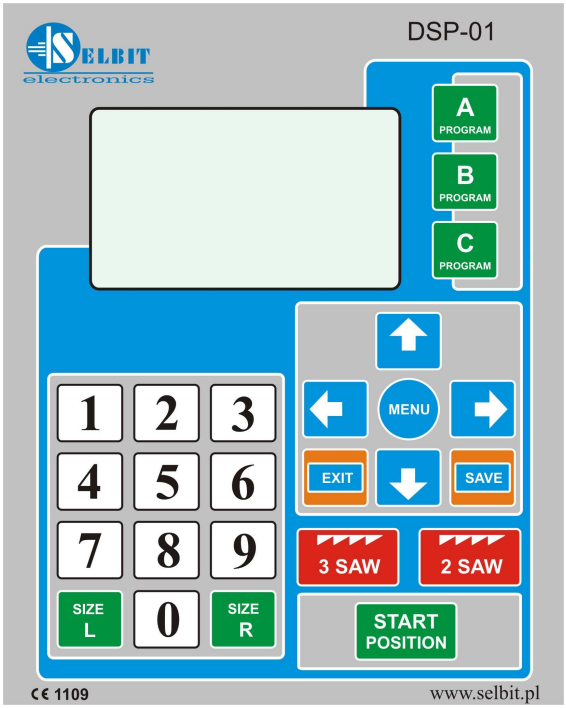
DSP-01

AUTOMATIC CUT THICKNESS CONTROLLER

FOR 2-HEAD BANDSAWING MACHINE



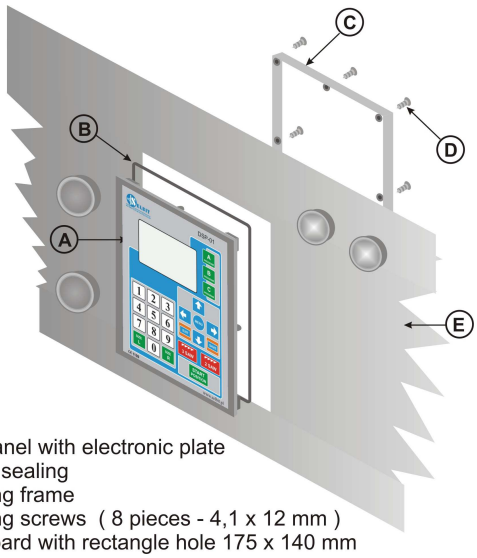
INSTALLAOR AND USER MANUAL

Mounting and controller's connections

During controller's mounting is advised to follow this instructions correctly.

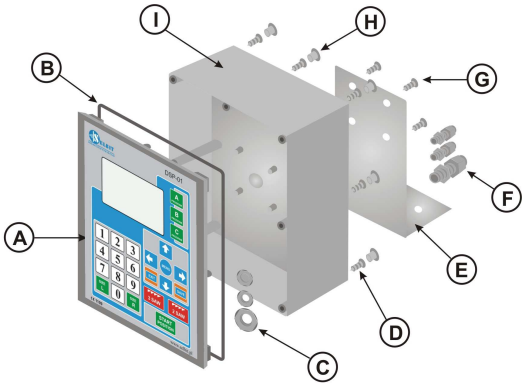
Before mounting in the main board (fig. 1) please cut off rectangle hole 175 x 140 mm. This hole should be made carefully thus rubber sealing is adjoined to the from panel. Eventually any irregularity created after incorrect cutting out please smooth them using small metal file and protect it by anti-corrosion painting. If on the main panel is no place to mount controller, it is possible to add it as separate device (fig. 2).

Figure 1. Controller mounting on the main board.



A - Front panel with electronic plate
B - Rubber sealing
C - Mounting frame
D - Mounting screws (8 pieces - 4,1 x 12 mm)
E - Main board with rectangle hole 175 x 140 mm

Figure 2. Mounted controller as separate device.



