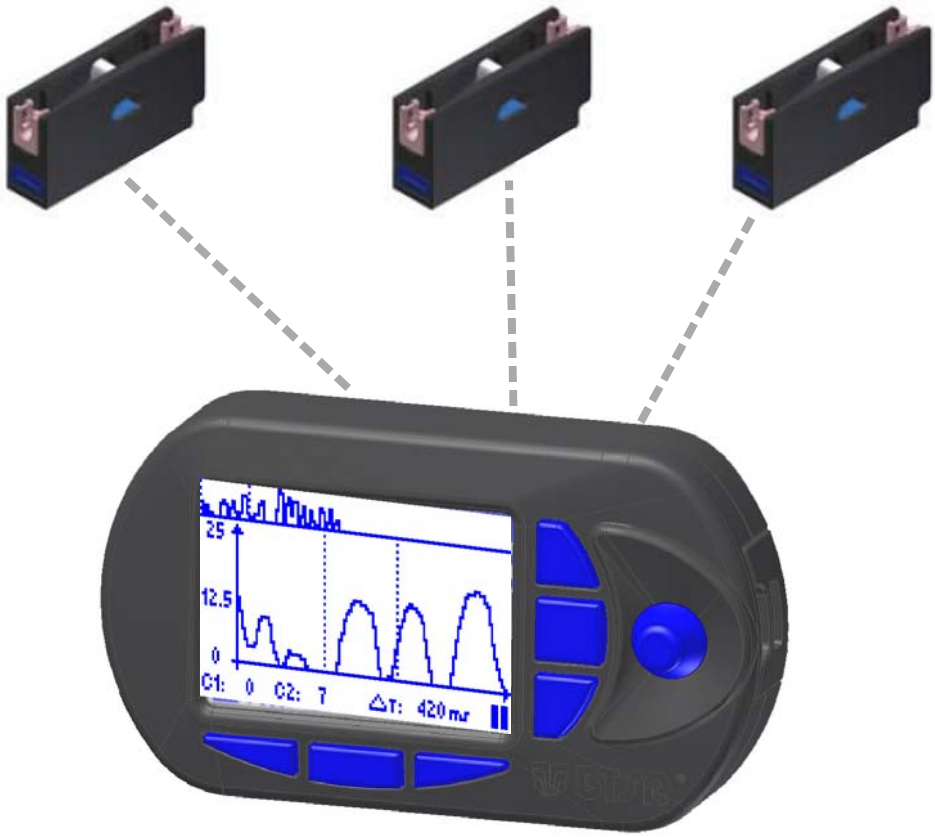
SMART MATRIX STITCH



Operating Manual

ENGLISH

Rev. 2.3 - September 2016

SMART MATRIX STITCH - Rev. 2.3 – September 2016

This manual is entrusted to the users of **SMART MATRIX STITCH** system developed for control/monitoring activities of determined stitching processes by means of **TS55/STITCH**tension control sensors. You are kindly recommended to thoroughly read the instructions provided by this manual prior to connect and use the system.

BTSR reserves the right to change at any time the contents of this Manual, without notice.

For any technical or commercial problem, please contact your local **BTSR** dealer or call directly BTSR customer service center. We will be glad to meet your needs.

Thank you for your trust and good job.

CE

The product described herein is compliant with the requirements of ***EMC Directive 2014/30/UE*** *and of* ***Low Voltage Directive 2014/35/UE***.

All BTSR products are covered by patents and adopt exclusive, profitable and high tech solutions.

Introduction

Introduction

Congratulations for choosing a **BTSR** product.

With our **SMART MATRIX STITCH** control system, you got an innovative, unique solution, which offers you multiple advantages concerning the quality control of your production.

SMART MATRIX STITCH has been designed for applications that require a strict (*real time*) control for correct execution of particular stitching typologies, e.g.: stitchings applied to safety belts for vehicles, aircrafts etc.

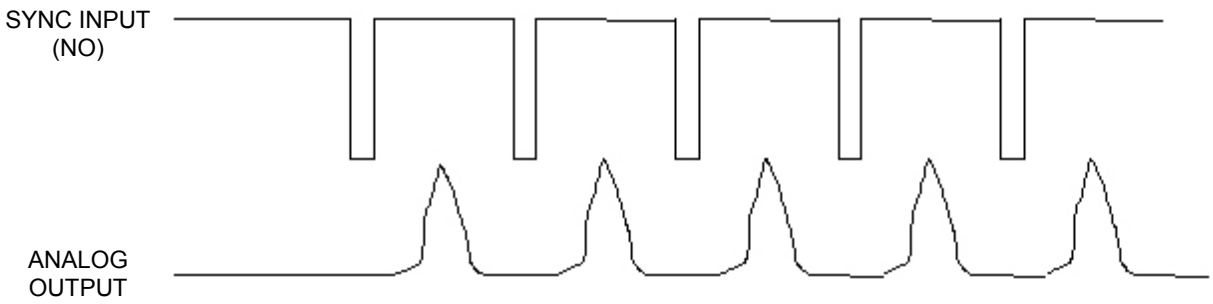
The control is essentially based upon the two following factors:

- Number of stitching actually carried out with respect of the programmed ones.
- Yarn tension trend during the stitching process. If the stitching operation is correctly executed, then the sensor shall detect a tension pulse (*with programmable characteristics*), after every stitching point, thus confirming a perfect strength of the stitching itself.

A wrong number of stitching points or a too low/non-existent tension pulse indicate an error condition which will cause a machine stop and a warning message on the display of SMART MATRIX STITCH terminal.

To carry out the above mentioned controls, the system uses two interface signals:

- A digital signal (*SYNC*) provided by the stitching machine upon each stitching point and sent to the sensor as synchronism pulse.
- An analogic output signal (*ANALOG*) sent by the sensor to the SMART MATRIX terminal, which represents the wave form of the tension pulse detected by the sensor itself after every stitching point.



SMART MATRIX STITCH, combined with **TS55/STITCH** tension sensors, represents a complete and effective stitching control system.

The **SMART MATRIX STITCH** system has been developed by **BTSR International S.p.A.** to make easier and optimize:

- The programming of sensor detection parameters,
- The system configuration,
- The production monitoring.

The availability of a “User Friendly” graphic interface allows you to quickly and intuitively program all the operating parameters of **TS55/STITCH** sensors; in addition, it provides a real time monitoring of sensors behaviour, i.e. the stitching process efficiency.

Manual Objectives

This manual has been written to provide the users of **SMART MATRIX STITCH** system with the essential information required to:

- **Correctly install and connect** the various system components *(SMART MATRIX terminal, TS55/STITCH sensors, etc.)*
- **Configure the system** according to the application needs and **setup the various operation parameters**.
- **Detect and interpret** the error signalling and system efficiency data
- **Use the diagnostics, maintenance and utility functions** offered by the system *(system component test, firmware upgrading, sensor offset etc.)*.

How to Use this Manual

The manual is subdivided into 3 sections:

Section 1 – includes the connection diagrams and the electrical interface of the various system components.

Section 2 – provides the operating instructions for a correct use of the **SMART MATRIX STITCH** terminal as well as the style configuration/programming instructions and data/error display facilities.

Section 3 – describes the main characteristics and performances of the TS55/STITCH sensors and the operation parameter programming of the sensors themselves.

Symbols Used

☞ *This symbol is used to point-out notes, warnings and other important information.*

TS Within this manual, the **TS55/STITCH** sensors used for **SMART MATRIX STITCH** application, will be indicated with the generic wording **TS** (*Tension Sensor*).

SETUP → **DEVICE** In the program function descriptions, this symbol indicates the function *(e.g. DEVICE)* within the menu item *(SETUP)*.

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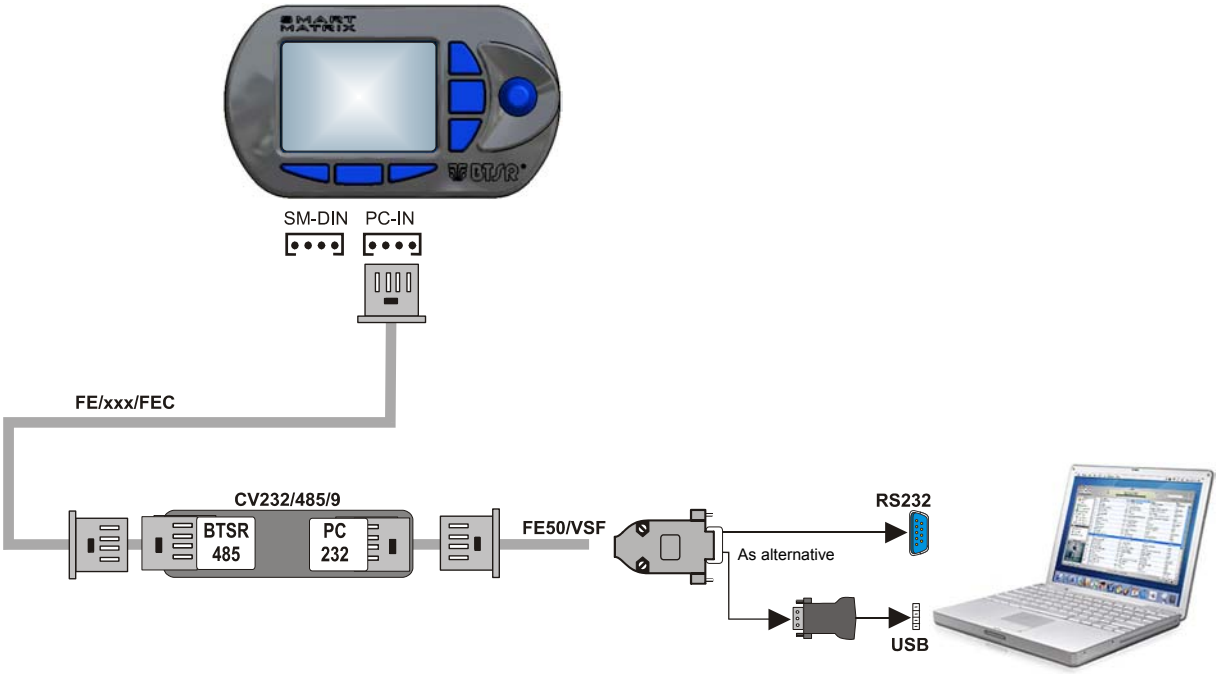
1 Connections and Electrical Interface

PC ↔ SMART MATRIX Connection

The following diagram shows the interconnections between SMART MATRIX Terminal and PC.

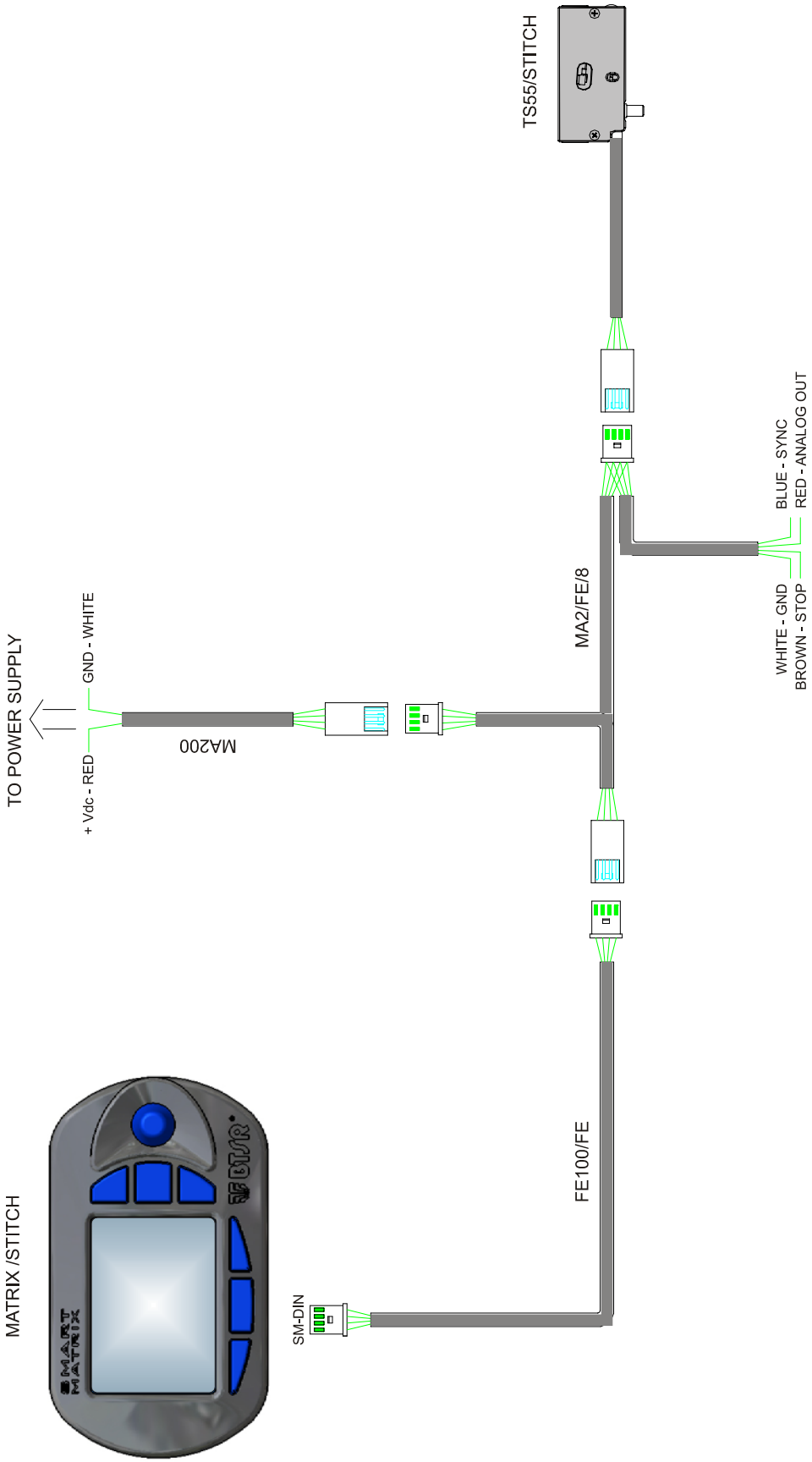
☞ *The PC is mainly used for firmware update operations on SMART MATRIX Terminal.*



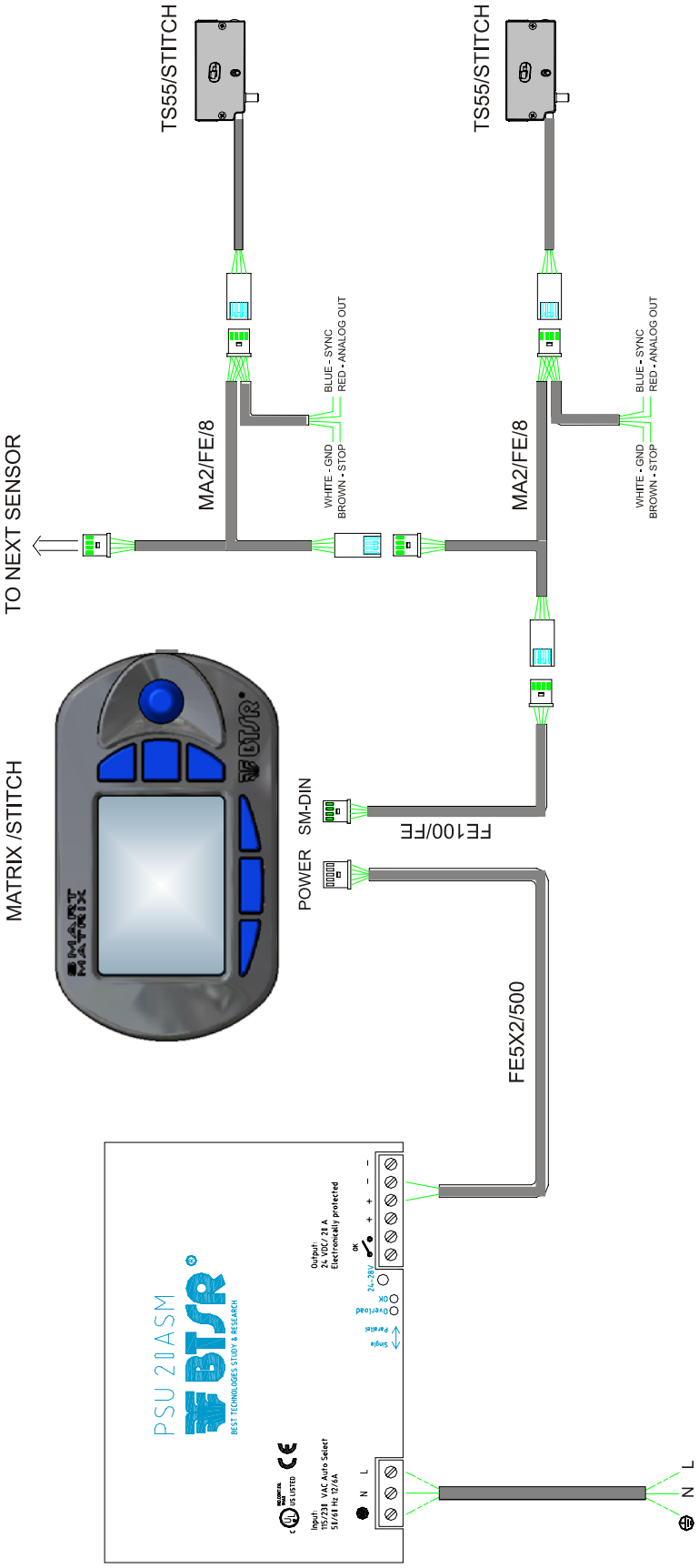
To connect the sensors, please refer to the following section:
Example of single sensor connection with external power supply *and* ***Example of multiple sensor connection with PSU 20 ASM BTSR power supply.***

⚠ On all electrical systems, you are kindly recommended to connect the ground cable (GND) to the support on which the devices are installed.

