



*Temelsan*<sup>®</sup>

# KN-41-HBC-PLC BUTT WELDING MACHINE USER MANUAL



Congratulation to your new TEMELSAN Butt Welding Machine  
KN 41 HBC PLC

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## BASIC INFORMATIONS

This manual user guide is prepared to be useful in order to get familiar with the machine and the functions of the machine. By the help of this manual guide, the operator becomes a capable to use the machine in an optimal way in order to operationalize safely, ergonomically and properly.

This manual user guide allows the operators not to take risk, minimize the idle and repair time. It also helps to increase lifetime of the machine.

This manual user guide should be kept in a proper place and be accessible easily when needed. The local regulations included safety and environmental requirements must be followed in addition to the statements based on this manual user guide.

In case of an issue, complaint, request, demand on spare parts etc. please note the following information along with the below message

### **Concerning following Object:**

**Machine Model:** TEMELSAN KN-41-HBC PLC

**Mfg. year:** 2020

**Serial Number:** \_\_\_\_\_

### **APPROPRIATE USE**

The welding capacity for Band Saw Blades is from minimum 6 x 0.65 mm up to a maximum 41 x1.30mm. The machine is capable to weld all kinds of band saw blades which are called carbon, wood, bi-metal, CT Work on the electrical power supply is only to be done by professional electrician.

In the event of using the machine rather than described in which case the machine would be out of warranty situation of Temelsan.

**Upset welding** /resistance butt welding is a welding technique that produces coalescence simultaneously over the entire area of abutting surfaces or progressively along a joint, by the heat obtained from resistance to electric current through the area where those surfaces are in contact. Pressure is applied before heating is started and is maintained throughout the heating period. The equipment used for upset welding is very similar to that used for flash welding.

**Flash welding** is a type of resistance welding that does not use any filler metals. The pieces of metal to be welded are set apart at a predetermined distance based on material thickness, material composition, and desired properties of the finished weld. Current is applied to the metal, and the gap between the two pieces creates resistance and produces the arc required to melt the metal. Once the pieces of metal reach the proper temperature, they are pressed together, effectively forging them together. You will be faced with technical words like Upset Pressure, Weld-Space, Welding-Ready Position. This will be explained later in this Manual. (Some Text here is copied from Wikipedia, which explains very well the Butt Welding procedure, many thanks to the writer)

## **WARRANTY AND LIABILITY**

In the event of involving a personal injury or physical damages are not covered by the warranty if the following events occur as below.

- Using the machine for a purpose rather than intended
- Technically, improper installation, start-up operation or maintenance of the machine
- In the act of using the machine while any of safety equipment is a broken or protective device inappropriately running.
- Making constructional changes on running parameters.
- Insufficient control of abrasion parts
- Inappropriate repairs
- The catastrophic failures due to the action of foreign objects / Bodies and excessive force applied

## **SAFETY**

Below safety requirements must be applied without skipping anything and priority case to carry out.

## **QUALIFIED PERSONNEL**

Certain tasks must be carried out on the machine by a professional qualified personnel. Not third parties neither the children should be near the machine working area.

## **PLANNING AND SET-UP**

Planning, transportation, installation, programming, start-up, maintenance, repairs and other works must be done by qualified personnel. Authorized technician must check it also.

The following matters must be noted:

- Technical data and details concerning the permissible use of the machine and its accessories.
- General and specific local preparation and safety measures.
- Personal usage and the use of general safety equipment must be related the norms.
- Especially listed on this manual guide but specifically not listed in the operating instructions that have been explicitly forbidden. Such as a handicapped to use the machine is such cases it is necessary to contact the manufacturing company.

## **OPERATIONS**

Dangers hidden in disregards of safety regulations.

## **SAFETY DEVICES**

The machine is equipped with the safety devices corresponding to current state of the art. In the matter of safety equipment, the machine may not be disabled, removed, dismantled, damaged. It applies in particular to:

- Safety switches (Emergency Stop Button)
- Electrical and electronic fuses

## AREAS OF USAGE

The butt-welding machine Temelsan KN-41-HBC PLC is used for low-alloyed and high-alloyed steel bands and band saw blades or bi-metal or carbide tipped band saw blades.

The welding capacity for Band Saw Blades is from minimum 6 x0.65 mm up to a maximum 41 x1.30mm. The machine is capable to weld all kinds of band saw blades which are called carbon, wood, bi-metal, CT Work on the electrical power supply is only to be done by professional electrician.

The machine is a single piece and no need to be assembled.

The machine can be set-up by the customer's own staff if officially approved by Temelsan.

Please read the following sections thoroughly and carefully before the initial start-up and ensure that you clearly understand it.

## MAINTENANCE

In order to insure a safe operation on the machine and prevent accidents, the job listed in the section "Servicing" must be carried out regularly. If the owner of machine is not in a position to do that also must be arranged by an authorized service agent.

## ISSUES

The machine must be switched off at once in case of any problem occurs during the operation and then locked for not being restarted accidentally by an unauthorized person.

The machine must be switched off in this case.

- Unusual sounds, vibrations, smells
- Unusual operations on the monitoring device
- Increased temperatures or power consumption
- Unusual reaction during the manual or automatic operation
- Strange behavior and error messages displayed



### WARNING!

Only suitably qualified personnel must service the machine!



### EMERGENCY

**ATTENTION!**

Note the following at emergent cases (fire, water, explosions, breakage):

- Cut the machine off from the mains power supply at an external main switch or external fuses
- Switch off the compressed air supply
- Use the fire extinguishers of a suitable type to deal with the fire

**SAFETY MEASURED RELATED WITH THE MACHINE****WEAR PROTECTIVE GLASSES!**

Welding beads produced during welding work could damage your eyes.

**WEAR GLOVES!**

The sharp edges of the blades can cause hand injuries.

**DANGER OF FIRE!**

Easily inflammable materials could be set alight if they come in to contact with welding sparks. Kind of inflammable materials should keep far away from welding area constantly during the operation!

**SWITCH OFF THE MACHINE!**

Cut off machine from the main supply before carrying out setting-up maintenance and servicing work on the machine.

**DANGER OF BEING CRUSHED!**

There is a degree of danger if being crushed when in the proximity of the clamping jaws during inserting parts. There is a degree of danger being crushed between the clamping jaws during the setting-up operations.

**ATTENTION!**

It's dangerous when contacting parts of the power supply, control and transformer.

**IN CASE OF EMERGENCY;**

Push the emergency stop button.

TEMELSAN | The emergency stop button is to use by emergency issues only!

Akçaburgaz Manviusün YAZICIÖĞÜ Cad. NO:55/1 ESEN YURT / İSTANBUL /

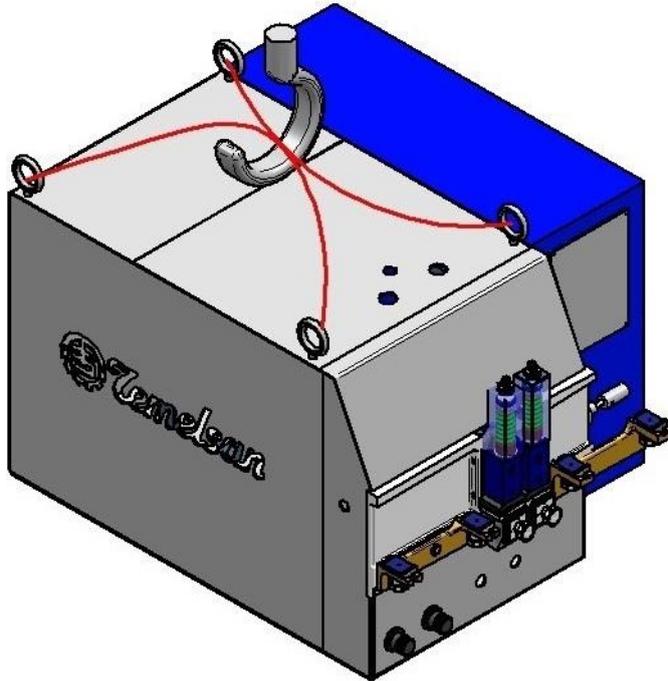
TEL: +90 (212) 544-2518 FAX: +90 (212) 577-6557 [www.temelsan.com](http://www.temelsan.com)

## TRANSPORTATION - STORAGE - PACKAGING

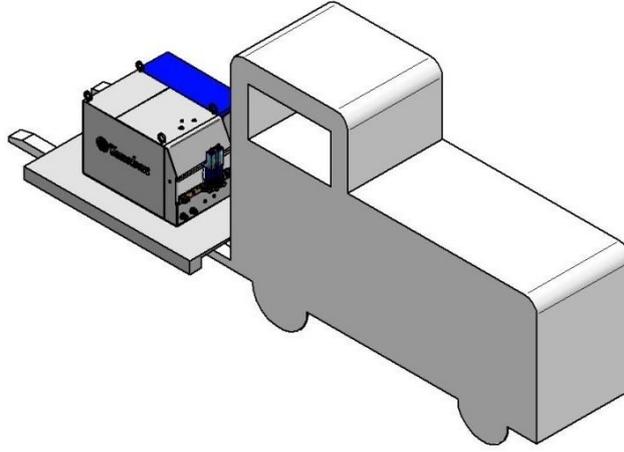
The machine may not be handled with special care in transport so as to prevent damage from impacts to careless loading and unloading. The measures listed below are essential. The following measures that must be taken only cover the transport within the company. Road, rail, airline transport and sea transport require additional measures to be taken.