A - Front panel with electronic plate
B - Rubber sealing
C - Fixing nuts for cable gland
D - Back frame mounting screws (6 pieces - 4,1 x 12 mm)
E - Mounting element (because of the variety of machines kind it is not included into the product)
F - Cable gland
G - Mounting screws (4 pieces 4,1 x 10 mm)
H - Hole cap
I - Back casing

In case of controller mounting as a separate device it is possible after its assembly to attached it to the machine's frame using 4 added screws for this purpose. In another case please made special fixing for mounting the controller which can be used as a distance support as well (fig. 2, E element).

Electrical installation

CAUTION!

Because of the risk of electric shock, all connections shall be performed only when the machine is disconnected from power. The best way to do that is to turn off the main switch of the machine.

All connections should be done with double-insulated cables, intended for controlling devices powered from 230V AC network. The cables which enter the case ought to be round, with the diameter adjusted to the chokes installed in the back of the case. Endings of the cables should cleaned and have sleeves, or be tinned before screwing. This is important for correct and fail-safe operating of the controller in the future.
In order to assure correct and fail-safe operation, the wiring ought to be performed in accordance with the following instructions. Incorrect wiring can result in disturbing the work of the controller, and thus impeding its operation.

The machine, in which the controller is installed, should have operational limit switches, and feed contractors ought to have a blockade preventing both of them to be turned on at once!

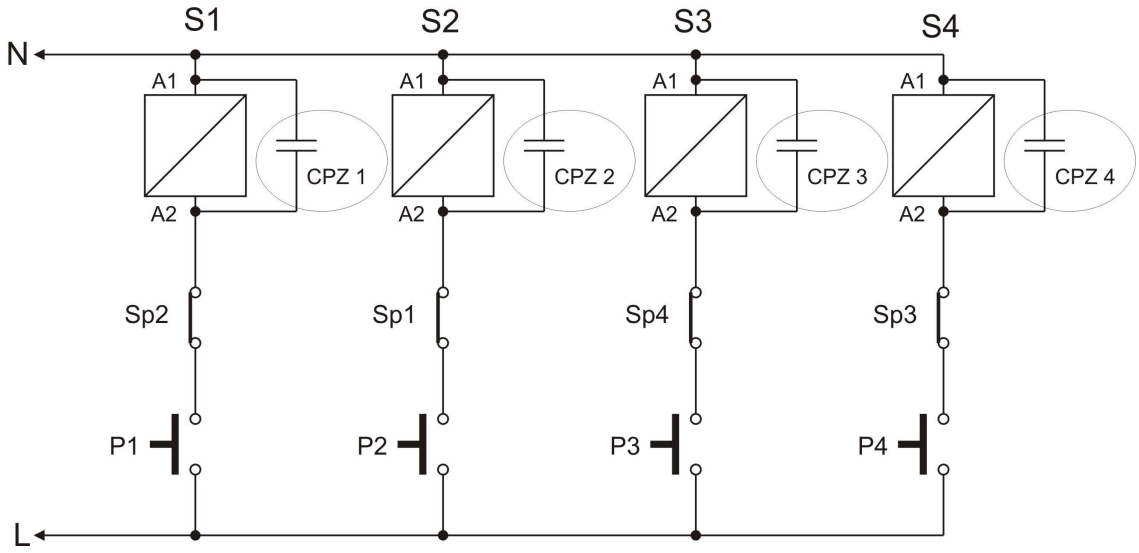
Installation of the TSS-8/24 power transformer