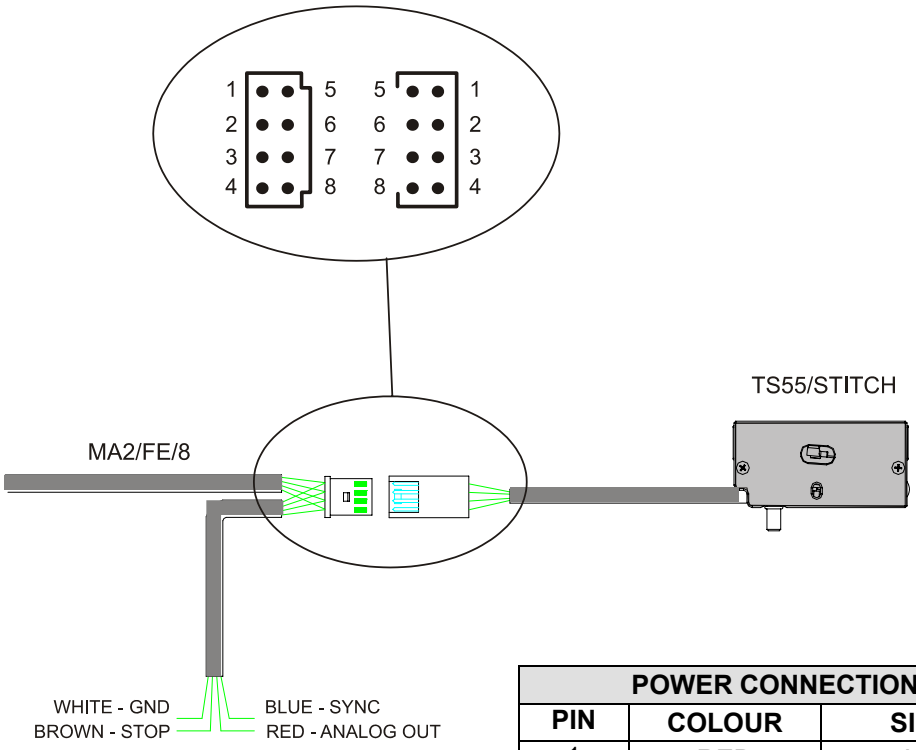
Example of single sensor connection with external power supply



Example of multiple sensor connection with PSU 20 ASM BTSR power supply



PIN assignation and Technical Characteristics of TS55/STITCH sensors

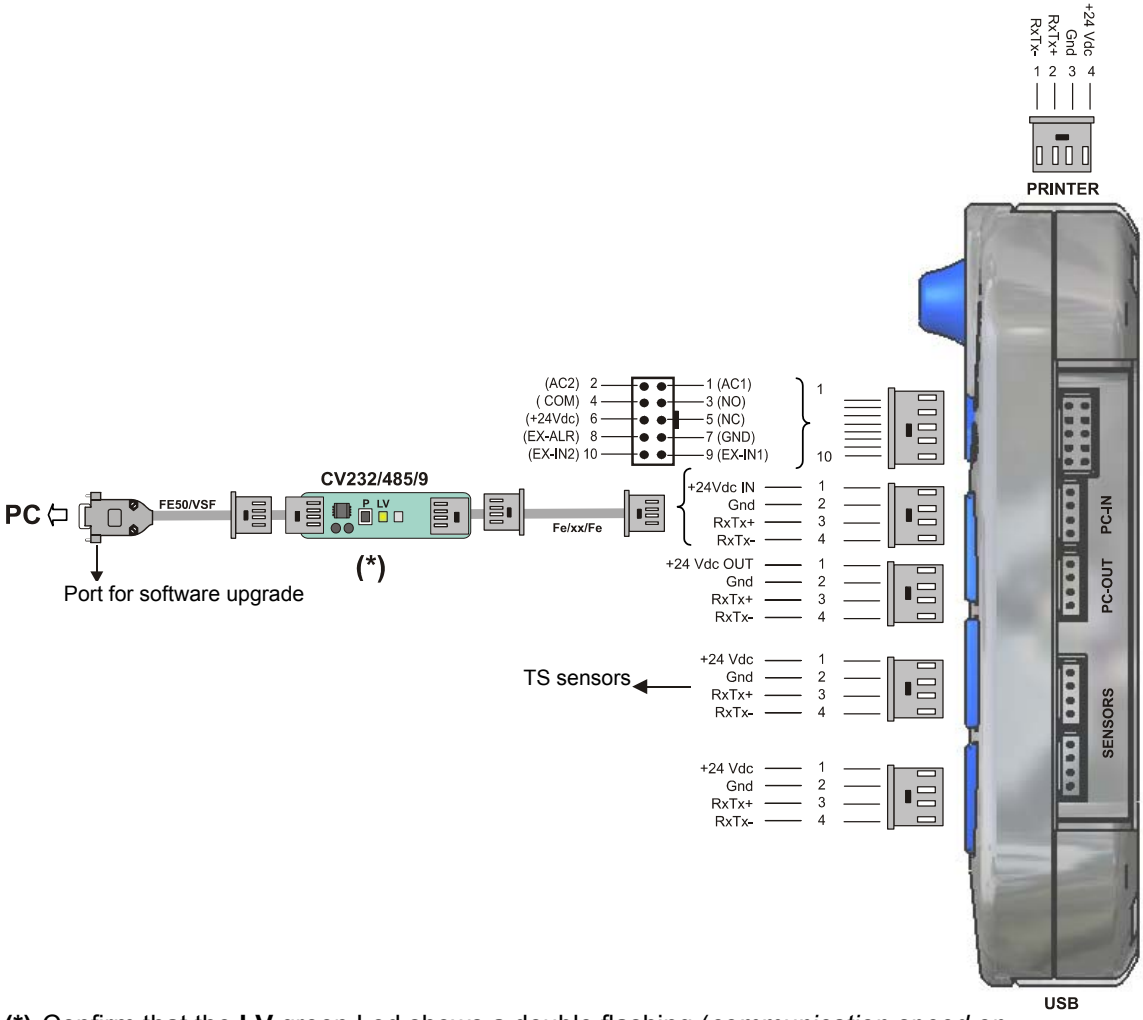


POWER CONNECTION		
PIN	**COLOUR**	**SIGN.**
1	RED	+VCC
2	WHITE	GND
3	GREY	Rx Tx +
4	BLACK	Rx Tx -
5	GREEN	STOP
6	WHITE	GND
7	BROWN	ANALOG OUT
8	BLUE	SYNC

Technical Characteristics of TS55/STITCH sensors	
Power supply voltage	12-24 VCC ± 10%
Current absorption	20 mA Max
Analogic output (only for TS5 – 8 pin)	500 mV – 10 V
Analogic output resistance (only for TS5 – 8 pin)	1K Ohm
Operating temperature range	+10° / +50° C
Storage temperature range	-25° / +85° C
Tension range	0 – full scale
Useful tension range	0% - 95% full scale
Max applicable tension	10 times full scale
Drift error	0.05%/°C
Repeatability error	0.5%
Max linearity error	2% (0 – full scale)

SMART MATRIX ↔ PC Interface

The following figure shows the electrical interface (*pin assignment*) of SMART MATRIX terminal.
The “USB” connector is not currently used for STITCH application.



(*) Confirm that the **LV** green Led shows a double flashing (*communication speed on CV232/485/9 = 115 Kbps*).
If necessary press the small **P** button.

SMART MATRIX Terminal Technical Characteristics	
Power supply voltage	24 VDC ± 10%
Current absorption	100 mA Max
Protection fuse (*SMART MATRIX*)	1.5 A
STOP output (NO/NC)	0,3 A 125 vAC
	1 A 30 VDC
Inputs	0 – 24 VDC
	VIL Max 1.2 VDC
	VIH Min 5 VDC
Operating temperature range	+10° / +60° C
Storage temperature	-25° / +85° C
Overall dimensions	140x80x31 mm

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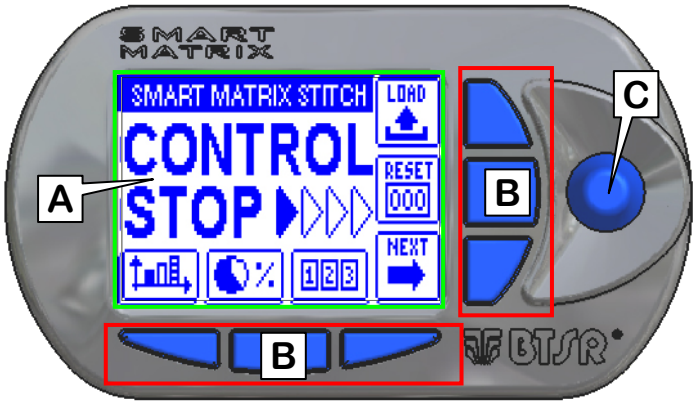
2 Operating Instructions

SMART MATRIX STITCH Operation

All the Configuration, Parameter Setting, Data & Error Display operations, etc. can be managed by the Operator in quick and intuitive way, using the SMART MATRIX STITCH control terminal.

The **SMART MATRIX ↔ Operator** interface consists of:



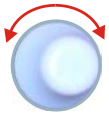
A - Graphic display showing:
- menus,
- operating states,
- operation parameters,
- error messages, etc.
- graphic information (*sensors map, etc.*)

B - 6 buttons for:
- immediate activation of particular functions
- increment/decrement speed-up (*shortcuts*)

C - Multi-function rotary selector.

How to Use the Rotary Selector

The selector provides both: “pointing” and “data entry” functions.



Turn the selector to select a menu item / function / parameter within the configuration screens, etc.

Rapid click: to confirm the selection.

Hold (*3 seconds*): keep the button pressed to switch from Control status to Interactive status and viceversa, return to the previous menu level, activate the data setting window, etc.

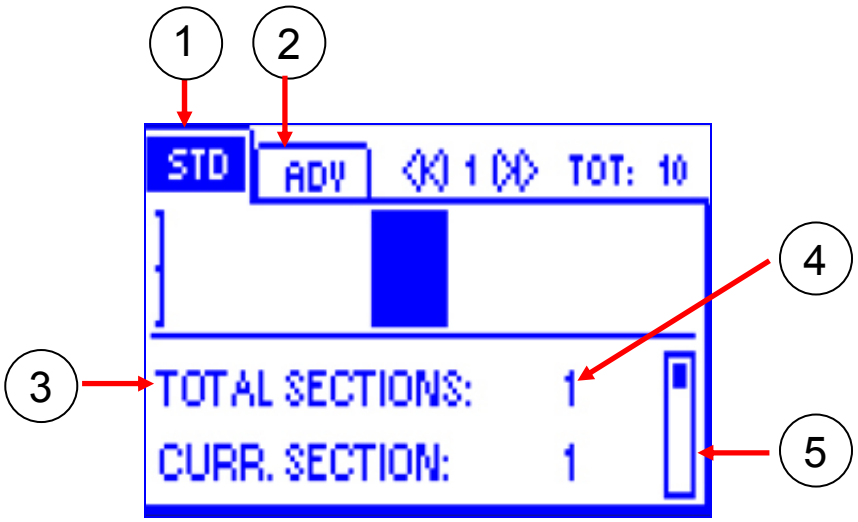
Navigation throughout the Display Windows

Some configuration/parameter setting functions of **SMART MATRIX** system require a number of parameters distributed among multiple display windows.

All the *"Window Selection", "Parameter Selection within a Window" and "Parameter Setting"* functions on **SMART MATRIX** terminal, can be carried out using exclusively the multi-function Rotary Selector, through a navigation technique based upon *"Pointing", "Selecting" and "Value Setting"* actions.

The following example explains this navigation technique.

The example refers to the Style Parameters Programming function for TS sensors, which makes use of 2 windows (*STD and ADV*).



1 - Name (*label*) of currently selected window (*foreground*)

2 - Name (*label*) of non-selected window (*hidden*)

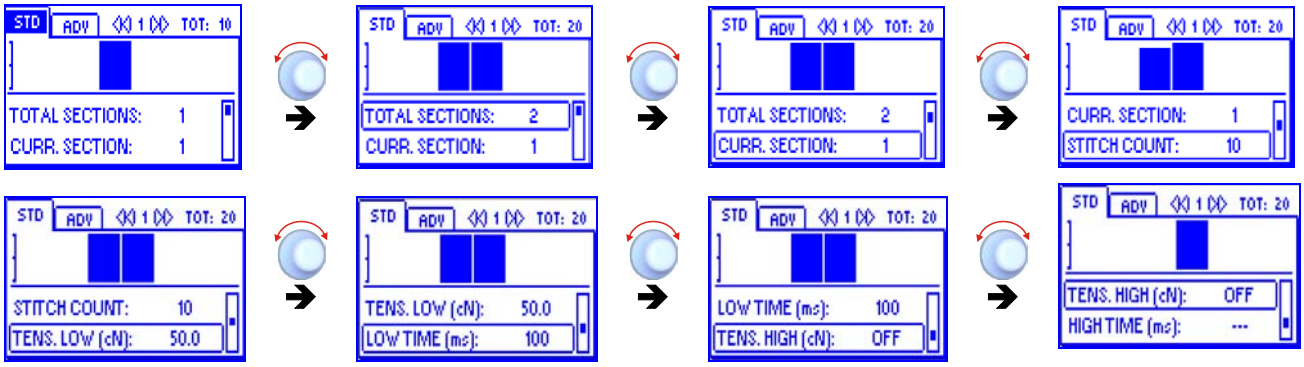
3 - Name of fields within the currently selected window

4 - Values related to fields

5 - Scroll Bar (*it indicates that additional fields are available*)

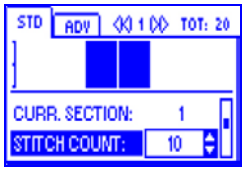
1 – Navigation inside the Selected Window (*STD*)

Turn the selector to *"Point"* in sequence the various items of the window (TOTAL SECTIONS → CURR. SECTION → STITCH COUNT → TENS. LOW → LOW TIME → TENS. HIGH → HIGH TIME).
The frame indicates the *"Pointed"* field.



Click to *"Select"* the pointed item. The field name will be shown in reverse and the symbols:  appear to the right of the field value

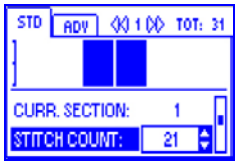
Example:



STITCH COUNT field selected (*reverse*)

Turn the selector either to Clockwise direction to increase the value, or to Counterclockwise direction to decrease it (*resolution 0.1*).
Turn the selector holding the button  pressed to increase/decrease the value more quickly.

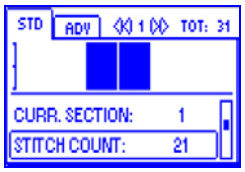
Example:



New value of STITCH COUNT field = 21

Once you have set the desired value (*e.g. 21*), click to confirm.

Example:



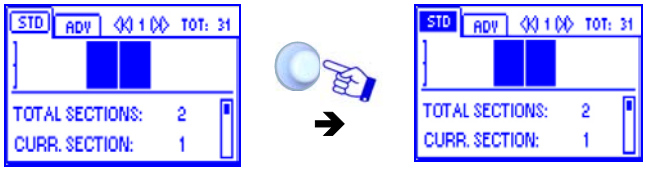
STITCH COUNT fileld no more selected

Turn the selector to select a new field and so on……

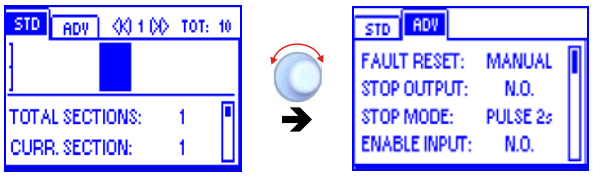
2 – Window Swap

Turn the selector to *"Point"* the label of the current window (*STD*) and click to select it.

Example:



Turn the selector to *"Point"* the ADV window
(*STD* → *ADV*).



Click to select the ADV window and enable the access to its parameters.

Select the desired parameter as explained on previous paragraph:
1 – Navigation throughout the Selected Window (*STD*)

3 – Entering Alphanumeric Values

To enter alphanumeric values, see for example the USERNAME and PASSWORD setting function (*KEY CODE*).
To enter the desired name and password, operate as follows:

Select the desired field (*e.g.: USERNAME*)
Turn the selector to choose the first letter of the name .

Click to confirm

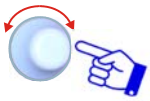
Turn the selector to choose the second letter of the name

Click to confirm

The sequence of characters shown turning the selector is the following:
A B C ……. X Y Z 0 1 2 ……. 9 space A B C ……etc.

4 – Parameter Saving

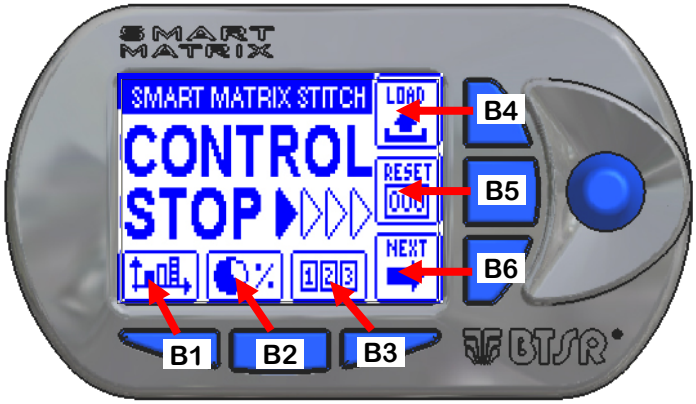
Once you have setup all the desired parameters, within a determined function, press and hold down for 3 seconds the rotary selector.



SAVE to save the settings
BACK to return to previous screen without saving
EXIT to return to menu without saving

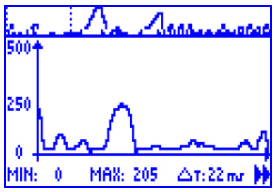
Immediate Function Activation through the SMART MATRIX Buttons

The 6 blue buttons (*B1 ~ B6*) allow you to directly activate some system functions without passing through the menu items. Such functions are indicated by the icons associated with the buttons, as shown on the following figure.
The detailed explanation of the various function will be provided on next paragraphs.
The following examples are only provided to summarize the Button → Function association.
Within some configuration/parameter setting functions, the B1 ~ B6 buttons may also perform a "shortcut" function, which will be explained time by time.



Immediate function activation buttons.

