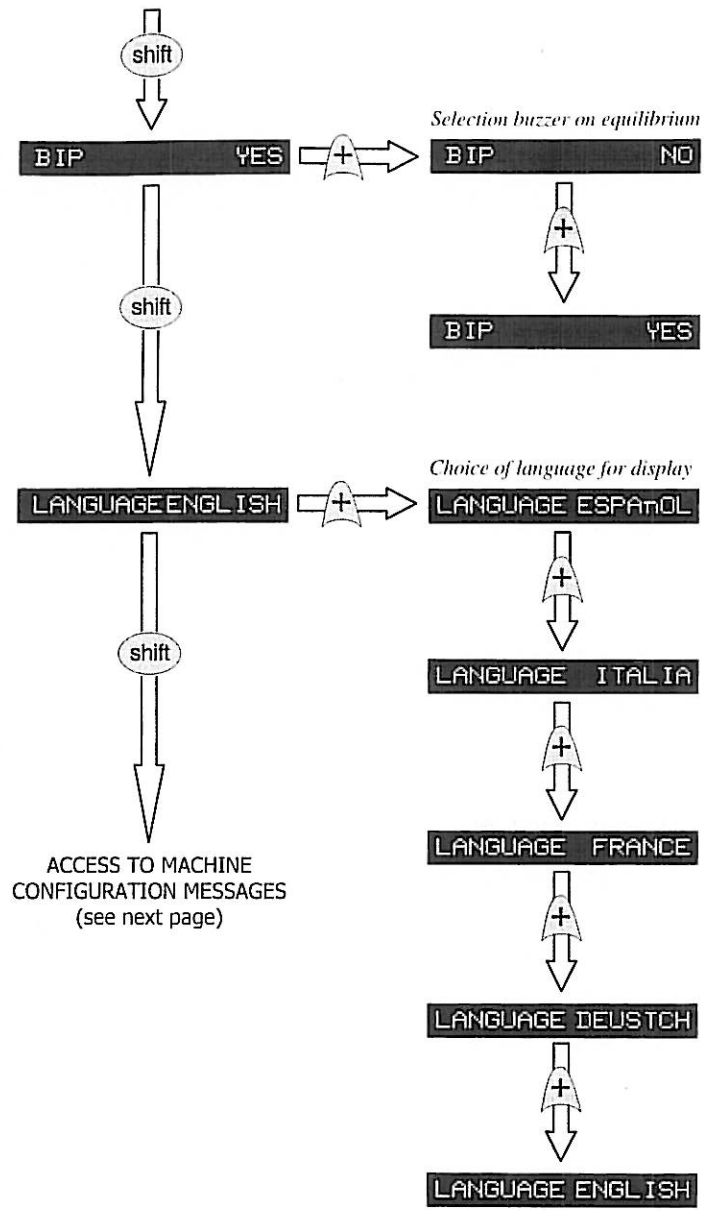
 

User mode



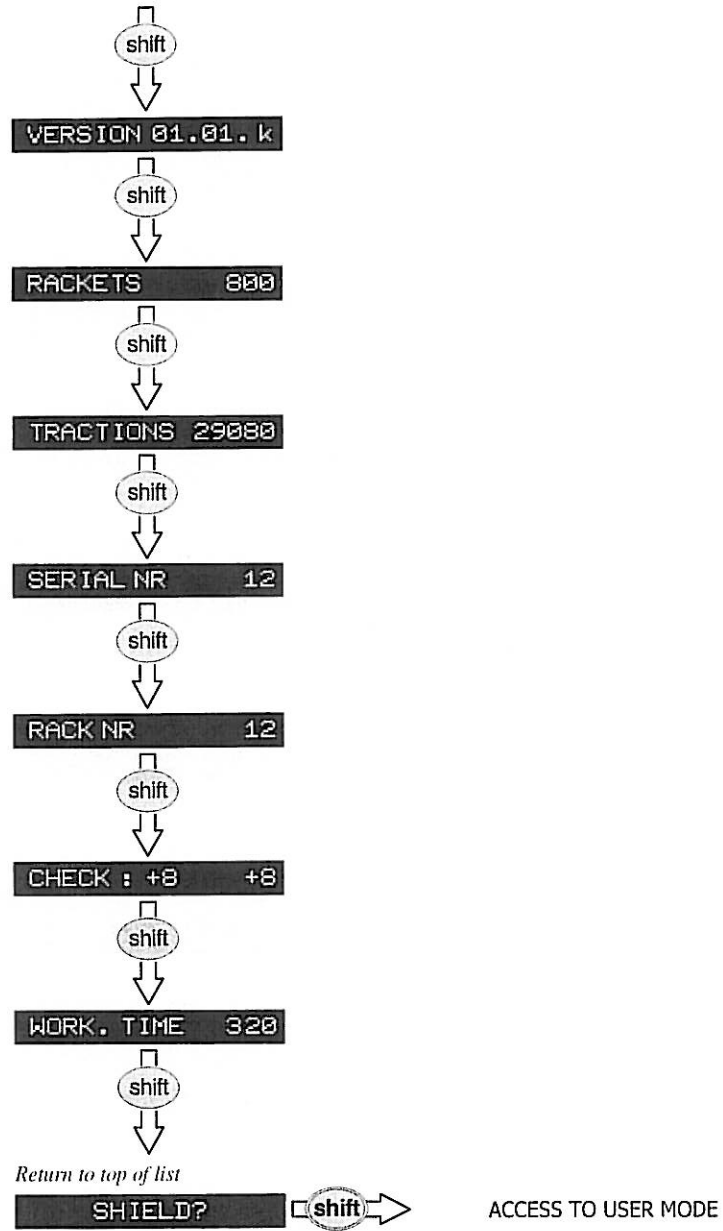
Programmable menus





NB: at any time, you can return to the user mode by pressing on **(shift)**.

Machine configuration messages

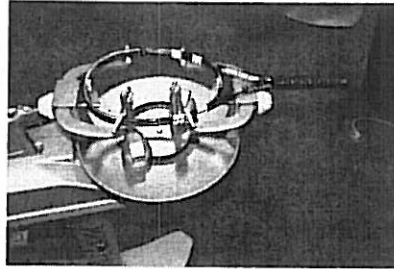


◆ Positioning the racket

The SENSOR stringing machine is designed to take all types of rackets, even oversized ones.

BE CAREFUL: *the racket locking system is designed to hold it in position and to prevent distortion when stringing. Any over-tightening of the arms and billiards may distort the racket and change the tension after stringing.*

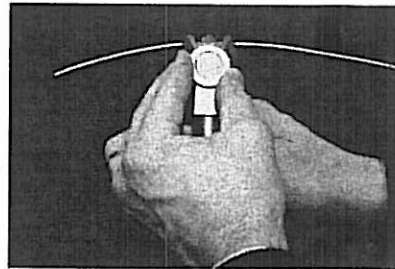
- Position the racket according to the symbols marked on the post.
- Hold the racket by its handle with one hand, and with the other turn the billiard control knob (on the side of the racket throat) until you bring the V-shaped pad of the billiard into contact, between 2 holes and over the positioning symbol marked inside the racket.
- Turn the control knobs of the arms to bring the pads into contact with the outside of the racket. Make sure the racket is more or less centred between the arm pads, then tighten the arms slightly.
- Turn the billiard control knob (on the side of the racket head) until you bring the V-shaped pad of the billiard into contact, between 2 holes and in line with the first billiard. Tighten the billiard slightly.



◆ Adjusting the clamp