Transport in assembled state (see figure below)

- Use only the lifting eyelets for transport by crane (Picture below)



- The use by forklift (pictured blow)



**Attention: RISK OF TIPPING OVER**

**The higher center of gravity requires a special view for transportation even the Machine should be fixed by screws to the pallet.**

**STANDART ACCESSORIES**

400 Bar	Strong Hydro-Pneumatic clamping system
6 - 41 mm	Width Bi-Metal and CT-Band welding capacity
10 - 50mm	Width Wood-Band welding capacity (by additional jaws 70mm width)
One type jaws	Both side usable and turn able for small widths
Adjustable	Numeric stoppers for cambered band saw blades
Digital Display	With touch-screen control
400 Program Memories	For 400 fully range of band saw blade dimensions
High Pressure Air	Cleaning system (air blow off), nozzles positioned inside the clamping jaws
Full Auto Annealing	Control by pyrometer 300-1300oC, swing system, measuring area 4x4mm
Pyrometer Cover	Is a well-constructed metal box with fully automatic open and close functionality; switch controlled, includes also the LED working place lamp. Digital positioning system of clamping jaws.
Air Pistol	For manual cleaning
Air Reservoir	To combine the income air capacity
Support Tools	Pre-Adjustment tools

**OPTIONAL ACCESSORIES**

Barcode Reader	
Liquid	Cooling System
2 Set Spare	Upper and Lower Jaws (4 pcs of upper + 4 pcs of lower jaws)

Please check the Packing when arrived before unloading the machine from truck.

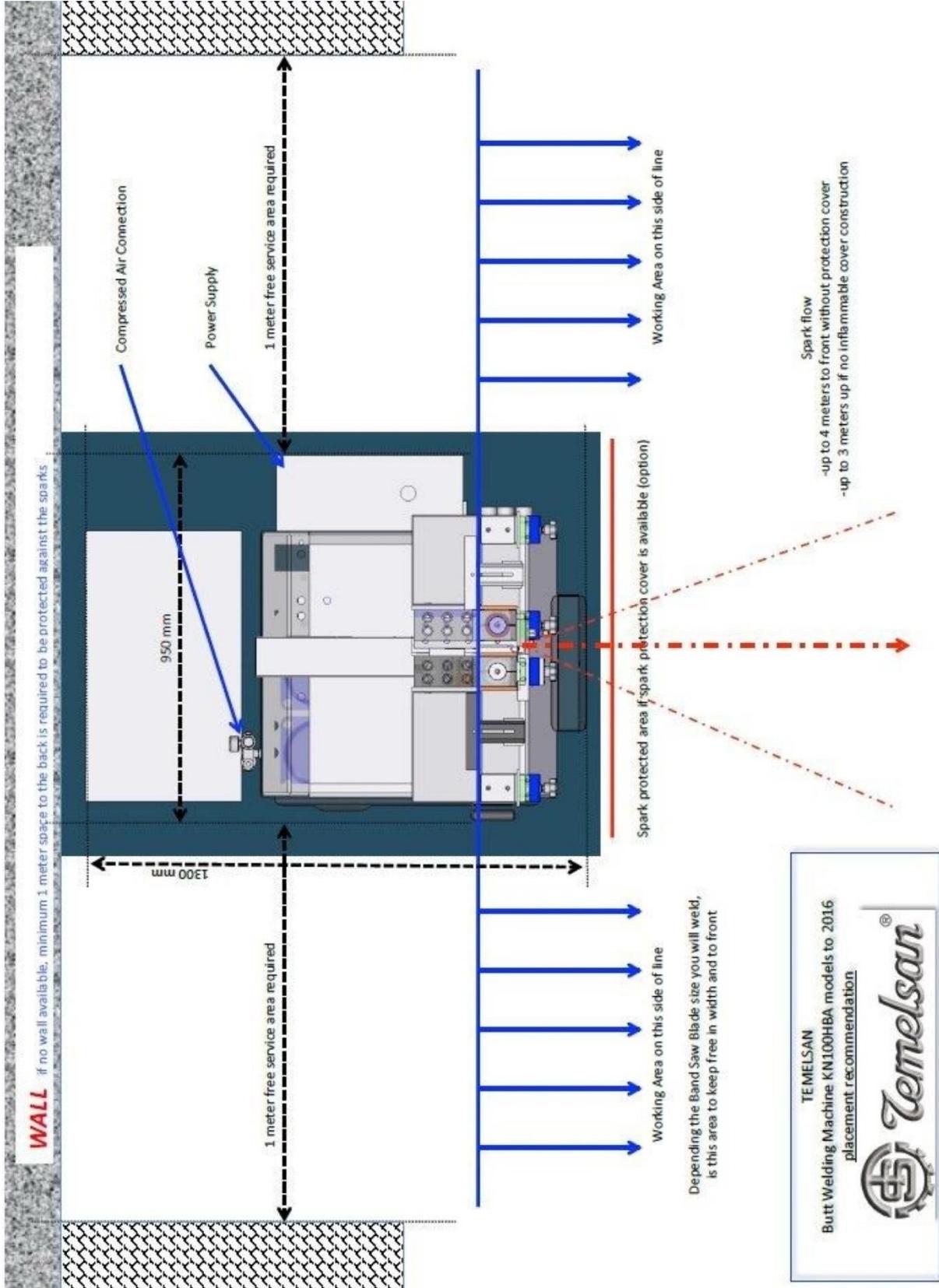
Do not accept the delivery if packaging is damaged or broken by transportation.

In case of broken or damaged packing of machine, it's possible with agreement of Transportation Company to unpack and check the machine condition before down loading

As soon you unload the machine, you accept the condition of machine, you take any responsibility for damages and eventually repairs.

**REQUIREMENTS OF WORKING PLACE**

- Flat and smooth ground
- Required big enough area around the machine
- Environmental conditions
- The running of the machine is not permitted if flammable liquids and objects are near to welding machine
- Enough air circulation is required
- The client is obliged to local electrical distributor notified technical requirements

**RECOMMENDATION HOW TO PLACE THE TEMELSAN KN41 HBC PLC MACHINE**


The Jaws and the transformer are heating up after any weld and annealing procedure.

Depends the number of welds and annealing during a short period and depends size of the band saw blades is the cooling time too short, the jaws and there level adjustment getting deformation and adjustment changes.

The cooling system is an separate liquid cooling system which is to position on the back of the welding machine. The liquid is an simple antifreeze pure which is used for cars. Do not use Alcohol.

The supplied Tubes have to be connected to the shot-off valves right behind the Machine and the valves have to be opened. Make sure you fill antifreeze liquid to the maximum level after connecting to welding machine and running the cooling system few minutes.

Also behind the welding machine is located an 220V plug where the cooling system have to be plugged. The 220V plug will supply power only when main power switch of welding machine is switched on, additionally the cooling system has an on/off switch.

The liquid temperature is adjustable down to 9-10°C, very important to know that the adjusted temperature should have not more then 10°C temperature different to room/working place air temperature. For example; if Room temperature is 25°C, the cooler should be adjusted not less then 15°C.

The reason is to prevent condensation of jaw blocks and transformer body. **We recommend to adjust the cooling system with 20°C**



LIQUID IN

LIQUID OUT



**Plug it in just behind the Welding machine.**

**POWER SUPPLY (Wiring draw see at following page)**

**Make sure that the main switch of the machine is on OFF position and prevent to be turned on by an accident.**

A qualified electrician must do the connection.

The input voltage (standard norm) is 400V AC (3 Phase + Neutral + Ground) 50Hz.

The input voltage (US Norm) is 600 V AC (3 phase + Neutral + Ground) 60 Hz. (optional)

The recommended fusing for power supply is **50 Amp fuse, sluggish type**

**The Diameter of each wire for power supply it's very important, please use the chart by selecting the Machine Type**

**Do not switch ON the machine before the all setup instruction is read and work performed**



**ATTENTION!**

Pay special attention to protect yourself from the energized cables moreover the control panel while operating the machine. Keep closed the cover of electrical control panel and do not forget to take out all the foreign objects in the cabinet which might cause short circuit.

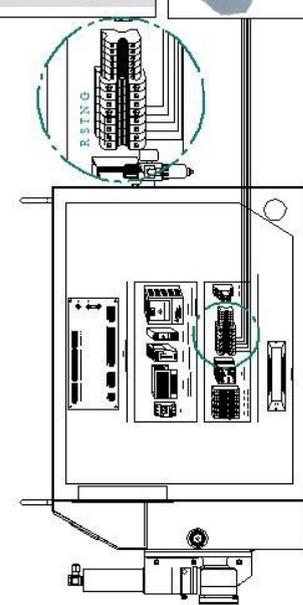


**WARNING!**

- Working on the electrical power supply has to be only done by professional electrician.
- The electrical equipment of the machine must be checked regularly
- Always keep the switching cabinet locked. Access is only permitted to authorized personnel with the key or special tool.
- Remove at once any loose or worn cables
- If it is essential to work on parts carrying a current there must be a second person present to turn off the main switch in case of an emergency
- The customer is required to comply with the technical conditions and requirements of the relevant electrical power supply company

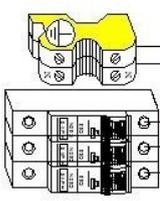
		KABLO / CABLE						
MAKİNE MODELİ MACHINE TYPE	TRAFO KVA	ŞEBEKE GERİLİMİ LINE VOLTAGE	SİGORTA GEÇİKMELİ FUSE SLUGGISH TYPE	KABLO MODELİ CABLE TYPE	KABLO UZUNLUK CABLE LENGTH	NOMİNAL KESİT NOMINAL CROSS SECTION	DIŞ ÇAP OVERALL DIAMETER	İLETKEN TEL SAYISI VE ÇAPI NUMBER OF CONDUCTING WIRE
		VOLT AC	AMPER		METER	mm <sup>2</sup>	mm	mm
KN41 HBS	4.5 KVA	400 VAC	50	TTR	< 5	5x10	21	6
KN67 HBS	12 KVA	400 VAC	63	NYN	< 5	3x16 + 10 +10	23	7x1,7
KN67 HBA	40 KVA	400 VAC	63	NYN	< 20	3x25 + 16 +16	25	7x2
KN100 HBA	63 KVA	400 VAC	63	NYN	< 50	3x35 + 16 +16	32	7x2,4



MAX METER  
NYN 3X16+10+10  
(KN41 HBS TTR 5X10)







NYN



TTR

## PRESS-AIR REQUIREMENTS

The machine needs dry and clean air pressure, which needs 7-8 bars. The reservoir capacity of the air compressor should be 300-500 liters

After some time the air becomes wet and dirty, then please clean the conditioner of air right behind the machine.

