

# NOTES OF OPERATION

# AG-15

## Index

General description.....	2
Main unit AG15.....	3
Display .....	3
Keyboard .....	3
Inside the main unit .....	3
Optical heads .....	4
Precision sensor and permanent magnet .....	5
Use of the main unit .....	6
Assemblage of device.....	8
Memorization of reference data.....	9
Regular operation and stop of production .....	10
Search of broken needle and reset of instrument .....	11
Cleaning of the heads .....	11
Advanced function of main unit .....	12
Password .....	12
Password selection .....	12
Turning off the main unit .....	12
Output relay blink.....	12

## General description

The device AGOTEX AG-15 is installed on Circular Looms for the production of fabrics, type mono front and with any type of sweater, with the purpose to notice the breakup of heads and needles and stop the production.

It is composed of :

- 'Main unit' AG15
- 'Magnetic sensor of precision', that is activated by a permanent magnet.
- 'Optical needle scanner', placed close to the heads of the needles by special mechanical supports .

The optical needle scanner is connected directly to the main unit.

The magnetic sensor points out the complete turn of loom on textile machine.

The microcontroller main unit handles to count, memorize and verify the number of present needles in two turns of machine (two turns for best tolerance to random errors).

When the device individualizes some needles with broken head, it points out on the display the number and it immediately stops the loom, or it stop the loom so that the first broken needle is placed in a selected zone, it depends on the set up of the device.

The data and the regulation of the device can be protected with an optional password.

Note: the device detect the number of broken needle only if the loom works under optimal conditions (regular speed).

For those knows AG14 device, the AG15 device can be described like an AG14 with one optical head per needle that includes in the main unit the adaptation module or amplifier. The other parts of device, like optical heads, cables, turn sensor, are the same, and the display messages and pages are the same too.

## Main unit AG15 :

Technical characteristics:

- Power supply: 24Vac
- Power consumption: 10W
- Output port: 2A - 250V
- Internal protection from short circuits
- Display indication of the broken needles number
- Set-up and information protected by password (optional)
- It counts up to 40000 needles for head and it works fine on looms with a speed between 10 and 70 turns/minute
- Languages: Italian, English and French.

## Display:

The present messages on display vary according the state of operation. When the loom regularly turns, the display shows the message 'COUNTING...(OK)' and on the left side points out the present heads (only one optical head for this model).

The count and the relative verification take place in two following turns of the textile machine.

## Keyboard:

The function of keys are the following :

- 'Page' key: to flow the various visualizations or 'pages' .
- 'R' key: it restores the normal operation of device after a block and if pressed for a long time (5 seconds) it disable the device.
- '+', '-', 'C' keys: are used to set-up the data in the various visualizations (needle stop, password...).
- 'C' key : it also serves to memorize the number of needles to count when the device shows the correct page.
- '-' and '+' keys of 'sensitivity' section near the green/red lights: they serve to set-up the sensitivity of optical needle scanner . These keys are active only when the display shows the pages of count and sensitivity (see chapter 'use of main unit') .

## Inside the main unit:

Inside the main unit, as opened during installation procedure, there are two micro switches (or dip-switches, two for each scanner) that , in the ON position, serve for optimizing the operation of system when the type of sweater produced foresees some very long voids between needle and needle.

Therefore with total presence of needles, both in coasts 1:1 , the micro-switch it will stay in position OFF.