B1 = Tension graph



B2 = Efficiency Data — It allows viewing the production efficiency values

B3 = Alarms Counters — It allows viewing and/or clearing the error counters

B4 = LOAD Activation — It allows the immediate activation of style loading function

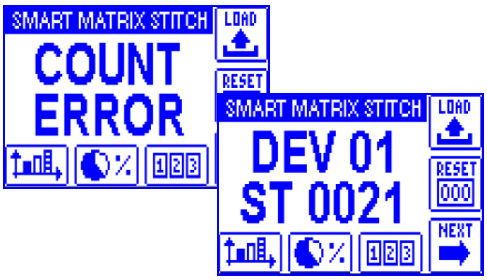
B5 = Counter Reset — It allows resetting the failure conditions

B6 = Next function activation — It allows activating the next page (*not used for STITCH application*)

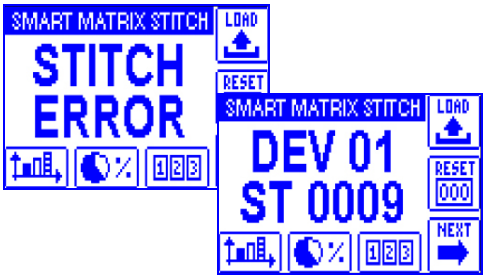
Interpretation of Operating Screens

- System working in Control status
- No error detected
- No stitching in progress

- System working in Control status
- No error detected
- Stitching No. 2 in progress

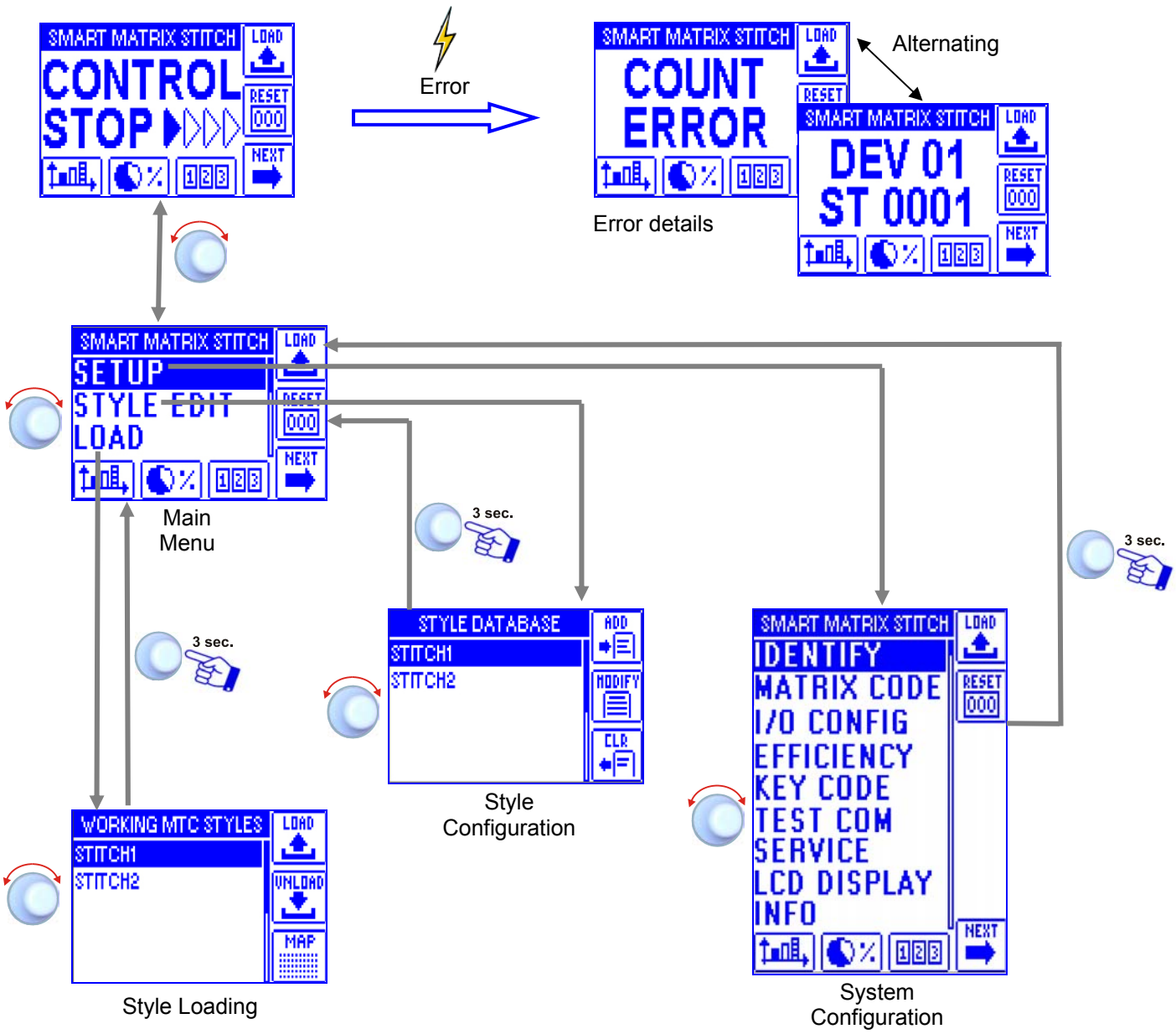


- COUNT ERROR
- Sensor 01 (*DEV 01*)
  Stitching point 21 (*ST 0021*)

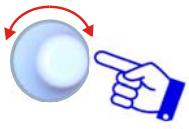


- Stitching tension failure (*STITCH ERROR*)
- Sensor 01 (*DEV 01*)
  Stitching point 9 (*ST 0009*)

SMART MATRIX STITCH Menu Structure



☞ *In the description of the various functions, the following graphic symbols will be used:*



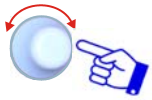
Select the desired option and click to confirm.

Press and hold down the button (3 sec.) to return to previous menu and/or to activate the data saving function.

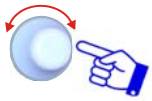
Sensor Configuration and Numbering

SETUP → **IDENTIFY**

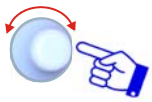
This function allows you to univocally identify each TS device connected to SMART MATRIX terminal.



Enter the SETUP menu.

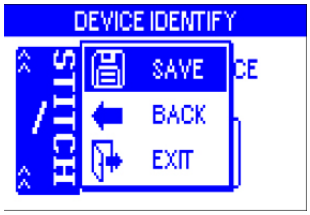


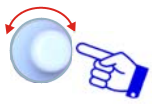
Select IDENTIFY.



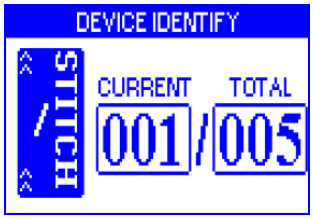
Set the number of TS sensors used [1..200].

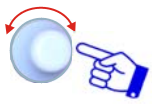
On this example: 5.





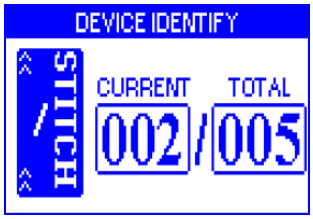
SAVE to save the settings





The example shown here indicates that the numbering (*identification*) procedure of the 5 TS sensors is going to start.

- The green LED starts flashing on the TS sensors.
- Skim the touch light of the First TS sensor and check that:
  a) the sensor LED changes from flashing green to red.
  b) the CURRENT field on SMART MATRIX STITCH terminal increases by 1



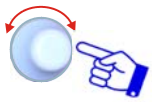
Skim the touch light of the Second TS sensor and continue with the numbering of all sensors.

When all the TS sensors have been numbered, the IDENTIFY screen automatically appears.

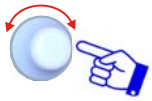
Smart Matrix Code

SETUP → **MATRIX CODE**

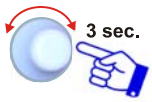
This function allows you to assign an identification code to the SMART MATRIX terminal, in case of application that uses multiple terminals.



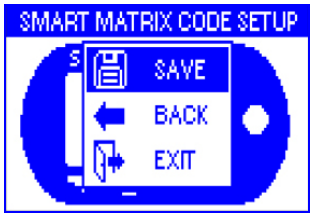
Enter the SETUP menu.

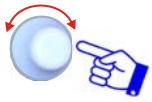


Select MATRIX CODE.



Choose the SMART MATRIX identification code and activate the save function.





SAVE to save the choice, BACK to return to the previous screen without saving, EXIT to return to menu.

I/O Configuration

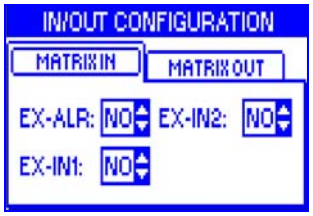
SETUP → **I/O CONFIG**

This function allows you to configure the input (EX-ALR, EX-IN1, EX-IN2) and output (STOP OUT) signals of SMART MATRIX terminal, as normally open (NO) or normally closed (NC) contacts.

Moreover, it allows you to configure the duration of the signal used as STOP output (STOP MODE).

Enter the SETUP menu.

Select I/O CONFIG.



Configure the input signals (*EX-ALR, EX-IN1, EX-IN2*) as NO or NC within the MATRIX IN window.

The EX-ALR signal can be used to display an alarm message on the display

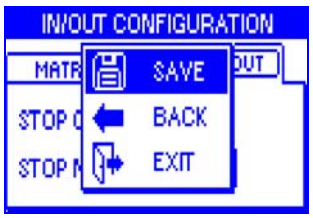
Configure the output signal (*STOP OUT*) as NO or NC within the MATRIX OUT window and configure the duration of the signal used as STOP output *(STOP MODE)*.

The default value of the STOP MODE parameter is “CONT” (*continuous signal*).

Keeping pressed the rotary selector for 3 seconds, the value 2.0 (*corresponding to a 2.0 seconds pulse*) appears in place of the “CONT” wording within the STOP MODE field. At this point, turning the rotary selector clockwise or counterclockwise you can increase or decrease the value.

[minimum 0.1 seconds. maximum 10.0 seconds]

To activate the saving function.

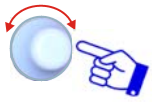


SAVE to save the choice, BACK to return to the previous screen without saving, EXIT to return to menu.

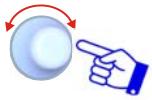
Efficiency Calculation Mode

SETUP → **EFFICIENCY**

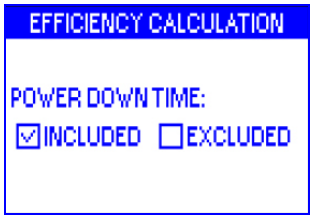
This function allows you to choose whether the POWER-DOWN TIMES shall be included or excluded in the calculation of efficiency index that will be shown pressing the button.

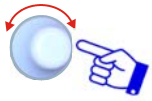


Enter the SETUP menu.



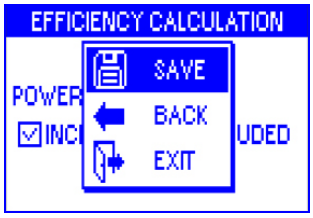
Select EFFICIENCY.

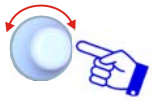




Choose either INCLUDED (*power down times included in the calculation*) or EXCLUDED.

To activate the save function.





SAVE to save the choice, BACK to return to the previous screen without saving, EXIT to return to menu.

Keycode Setting

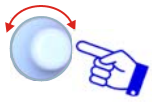
SETUP → **KEY CODE**

This function allows you to configure the user names and access passwords (KEY CODE) to the menus and other options of SMART MATRIX system.

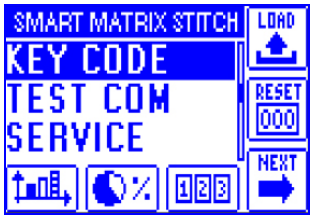
The first user ADMIN (Administrator) is set by default and cannot be deleted. The ADMIN user has the access rights to all menus and system options.

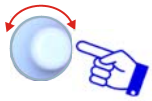
This function allows you to create new users, to associate an identification password to each user and to configure the list of accessible menus and options; it also allows you to remove (clear) users and to change the list of accessible menus and options.

☞ *You cannot set two users with the same name or with the same password!*



Enter the SETUP menu.

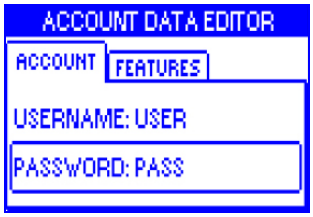


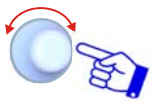


Select KEY CODE.

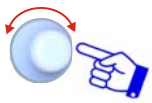
Aggiunta Nuovo Utente

Press the indicated button to add a new user.





Set the new user name (*e.g. USER*) and password (*e.g. PASS*) in the ACCOUNT **(*)** windows



Select the menus and options available to the new user (*SETUP MENU, STYLE LOAD, SENSORS READING, STYLE EDIT, ERROR COUNTERS*)

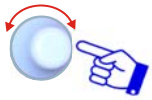
(*) User name and password can be set character by character turning the selector and clicking to confirm *(you* may *set numeric and alphabetic characters*).

Clear a User

Press the indicated button to remove the selected user from the list.

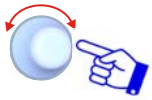
Change Configuration

Press the indicated button to edit (*change*) the access rights of selected user.



Change the configuration of menus and options available to the selected user (*SETUP MENU*, *STYLE LOAD*, *SENSORS READING*, *STYLE EDIT*, *ERROR COUNTERS*)

☞ *When you try to access a password-protected function, the following prompt will appear:*



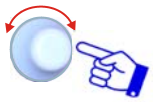
Choose the user name and set the password to access the selected function.

Communication Test

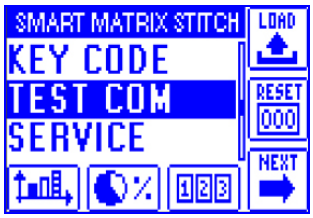
SETUP → **TEST COM**

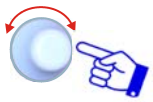
This function allows you to check:

- *The efficiency level of communications between SMART MATRIX and Sensors.*
- *The correct operation of Sensors.*

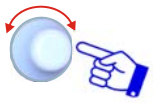


Enter the SETUP menu.





Select TEST COM.



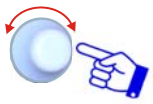
Select GLOBAL (*global communication efficiency*) or SINGLE (*communication efficiency with the individual sensors*).

Number of sensors on which communication errors occurred (*DEV IN ERROR*) and total number of transmissions repeated against detected errors (*TOTAL RETRY*). A maximum of 5 transmissions are repeated for each sensor.

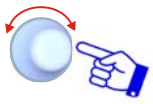
Global efficiency index.

Like for GLOBAL option, but referred to the selected sensor only. (*e.g.: DEVICE NUMBER 1*)

Efficiency index of sensor 1.



To select a new sensor.



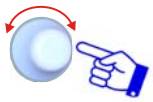
BACK to return to the previous screen without saving, EXIT to return to menu.

Device Offset

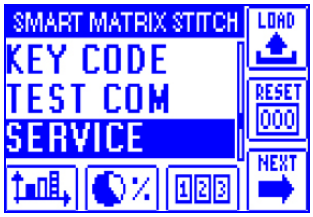
SETUP → SERVICE → DEV OFFSET

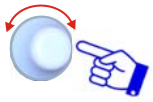
This function allows you to carry out the calibration (offset), either on all sensors or on the specified sensor.

Prior to start the calibration, ***remove the yarn from the loading cell*** *of the involved sensors.*

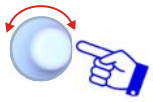


Enter the SETUP menu.



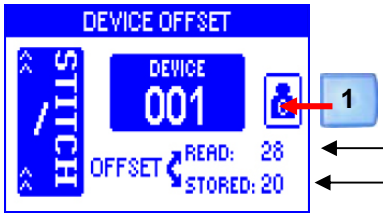


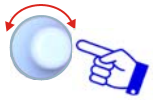
Select SERVICE.



Select DEV OFFSET.

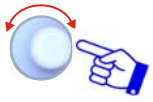
Offset on a single sensor





Select the desired sensor

Offset value actually detected on the sensor.
Offset value actually stored (*if it is different from the detected value, then press the button 1 to store the new value*).



When you press the button 1, a message requesting the confirmation for offset execution appears.

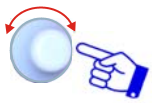
YES to confirm the offset execution.

NO to quit the function without executing the calibration

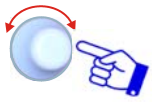
The OFFSET EXECUTE bar indicates the offset operation in progress (p*ercentage of calibrated sensors*).

Offset on a range of sensors

To continue.



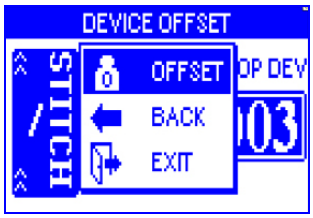
Select OFFSET RANGE to carry out the calibration on a determined range of sensors.

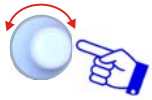


Set the identification number of the first (*START DEV*) and of the last (*STOP DEV*) sensor for which you want to carry out the calibration.

On this example the calibration will be carried out on sensors 1, 2 and 3.

To continue.



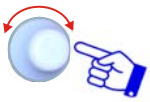


OFFSET to carry out the calibration on the selected sensors.

The OFFSET EXECUTE bar indicates the offset operation in progress (*percentage of calibrated sensors*)

Offset on all sensors

To continue.



Select OFFSET ALL to carry out the calibration on all sensors.

YES to confirm the operation.

NO to quit the function without executing the calibration

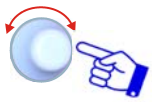
The OFFSET EXECUTE bar indicates the offset operation in progress (*percentage of calibrated sensors*).

At the end of calibration the SERVICE menu will automatically re-appear.

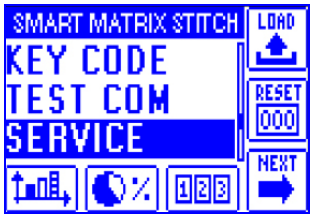
Sensor Firmware Upgrade

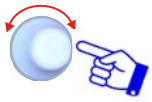
SETUP → **SERVICE** → **DEVICE UPG**

This function allows you to upgrade the firmware of sensors.

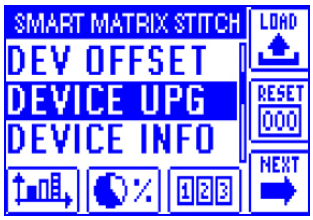


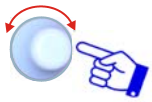
Enter the SETUP menu.



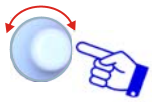


Select SERVICE.

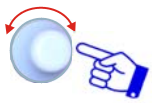




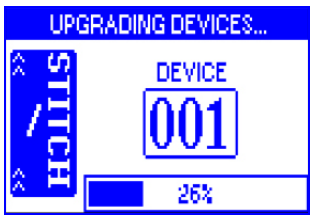
Select DEVICE UPG.



Select the sensor range to be updated. On this example, sensors from 1 to 5.



Select UPGRADE to carry out the upgrading.



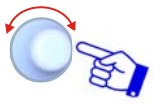
The lower bar indicates the percentage of currently upgraded sensors.

At the end of the firmware upgrade the SERVICE menu will automatically re-appear

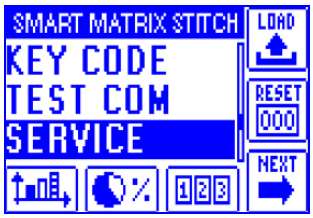
Information about Sensors

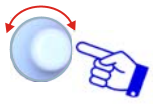
SETUP → SERVICE → DEVICE INFO

This function allows you to display the information about the sensors connected to the SMART MATRIX STITCH terminal.

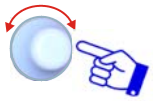


Enter the SETUP menu.

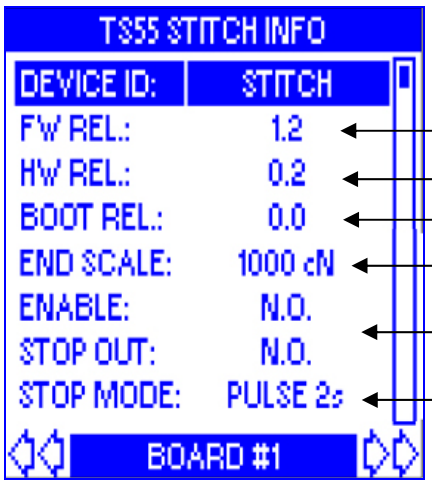


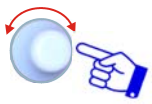


Select SERVICE.