Connect air hose supply coming from the compressor through on main shot-off valve to the conditioner at the rear side of the machine. We recommend to have positioned a shot-off valve on the escape route or behind the machine.

**As soon the compressed Air supply is connected, check and adjust the income pressure right behind the machine to 7 or maximum 9 Bar.**

**Machine has a Press-Air control-switch; it will give an Alarm when incoming air-pressure is too low. Following page shows an overview about Press-Air Connection.**

### Air Supply Check

Main Air Supply minimum 7 maximum 9 Bar

The compressor should be adjusted as starting to fill the air by 8 Bar and stop to fill by 9 Bar

If Clamping Pressure does not reach the 300 Bar, the main air pressure is too low never adjust the main Air pressure over 8 Bar. Factory adjustment is 7 Bar the Tube size for Air Pressure supply is minimum 7,5 x10 mm.

Machine can weld the smaller bandwidths by lower Air pressure but the wider bandwidths could be not welded well. In fact you limit your machine if you use low air pressure supply. Machine needs always higher Air-Pressure income then finale for Bandwidth needed.

### Table for Air pressure comparison to clamping pressure KN-41-HBC-PLC

Income Air Pressure	Created Clamping Pressure	Required Bandwidth	Clamping Pressure
4 Bar	250 Bar	6mm	100 Bar
5 Bar	300 Bar	10mm	150 Bar
6 Bar	350Bar	13mm	200 Bar
6.5 Bar	375 Bar	20mm	250 Bar
7 Bar	400 Bar	27mm	275 Bar
		34mm	300 Bar
		41mm	350 Bar



## FIRST INSTALLATION AND ADJUSTMENTS

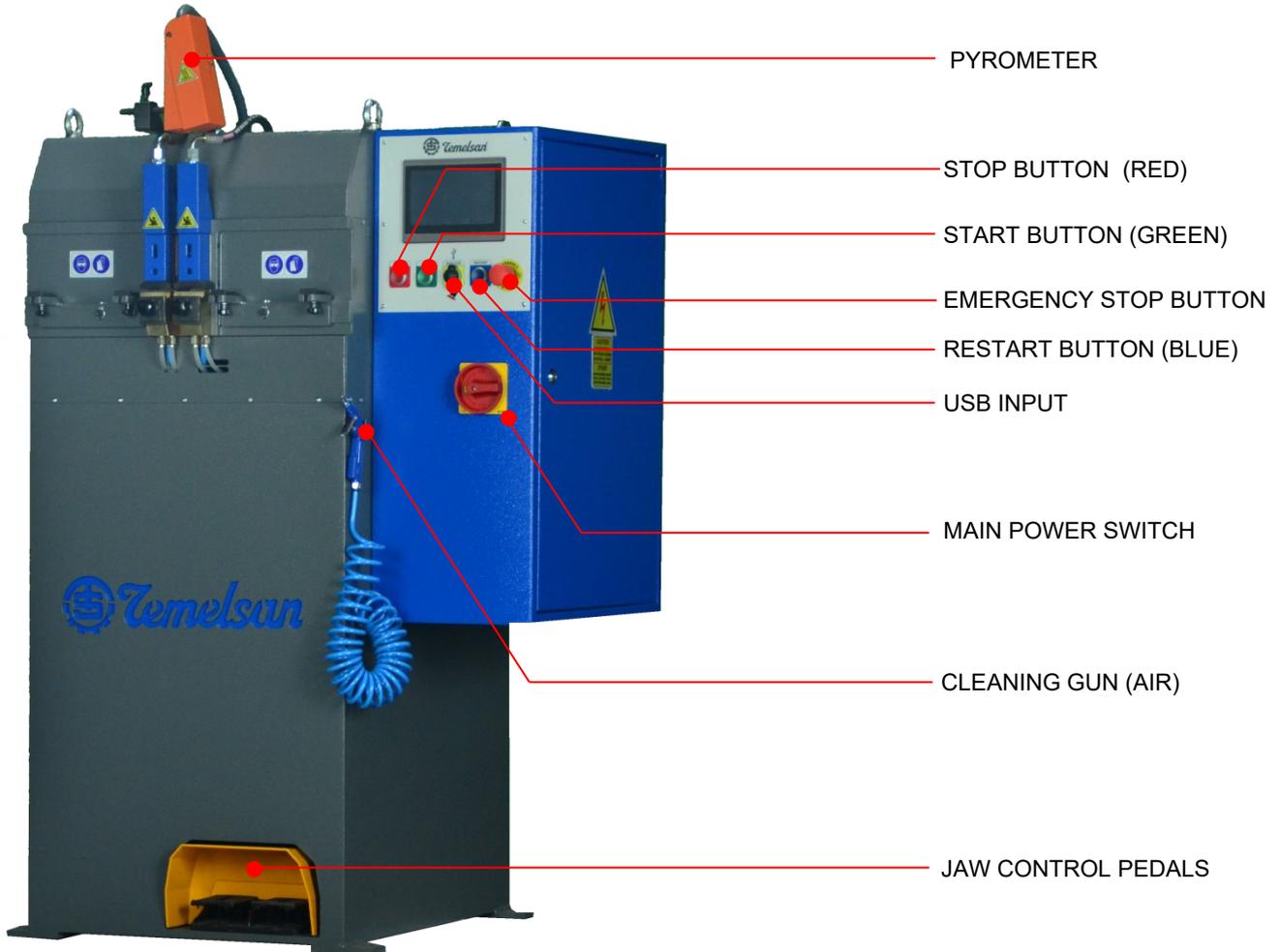
Authorized professionals, who must read this user guide, must do first installation and adjustments. In case of questions, is an immediately contact with manufacturer/supplier required.

## FIRST CLEANING

Unpainted parts on the machine are slushed with conservation oil and have to be cleaned before the operation can start. Especially the jaws and around them must be cleaned properly.

### Check Points

1. Power is connected through the instructions above, All fuses are ON also inside the electro cabinet
2. Air is connected and adjusted with 7 Bar (KN 41 HBC PLC)
3. Cooling System is connected properly (Optional device)



## OPERATOR PANEL AND STARTING OF THE MACHINE

The new type of KN 41 HBC PLC version has touch screen operator panel with optional barcode reader system. More easy and more specific settings of welding and annealing procedure can be done faster with touch screen panel.

The steps below should be followed for correct start of the machine.

- Switch the main ON-OFF switch to the ON position.
- Check and unlock the Emergency Stop Button (to unlock turn on Button to left side)
- Press and hold the BLUE RESTART BUTTON on the Operator panel for few seconds.



Then the machine starts to get its reference point automatically.

**CAUTION!** The machine gets its reference point every start. While machine is moving to get reference, please **DO NOT** touch any part of the machine.



Green colored box with 'REFERANCE HAS BEEN COMPLETED' text indicates the reference is completed and the machine is ready to use.

**ATTENTION!**

Please contact the authorized Temelsan technic personnel if you receive an error as follows.



The main menu appears in the screen when the machine ready to use.



There are 3 options to choose;

- 1- **WELDING**
- 2- **ANNEALING**
- 3- **AUTOMATIC WELDING & ANNEALING**

## 1 - DESCRIPTIONS OF ONLY WELDING PROCESS

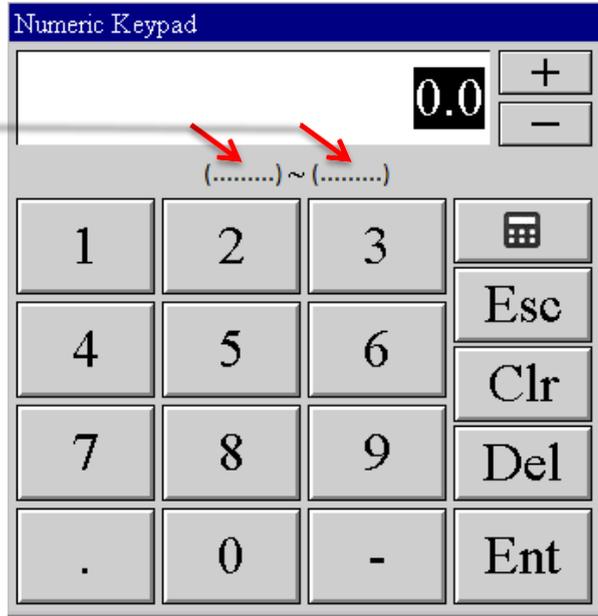


This process provides the desired welding with the parameters to be entered manually. The options below appear on the screen when user click Welding button.