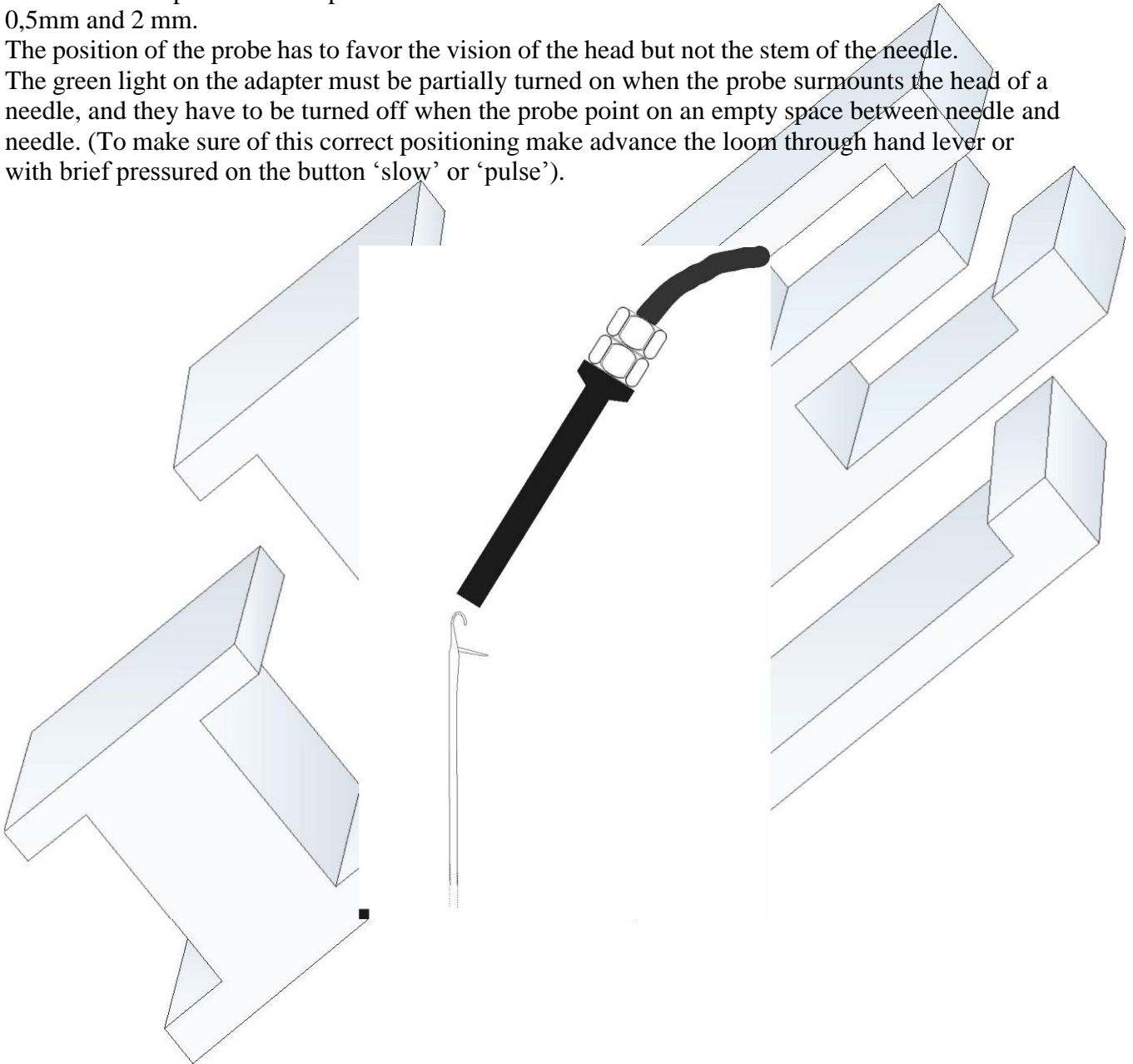
## Optical heads:

The optical heads (probes) must be set with a lot of care in proximity of the head of needle, and once individualized the positioning (see figure) their support must be held to avoid moves during the workmanship.

The head of the probe must be placed so that it surmounts the head of needles at distance between 0,5mm and 2 mm.

The position of the probe has to favor the vision of the head but not the stem of the needle.

The green light on the adapter must be partially turned on when the probe surmounts the head of a needle, and they have to be turned off when the probe point on an empty space between needle and needle. (To make sure of this correct positioning make advance the loom through hand lever or with brief pressured on the button 'slow' or 'pulse').