The**TSS-8/24 230/24V** power transformerincluded in the set ought to be installed in the power supply cabinet of the machine.
The transformer is intended for a standard TSS-35 fixing rail, commonly used in electric machines. The location of the transformer ought to be maximally away from other electric elements (electrical converters, contractors, other transformers). It is important, because otherwise electromagnetic noise may penetrate the electronic system of the controller through the transformer.
The cables providing 230V power should be connected to the transformer clamps marked as **PRI 230V. The transformer should be installed in the circuit which includes neither contractor inductors nor an inverter.**
230V power cables ought to be laid as far from other cables in the cabinet as possible.
The cables transmitting power to the electronic board should be connected to the transformer clamps marked as **SEC 24V.** Similarly as in the previous connection, these cables ought to be laid as far from other cablesas possible, including the 230V cables powering the transformer. Length of the power cables (24V) should be adequate to the location of the controller.
The cables going from the **SEC 24V** transformer clamps should in the final stage of the installation be connected to controller board clamps marked as **PWR.**

Installation of the interference suppressors (CPZ)

Interference suppressors **CPZ** (**WX1P 224M 440V)**included in the set prevent excessive emission of the electromagnetic noise, which is generated when the contractors installed in the machine are operating. Their proper installation is crucial for correct work of the controller.

CPZ suppressors ought to be connected parallel to the inductors of the contractors which control the move of each of the two heads of the machine , according to the following picture:



CPZ 1-4 – WX1P 224M 440V suppressors
S1, S2, S3, S4 – inductors controlling the movement of Hades.

Installation of the encoders in the machine heads

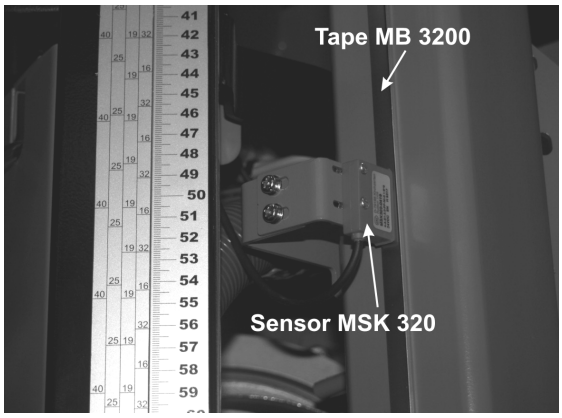
Installation of the linear magnetic encoder MSK-320 and magnetic tape MB-3200.
The magnetic measuring tape consists of two elements, each of which has a layer of self-adhesive tape.
The first part, thicker one, is to be stuck on a smooth, flat, and straight surface (after it has been carefully cleaned and degreased with acetone or alcohol).
During the sticking, one should remove only part of the foil protecting the glue, then stick the first part, starting from the top. Then, gradually, one should remove further pieces of the foil, while sticking the freed piece of the tape to the surface.
A rubber roller might be used for pressing after the sticking, to provide a better pressure. The tape should be stuck carefully, to avoid any bulges and stick the tape **exactly straight.** After sticking the first part, protecting steel tape ought to be stuck on the top of the tape, with the same precautions as in the case of the first sticking. Both tapes should be stuck exactly one on top of another. MSK 320 sensor with a cable should be installed on a non-moving part of the machine (with respect to the controller), so there will be no movements of the cable which may lead to its damage. **When the sensor is installed in the moving position, its cable must be protected with moving rails preventing bending of the cable.**
The sensor ought to be fixed with two screws going through the case in such a way that it will be exactly **1 to 1.5 mm** above the tape, in aparallel position.
In laying the sensor cable, it is important to put the cable as far away from the other cables and electric devices. The tape, above which the sensor is moving, cannot be located close to any source of magnetic field (magnets, electromagnets) before, during and after installation. Otherwise, it may be damaged!

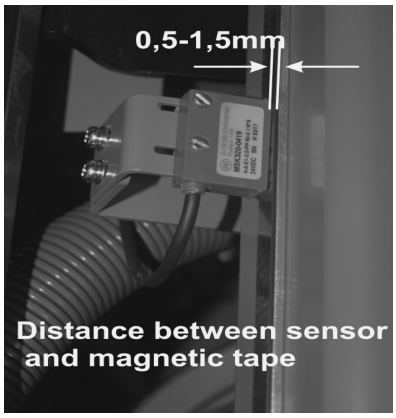
The surface of the tape ought to be regularly cleaned from dust and dirt with a soft brush. It is prohibited to hit the tape or the sensor. The sensor should be installed in a position in which the sticker **SCALE SIDE** in pointing towards the magnetic tape.