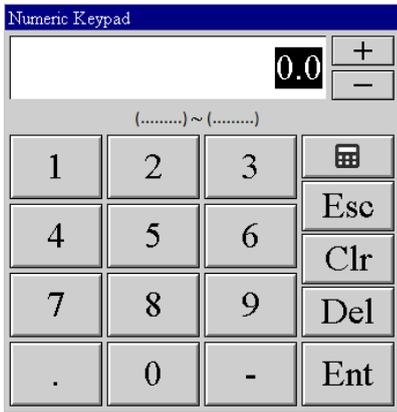


The user can assign the value which want to change by simply clicking on it. When the user click on it, a numeric keypad appears shown like at below.

**Note:** The shown values indicate the minimum and maximum applicable value range. User should make selection within these values.



**Welding Current:** To set welding current as percentage. (0 - 99%) (\*Note: Welding Current is one of important setting for qualified welding.)



When this numeric keypad appears, user can assign the percentage of using the transformer.

After user assigned the percentage, user has to click "Ent" button to confirm it.

If user wants to cancel his/her changes, user should click the "Esc" button to cancel it.

If user needs to change assigned values his/her can use the "Clr" button to delete all numbers which is appear.

**Welding Speed:** To set welding speed as percentage. (0 - 99%)

After user clicks of this button, numeric keypad will be appear and user have to assign value there to set parameters.

This option is the speed of welding operation, but it must be kept within a certain minimum and maximum range, depending on saw characteristics and dimensions.

**Clamping Pressure:** To set clamping pressure which changes related to saw width and thickness as a pressure unit (bar).

**Jaw Gap:** The gap distance between left and right jaw which changes related to saw width and thickness as a millimeter.

**Welding Stop Point:** The point which finishes the welding process .The inputted value indicates the position of Cam of the machine as degree.

This option helps user to adjust his/her welding burr size and also this is one of important parameter of welding.

After user clicks of this button, numeric keypad will be appear and the user has to assign values to set parameters.

**Up-Set Pressure:** To set up-set pressure which changes related to saw width and thickness as a pressure unit (bar).

If all of above are set the desired values, click on the apply button and finalize the welding settings.

To start welding process, push the **GREEN START BUTTON** on the operator panel.

**Once the parameters have been assigned, the machine will recall those parameters until the user wants to change the parameters. In this way, the parameters do not need to be assigned each time.**



The right side of the screen shows the instantaneous values of Left Jaw Pressure, Right Jaw Pressure, Up-Set Pressure and Jaw Gap Distance.

When welding process is done, the following screen appears.



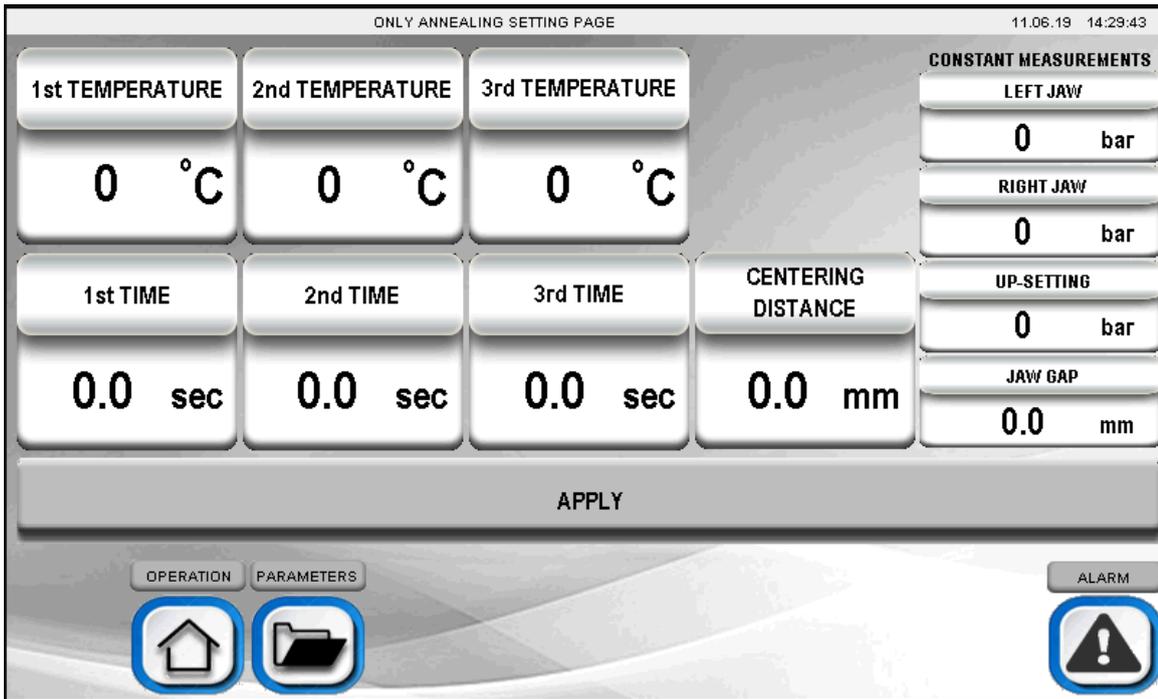
**Save Last Parameters:** Saves the last parameters which have been assigned settings on last welding. If welding quality is satisfying, the user can save welding parameters by this button.

**Repeat The Last Operation:** Reapplies the last parameters which have been assigned and switches the screen to the select operation screen.

**Select Operation:** If welding quality is not satisfying, the user can change welding parameters by this button. The parameters below appear on the screen when user touch Select Operation button. The user could change the values by clicking on it.



## 2 - DESCRIPTIONS OF ANNEALING SETTING SCREEN



**1<sup>st</sup> Temperature:** Temperature value that to be reach of first step of annealing.

**2<sup>nd</sup> Temperature:** Temperature value that to be reach of second step of annealing.

**3<sup>rd</sup> Temperature:** Temperature value that to be reach of third step of annealing.

**1<sup>st</sup> Time:** Time value as seconds that to be apply first step of annealing.

**2<sup>nd</sup> Time:** Time value as seconds that to be apply second step of annealing.

**3<sup>rd</sup> Time:** Time value as seconds that to be apply third step of annealing.

**Centering Distance:** Distance between the jaws. (Welding line set in the center always.)

**Constant Measurements:** Shows the instantaneous values of Left Jaw Pressure, Right Jaw Pressure, Up-Set Pressure and Jaw Gap Distance.

If all of above are set the desired values, press on the apply button and finalize the annealing settings.

To start annealing, push the **GREEN START BUTTON** on the operator panel.

### 3 - DESCRIPTIONS OF AUTOMATIC WELDING & ANNEALING SETTING SCREEN

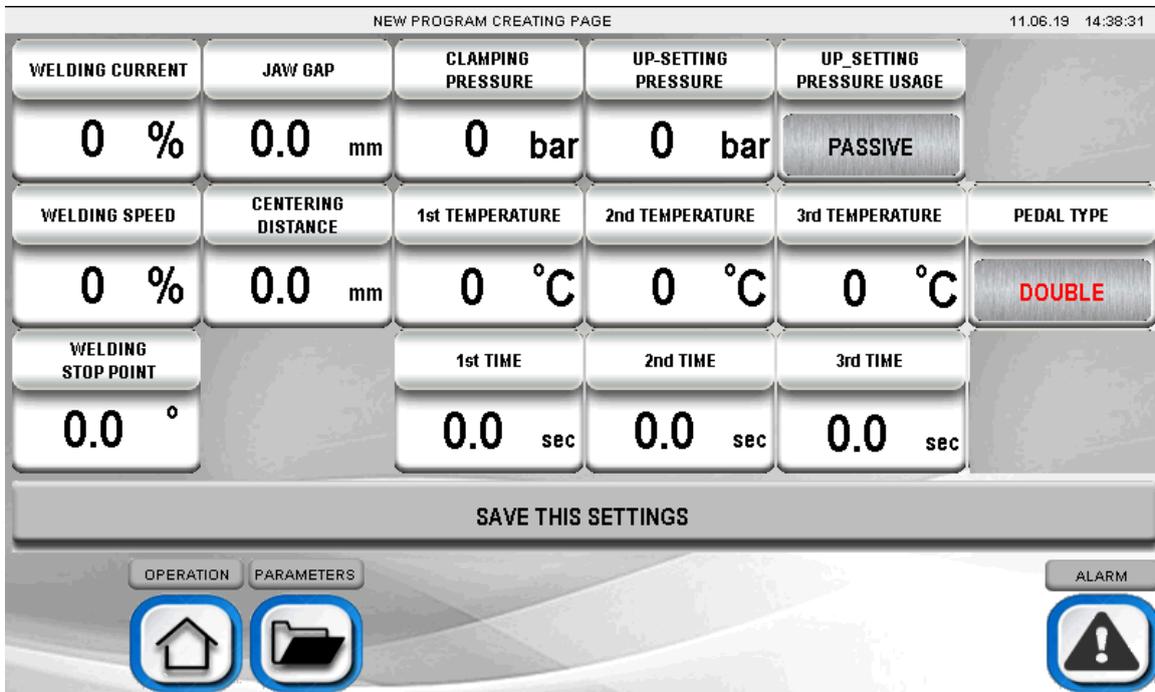


This process provides the desired welding and annealing with the parameters to be automatically. The options screen at below shown on the screen when the user clicks on Automatic Welding & Annealing button.