The gap between the jaws should be adapted to the gauge of the string that is used. This can be adjusted by turning the wheel as follows:

- thread a string between the jaws of the clamp,
- activate the locking lever to tighten the string between the jaws. If any resistance stops it from locking, that means the gap is not wide enough. Extend it by loosening the wheel,
- pull on the string by hand and it should not slide between the jaws. If this is not the case, reduce the gap by tightening the wheel.

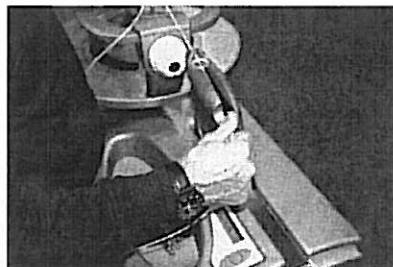


BE CAREFUL: *adjust the clamp gap to secure the string properly without crushing it, as this would cause distortion and cracking.*

◆ String tensioning

Once the racket has been properly installed and the clamp(s) adjusted, refer to the stringing recommendations of the racket manufacturer and enter the tension value of the string (TENSION) on the control panel.

- To tension the string, thread it through the pulling unit. At this point you should make a precise movement: bring the string towards you, and without letting it go, lightly touch the "cycle start" button. This precise movement is something you should get used to very quickly.
- After the pulling head is activated, the pulling unit closes itself over the string. Let go of the string. When the required tension is reached, use the 3-tooth clamp to maintain the tension of the stretched string. Lightly touch the "cycle start" button again. The pulling head will return to its initial position and the pulling unit will open up and release the string.