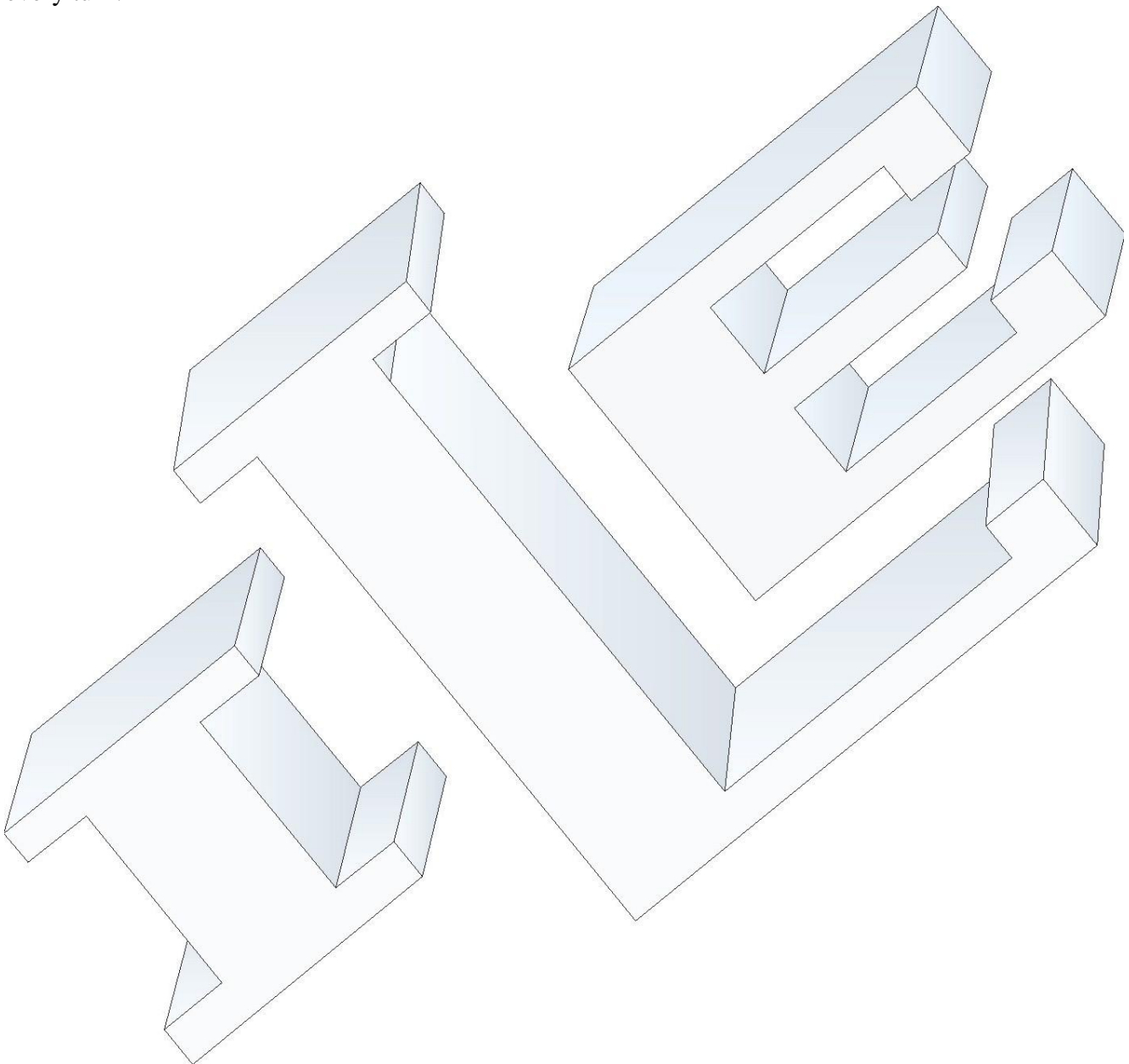


**Magnetic sensor and permanent magnet:**

Install the sensor on a firm part of the machine, in protected position from the bumps. Position the magnet on a rotating part in such position to activate the sensor for each turn of the loom. The distance between sensor and magnet must be around 4 mm.

Pay attention to obligatory polarity of magnet.

The cable of the sensor finishes with a connector to insert in the circuit of command. If the sensor is correctly installed it will be noticed on display by the writing 'MAGNET' at the conclusion of every turn.





## Use of main unit

The device is endowed with various pages that allow to plan all the necessary parameters for a correct operation. The various pages flow using the special key 'Page' which has sketches of the pages.

Here is a following description of the various pages, where the pages can be recognized from the writing on the superior line of display. Note that this description refers to the simplest situation or without foreman password, which is described subsequently.