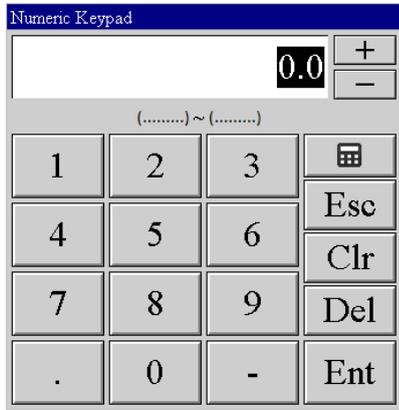
### CREATING A NEW PROGRAM:

When user clicks 'CREATE A NEW PROGRAM' button following screen appears.



The user can assign the value which want to change by simply clicking on it. When the user click on it, a numeric keypad appears shown like at below.

**Welding Current:** To set welding current as percentage. (0 - 99%) (\*Note: Welding Current is one of important setting for qualified welding.)



When this numeric keypad appears, user can assign the percentage of using the transformator.

After user assigned the percentage, user has to click “Ent” button to confirm it.

If user wants to cancel his/her changes, user should click the “Esc” button to cancel it.

If user needs to change assigned values his/her can use the “Clr” button to delete all numbers which is appear.

**Welding Speed:** To set welding speed as percentage. (0 - 99%) This option is the speed of welding operation, but it must be kept within a certain minimum and maximum range, depending on saw characteristics and dimensions.

**Clamping Pressure:** To set clamping pressure which changes related to saw width and thickness as a pressure unit (bar).

**Jaw Gap:** The gap distance between left and right jaw which changes related to saw width and thickness as a millimeter.

**Welding Stop Point:** The point which finishes the welding process .The inputted value indicates the position of Cam of the machine as degree.

**Up-Set Pressure:** To set up-set pressure which changes related to saw width and thickness as a pressure unit (bar).

**Centering Distance:** Distance between the jaws for annealing section. (Welding line set in the center always.)

**1<sup>st</sup> Temperature:** Temperature value that to be reach of first step of annealing.

**2<sup>nd</sup> Temperature:** Temperature value that to be reach of second step of annealing.

**3<sup>rd</sup> Temperature:** Temperature value that to be reach of third step of annealing.

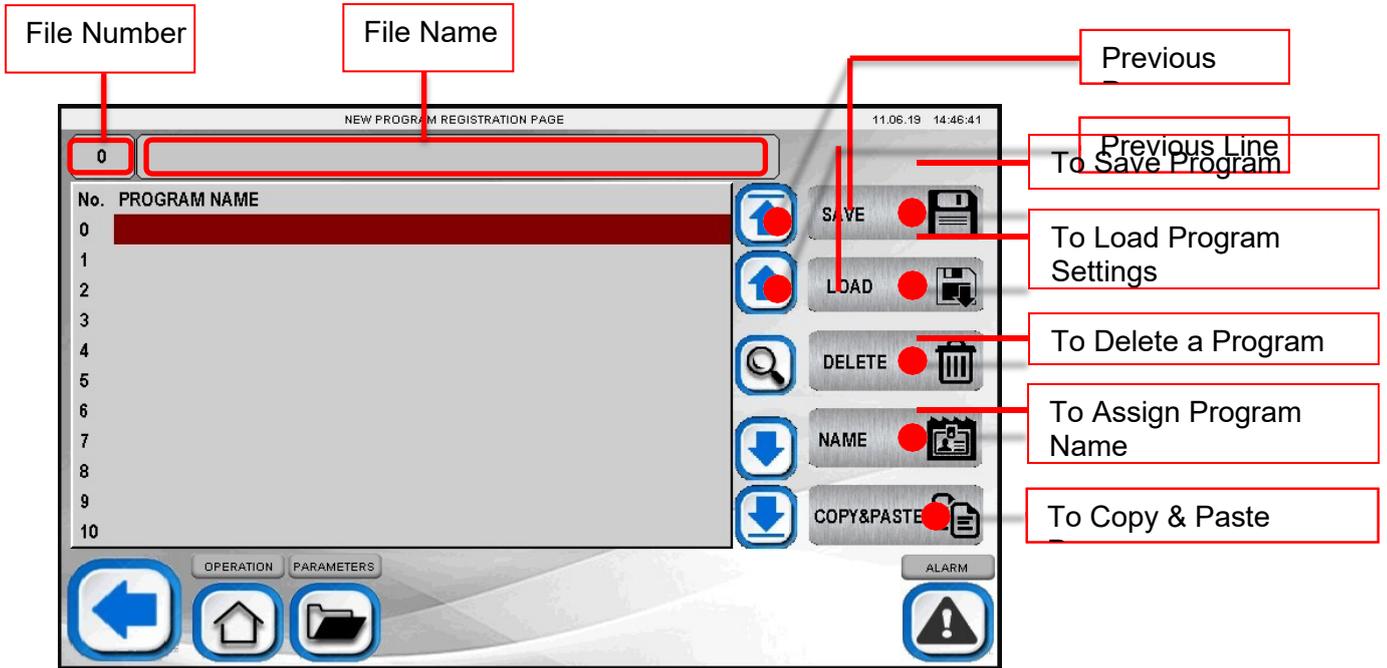
**1<sup>st</sup> Time:** Time value as seconds that to be apply first step of annealing.

**2<sup>nd</sup> Time:** Time value as seconds that to be apply second step of annealing.

**3<sup>rd</sup> Time:** Time value as seconds that to be apply third step of annealing.

**Pedal Type:** Single or Double Option

If all of above are set the desired values, press on the “SAVE THIS SETTINGS” button and finalize the settings. Then save details appears on the screen like picture below.



When user touched on the program name section a Keypad appears and the user could give desired name of your setting easily. Also the user can save the program to particular file number by clicking on the number which user wants to save.

Or

You could also use Barcode Reader for this step.

To finalize the creating a new program press the save button.

#### **QUICK WAYS OF CREATING NEW PROGRAM:**

- 1- Click the AUTOMATIC WELDING AND ANNEALING BUTTON.
- 2- Click the NEW PROGRAM.
- 3- Feed the necessary parameters.
- 4- Click RECEIPT button on right side below.
- 5- Click some empty area on list.
- 6- Click the NAME button.
- 7- Write the name and click ENTER.
- 8- Click the SAVE button.
- 9- Click the LOAD button.

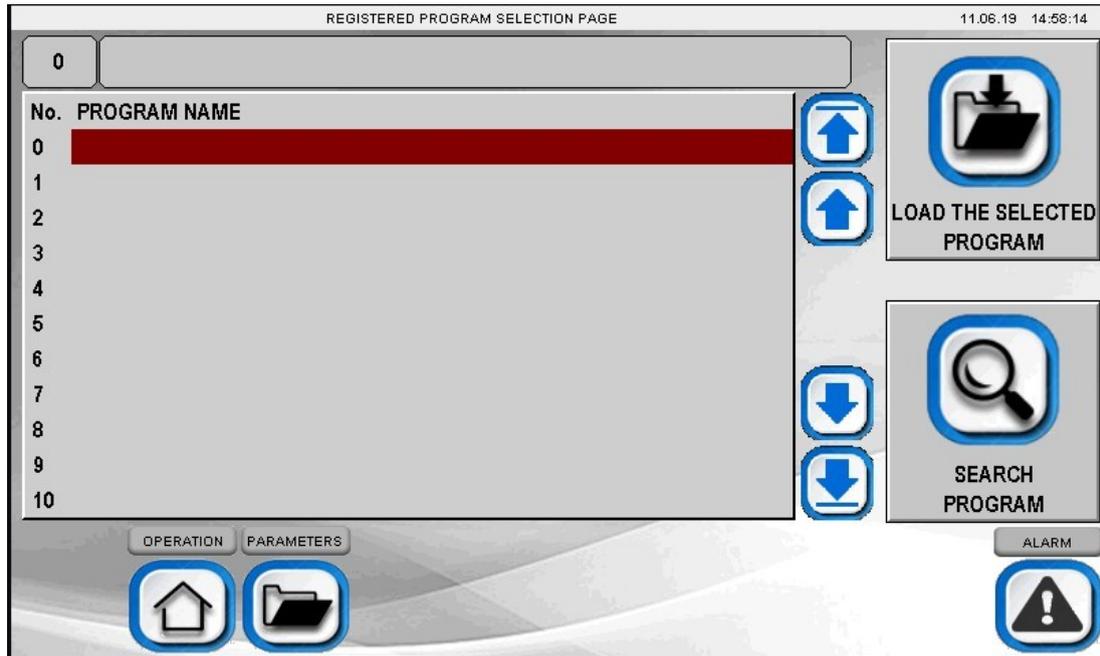
Adding totally new program:

- 1- Please find the size which is closer to your new blade and load it to appear on screen.
- 2- Click RECEIPT button on right side below.
- 3- Click some empty area on list
- 4- Click the NAME button.
- 5- Write the name and click ENTER
- 6- Click the SAVE button
- 7- Click the LOAD button

After doing your tests about these parameters. When all quality is ok please follow instruction do not lose the parameters.

- 8- Click RECEIPT button
  - 9- Click SAVE button
- to save parameters with the exist name.