Select DEVICE INFO.

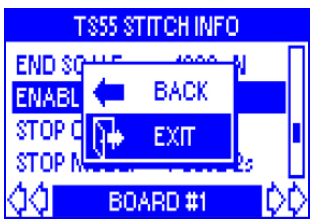




Turn the selector to scroll throughout the items.

- Firmware Release
- Hardware Release
- BOOTLOADER Program Release
- Full scale value of tension sensor
- Electrical interface of I/O signals (*either NO or NC*)
- Type of STOP signals (*continuous, 2 sec pulse, 10 sec pulse*

To continue

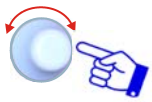


EXIT to return to SERVICE menu.

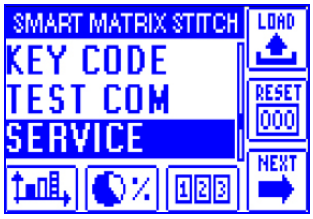
I/O Check

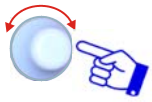
SETUP → **SERVICE** → **SM I/O CHECK**

This function allows you to display the external optional inputs PRX, ZPX and STC (currently not used).

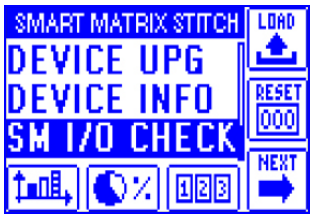


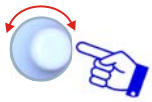
Enter the SETUP menu.



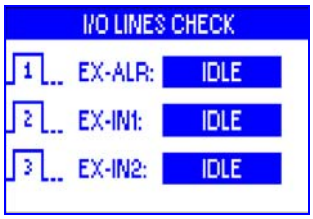


Select SERVICE.





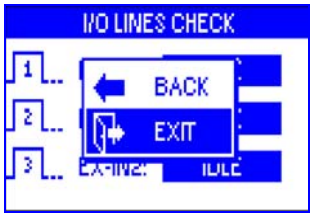
Select SM I/O CHECK.



The signals EX-ALR, EX-IN1 and EX-IN2are displayed.

ACTIVE = signal active

IDLE = signal inactive

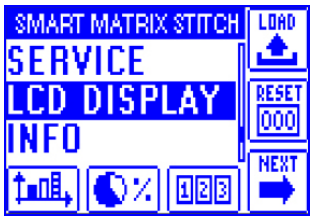


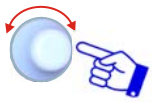
BACK to return to the previous screen without saving, EXIT to return to menu.

LCD Display Adjustment

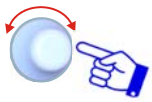
SETUP → **LCD DISPLAY**

This function allows you to adjust the brightness and contrast of display and to set the display auto-off time (1 .. 20 minutes, or No (Off) if the auto-off function is not required).





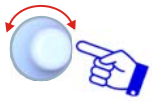
Enter the LCD DISPLAY menu.



Adjust:

- CONTRAST,
- BRIGHTNESS,
- DISPLAY AUTO OFF.

To activate the save function



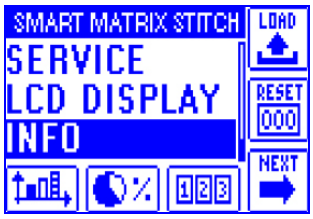
SAVE to save the settings,
BACK to return to the previous screen without saving,
EXIT to return to the menu.

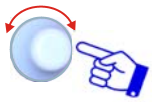
Information about SMART MATRIX STITCH

SETUP → INFO

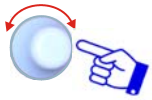
This function allows you to detect the Hardware, Firmware, OS and Boot Program versions.

These values shall be communicated to BTSR Service Department when requiring technical support to solve specific problems.





Select the INFO menu item.



To return to previous menu.

Style Programming

STYLE EDIT

This function allows you to program the operation parameters of TS55/STITCH sensors.

The STYLE EDIT function provides 3 options selectable using the immediate activation buttons.

To create a "new" style and add it to the style database.

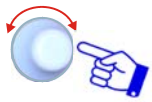
To either change the parameters of an existing style, or to create a new style starting from a similar already existing style.

To remove a style from the database.

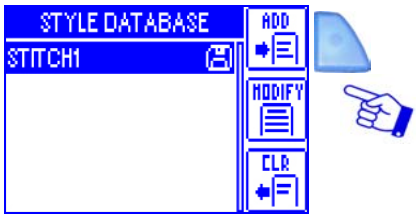
All the stitching points can be configured with the same parameters or, (to increase the system flexibility) you may create multiple stich sections configuring each section with different parameters.

Programming a new style

This example shows how to create a new style (*STITCH2*).

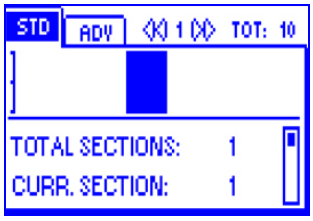


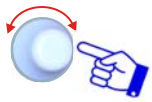
Select STYLE EDIT.



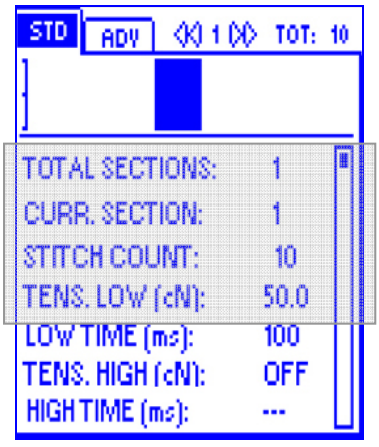
Press ADD

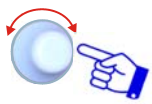
(*the* 💾 *symbol indicates that STITCH1 is the style currently loaded to the sensors*)





Select and set each value on STD window





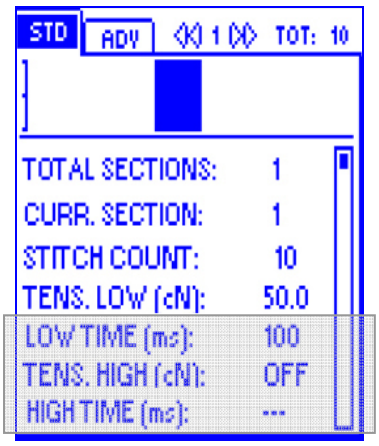
The following parameters can be configured on STD window:

TOTAL SECTIONS: max number of sections into which the stiching can be subdivided [1…10 – *Default*=1] (*Note 1*).

CURR.SECTION: section which the following parameters refer to. The parameters are to be set for each section if TOTAL SECTIONS > 1. [*Default=1*].

STITCH COUNT: number of SYNC pulses expected for the current section [1…200 – *Default*=10]

TENS.LOW: minimum tension threshold; the analogic tension signal generated by the sensor shall be greater than the value of this parameter for the time indicated in LOW TIME. [0.1…1000.0 cN – *Default*=50]



LOW TIME: minimum duration of the low tension analogic signal generated by the sensor at each stitching point [1…500 ms – *Default*= 100 ms] or [%]

[see note 2 on page 2-34]

TENS.HIGH: maximum tension threshold; the analogic tension signal generated by the sensor shall not exceeded the value set on in this parameter for the time indicated in HIGH TIME. [0.1…1000.0 cN – *Default*=OFF].

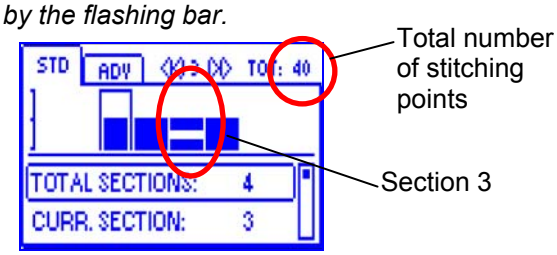
HIGH TIME: maximum duration of the high tension analogic signal generated by the sensor at each stitching point [1…500 ms – *Default*= 100 ms] or [%]

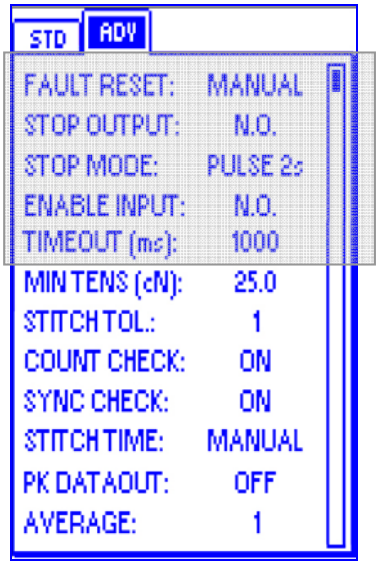
[see note 2 on page 2-34]

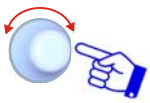
The TENS. LOW and TENS. HIGH parameters can also be disabled (*OFF*). In particular, it could be useful to disable the TENS. HIGH parameter.

Nota 1: *the number of sections set in TOTAL SECTIONS parameter is graphically indicated on the bar graph shown on the top area of the screen.*

The following example indicates that 4 sections and a total of 40 stitching points have been configured. The section which is currently being programmed (section 3) is indicated by the flashing bar.







The following parameters can be configured on ADV window:

FAULT RESET: error reset mode
[AUTO, MANUAL – *Default*=MANUAL]:

[MANUAL] manual reset through terminal or sensor touch light

[AUTO] automatic reset at the first Sync pulse generated after the re-start of the machine.

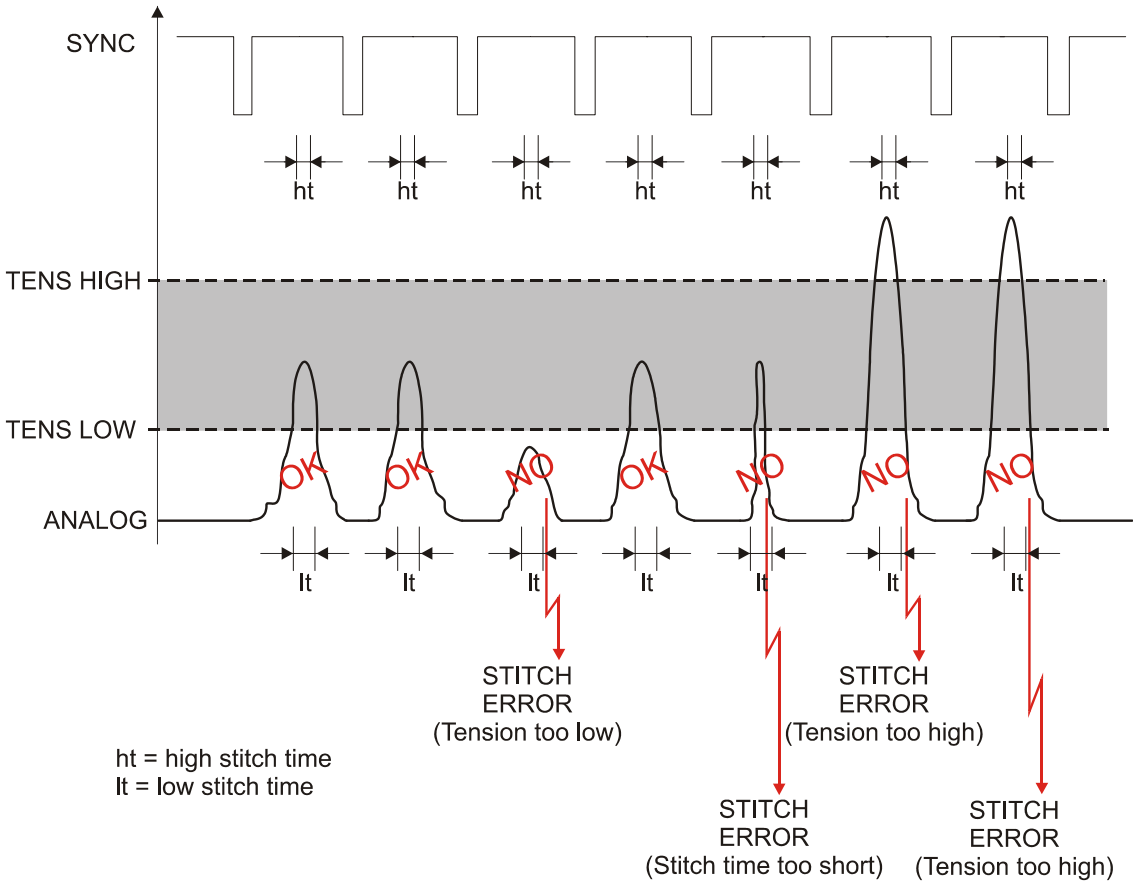
STOP OUTPUT: electrical interface of STOP output [either NO or NC – *Default*=N.O.].
STOP MODE: type of signal that will be sent through the STOP output [Cont, Pulse 2s, Pulse 10s – *Default*=PULSE 2s]. The possible choices are:

- Continuous Signal (*CONT*)
- 2 sec Pulse Signal (*PULSE 2s*)
- 10 sec Pulse Signal (*PULSE 10s*)

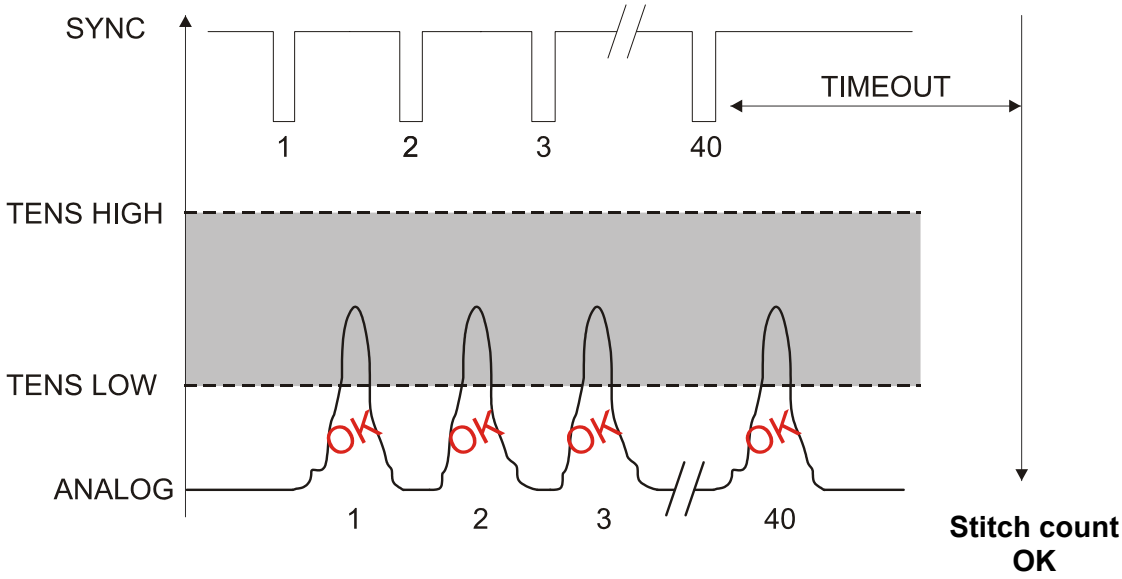
ENABLE INPUT: electrical interface of the SYNC input [either NO or NC – *Default*=N.O.].

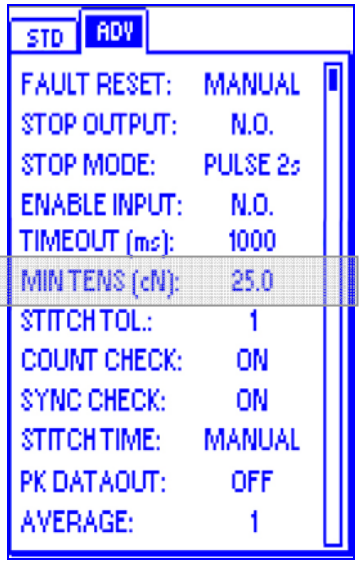
TIMEOUT: max time between two SYNC signals provided by the machine. After this time, the sensor assumes that the stiching is complete and checks if the number of points is correct [200…10000ms – *Default*=1000].

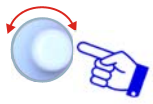
Example of tension pulse management(*ANALOG*)



Example of TIMEOUT parameter management







MIN TENS: static tension control:

a) during the stand-by period.

b) during the stitching execution

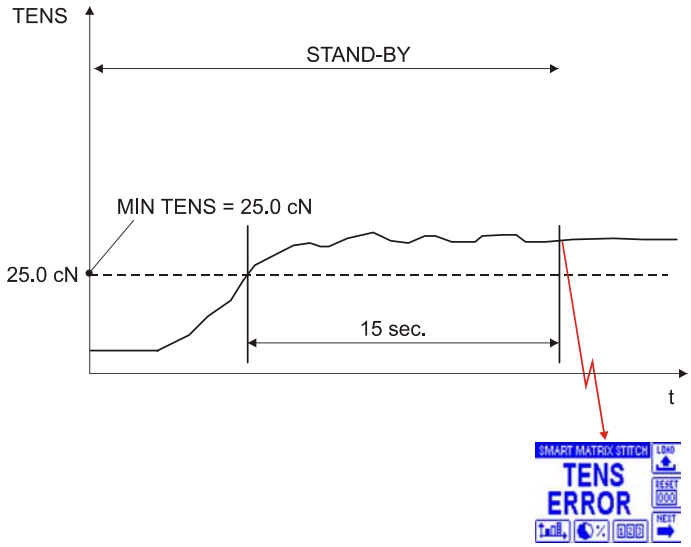
[1…1000 cN – *Default* 25 cN], or

[OFF] – control deactivated.

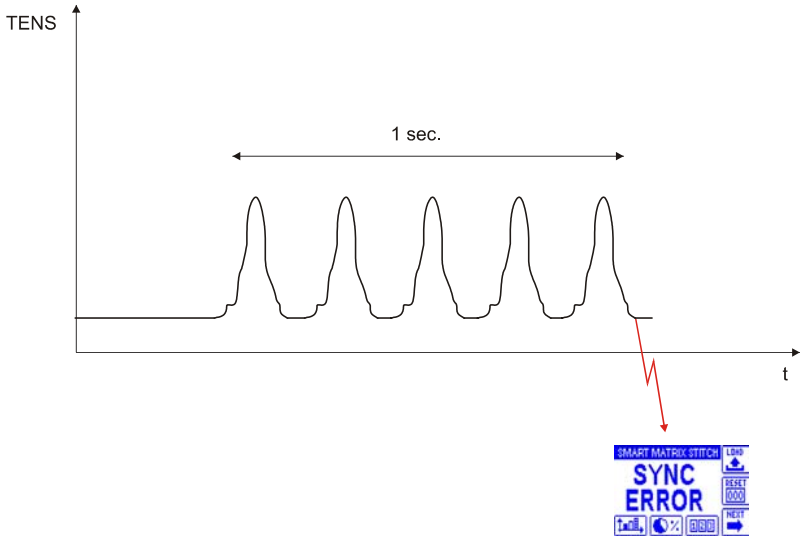
a) If, during the stand-by period (*waiting the stitching cycle start*), the tension detected by the sensor exceedes the value set on this parameter **for more than 15 seconds**, an alarm is signalled (*TENS ERROR*).