<i>Page</i>	<i>Description</i>
Initial	<p>This page appears at power-on.</p> <p>It shows the state of the instrument ;</p> <ul style="list-style-type: none"> <li>• the writing 'Wait for Work' appears if the device doesn't receive the signal of activity from the machine, because it is stopped, or the wire is not connected.</li> <li>• the writing 'Magnet' appears if the magnetic sensor has given an impulse, or a turn of the loom is finished.</li> <li>• the writing 'Counting..OK' appears if there is the signal of activity, the machine is regularly turning and the number of needles coincides.</li> </ul> <p>To the left is shown the number of present heads; head number '1' is always shown like present'.</p> <p>In case of disabled password or correctly set-up, at the end of second line is shown the value of sensitivity of needle optical head by a number between 0 to 98, ( Note: the higher the number, the higher the sensitivity) and it is possible to change this value, in the correct page.</p>
Needles memory	<p>It points out the number of needles memorized for each head. For every head or probe shows it her own number of needles to count and verify. This page serves only to read such number (here you cannot modify it, you can on other pages). This page repeats as many times as the amount of present (connected) probes there are.</p>
Count S1=	<p>Here the device counts the needles for the suitable probe on the display and visualizes the total number every 2 turns of the machine. When the device shows this 'page of installation' it doesn't verify the number of needles (it doesn't stop the machine) , but it counts them and eventually memorize the number. In fact pressing the 'C' key the display writes 'MEMORIZE', and the number of needles counted is set in 'memory needles' for the visualized probe. This page repeats as many times as the amount of present probes there are.</p> <p>When this page is shown, the '-' and '+' keys of 'sensitivity' section are enabled to set up the sensitivity, shown by the number at lower left.</p>
Needle Sensitivity	<p>Here the sensitivity of Optic Needle Scanner is shown as a number from 0 to 98, the higher number the greater sensitivity . The '-' and '+' keys of section 'sensitivity' are enabled to set up the sensitivity of Optic Needle</p>

<i>Page</i>	<i>Description</i>
	Scanner to a value so that the green lights are turned on when a needle is present under the scanner. It is the same number normally visible on the lower left, exposed more clearly.
StopBrkNeedle	In this page must be specified the percentage of turns among the position of the scanner and the points in which the stop of the broken needle is desired. Such distance or arc must be measured in the sense of rotation of the needles, and it must slightly be increase in base of the inertia of the machine. Input the desired number with the keys '+' and '-'. If the percentage is 'zero', then the machine stops immediatly and the broken needle is placed in random position.
Error output	Here you can specify if in condition of stop of the machine the output relay must have maintained fixed or has to blink. It changes with the 'C' key .
Maintenance	A number of turns can be input here, at which the device stops the machine to ask for a maintenance . With the 'C' key the number is modified, the '+' key increases the number pointed by the cursor, while the '-' key makes flow the cursor to the following figure. Pressing the 'C' key the number is memorized. A number equal to Zero disable this function.
Speak language	Set the language (English or Italian or French).  Application of other languages can be included.

## Assemblage of device

1. Choose a position for the main unit that is firm, visible, and closest to the Optic Heads so the device can be connected. Unscrew the two screws placed on the sides, and separate the front panel of the device from the hull in black metal, making it slip down towards the front panel. Put aside the front panel, handle with care.
2. Fix the black metal hull to the selected place, avoiding leaning screw toward the inside of the device. Clean possible metallic shavings due to the workmanship, and insert again the front panel in the metallic hull. Fix the front panel with the screws previously removed.
3. Plug the power supply cable to the main unit; the black cable with 3 wires and the terminal block in head must be connected to the magnetic sensor, connecting the white to the white, the brown one to the brown one, the screen to the screen; the grey cable with 7 wires must be connected here according to the suitable instructions following and to manual end.

Wire	Function	Connection
Brown	Power supply input -	to 0V of the transformer of the services of the loom
Red with fuse	Power supply input +	to 24V of the transformer of the services of the loom
Black or Orange	Activity input signal	to 12V or 24V available only when machine is turning
Yellow	GND	To protection earth (PE) or ground
Green	Needle protection input	To needle protection device (optional)
Blue with fuse	Stop output relay +	See Note 1
White	Stop output relay -	See Note 1

Note 1 : The “Stop output relay” are two pins of a contact of relay, selectable NC or NA through the pages of the device. Such contact of the relay doesn’t have inside connections to the device, and it is isolated therefore from GND and from other signal. Use to stop the machine.