#### SELECT A PROGRAM FROM LIST:

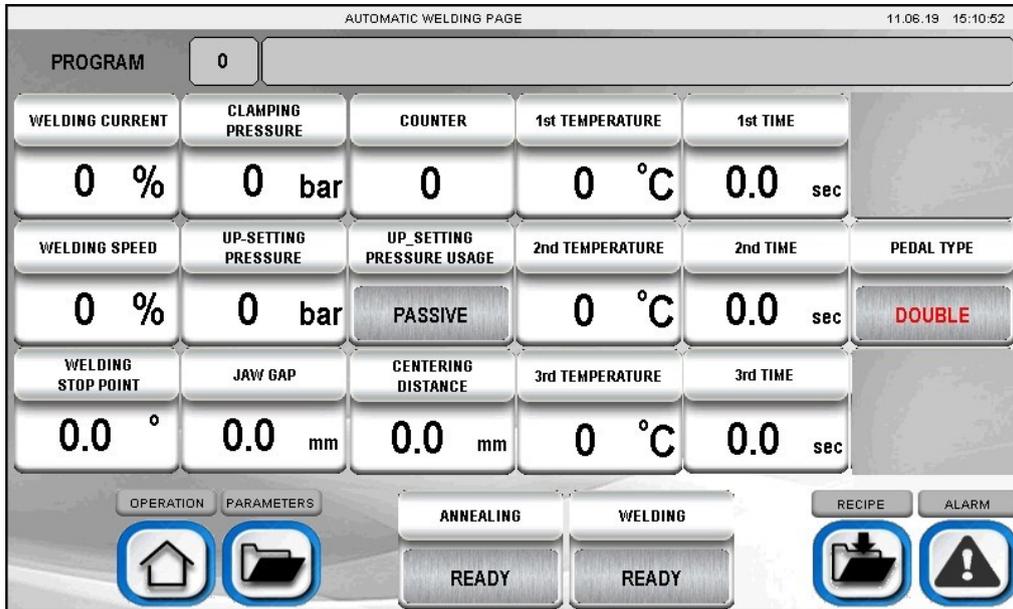


**Load the Selected Program:** To load welding and annealing properties that for selected saw properties which is set and saved before. When the user chooses a program and click 'LOAD THE SELECTED PROGRAM' button, assigned Welding & Annealing settings are set automatically and machine is ready to welding & annealing processes. The machine waits the user to pressing START button.

**Search Program:** To search and load particular program with easily. Only three characters are enough to find the desired program.

**CONTINUE WITH LAST PROGRAM:** To load the last program used.

Following screen appears and the user can see the all set values on this screen.



When the user press the 'START' button;

If operator wants to change a parameter and save it to the next operations, the recipe button should be use. This button helps to save the parameters for that program. When all parameters are desirable the operator could follow steps to do not lose the parameters.

Click RECEIPT button and then click SAVE button to save parameters with the exist name.

Following screen shown in automatic Welding & Annealing Mode while in process. The line bottom on the screen describes the processes which have been done.



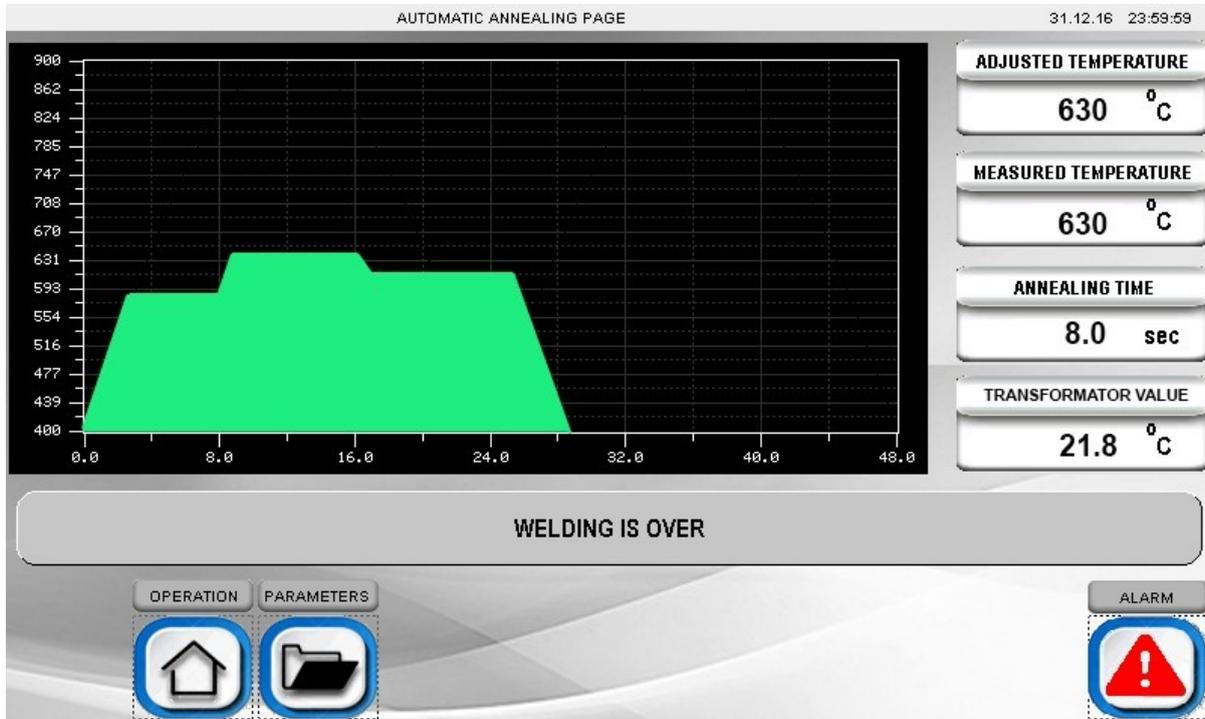
The instantaneous situation of the machine.

**AUTOMATIC ANNEALING SCREEN:**

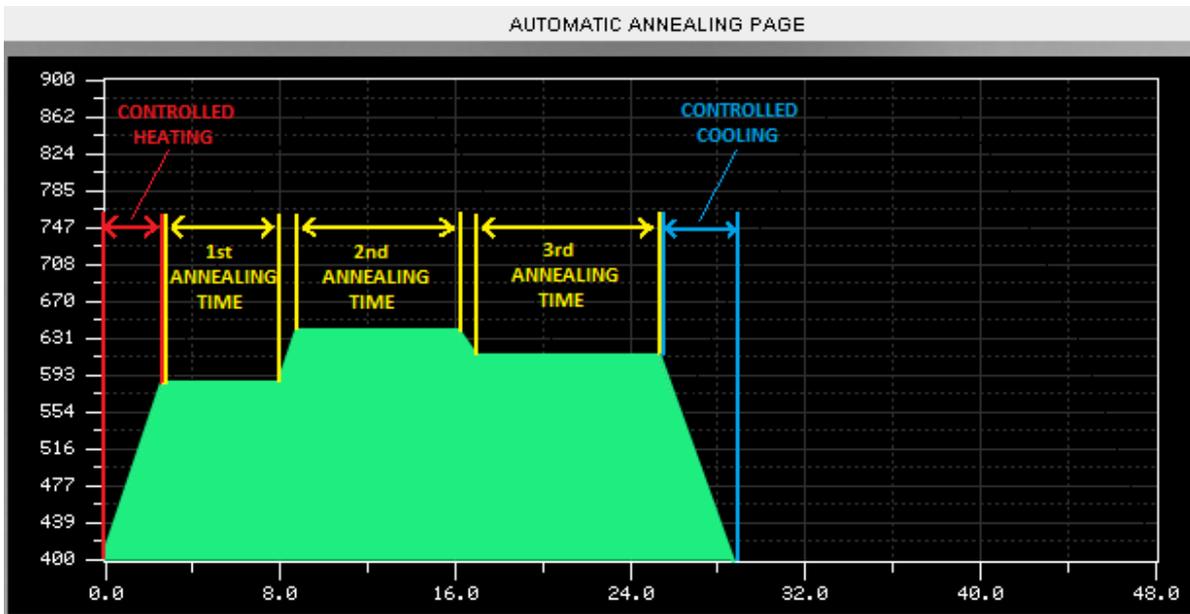
Mainly, screen divided to two sections. First section is left side which indicates and draws a graph the actual values of the annealing process. The right side indicates the 'Adjusted Temperature', 'Measured Temperature', 'Annealing Time' and 'Transformator Value'. The values of right section may change every stage of the annealing process because of the annealing process finalize in three different stage.

If explain the workflow diagram shortly;

First of all, machine provides the temperature that 1<sup>st</sup> annealing temperature, and then the machine applies the heat for given time interval by the operator. Other stages are also similar, the previous stages repeat. The critical point is the controlled heating and cooling stages which is the first and last section of the graph.



Additionally, the annealing times starts at the degree which given by the operator. Before the annealing process the material is heated and after annealing process the material is cooled under control by the PLC. The descriptions of time intervals are shown below at the graph.



#### SAVING OF PARAMETERS:



**USB >> PANEL SAVE:** This option helps to you Welding & Annealing settings transfer from USB Memory Stick to the Machine.(For this operation Barcode reader USB input could use.)

**PANEL >> USB SAVE:** This option helps to you Welding & Annealing settings transfer from the Machine to USB Memory Stick. (For this operation Barcode reader USB input could use.)

**ALARM SECTION:**

The any fault occurs in an operation records into Alarm section. Alarm section is accessible from at right bottom side of the every screen.



The all faults are seen in the following screen. Fault can be select by the help of the arrows and to delete a fault the user can click the trash can button.