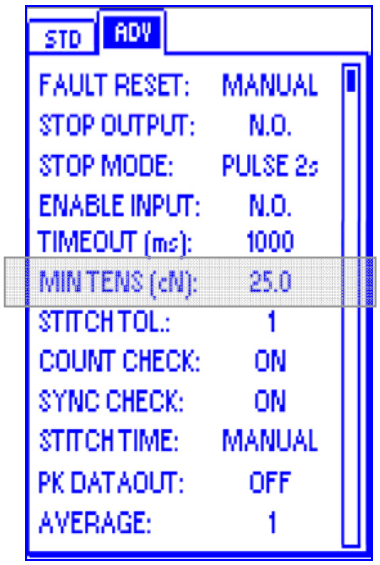
This fault can be caused, for instance, by a sensor malfunctioning or by a yarn locked inside the sensor

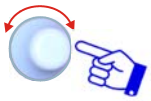
Example: MIN TENS = 25.0 cN



\+ *If the sensor detects at least 5 tension pulses acceptable as "stitching points" within 1 second, without synchronism pulses (SYNC), an alarm (SYNC ERROR) is generated (possible fault of the pulse generating proximity*

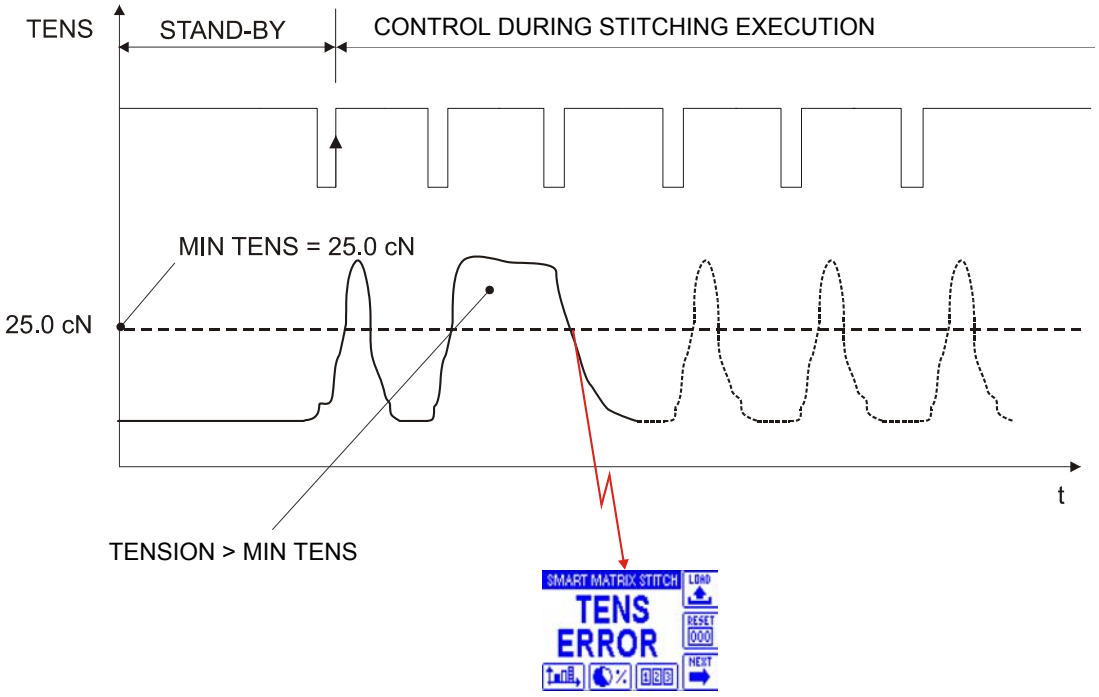

TENS
1 sec.
t
SMART MATRIX STITCH
SYNC
ERROR

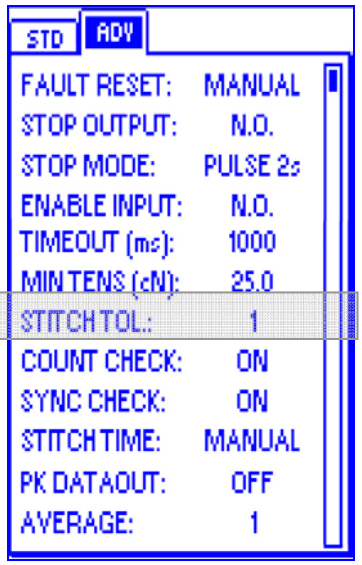


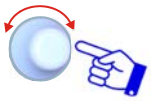


b) If, during the stitching execution, the tension detected by the sensor is always over the value set on this parameter for a time corresponding to 2 SYNC pulses, then an error (*TENS ERROR*) is generated.

Example: MIN TENS = 25.0 cN







STITCH TOL.: stitching control.

[1…25– *Default* 1 (*control deactivated*)]

The STITCH TOL. parameter allows you to set a tolerance on stitching errors.

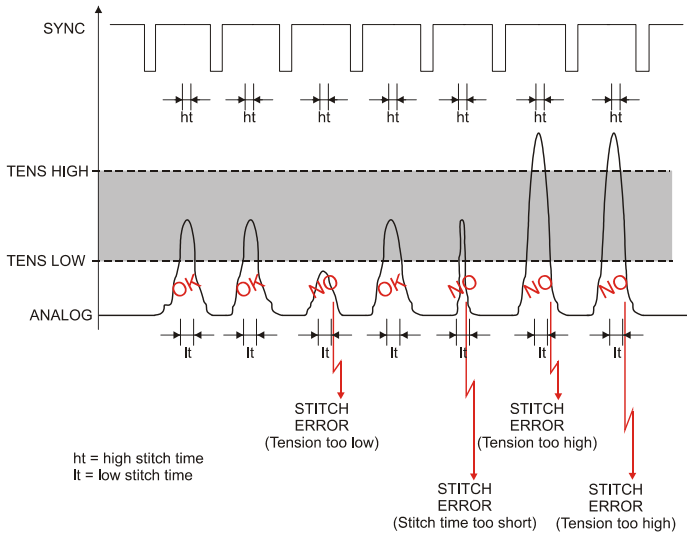
If the parameter is set to 1 (*control deactivated*), then the sensor generates an alarm any time the tension value detected or its time are not within the tolerance band.

Otherwise, if the parameter is > 1, then the alarm is generated after a number of wrong consecutive stitching points equal to the value set on the parameter itself.

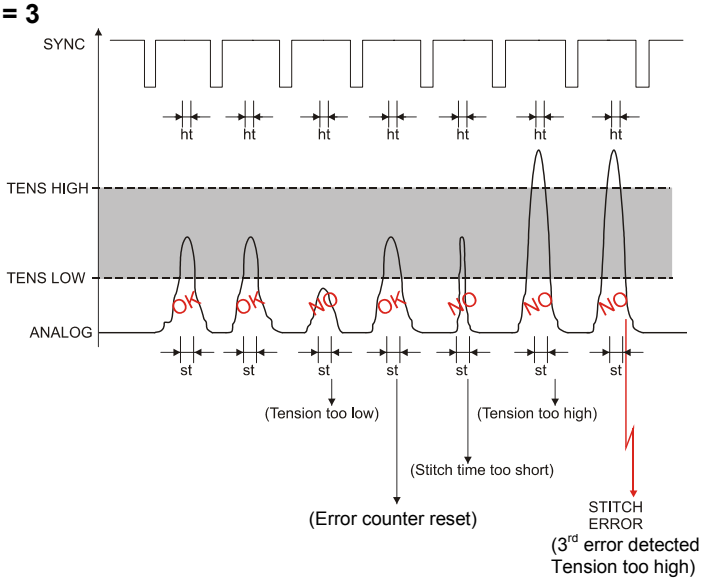
For instance, if STITCH TOL.: 3, then the sensor generates the alarm only after 3 consecutive errors detected.

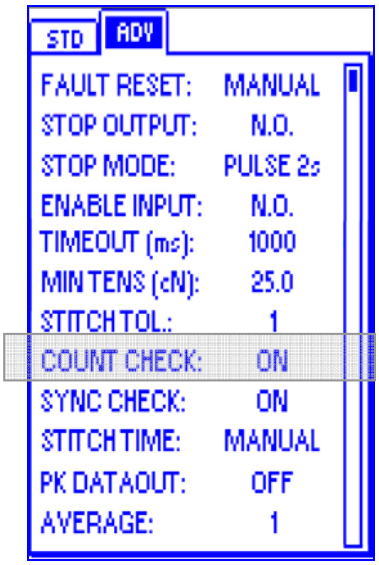
☞ *The error counter is reset if the sensor detects a correct stitching before the number of errors set in STITCH TOL. is reached*

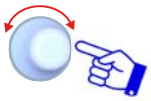
Example: STITCH TOL. = 1



Example: STITCH TOL. = 3







COUNT CHECK: control on number of executed stitching points enabling/disabling [ON = control enabled; OFF = control disabled].

If you enable this control (*ON*), an alarm (*COUNT ERROR*) will be generated on the following situations:

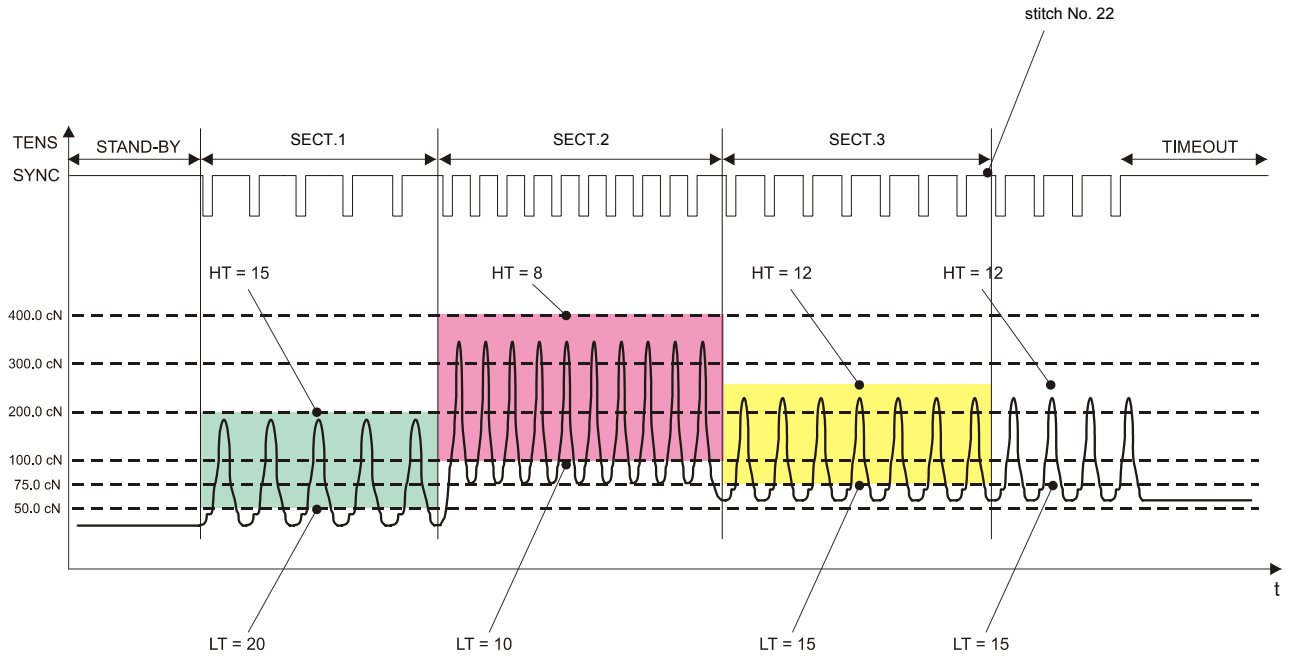
- when the number of actual stitches < STITCH COUNT
- when the number of actual stitches > STITCH COUNT

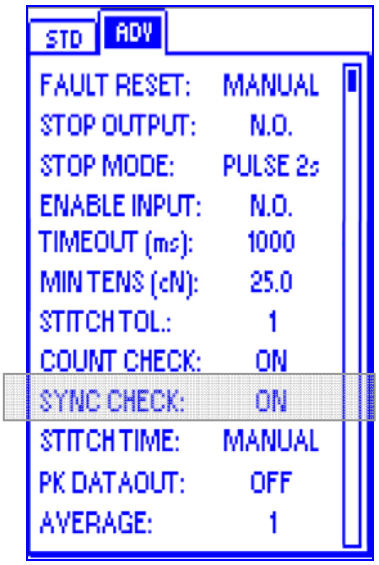
Otherwise if you disable this control (*OFF*), an alarm (*COUNT ERROR*) will be generated only when the number of actual stitches is < STITCH COUNT .

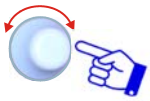
If the number of actual stitches is > STITCH COUNT, no alarm is generated. In this case, the control on exceeding stitches will be carried out depending on the parameters of the last valid stitch, until the TIMEOUT condition.

Example: COUNT CHECK = OFF on a style with 3 sections programmed with different parameters. (*No. of total stitching points= 22*)

Section	STITCH COUNT	TENS HIGH (cN)	TENS LOW (cN)	LOW TIME(ms)	HIGH TIME(ms)
1	5	200	50	20	15
2	10	400	100	10	8
3	7	250	75	15	12

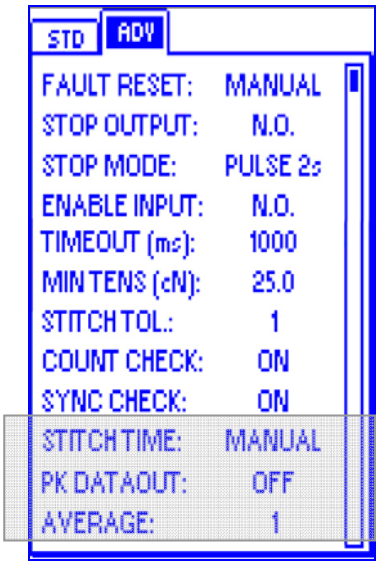


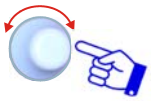




SYNCH CHECK: synchronism pulses control enabling/disabling [ON = control enabled; OFF = control disabled].

If the control is enabled and a not correct synchronism pulse is detected, (*for instance a pulse too long*), then the sensor generates the alarm.





STITCH TIME (MODE): stitching pulse minimum and maximum duration calculation mode (*LOW TIME and HIGH TIME*)
[MANUAL or AUTO %]

MANUAL: regular duration pulses defined on LOW TIME (ms) or HIGH TIME (ms) parameter of each section.

Option normally used on automatic machines with constant stitching speed.

AUTO %: pulse duration dynamically calculated as % of the time elapsing between a SYNC pulse and the next one.

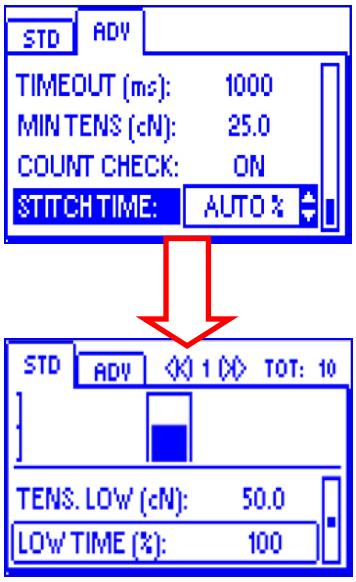
The AUTO % option is normally used on variable speed machines or on manually controlled machines.

PK DATAOUT: using this parameter it is possible to issue through the serial port a set of data summarizing the pulse characteristics (*amplitude, duration and serial number*).

The data issuing function can be activated ON or de-activated OFF.

☞ *For more details about this function please contact the BTSR Customer Service.*

AVERAGE: if the data detection is affected by noises (*for instance due to excessive machine vibrations*), it is possible to execute an average of the read data by setting for this parameter a number > 1. (*If AVERAGE = 1 the option is deactivated*)

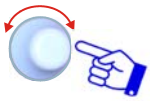


Note 2 *If STITCH TIME MODE = AUTO %, then the LOW TIME and HIGH TIME parameters on STD window will be expressed as (%) value rather then as (ms)*

\+ *An example of application with STITCH TIME MODE = MANUAL (and therefore LOW TIME and HIGH TIME expressed as ms) is shown on page 2-31*
An example of application with STITCH TIME MODE = AUTO % (and therefore LOW TIME and HIGH TIME expressed as %) is shown on page 3-14.

☞ ***For further information about the function and programming mode of the individual parameters (including the STITCH TIME MODE = AUTO % parameter), please refer to the examples on section 3: "Programming the operation parameters of TS55/STITCH sensors".***

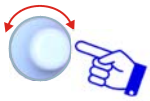
To activate the saving function, once you have completed the style programming stage.



SAVE to save the style,

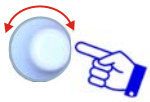
BACK to return to the previous screen without saving,

EXIT to return to the menu.

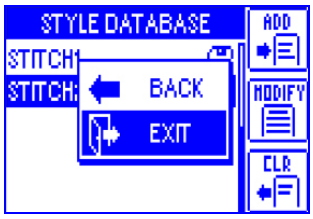


Set the Style Name (*e.g. STITCH2*), operating as described on paragraph - Navigation throughout the Display Windows.

Once you have setup the Style Name.
If the set name was already used for another style, the warning "DOUBLE STYLE NAME!" will appear



YES to save the style (*STITCH2*) to the database.



BACK to return to the previous screen without saving,

EXIT to return to the menu.

Style Modify

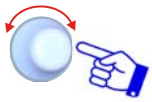
The Style Modify function is basically identical to the Programming a New Style function.

The main differences are the following:

1) once you have activated the STYLE EDIT window from Main menu, choose from the database the style you want to modify (*e.g. STITCH2*) and press MODIFY

Program all the steps described on Programming a New Style sequence, to bring all the desired changes with respect to the reference style STITCH2.

2) the bottom line of STYLE NAME screen that contains the style name setting keyboard shows the name of the selected style, to be modified (*STITCH2*).



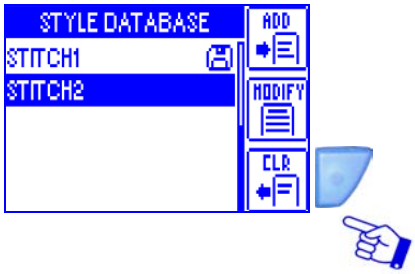
Type the Name you want to assign to the modified style.

To save the new style.

☞ *If you change the style currently loaded on specific devices (indicated by the diskette symbol) the changes will be automatically loaded to the relevant devices.*

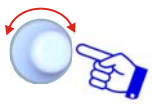
Style Clearing

This function allows you to remove a style from the database.