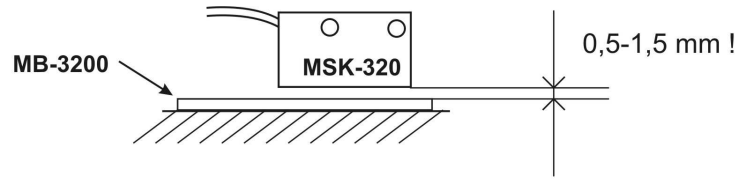
Both the sensor and tape should be installed in such a way that in performing the whole movement, the sensor constantly remains in the range of the tape located below.

Special attention should be put to stability of the sensor and tape installation, to prevent vibrations of these elements while they are at work.

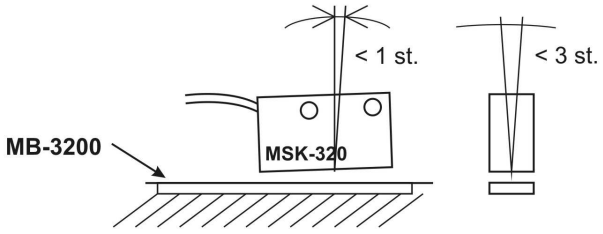
Sensor and magnetic tape mounting example



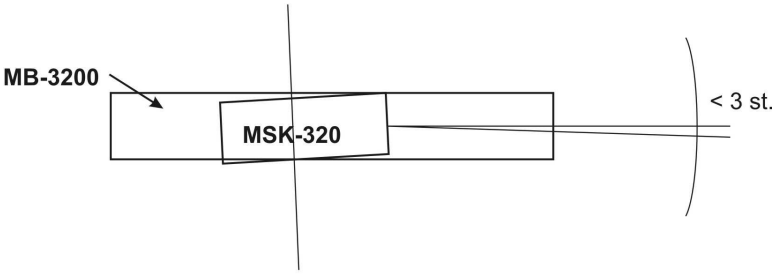




Distance between sensor and magnetic tape



Maximum vertical sensor deviation



Maximum horizontal sensor deviation

Rotating encoder mounting

Added rotating encoder is designed to convert rotation of the head saw feeding screw for electrical impulses. Number of the impulses depends on screw pitch and this relation describes table 1. In most of the frame sawing machines this screw has got free tip where the encoder can be installed. Please make a concentric hole in the screw and mount encoder's clutch. Please make sure that this hole is concentric otherwise it can cause swinging and eventually incorrect encoder working and its damage. Please make hole around 15 mm and create thread M8. Next mount encoder using fixing band (fig.4). The band should be attached to the special fixing which because of the variety of the frame sawing machines should be created individually. Example of the encoder mounting is shown at the photo 4a below.

Photo 4a. Example of the necoder mounting.

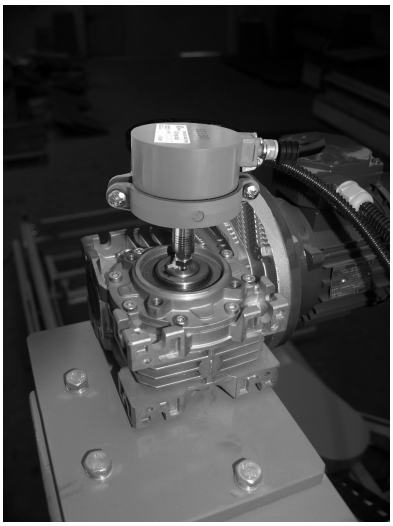


Fig. 4 Encoder mounting example.