**THE MESSAGES:**

**EMERGENCY STOP IS ACTIVE:** Please check emergency stop buttons.

**HYDRAULIC MOTOR FAULTED:** Please check thermal fuse of the motor.

**PHASE LOSS FAULT:** Please check sequence of phases and check connection of all phases.

**MAIN AIR PRESSURE IS UNDER THE LIMITS:** Please provide air to the machine more than 7 bar.

**CAM SERVO DRIVE IS FAULTED:** First, check the hydraulic oil level of up-set pressure piston. Secondly, check coupling of the cam servo motor drive for any visible damage. If there is no change in the alarm, contact with the Temelsan technic personnel.

**UP-SETTING SERVO DRIVE IS FAULTED:** The hydraulic oil level of Up-Set pressure piston may be high. Check the oil level of Up-Set pressure piston. If the oil level is OK, contact with the Temelsan technic personnel.

**SYSTEM COULD NOT GET THE REFERENCE:** General safety warning.

**REFERENCE PROCEDURE IS RUNNING:** It is only information for user.

**LEFT JAW CLAMPING PRESSURE IS OUT OF THE LIMIT TOLERANCE:** Left jaw pressure out of the tolerance limit.

**RIGHT JAW CLAMPING PRESSURE IS OUT OF THE LIMIT TOLERANCE:** Right jaw pressure out of the tolerance limit.

**UP-SETTING PRESSURE IS OUT OF THE LIMIT TOLERANCE:** Up-Set pressure out of the tolerance limit.

**JAW GAP SENSOR CALIBRATION IS WRONG:** Go to the reference screen and click to " START REFERENCE" to calibrate the machine.

**CHECK THE PROGRAM VALUES:** Please check your receipt values. Your welding setting are anomalous.

**I/O TEST SECTION:**

31.12.16 23:59:59

PLC INPUT OUTPUT MONITORING

**PLC-I**

00
01
02
03
04
05
06
07
22
23

**PLC-O**

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12
13

**NX-DA3603**

-99999
-99999
-99999

**NX-AD3603**

-99999
-99999

**NX-AD3203**

-99999
-99999
-99999
-99999

OPERATION



PARAMETERS



SERVICE



ALARM



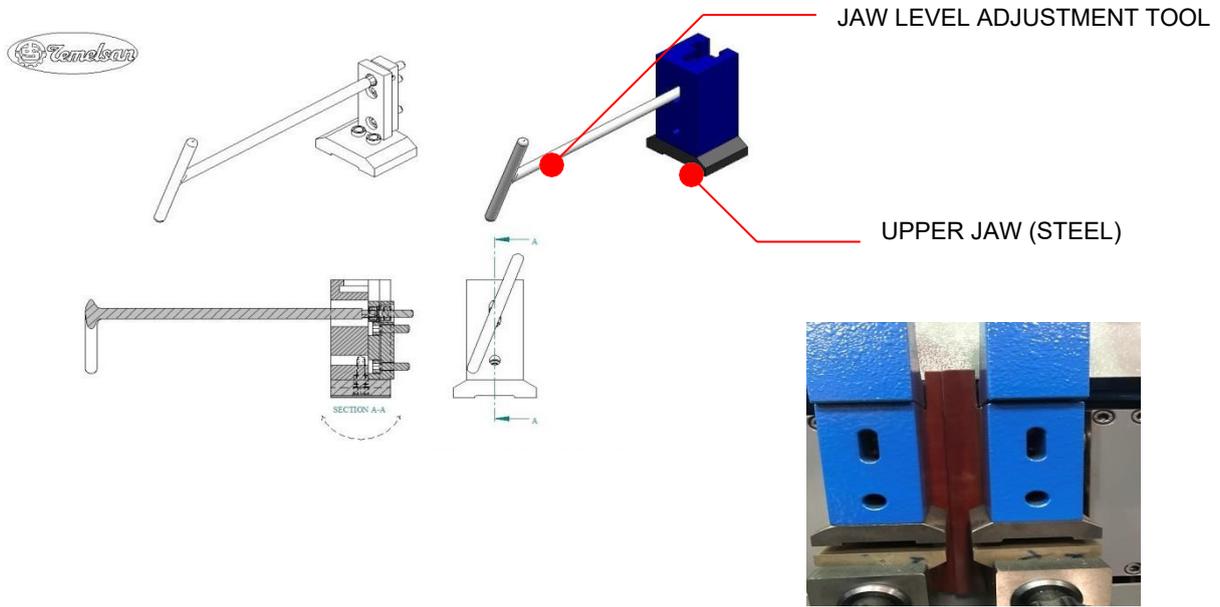
The descriptions of I/O Test module is below.

PLC-I	DESCRIPTION	PLC-O	DESCRIPTION
00	THERMAL SWITCH FAULT	00	
01	START BUTTON	01	LEFT JAW AIR BLOW VALVE
02	STOP BUTTON	02	RIGHT JAW AIR BLOW VALVE
03		03	
04		04	PYROMETER COVER VALVE
05	LEFT CLAMPING PEDAL	05	UP-SET PRESSURE THE LOWER VALVE
06	RIGHT CLAMPING PEDAL	06	UP-SET PRESSURE VALVE
07	PYROMETER COVER SWITCH	07	RIGHT CLAMPING VALVE
22	PHASE ROUTE ERROR	08	LEFT CLAMPING VALVE
23	EMERGENCY STOP BUTTON	09	
		10	
		11	STOP BUTTON LAMP
		12	START BUTTON LAMP
		13	PYROMETER LAMP

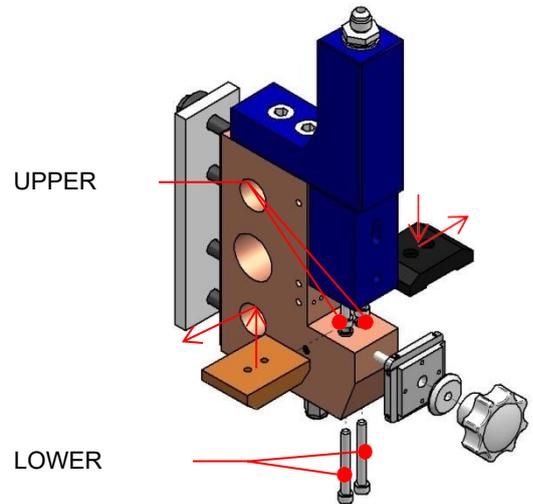
<b>NX-DA3603</b>
WELDING CURRENT
CLAMPING VALVE
UP-SET PRESSURE VALVE

<b>NX-AD3603</b>
JAW GAP INDICATOR
MAIN PRESSURE

<b>NX-AD3203</b>
PYROMETER
UP-SET PRESSURE
RIGHT JAW CLAMPING PRESSURE
LEFT JAW CLAMPING PRESSURE

**SERVICING THE JAWS ( PLEASE SERVICE THE JAWS FREQUENTLY )**


1. unscrew the "Lower Jaw retaining screw"
2. move up the Lower Jaw block
3. pull out the "Lower Jaw to left or right side"
  
4. unscrew the "Upper Jaw retaining screw"
5. move down the Upper Jaw block
6. pull out the "Upper Jaw to left or right side"



## CLAMPING JAW GRINDING INSTRUCTIONS

The lower jaws (Bronze) -just to grind on top surface until any crack on weld edge is out  
-Both lower jaws have to be same thickness; it's recommended to grind it together as a pair

The upper jaws (Steel) -just to grind on bottom surface until any crack on weld edge is out  
-Both upper jaws should have the same thickness

We recommend grinding the surface of jaws frequently that has the advantage of  
-Better power connectivity  
-Straight surface  
-Higher weld precision

As earlier you take it out to grind, as less material have to be grinded, the life of jaws will increase.

## INSTALLATION OF CLAMPING JAWS

Please make sure that the touch points between Jaws and Jaw-blocks are clean and free from grease.

When you place the Jaw to position it, check if all surfaces have contact, very clean between. Do not create the contact by tighten the screws.

When fixing the screws, not too tight please!

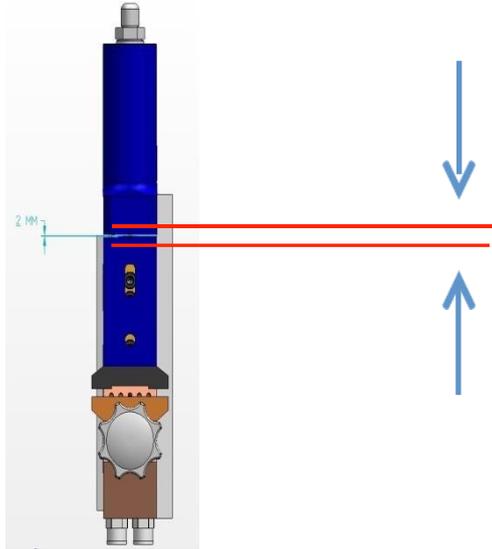
## CLAMPING DEVICE

The clamping devices are Hydro-Pneumatic system to clamp Metal Band or Band Saw Blade for butt-welding procedure.

The Clamping power is up to 400 Bar, so keep your hand far away from the clamping jaws when using it.

**The Oil-Level has to be controlled frequently** by viewing the size of the space between Jaws.

Block and Piston.