Once you have activated the STYLE EDIT function from main menu, choose the style you want to remove (*e.g. STITCH2*)

Press CLR button



Confirm the operation.

STITCH2 will be removed from the database.

Style Loading

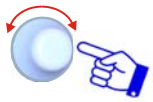
LOAD

This function allows you to load, to the sensors, one of the styles available in the database, or to unload the style currently loaded on the sensors.

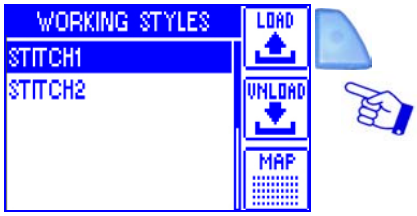
All the connected sensors can be configured with the same parameters or, (to increase the system flexibility) you may create multiple device groups, configuring each group with different parameters.

When a style is loaded on the sensors, the relevant name will appear on the upper side of the display, instead of "SMART MATRIX STITCH".

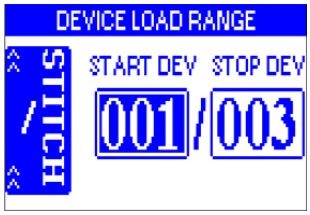
Style Loading

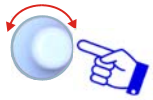


Select the LOAD menu item.

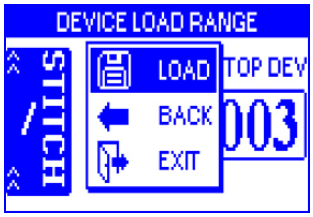


Once you have activated the STYLE LOAD function from main menu, choose the style you want to load (*e.g. STITCH1*) and press LOAD.





Select the range of devices to be loaded with the style (*default*: *all the sensors*).



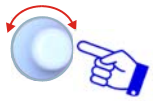
LOAD to load the style.

"LOAD STITCH STYLE" appears for a few seconds and then the display turns back to the LOAD menu, with the new style loaded.

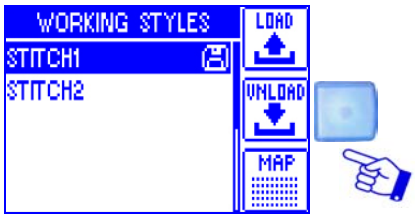
If different styles have been loaded to different devices, the symbol (*style loaded indication*) appears for 2 or more styles.

If on the same device two different styles are loaded, the warning "STYLE OVERLAP CONTINUE?" appears

Style Unloading

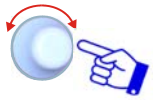


Select the LOAD menu item.



Once you have activated the STYLE LOAD function from main menu, choose the style you want to unload (*e.g. STITCH1*) and press UNLOAD.

The symbol indicates that STITCH1 is the style currently loaded on the devices.



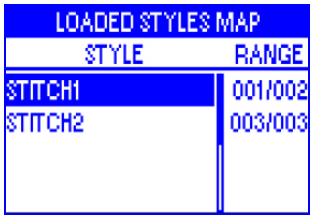
Confirm the style unloading operation.

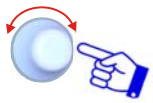
The style STITCH1 will be unloaded from the devices .

The symbol will disappear from the right side of the style name.

MAP function

Press the MAP button to display the device range on which the various styles are loaded





Rotate to scroll the list.

This example indicates that STITCH1 style is currently loaded to sensors 001 and 002 while STITCH2 is currently loaded to sensor 003.

EXIT o go back to main menu.

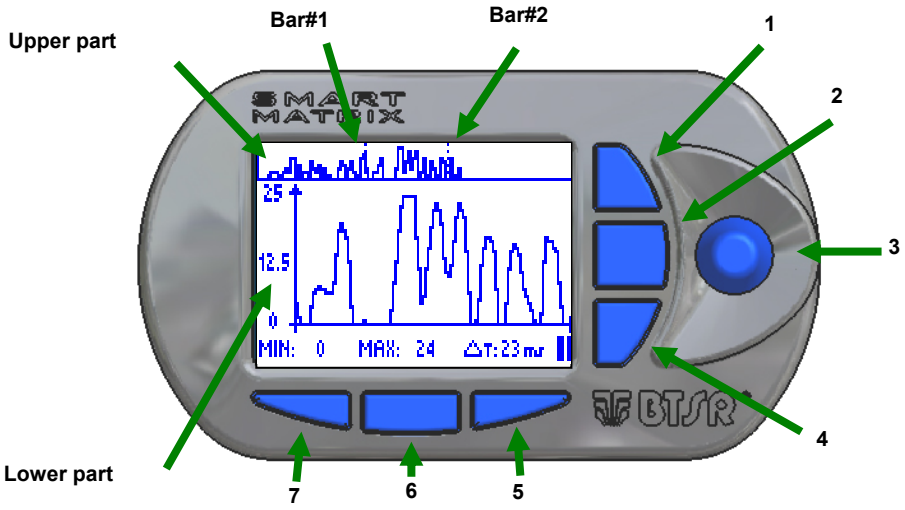
Tension graph

This function, which can be activated pressing the  *button, provides several graphic information which allow you to locate the tension wave-form detected by the TS sensors.*

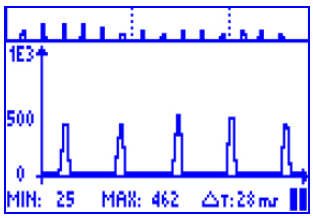
Using the various buttons available on the SMART MATRIX STITCH terminal, you may activate several functions (zoom, data recording, etc) which allow you to optimize the control parameters and to locate possible critical conditions.

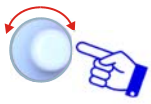
The graphic screen is subdivided into two parts (upper and lower). The upper part shows all the data recorded by the TS sensors during the last 10 seconds, with a low resolution tension graph. The lower part shows only a portion of the data represented on the upper part (i.e. the segment ranging between the two limit bars– Bar#1 and Bar#2), with a better resolution.

The following figure shows an example of graphic display and locates the buttons available for the graph analysis.



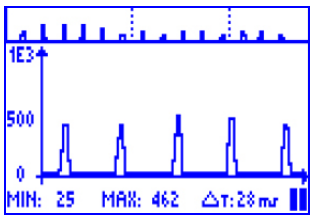
Press the indicated button to directly access the graphic.





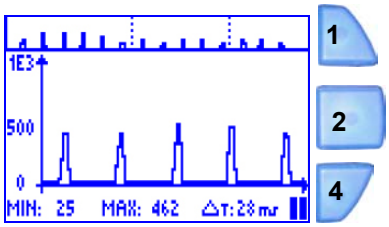
Click on the selector to start and click again to stop the data recording.

On the lower part of the screen, the minimum and maximum tension data and the time interval (ΔT) between Bar#1 and Bar#2 are displayed.



Data recorded by the sensor during the last 10 seconds. (*Low resolution*).

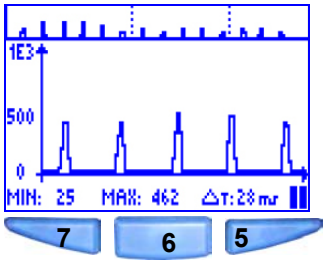
High resolution display of the portion ranging between Bar#1 e Bar#2. To change the range between Bar#1 and Bar#2, simply turn the selector (***3***).



It increases the zoom factor on the lower part of the screen.

It decreases the zoom factor on the lower part of the screen.

If multiple sensors are connected to SMART MATRIX terminal, then pressing this button you may enable the selection of sensor for which you want to display the data; to actually choose the sensor, turn the selector **3**.

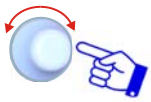


7: it increases the area between Bar#1 e Bar#2. It decreases the time resolution of the tension graph.

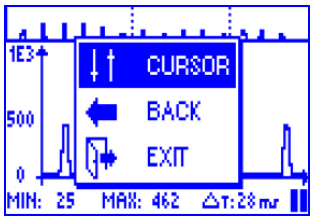
6: Keeping this button pressed, while you change the range between Bar#1 and Bar#2 through the selector **3**, you may speed up he shift of the portion ranging between Bar#1 and Bar#2.

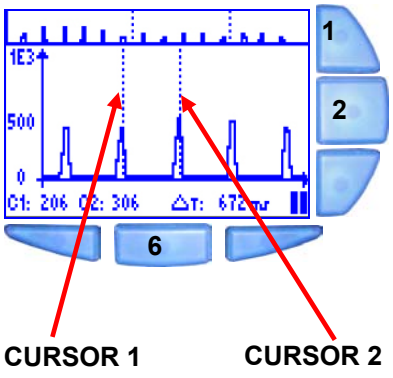
5: it decreases the area between Bar#1 e Bar#2. It increases the time resolution of the tension graph

To enter the CURSOR function, which allows you to better analyze the data.



To use the cursor function





Click on the selector **3** to toggle between CURSOR 1 and CURSOR 2. Turn the selector, to move the cursor to the left or to the right.

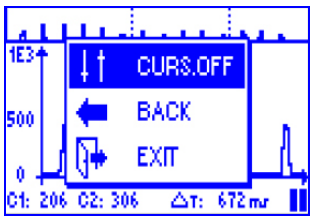
1: It increases the zoom factor on the lower part of the screen.

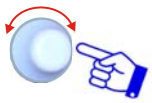
2: It decreases the zoom factor on the lower part of the screen.

6: Keeping this button pressed while you turn the selector to move either CURSOR 1 or CURSOR 2, you may speed up the shift operation.

On the lower part of the screen, the values of the cursors and the time (ΔT) between them are displayed.

To leave the CURSOR function and go back to the previous display.





CURSOR OFF to leave the CURSOR function, still remaining within the the “Graph”function.

BACK to return to CURSOR function

EXIT to quit the “Graph” function

Efficiency Data

This function allows you to display the production efficiency value (work time, stop time, total time and efficiency index %).

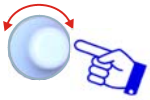
The efficiency index calculation depends on the setting carried out with the EFFICIENCY function within the SETUP menu.

Press the indicated button to directly access the efficiency data.

Select one of the windows (*STYLOAD and RESET*,) to view the data that summarize:

- work time
- stop time
- total time (*work time + stop time*)
- efficiency percentage, respectively:
  - from the last style loading (*STYLOAD*)
  - from the last RESET

To exit the function.



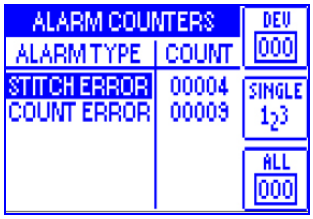
BACK to return to the previous screen without saving,

EXIT to return to main menu.

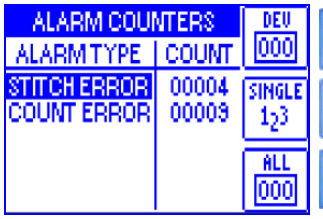
Error Counter Display

This function allows you to display the sensor error counters.

Press the indicated button to directly access the counters.



The indicated values represent the sum of all errors (*STITCH ERROR, COUNT ERROR*) referred to all the sensors.

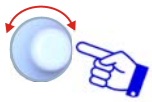


Counter clearing on a range of devices

Displaying the counters of individual devices

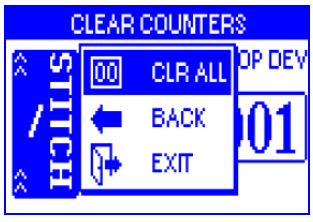
Clearing all counters

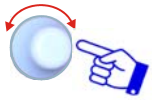
Counter clearing on a range of devices



To select the desired device interval. (*From START DEV to STOP DEV*)

To activate the clearing operation.

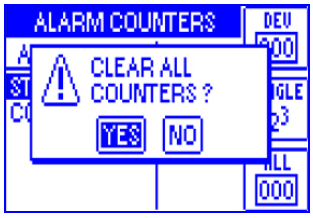


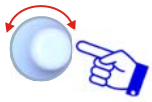


CRL ALL to clear the counters of selected devices.

During the clearing operation, a CLEAR COUNTERS message will appear.

Clearing all counters

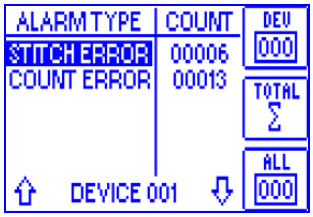




YES to clear all counters.

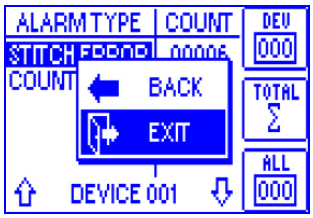
During the clearing operation, a CLEAR COUNTERS message will appear.

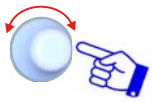
Displaying the counters of individual devices



To select desired device. (*the values of counters are referred to the selected device only, in this example: DEVICE:001*)

To continue.





EXIT to leave the function to CONTROL status.

SMART MATRIX Error Messages

During the normal operation, the SMART MATRIX STITCH display will show CONTROL NN (where NN represents the stitching point counter) or CONTROL STOP when the machine is not performing stitching operation.

In case of errors or fault detection, the CONTROL NN indication will be replaced by a message which summarizes the type of error or failure occurred.

The error and failure messages can be classified as follows:

Errors detected by the SMART MATRIX STITCH terminal power-on self-diagnostic

Error on SMART MATRIX STITCH terminal EEPROM data

Error on SMART MATRIX STITCH terminal RAM data

Error on SMART MATRIX STITCH terminal internal communication bus

Errors detected during the system operation

The errors detected during the system operation are shown on SMART MATRIX STITCH terminal display with 2 alternating screens (one indicating the type of error, the other indicating the relevant device).
The following list describes the most common error messages.

Communication error between SMART MATRIX STITCH terminal and sensor 01.

Count error (*the number of tension pulse read by the sensor 01 does not correspond to the one set on the STITCH COUNT parameter).*

Low tension error (*the tension detected by the sensor 01 is out of the threshold and/or time limits set up in TENS LOW and/or LOW TIME parameters*).

High tension error (*the tension detected by the sensor 01 is out of the threshold and/or time limits set up in TENS HIGH and/or HIGH TIME parameters*).

Synchronism error (*see the example on chapter "Style Programming" STYLE EDIT) - ADV window*.

Tension error detected during the stand-by period and/or during the stitching execution (*see examples on chapter "Style Programming" STYLE EDIT) - ADV window*

Short circuit or overload on the TS55 sensor STOP output

3 TS55/STITCH Sensors

TS Sensor Features

The **TS** devices are intelligent sensors capable of detecting, due to a sophisticated control technique, the tension applied to the yarn being controlled, signaling possible anomalies about the tension itself.

The tension exerted by the yarn on sensor loading cell, is detected by the electronics of the sensor and converted by the built-in DSP *(Digital Signal Processor)* into an analog signal that can be interpreted both by the **TS** sensor and by the **SMART MATRIX** program.

TS devices can be used for yarn quality control *(under both static and dynamic conditions)* which, thanks to an innovative patented technique *(Tension Smart Scanning Sensor)* don't need complex wirings and long installation times.

The **TS** devices are fully programmable for an easy implementation of quality control of any kind of yarn/application.

As the **TS** are parametric devices, it is possible to set freely the tension thresholds and the pulse duration, in order to adapt the control to the specific requirements.

Function of the TS Sensors

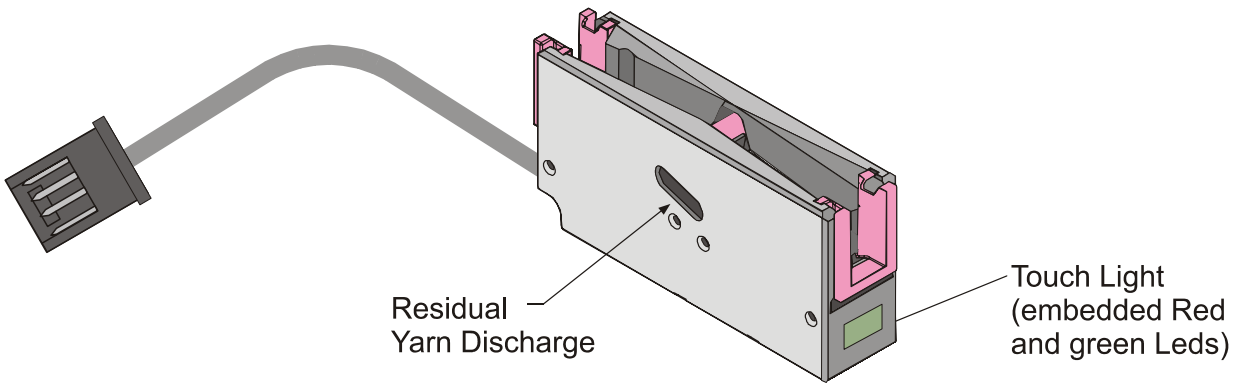
The **TS** sensors provide the real time control of the yarn running inside the eyelet and, in case of defect, they immediately stop the machine which the sensor is connected to.

The **TS** sensors have two signalling lights *(green LED, red LED)* and a “Touch Light” button.

The “Touch Light” button is used to carry out the automatic sensor numbering and error reset operations.

During the automatic numbering of the sensors *(flashing green LED),* by skimming the touch light you assign the sensor the number shown on the device identification screen of **SMART MATRIX** program.

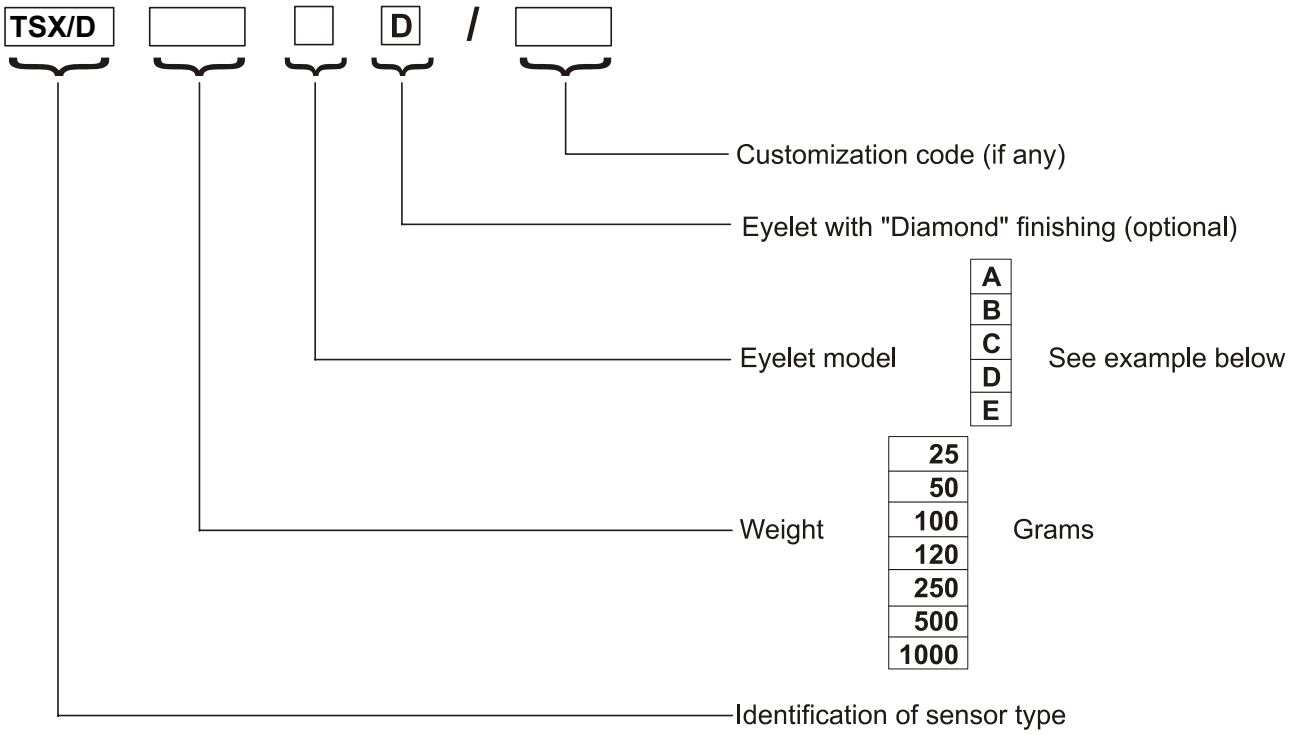
During an alarm condition *(flashing red LED)*, by skimming the touch light, you will reset the error condition (*when the FAULT RESET parameter is set to MANUAL)*.