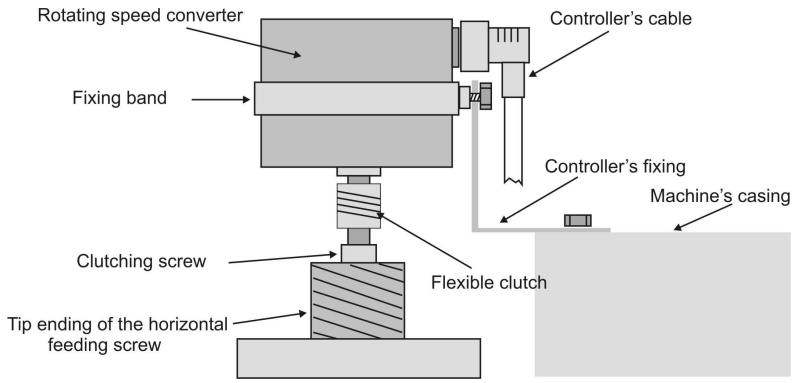


Table 1

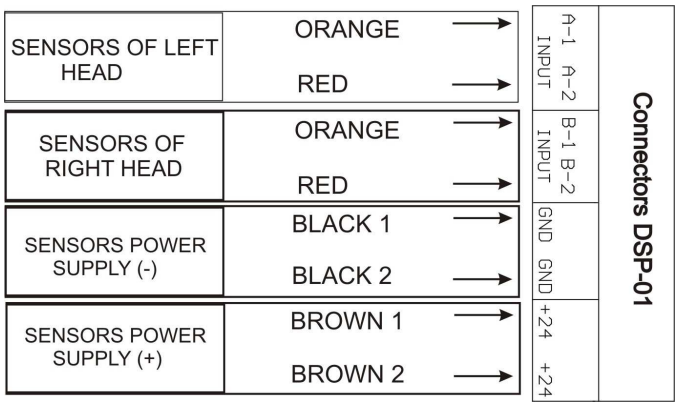
Screw pitch [mm./obr.]	Encoder type [imp./rotation]	Devider
3	**Rotating 42**	**28**
4	**Rotating 42**	**21**
5	**Rotating 50**	**20**
6	**Rotating 48**	**16**
7	**Rotating 42**	**12**
8	**Rotating 48**	**12**
9	**Linear MSK320 + MB3200**	**5**
10	**Rotating 50**	**10**
Chain sawing frame machine	**Linear MSK 320 + MB 320**	**5**

Data from table 1 should be used during procedure of checking the controller's parameters.

Cable connection of the encoder should be routed as far as it is possible from other electrical cables. Using special clip bands lead it to the place where the controller is mounted.

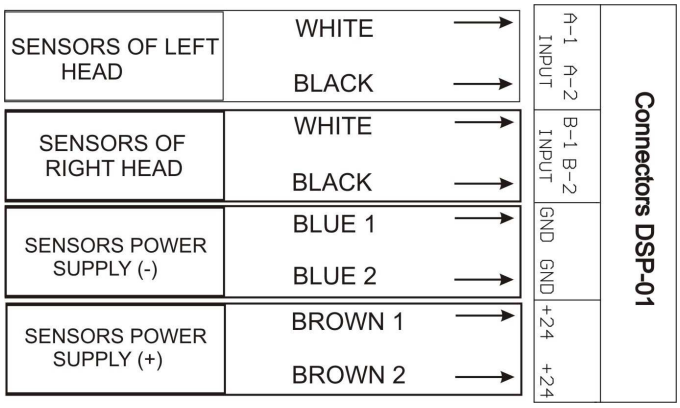
Connection of MSK-320 magnetic sensors to the controller board.

The magnetic sensors of the left head and the right head should be connected as shown in the figure below:



Connection of rotary encoders to the controller board.

The rotary encoders of the left head and the right head should be connected as shown in the figure below:



When the controller is started for the first time, it may be necessary to change the counting direction of one or both sensors, perform it according to the description of the first commissioning, by replacing the **orange** and **red** wires of the MSK 320 sensor or the **white** and **black**of the rotary encoder.