4. Install the cylindrical supports of the heads in a stable way (eventually through perforation on the sector).
5. Install the heads according to the suggestions already stated in the above description of the parts. Their supports allow any movement. For every loom it will be opportune to adapt the wands of metal so that to make it the shortest possible. We remember that the heads don’t have to prevent the access to the needles from the opposite panels, they don’t have to hamper the movements of the guide-threads and don’t have to be joined with the ring of the guide-threads, so to avoid that the adjustments of the same don’t alter the distance between heads and needles.
6. Connect the heads to main unit. Turn on the instrument to advance to the regulation of device and memorization of reference data.

**WARNING:** *Avoid to make the cables run near the cables of power supply to the loom (380 V) and avoid to pick up the excesses of length rolling up her. Stretch the cables well.*



## Memorization of reference data

The main unit counts the present needles in two turns of the loom and compares them with the memorized datum, this for every probe or connected optic head.

To memorize the correct number of needles it is necessary to use the keyboard and the display of main unit so that to access the special pages of installation heads.

We recommends to read the part ' Use of main unit' first exposed.

Then follow the indications here available:

- To begin the installation, power on the instrument.
- Press the 'Page' key to flow the various present pages, until it reaches the page 'Count S1=..... '. **This message points out an installation page.** It may be necessary to insert the password, as described later in this document.
- The device counts the needles for the suitable probe on display and visualize the total number of it every 2 turns of the machine. When the device shows these 'pages of installation' it doesn't verify the number of needles, but it limits to count them and eventually to memorize them.
- Press the 'page' key until 'Count...!' appears on the page related to the probe that it desires to install.
- Start the machine.
- In such page at every couple of turns the number of counted needles remains on display for 2 seconds; pressing the 'C' key the display writes 'MEMORIZE', and the number of needles counted in 'memory needles' for the visualized probe.
- In this page, if the number of needles shown doesn't correspond to the reality, use the '-' and '+' keys of the section 'sensitivity' to modify the sensitivity of optic needle scanner, then increase or decrease the sensitivity until the instrument counts the exact number, or at least the green lights are ON in presence of a needle. It is possible to read the sensitivity value on the lower left.
- If he doesn't succeed in getting the exact number it will be useful to check or modify the positioning of the probe and the distance from the needles.
- When the counter is correct press again the 'C' key, the display will writes 'Memory' again visualizing the new amount just saved'.
- The installation of the probe is complete, others can be installed or return to the normal page with the 'Page' key. After a time-out the device goes back to normal operation.

## Regular operation and stop of the production

The stop of the machine happens if the device notices for two couples of consecutive turns a difference greater than 1 among the number of needles and the data saved in memory. The device counts and verifies the present needles regardless of any operation that is performing through keyboard, except in the following cases:

1. The display shows a 'Page of installation'.
2. The device is disarmed by pressing 'R' key, see relative paragraph.
3. The device doesn't receive the signal of activity, and in such case the display shows the message 'Wait For Work'.

When the device notices the breakup of head of a needle the stop of the machine can be immediate or delayed so that the broken needle is placed in a pre-arranged position. Programming the device, well will use method selected during the stop:

- If immediate stop is desired, for instance to avoid producing defective material, set the device writing '00' in the page 'Stop Brk Needle'. During the stop the display will point out the number of counted broken needles however.
- If the positioning of the broken needle is desired, set up the device writing in the page 'StopBrkNeedle' the percentage of turn among the position of the probe and the point in which the stop of the needle is desired. Such distance must be measured in the sense of rotation of the needles. Please note that the device activates the stop of the loom when the broken needle is in the programmed position, then the loom inertia will move it further to a distance which depend also from loom rotation speed. Also in this case the display points out the number of broken needles counted in the last couple of turns.

After the stop of the machine, the device shows a message like the following example:

<b>E</b>	<b>R</b>	<b>R</b>	<b>.</b>	<b>S</b>	<b>C</b>	<b>A</b>	<b>N</b>	<b>.</b>	<b>1</b>		<b>-</b>	<b>2</b>			
<b>B</b>	<b>R</b>	<b>K</b>		<b>N</b>	<b>E</b>	<b>E</b>	<b>D</b>	<b>L</b>	<b>E</b>	<b>'=</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>6</b>	

The upper line shows which scanner gave the count error, and it also shows the number of missed (broken) needles.

The lower line shows the number of broken needle, counting from the needle under the scanner when the magnetic sensor and magnet coincide. In other words, rotating the loom so that the magnet and magnetic sensor coincide, in that position the count begin with the first needle placed in front of the scanner, and goes up with the other needle that flow under the scanner with the rotation of the loom.