TS Sensor Types

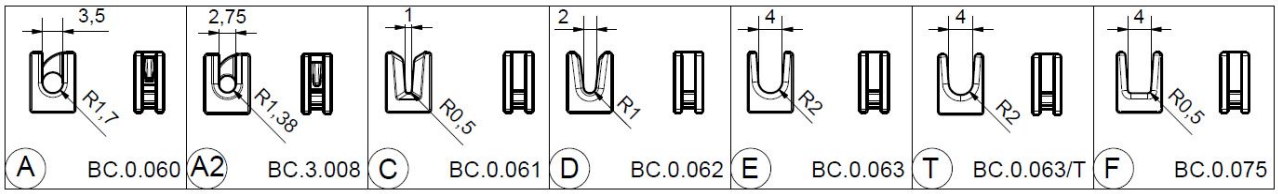
The **TS** sensors are available in various typologies to meet specific needs of individual installations/applications.

The following diagram shows a detailed coding rule of the available sensors, depending on possible variables.



Example: **TS55/D500DD** = TS55 sensor, 500 grams weight, with model D eyelet, Diamond finishing

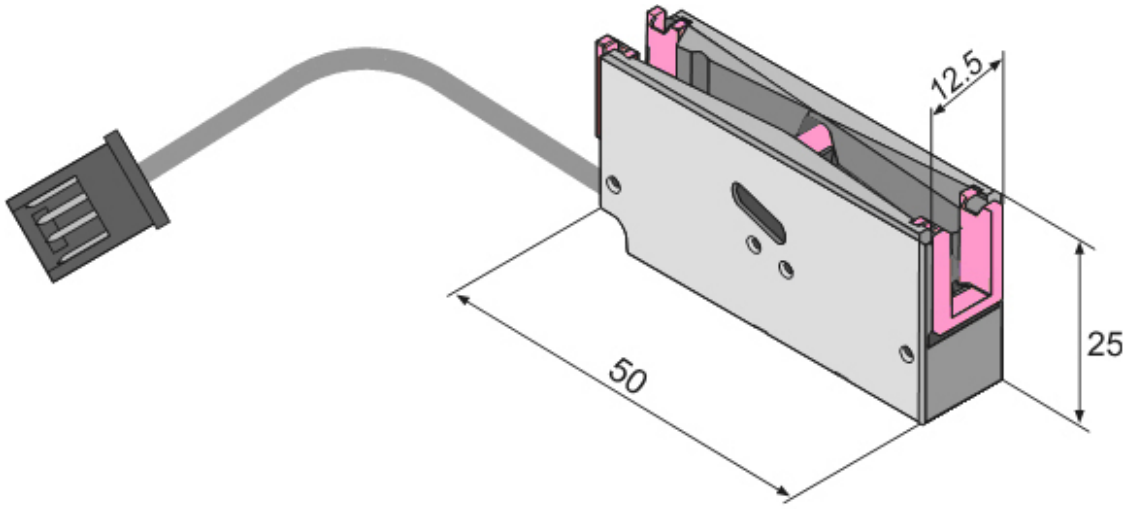
Eyelet Models

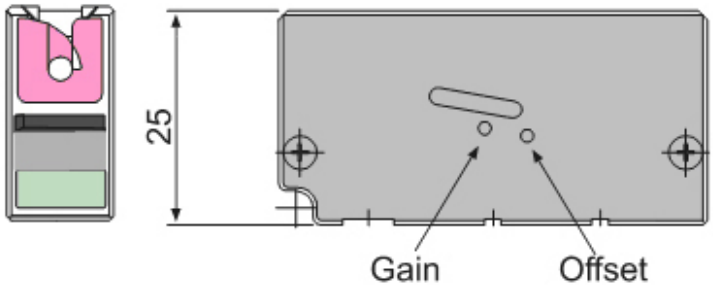


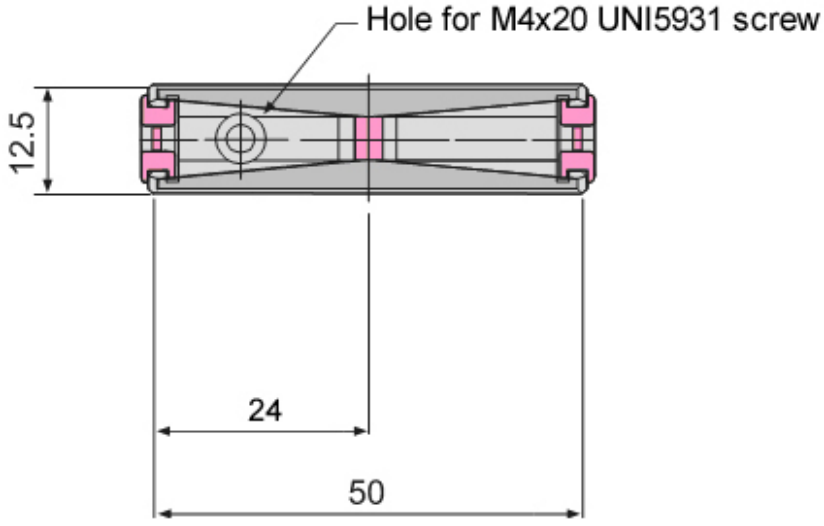
(A) = BC.0.060 (self-threading eyelet ceramic type “A” for TS4)
(A2) = = BC.3.008 (black self-threading eyelet ceramic type “A2” for TS4)
(C) = BC.0.061 (“V” eyelet ceramic type “C” for TS4)
(D) = BC.0.062 (“V” eyelet ceramic type “D” for TS4)
(E) = BC.0.063 (“U” eyelet ceramic type “E” for TS4)
(T) = BC.0.063/T (“U” black titanium eyelet ceramic type “T” for TS4)
(F) = BC.0.075 (“U” eyelet ceramic type “F” for TS4)

Mechanical Characteristics of TS Sensors

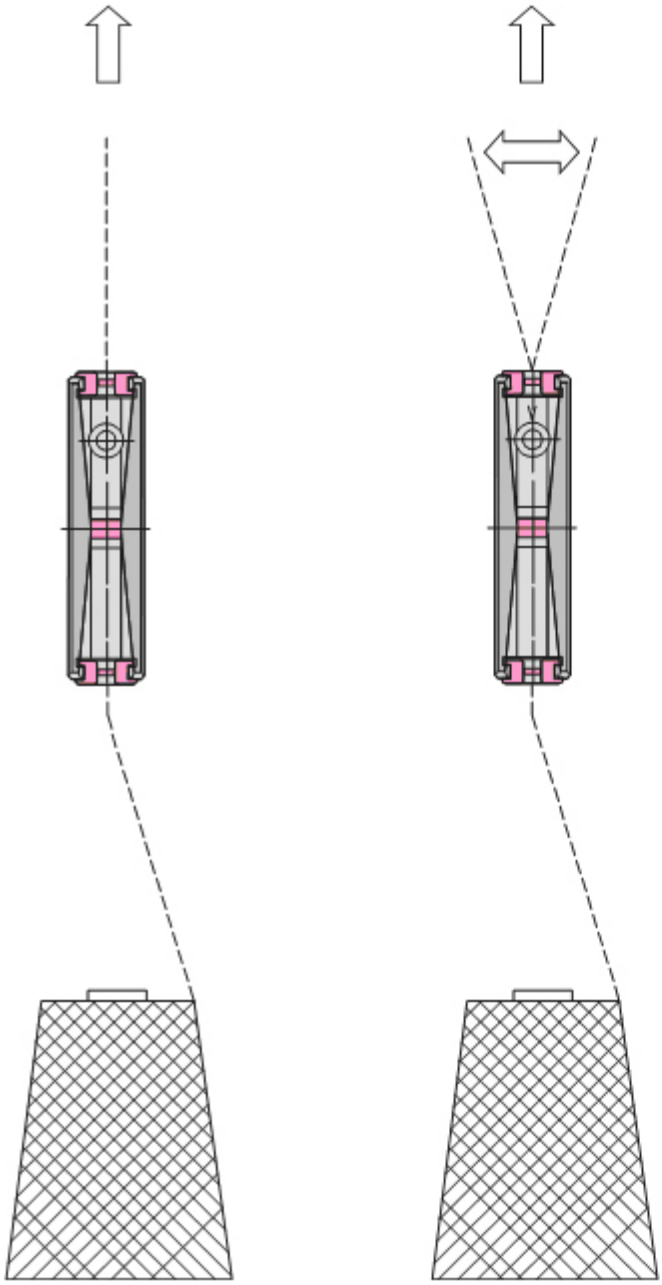
Dimensions (mm)

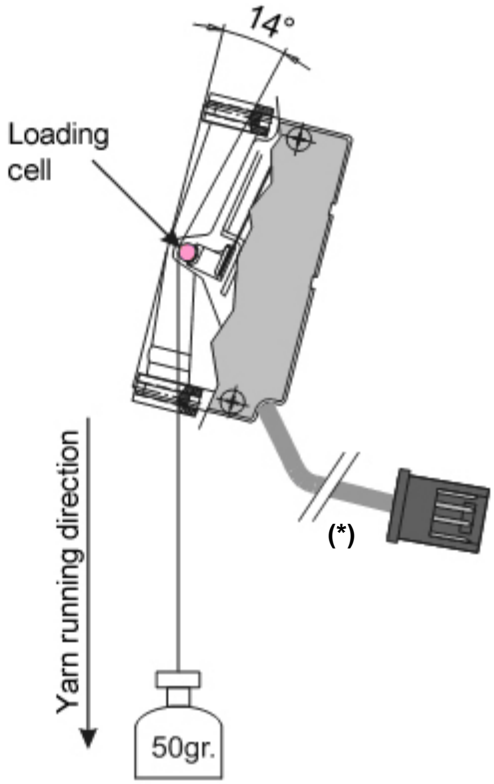






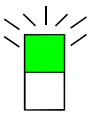
Usage





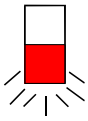
Interpretation of the Signaling Lights Located on the Sensors

Green Led ON
Sensor under normal control;
No defects detected by the sensor Control mode.



Green LED FLASHING

- Sensor under automatic numbering procedure.



Red LED FLASHING

During the machine operation the sensor detected a failure condition (*STITCH ERROR or COUNT ERROR*).

Green Led ON
Red Led ON
Sensor locked. Switch off and on the system. If the condition persists, replace the sensor.

Green LED OFF
Red LED OFF
Sensor not powered.

Programming the operation parameters of TS sensors

The **TS** series sensors are microprocessor based electronic sensors capable of detecting the most common types of yarn tension failures:
In particular within the STITCH application, the sensors control that at every stitching point (*indicated by the ENABLE digital signal, provided by the stitching machine*), the yarn receives a tension pulse with amplitude and duration ranging within the predefined limits, thus confirming that the stitching point has been correctly applied; otherwise, the sensor sends an error signal to the SMART MATRIX STITCH terminal.

The yarn running inside the sensor touches the loading cell that moves depending on the tension applied to the yarn itself.

In normal working conditions, the loading cell is pushed inside the sensor by an amount which is proportional to the yarn tension. The position of loading cell *(i.e. the yarn tension)* is converted into an analogue signal by the sensor electronics.

The built-in sensor's processor performs a real-time processing of such analog signal through a special program loaded into the sensor memory, which controls the tension level of the yarn running inside the sensor and detects / discriminates the presence of the above mentioned failures.

The variables of this program are represented by the settings related to the article which is being controlled, i.e. the settings that can be **defined**, **changed** and **loaded** into the sensors by means of the **SMART MATRIX** terminal (*STYLE EDIT and STYLE LOAD functions*):

These parameters can be classified into three categories:

1. Parameters related to stitching
2. Parameters related to the stitching point characteristics
3. System parameters

1. Parameters related to stitching

TOTAL SECTIONS

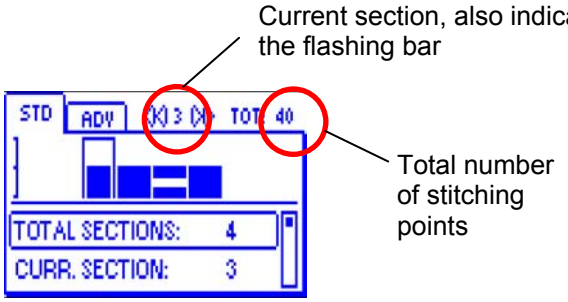
Total number of sections which a stitching can be subdivided in.
A stitching can be made of NN points, having the same characteristics (*in terms of yarn tension*), or it can be made of multiple sections, with NN points for each section; the point tension characteristics can change section by section.

CURRENT SECTION

This parameter is significant only during the parameter programming, if TOTAL SECTIONS > 1.
It indicates the current section whose parameters are being set.
All the sections defined in TOTAL SECTIONS, have to be **always** programmed.

STITCH COUNT

Number of stitching points for the current section. During the parameter programming stage, the number of sections set, the current section, and the total number of stitching points are indicated on the upper part of the STD window.



2. Parameters related to the stitching point characteristics

- LOW TIME *(minimum time for which the tension must exceed the minimum threshold)*
- HIGH TIME *(maximum time for which the tension must not exceed the maximum threshold)*
- TENS LOW *(Min Tension Threshold)*
- TENS HIGH *(Max Tension Threshold)*

LOW TIME

If the tension pulse exceeds the minimum threshold for a time lower than the value set on this parameter, a STITCH ERROR is generated. LOW TIME is expressed in ms if STITCH TIME MODE in ADV is = MANUAL, or in % if STITCH TIME MODE in ADV = AUTO %.

HIGH TIME

If the tension pulse exceeds the maximum threshold for a time higher than the value set on this parameter, a STITCH H ERROR is generated. HIGH TIME is expressed in ms if STITCH TIME MODE in ADV is = MANUAL, or in % if STITCH TIME MODE in ADV = AUTO %.

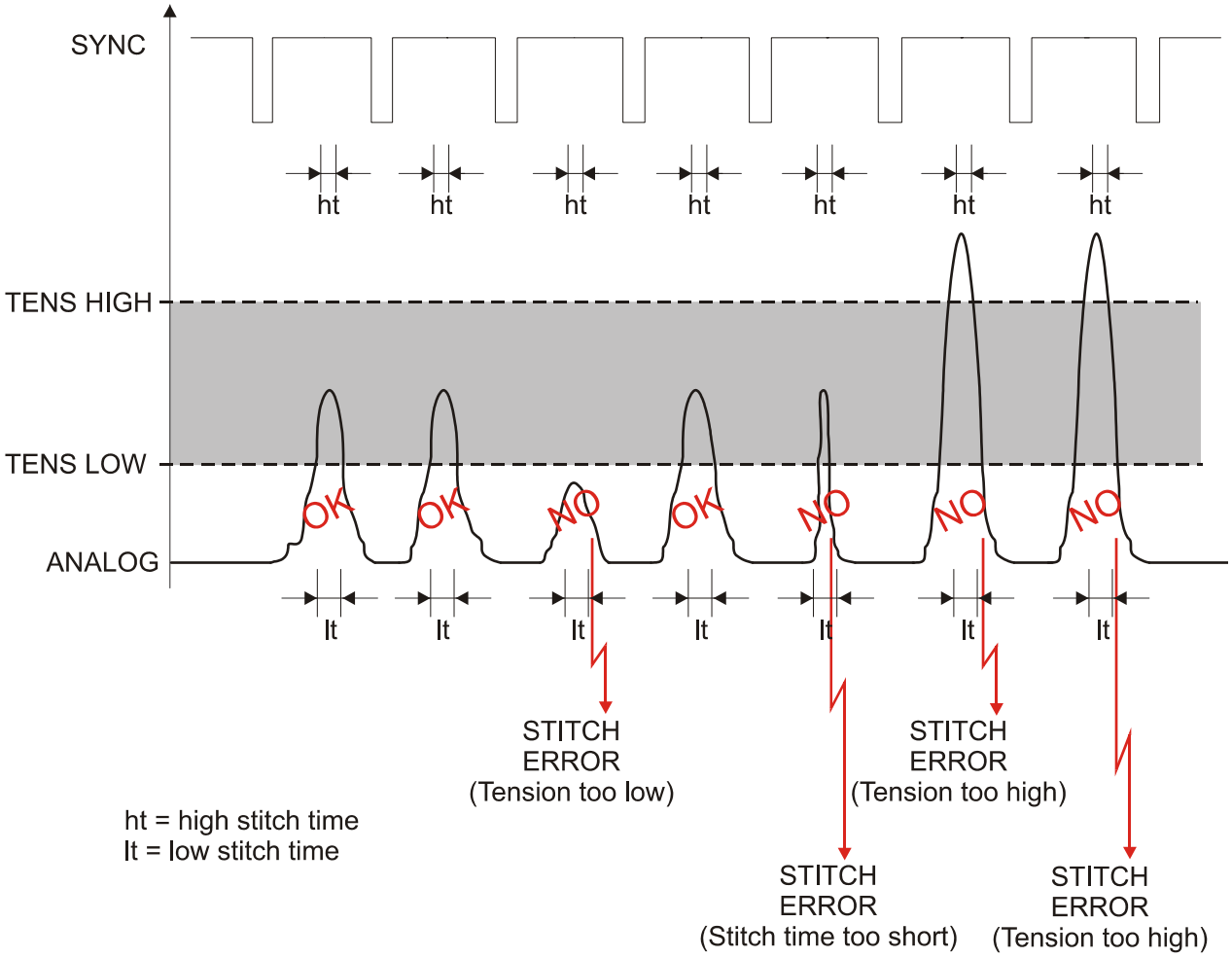
TENS LOW

Minimum tension value which must be detected on the yarn at every stitching point; it shall have a duration ≥ LOW TIME; if the pulse doesn't reach the value set on this parameter or does not have a duration ≥ LOW TIME, the system will not count the stitching point and will generate a STITCH ERROR