Warning !! improper wiring will cause serious damage to the encoder!!

Connection of contactor control wires

The keys controlling the feed of the left and right head, which the machine comes equipped with from the factory, should be of the contact type, without support (they should close their contacts when pressed and open them after releasing the key).
The keys on the machine's desktop, controlling the feed of the heads, should be connected to the cable containing four pairs of wires in double round insulation of such diameter that it can be transferred through a larger gland in the back of the controller housing. Two pairs of wires

should be connected in parallel to the terminals of the right head feed keys, the other two, analogically, to the terminals of the left head feed buttons. Remember to install mounting collets or tin the terminals. The cables should have different colors, which will facilitate later, proper connection to the appropriate terminals on the controller board. Route the cables away from other electric wires and lead them to the place where the control panel will be mounted.

The machine in which the actuator is being installed must have functional limit switches and the contactors should be protected against switching both at the same time!!

The wires that connect the contactors are connected as described below:

W-1 - connect the right head movement contactor, directionleft (decreasing dimension)
W-2 - connect the right head movement contactor, direction right (increasing dimension)
W-3 - connect left head contactor, directionleft (increasing dimension)
W-4 - connect the left head movement contactor, direction right (decreasing dimension)

After making all connections, beginscrewing the controller housing together.
Before inserting the front panel into the back of the housing or the panel, check whether the rubber seal is in the groove provided for it on the perimeter of the panel. This is important to ensure that the connection is properly sealed and prevents contamination from entering the housing.
After inserting the panel into the back of the casing, screw it together with six 4.1x12 screws included in the set. Before finally installing the controller and tightening it to the machine, it is recommended to check the correctness of operation as described in the next item "first start of the controller". After confirming that the controller is correctly connected and working as described, push the protection plugs into the guide holes of the screws, and tighten the controller to the machine.
The assembly of the controller in the panel is carried out in the same way as above, the only difference is that the front panel is tightened from the rear with a plastic frame through the sheet of the pulpit housing.

After assembly, gently pull the wires coming out of the PG glands to remove their unnecessary excess from the inside of the casing (do not pull the wires tightly so as not to damage their connections to the controller's terminals), and then tighten the outer PG gland nuts sealing the cable entry points.
Now, in the case of assembly as an independent device, it can be tightened to the machine or a bracket, using four 4.1x10 screws, screwing them into four holes designed for this purpose in the rear part of the controller housing.

First start

After switching on the power supply, check whether the controller **logo** is displayed on the controller. If not, check that the TSS 8/24 transformer connections are correct and try again.

Checking the input divider.

Entering the menu of the controller, for all available settings, is done by briefly pressing the "MENU" key, selecting the appropriate menu window with the keys marked with an arrow to the right or an arrow to the left and pressing the "MENU" button again.
Note!The currently selected window is marked by a pulsating frame.

The record of changes is made by briefly pressing the "SAVE" key.

Depending on which encoder the controller is working with, enter the appropriate value of the input divider.
In the case of MSK-320 linear encoders working with the MB-3200 magnetic tape, the value of the input divider is **5!**

To check or set the divider value, enter the menu by briefly pressing the "MENU" key, then using the right arrow key select "**SERVICE**" (the active window flashes) and press the "**MENU**" key again.
Changing the divider value is possible after entering the 3-digit access code factory set at **123.**
After checking or changing the divider, confirm the change by pressing the "**SAVE**" key or exit the menu by pressing the "**EXIT**" key if you do not want to save the changes.
The value of the divider is entered only once when the controller is started, there is no need to intervene in this setting later, unless there is a suspicion of de-calibration of the controller, for example after overvoltage in the electrical system, etc.

Checking the correctness of the controller connection

To check the correctness of the motion contactor control connections, the **right and left head counting test** should be performed.