If the pointed broken needle is the number 'zero', then the device was unable to find the broken needle; the function of search and positioning related to the broken needle can be prevented by troubles of various nature like irregular speed of the machine or out of limit speed 10 - 70 turn/min., folded up needles or device just turned on.

The stop of machine can be removed by pressing the 'R' key and the display shows the message described in the following section.

## Search of the broken needle and reset of the instrument

As explained above, the stop of the machine happens if the device notices for two couples of consecutive turns a difference greater than 1 among the number of counted needles and the data saved in memory.

After the device stopped the machine, pressing the 'R' key the instrument release the machine and shows a message to help in searching the broken needle, it found:

B	R	K		N	E	E	D	L	E	'=	4	4	0	6	
S	C	N	1	.	N	E	E	D	L	'=	4	1	0	3	

The upper line shows again the number the broken needle, the lower line shows which scanner is referring to and the number of needles counted from the beginning of the turn.

In this way it is easy to move the loom by hand and check the number of needles counted, stopping when the broken needle is reached.

Note that there is a tolerance in the indication of the broken needle; the broken needle is around the shown number in the range from minus 6 up to plus 6.

Press the 'R' key for at least 3 seconds to reset the device and return to normal operation . After 5 minutes the instrument will return to normal operation in any case.

## Cleaning of the heads.

With the progress of the job in the time, in case of dusty yarns, there is the danger that the dust can obscure progressively the heads, causing a lower sensitivity (this is underlined by a decrease of brightness of the leds on the form adapter).

It is useful to handle the cleaning of the heads with regularity, for instance every piece, with spun of middle cotton.

Clean the heads by blowing with compressed air or, if dirty of paraffin, clean the optic part brushing it with a clean and soft rag.

## Advanced function of main unit.

### Password.

The password or secret code can be required when using the page key, in order to access the pages of installation.

Correctly inserted it allows to pass to the following pages.

To insert the code use keys '-' and '+' to move the cursor and to modify the digit pointed by the blinking cursor.

Press the page key when finished. The password can be disabled.

### Password selection.

The code must be chosen considering that the code '0000' means disabling the password, that therefore is never asked.

To specify and to train the password, act as it follows:

- Connect power supply and turn on the device. The machine has to be stopped, or on the signal in entry of 'activity' it doesn't have to be any voltage.
- Insert the password key furnished with the device.
- The special page it will appear.
- By pressing '-' and '+' keys, write the desired code then press the key 'Page'.
- After pressing the 'Page' key the device remembers to unplug the password key and to reconnect the magnetic sensor.
- The inserted code is now the new password, requested when necessary.

### Turning off the main unit.

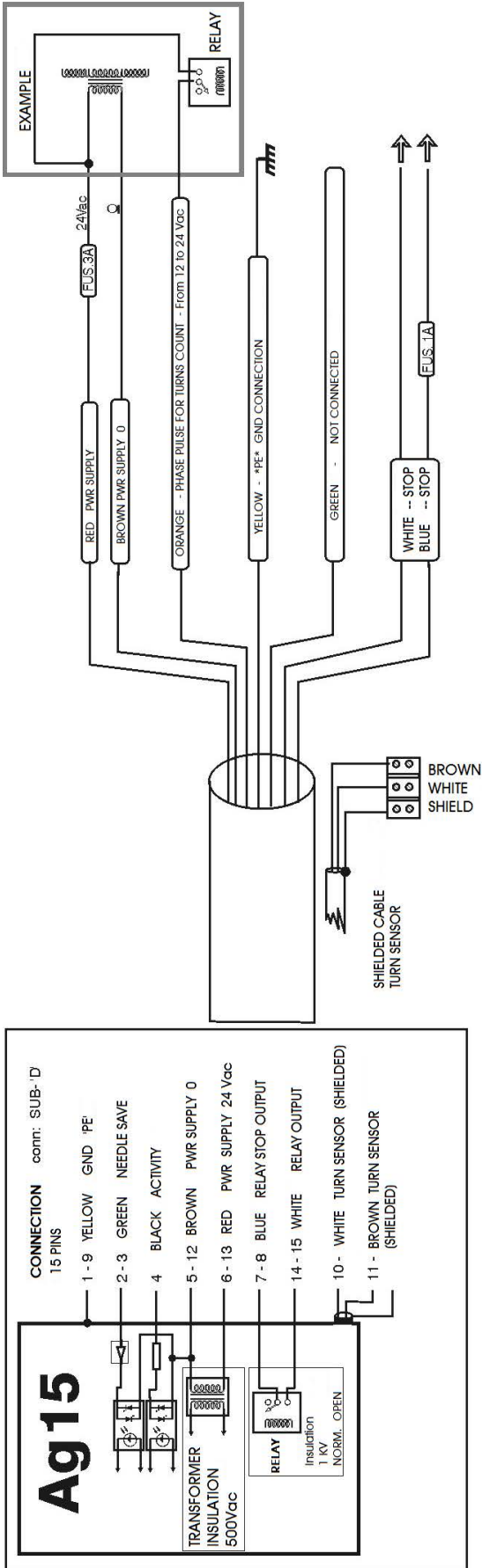
The device can be disarmed by pressing the 'R' key for a long time.