TENS HIGH

The tension pulse detected at every stitching point shall not exceed the value set on this parameter for the time set on HIGH TIME; otherwise, the system will generate a STITCH H ERROR. It can be disabled, setting OFF

Example of tension pulse management (*with STITCH TIME MODE = MANUAL*)



Ex. of stitching programming with 3 sections (*and STITCH TIME MODE = MANUAL*)

If you want to realize a stitching with three different type of stitches:

- a first section with 10 stitches, minimum yarn tension = 100 cN and tension pulse minimum duration = 5 ms,
- a second section with 50 stitches, minimum yarn tension = 200 cN and tension pulse minimum duration = 10 ms,
- a third section with 20 stitches, minimum yarn tension = 150 cN and tension pulse minimum duration = 7 ms,

and assuming that you don't want to carry out the Maximum Tension control, you have to program the following parameters:

STD WINDOW

PARAMETER	SECTION 1	SECTION 2	SECTION 3
TOTAL SECTION	3		
CURRENT SECTION	1	2	3
STITCH COUNT	10	50	20
LOW TIME (ms) (*)	5	10	7
TENS LOW (cN) (*)	100	200	150
TENS HIGH (*)	OFF	OFF	OFF

ADV WINDOW

PARAMETER	VALUE
FAULT RESET(*)	Depending on needs
STOP OUTPUT(*)	
STOP MODE(*)	
ENABLE INPUT(*)	
TIMEOUT (ms) (*)	
MIN TENS (cN) (*)	
STITCH TOL (*)	
COUNT CHECK(*)	
SYNC CHECK (*)	
STITCH TIME MODE(*)	MANUAL
PK DATAOUT (*)	Depending on needs
AVERAGE (*)	

(*) For more details about these parameters, please refer to previous paragraph – **2.Parameters related to the stitching point characteristics** and to **Style Programming** chapter (*STYLE EDIT*) on Section 2

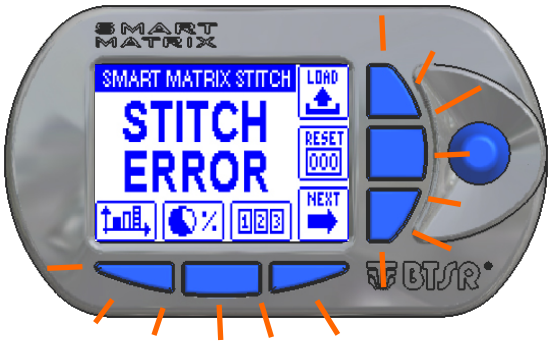
3. System parameters

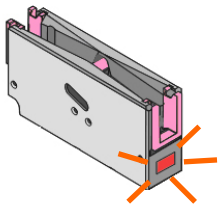
The control performed by **TS55/STITCH** sensors is also affected by other parameters such as:

- FAULT RESET (*error reset mode – either Manual or Automatic*)
- STOP OUTPUT NO/NC *(Stop output operating mode)*
- STOP MODE (*Stop output signal type)*
- ENABLE INPUT NO/NC *(Sync input operating mode)*
- TIMEOUT (*Maximum time after which the last control is carried out)*
- MIN TENS (*Optional static tension control during the stand-by period and during the stitching execution*)
- COUNT CHECK (*control on number of executed stitches enabling/disabling*)
- STITCH TIME MODE (*stitching pulse minimum duration calculation mode*)

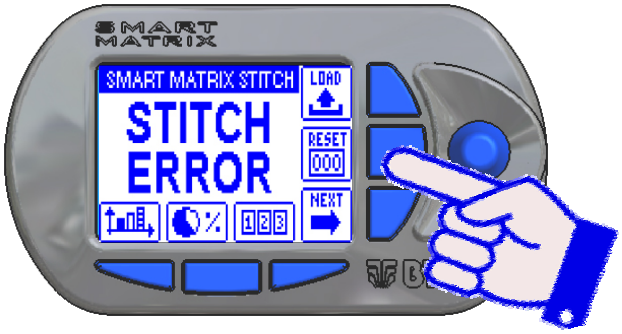
FAULT RESET

The error conditions (*STITCH ERROR, STITCH H ERROR and COUNT ERROR*) cause a machine stop and an error signalling through the lighting of blue lamps embedded in the six SMART MATRIX STITCH buttons, and through the flashing red LED on the TS55/STITCH sensor, that detected the error.

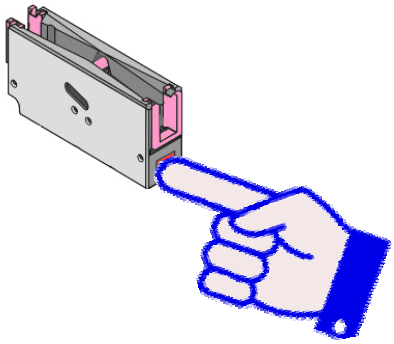




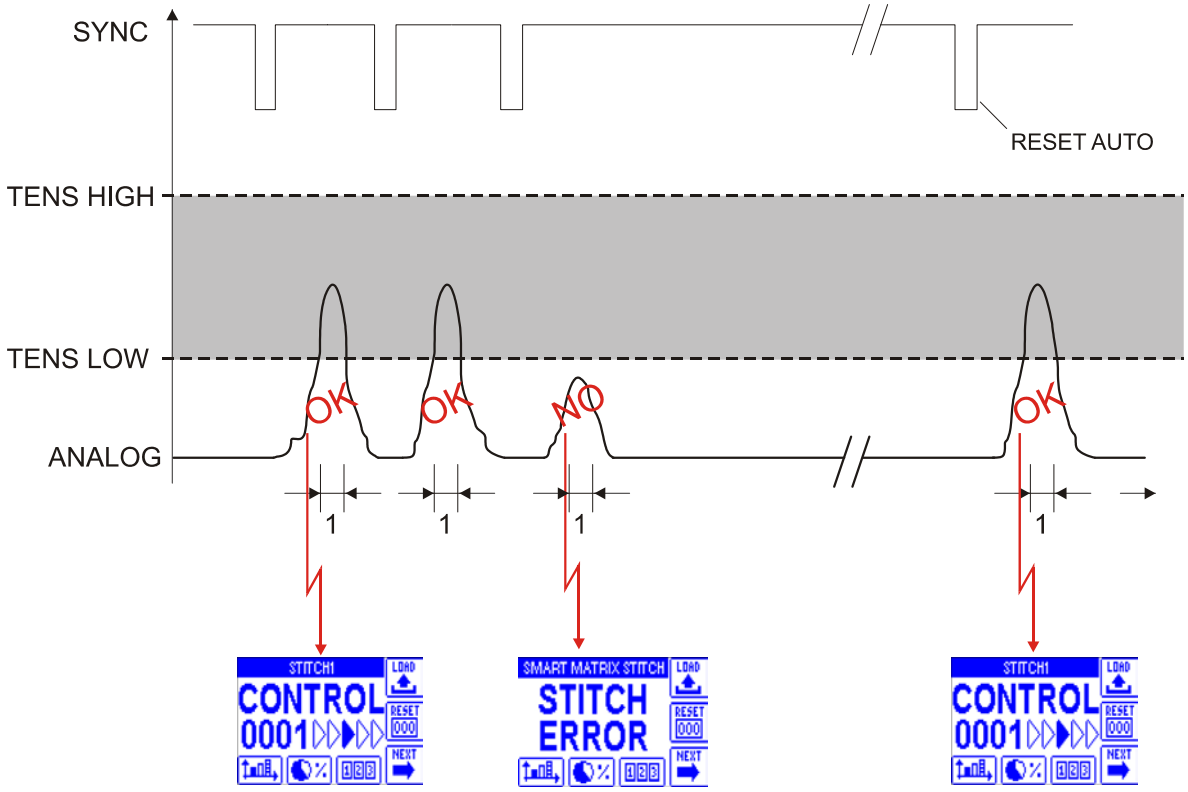
If FAULT RESET = MANUAL, the error has to be manually reset by the operator, pressing the RESET button or touching the “touch light” area of the sensor.



or

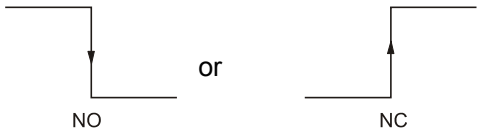


Otherwise If FAULT RESET = AUTO, the error will be automatically reset by the system, when it detects the next pulse.



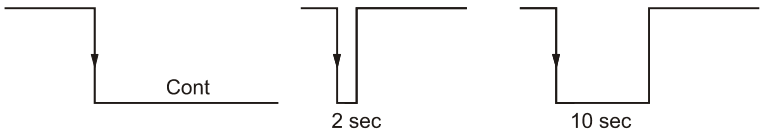
STOP OUTPUT

Electrical level of the output signal (either NO – Normally Open or NC – Normally Closed).



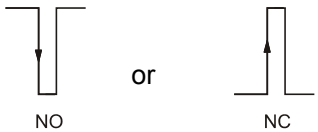
STOP MODE

Type of signal sent on the STOP output.



ENABLE INPUT (SYNC)

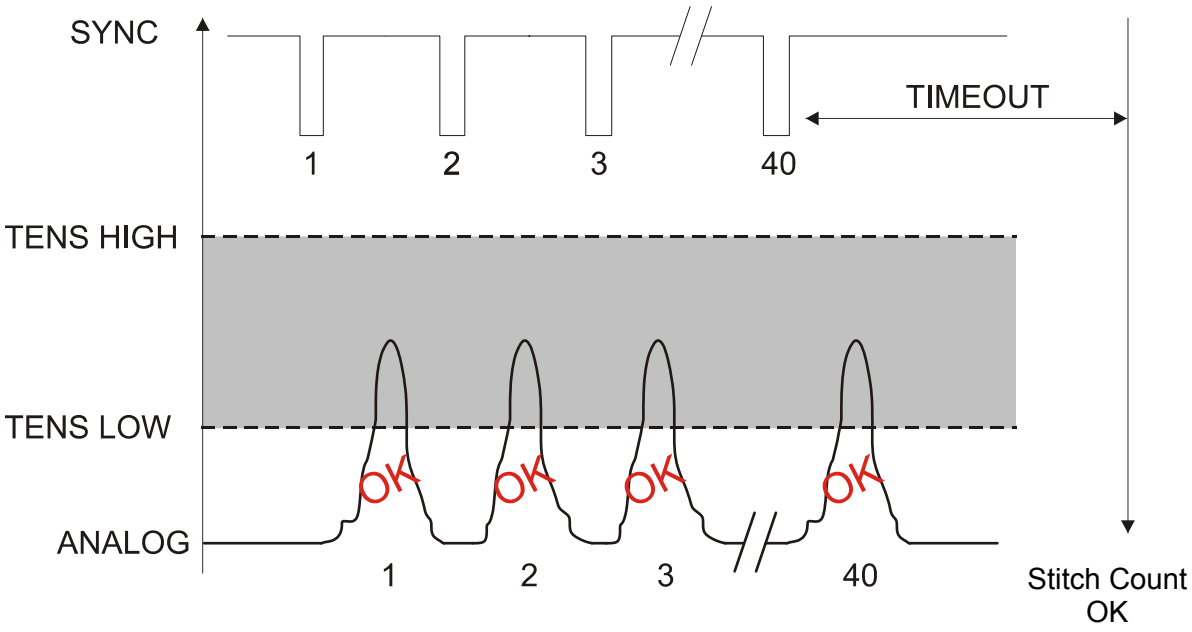
Electrical level of the signal expected on the SYNC input (either NO – Normally Open or NC – Normally Closed).



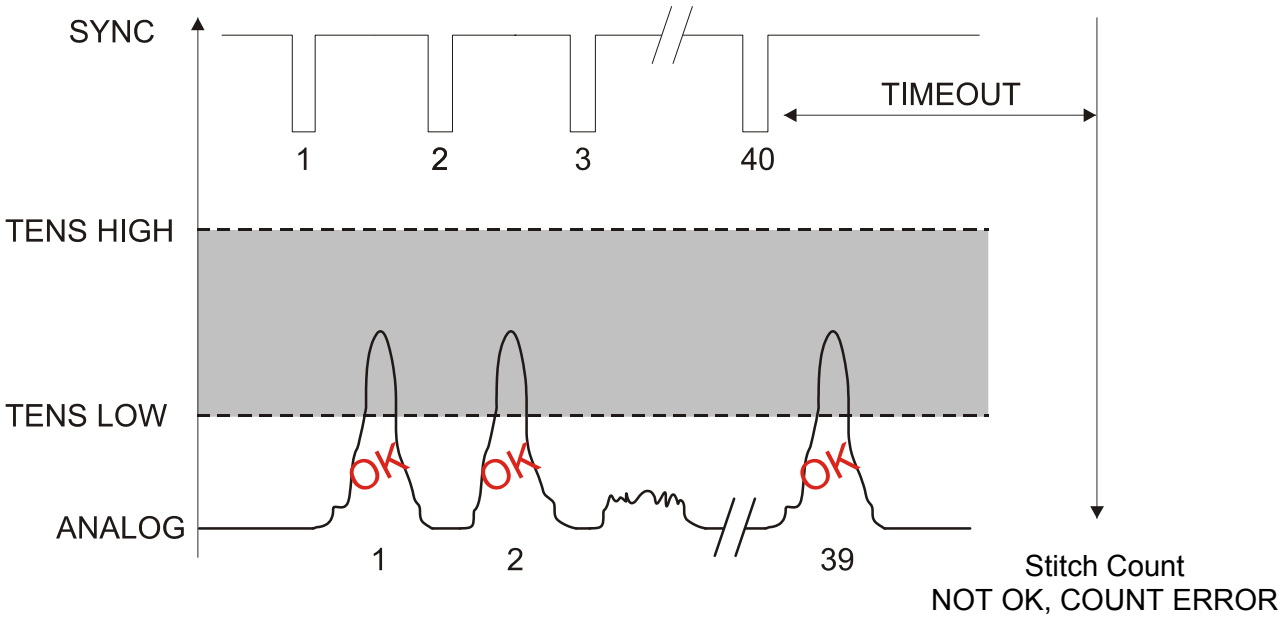
TIMEOUT

Maximum time between two SYNC pulses. After this time, the system assumes that the stitching process is complete, and gets ready for the next stitching, re-setting the point counter (*STITCH COUNT*). Furthermore it verifies that the number of tension pulses detected by the sensor matches the number of programmed stitching (*STITCH COUNT*). Otherwise an error (*COUNT ERROR*) will be generated.

Example of stitching with 40 programmed points, correctly executed



Example of stitching with 40 programmed points, with only 39 correctly executed



MIN TENS

The meaning and implications of the MIN TENS parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

STITCH TOL.

The meaning and implications of the STITCH TOL.parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

COUNT CHECK

The meaning and implications of the COUNT CHECK parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

SYNC CHECK

The meaning and implications of the SYNC CHECK parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

STITCH TIME MODE

The meaning and implications of the STITCH TIME MODE parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

PK DATAOUT

The meaning and implications of the PK DATAOUT parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

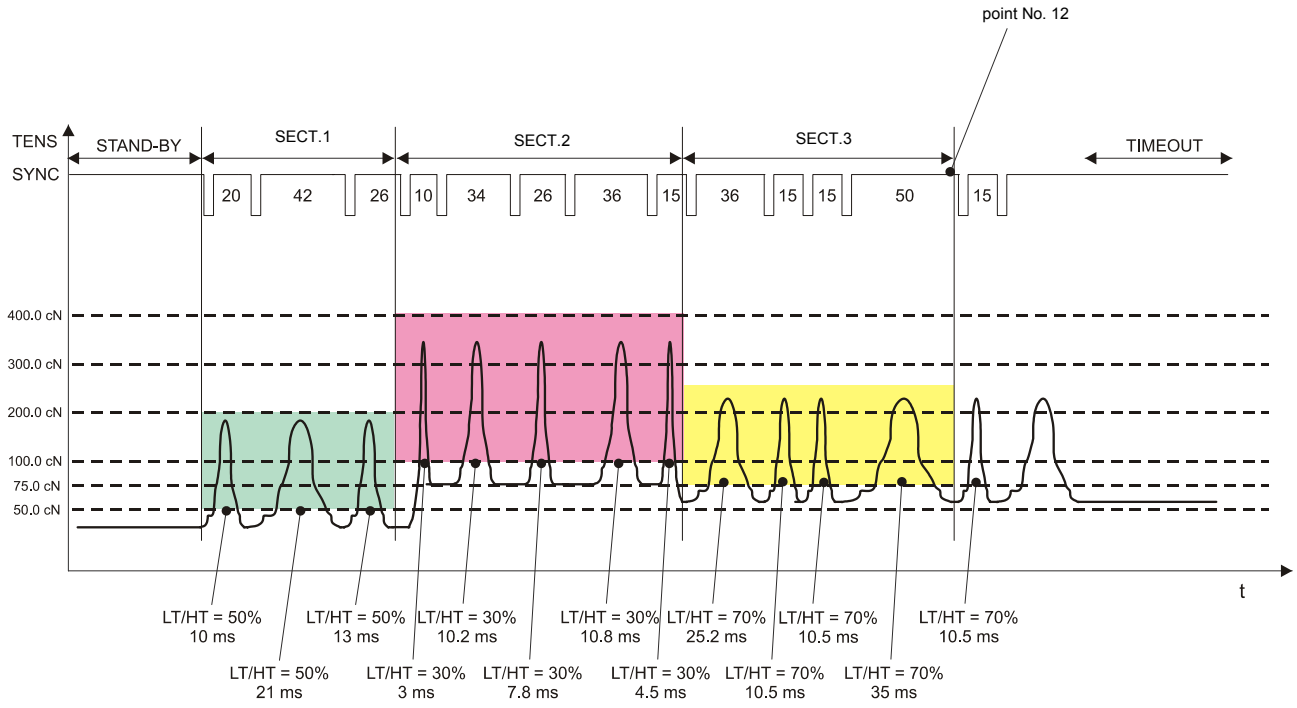
AVERAGE

The meaning and implications of the AVERAGE parameter on stitching applications are explained on the parameter description of ADV window within the Style Programming (*STYLE EDIT*) chapter.

The following example has the purpose of explaining the system behaviour when you program the parameter STITCH TIME MODE = AUTO%.

Example: STITCH TIME MODE = AUTO% on a style with 3 sections programmed with different parameters. (*No. of total stitching points = 12*)

Section	STITCH COUNT	TENS HIGH (cN)	TENS LOW (cN)	LOW TIME	HIGH TIME
1	3	200	50	50%	50%
2	5	400	100	30%	30%
3	4	250	75	70%	70%



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