Right head counting direction test
Upon pressing the key of the machine controlling the right head movement to the left, the value of the counter visible on the **left** side of the display (**position L**) should **decrease**, and upon pressing the machine key controlling the right head movement to the right, the value of the counter should **increase**.
Left head counting direction test
After pressing the button of the machine controlling the left head movement to the right, the value of the counter on the **right** side of the display (**position R**) should **decrease**, and after pressing the machine keycontrolling the left head movement to the left,the value of the counter should **increase**.

If the right and / or left head counting test shows an incorrect counting direction, after changing the power supply, replace the wires: red and orange for the MSK-320 sensor or white and black for the rotary encoder (correct for the head for which the wrong countingdirection occurred), connected to the INPUT connectors on the controller board.
The direction test is carried out only after the controller has been installed, the first time it is started, there is no need to do it again during further operation.

Programming the number of saws installed in the machine

The controller allows working on a machine equipped with two movable heads, right and left, with the possibility of mounting an additional, fixed saw in the middle between the heads.
To program the number of currently used saws, press and hold the "**3 SAW**" key for approx. 2s for 3 saws or the "**2 SAW**" key for two saws. After entering the procedure for changing the amount of saws, measure the actual distance between the saws, press the "**START**" key and

enter the measured dimension for the left saw in relation to the center saw and the right saw in relation to the center saw (for 3 saws) or the left saw in relation to the right saw (in the case of 2 saws), using the numeric keypad of the controller. Confirmation of the entered dimension follows after a short press of the "**SAVE**" key. Entering the dimension is necessary after each change in the number of saws in the machine.
During normal operation, entering the actual dimension of the saw blade spacing takes place via entering the menu of the controller as described in the next section.

Programming the actual dimension of the head spacing

The controller has the actual dimension counters on which the saws are currently located.
In order for the controller to work properly, it is necessary to ensure that the values displayed in the controller are compatible with the dimensions on which the saws are physically located in the machine.
To change (set) the dimension of the head, enter the menu and then select the "**POS.L**" window for the left head or "**POS.R**" for the right head and again short-press the "**MENU**" key. Now it is necessary to accurately measure the distance in which the saw is located in the selected head in relation to the center saw (measure the actual distance from the inside edges of the saws, i.e. the dimension that would remain after cutting). For accurate measurement, you can make a sample material cut on the head and measure its dimension after the cut.
After entering the dimension, press the "**SAVE**" key briefly.
The same applies to the right head and the left head.
The above procedure is used in the same way when working with two saws, selectingthe window with the description "**POS.R L**" in the menu**, remembering to set the saws to the minimum dimension in advance so that they can move away symmetrically during operation.**

It is recommended to check the compatibility of the displayed and actual height each time before starting work on the machine.

Autocalibration of the controller

Each machine has a certain mechanical inertia of motion dependent on many factors, such as the outside temperature, own resistances after lubricating the guides, etc.
In order to ensure the most accurate adjustment of dimensions, the controller should be auto-calibrated frequently.

It is recommended to perform auto-calibration at least twice a week and each time after lubricating the mechanical elements responsible for the machine heads feed.

In order to carry out auto-calibration, set the saws close to the minimum possible spacing, shortly press the "**MENU**" key, select the window with the description "**AUTO CALIB**" and confirm the selection by briefly pressing the "**MENU**" key. After making sure that the saws are in the required position and you can safely start the machine, press the "**START**" key briefly.
During autocalibration, the controller performs the movements of the machine heads in sequence, displaying the progress bar and the measured correction factors successively for each of the movements.

After the correct completion of autocalibration, the controller displays the message confirming the end of the function. Exiting the Auto Calibration procedure follows a short press of the "**EXIT**" key.