The display shows the writing 'Turned off by operator'. To reactivate press the same 'R' key for a long time. The device remains turned off indefinitely even if powered off and on.

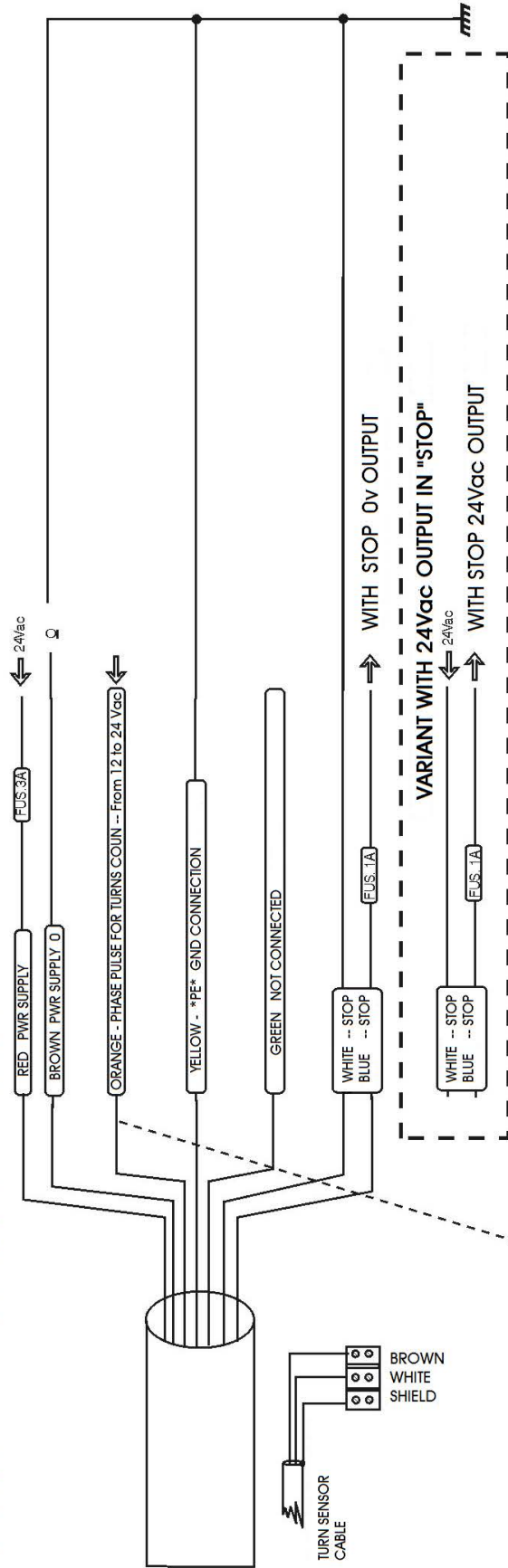
### Output relay blink.

There is a page in which is possible to choose if, in condition of stop, the output relay must stay turned on or has to blink (to give greater visibility to connected lamp).





**RECOMMENDED CONNECTIONS FOR OLDER MACHINES PRODUCTIONS NOT CONFORM TO THE LAWS APPLIED TO NEW PRODUCTS**



**WARNING: THE PASSWORD CAN ONLY BE ENTERED WITH THE MACHINE IN STOP CONDITION. IN THIS REQUIREMENT IF THE PASSWORD DOESN'T ENTER, CHECK THAT THE ORANGE WIRE THERE IS NO VOLTAGE.**