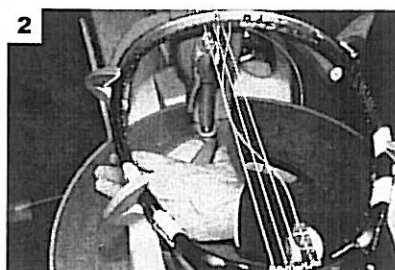
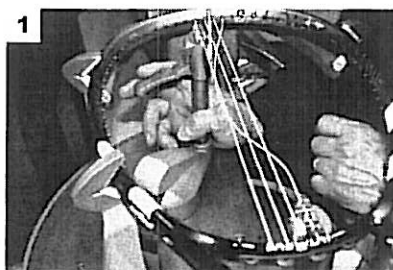
When the pulling head arrives at its end of travel without the tension being reached, the buzzer goes off to indicate that the tension is not correct.

NB: the measuring system on your SENSOR stringing machine is automatically adapted to the elasticity of the string (gut, synthetic, Kevlar[®], etc.).

Clamp-holding system

With the clamp-holder you can easily position the 3-tooth clamp at any point on the racket by sliding it over the circular turntable.

- During the stringing process, in order to keep the string pulled, you should:
 - slide the clamp-holder over the turntable to position it under the string that you wish to keep pulled,
 - tighten the string using the locking lever of the 3-tooth clamp (1),
 - fasten the clamp-holder onto the turntable by pushing down the locking handle (2).
- To release the clamp-holder, loosen the string by lifting the locking lever and let the clamp drop. You can also release the clamp-holder by lifting the locking handle. To make it easier to move, hold it by the base of the clamp support barrel.



◆ Removing the racket

Always start by loosening the billiards before opening the arms. After releasing the racket, unscrew the billiards completely so that you can easily insert the next racket.

◆ Turntable braking system

The locking button on the circular turntable can be used to immobilise it during rotation. You will find this function useful when tightening the knots and tidying up the strings after you have finished stringing.



TROUBLESHOOTING

At power up, the digital display does not light up

- Make sure the power cable is properly connected to the machine and to a mains socket.
- Press the "cycle start" button:
 - if the pulling arm moves, call your BABOLAT After-Sales Service Centre,
 - if the pulling arm does not move, check the fuses and replace them if necessary (see paragraph "Changing voltage or fuses").

At power up, the digital display lights up but the pulling arm does not move after the "cycle start" button is pressed

- Turn off the machine, wait 30 seconds and turn it back on.
- If the problem continues, go to the "check" menu (see paragraph "Using the control panel"), note down the values displayed and the serial number of the machine, then call your BABOLAT After-Sales Service Centre.

During the stringing process, the clamp-holder malfunctions or does not unlock

- Call your BABOLAT After-Sales Service Centre and if the problem cannot be solved you will need to replace the circular turntable (see paragraph "Replacing the circular turntable").

◆ Replacing the circular turntable

The turntable is fixed by 3 screws placed at 120°. The screws can be reached through the hole, intended for this purpose, under the machine.

- Turn the circular turntable by hand to position the posts perpendicular to the line of the pulling head, with the "racket throat" positioning symbol on the side nearest to you.
- Loosen the first screw using the size-6 Allen key: it will remain captive.
- Rotate the turntable clockwise by 120°, loosen the second screw and do the same for the third.

- Rotate the turntable again by 120° to bring it back to its initial position and lock the rotating turntable by tightening the locking button.
- Lift up the turntable and remove it from its central pivot.
- Replace it with the new turntable, making sure the interlocking elements are lined up.

For re-assembly, following the dismantling procedure in the opposite order.



MAINTENANCE



Make sure the stringing machine is always turned off before cleaning it or servicing one of its components. Unplug the power cable from the mains socket.

Never wash the machine using water, a hose or high-pressure cleaning.

BE CAREFUL: never use corrosive products to clean your stringing machine.

- Clean the housing of the machine regularly with alcohol at 90° only. Never use water, detergents or acetone.
- The circular turntable surface should be cleaned with alcohol every week to preserve the optimal sliding capacities of the clamp-holder.
- Remove the clamps, clean the clamp-holder rods and the inside of the clamp barrel with a cloth soaked in alcohol, then lubricate them lightly with oil (sewing-machine type). Replace the clamps on the clamp-holders and slide them about to spread the oil.
- Clean the inside of the clamp teeth (depending on use, every day or once a week) with a metallic brush, in order to avoid any clogging of the tungsten coating.
- The Sensor pulling head does not require any particular servicing, apart from cleaning once a year by passing a cloth soaked in alcohol between the articulated jaws of the pulling unit.

Never oil the ball bearings on the pulling head.