Entering the A, B, Cdimension -program

The controller allows you to enter the size of the saw blade dimension into the memory for a later quick-call during operation.
To save the necessary dimensions in the memory, first enter them from the keyboard for each of the heads (L and R for 3 saws or L-R for 2 saws). The dimension entered always applies to the head for which the dark field with the dimension flashes on the display. The change of the active head in the entry is made by briefly pressing the "**SIZE L**" or "**SIZE R**" key. After entering the necessary dimensions, press and hold for about 2 seconds the key with the letter under which the dimension is to be saved, there are three keys marked with the letters A, B and C.
Values stored for keys A, B and C entered for 2 and 3 saws are stored separately in memory and are available after each switching of the controller mode from 2 to 3 saws and vice versa.
Calling up the dimensions saved in the memory is possible after brieflypressing the key with the letter A, B or C.
Deleting the previously saved value takes place automatically when saving the new value of the saw spacing.

Selection of the menu language

The controller has the ability to change the language of the displayed menu. To change the language, enter the menu by briefly pressing the "**MENU**" key, select the "**PL EN**" window and briefly press the "**MENU**" key. After entering the procedure of changing the language of the menu, select the language version using the up and down arrow keys and confirm the language version by briefly pressing the "**SAVE**" key.

Operation of the DSP-01 controller

The operation of the DSP-01 controller after its proper connection, start-up and calibration is limited to selecting the operating mode (two or three saws) and entering the required spacing for each head (you can use ready-made values saved under keys A, B and C).
After entering the dimensions, press the "**START POSITION**" key briefly so that the controller can move the setting to the dimension. The adjuster, in order to cancel possible mechanical play of the machine, always makes the approach movement to the dimension from the side higher than the entered dimension (from the left side for the left head and from the right side for the right head).

Operating recommendations

In order to maintain the best possible cutting parameters, it is recommended to perform the auto-calibration procedure at least twice a week, as described in the section: **Auto-calibration of the controller.**
Warning! The temperature of the controller operation is from -10 to +45 ° C.

Before commencing work, check whether the saw spacing displayed on DSP-01 is compatible with the dimension shown by the mechanical measuring device.

If a discrepancy is found, enter the correct dimension into the positioner as described in section: **Programming the actual dimension of the head spacing.**

Do not press the keyboard of the controller with hard objects or press it too hard, it can cause irreversible damage.

If the keyboard gets dirty, use popular cleaning agents for cleaning, remembering not to press the membrane keys too hard. Pressing the keys too hard can damage them and consequently the entire keyboard must be replaced.

The controller should not be exposed to direct wetting, flooding with water or other liquids.

In case of inability to perform a specific motion due to reasons independent of the controller (actuation of the limit switch, damage to the encoder or control connections), the controller stops the movement by displaying relevant information messages.

<u>Error messages and reasons for their display</u>

Message type	**Reasons for occurrence**
Incorrect entry	Attempt to enter a dimension that does not fit within the allowed range of values, e.g. an attempt to storein the memory the value of a divider greater than 30.
Attention motion stopped, no impulses Press enter, reset the controller	The limit switch for the head movement has tripped. Break in the MSK-320 sensor connections. MSK-320 sensor defective. Incorrect input divider.
Warning calibration failed Press enter, reset the controller	The limit switch for the head movement has tripped. Break in the MSK-320 sensor connections. MSK-320 sensor defective. Incorrect input divider.
Saving incomplete	During the procedure for changing the number of saws, the new dimension of the spacing was not correctly saved ("EXIT" key used instead of "SAVE" key).

EMC Compatibility

DSP-01 controller conforms to the current norms concerning electromagnetic compatibility (EMC).
DSP-01 controller should be installed and configured in accordance with national and European norms. It is a responsibility of the fitters of the machine electric control system, who must conform to the EMC directive.
DSP-01 controller must be considered as a part of the system, it is not a stand-alone machine ready to use, according to the European directives (Machines Directive and EMC compatibility directive). It is responsibility of the final user to assure that these standards are met.
The product and its accessories described in this manual can be changed and modified many times, both from technical point of view and from the perspective of utilisation.
Their description by no means can be treated as a contract.