#### Piston Oil Level Check

Check the space showed on picture is the space is:

2mm	=	OK
0-1 mm	=	too low level of oil
3mm or more	=	too much oil

#### Use of clamping devices

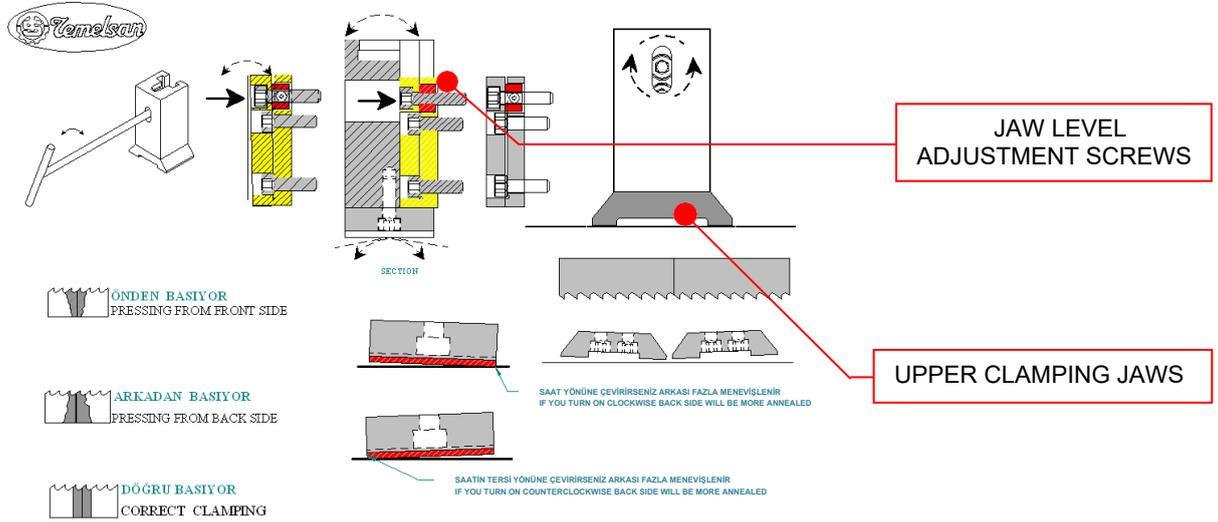
Use the pedals to clamp and unclamp the clamping devices. Keep your hand far away from the clamping devices when operating on the pedals!

You have the possibility to select between single or double action of pedals, that means single for each pedal, one clamping vice or double for one push of one pedal to close or open both vices together.

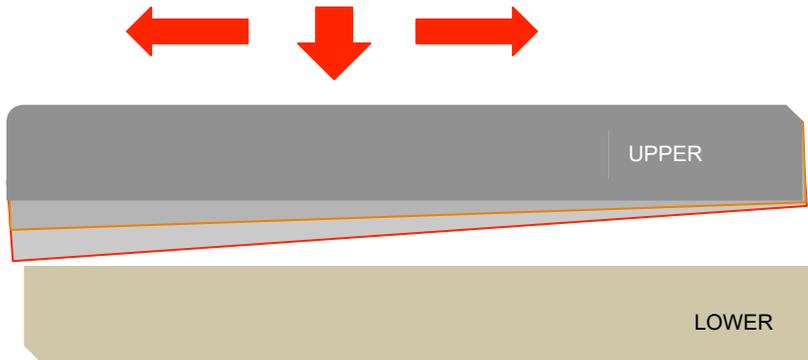
The Selection to adjust is to find into Menu 2 on the screen. Look at page nr. 33.



There is on both Clamping Jaw Blocks a Jaw Level adjustment Screws they makes the adjustment very easy.



With changing of Annealing Press Point we are able to clamp properly all different width of Metal-Band

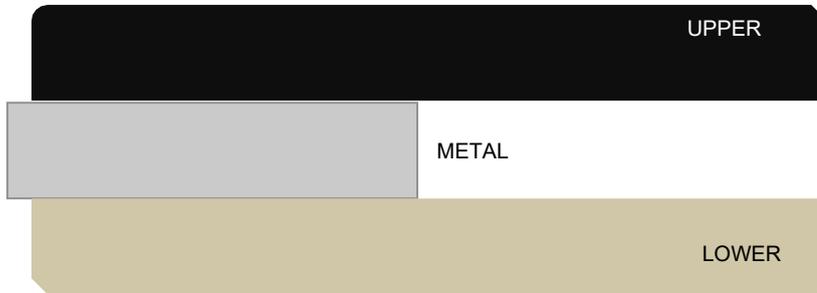
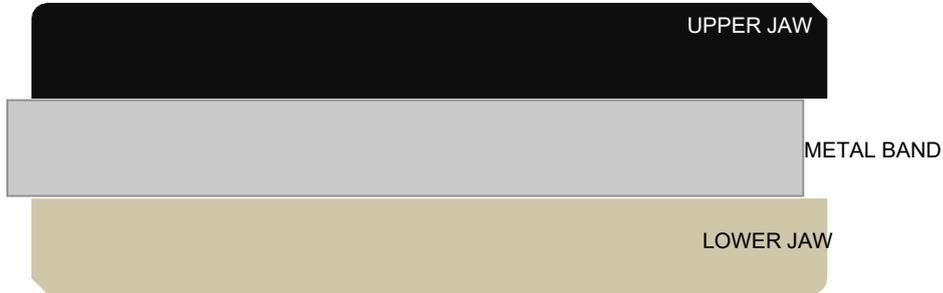


### Band Clamping Pressure Point

Where the pressure is higher, there is more electric connectivity, so the heat we want to create for proper annealing is there as highest. The goal is to create similar heat on all width of Metal-Band.

The jaw blocks are designed to be able to clamp different widths of Metal-Band or Band Saw Blade

#### Metal-Band Large Width Positioning



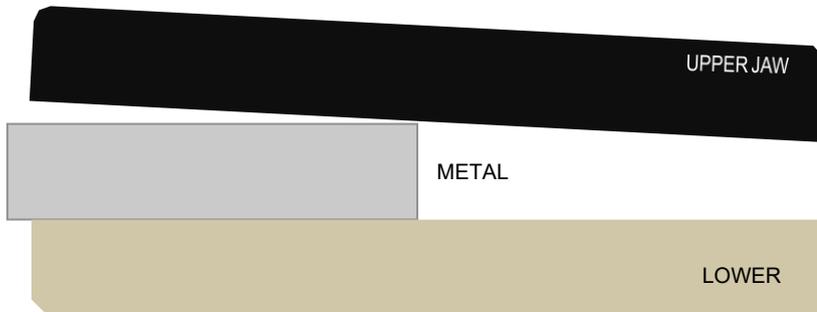
#### Metal-Band Small Width Positioning

### IMPORTANT TO KNOW!

The Clamping Pressure of the upper jaws has to be adjusted correctly in advance, in general is to know, as larger the band width as more clamping pressure can be used. There is recommended to memory the clamping pressures for each band size on a Parameter Chart.

What's happen when too high clamping pressure is adjusted.

In this case it's almost not possible to make a Jaw Level Calibration.



**Band Annealing Pressure Point (Jaw Level Calibration)**

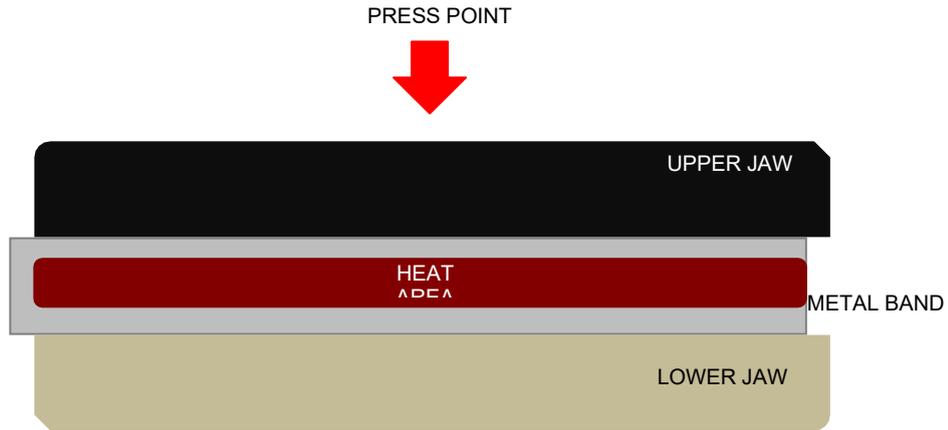
Clamping Pressure should be correct for each selected band-width.

When Clamping Jaws are on annealing position and using the annealing procedure the heat will show where the Annealing Press Point are.

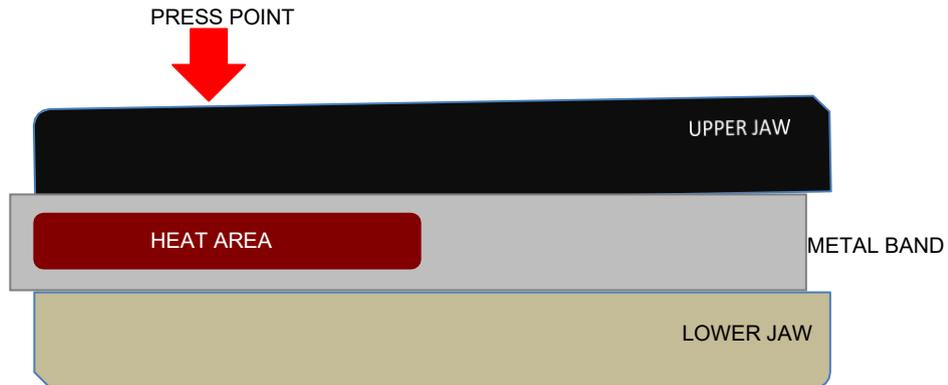
Where the pressure is, there is the electric connectivity higher, so the heat we want to create for proper annealing is there as highest. The goal is to create similar heat on all width of Metal-Band at the same time

Like on picture # 1.

Picture # 1

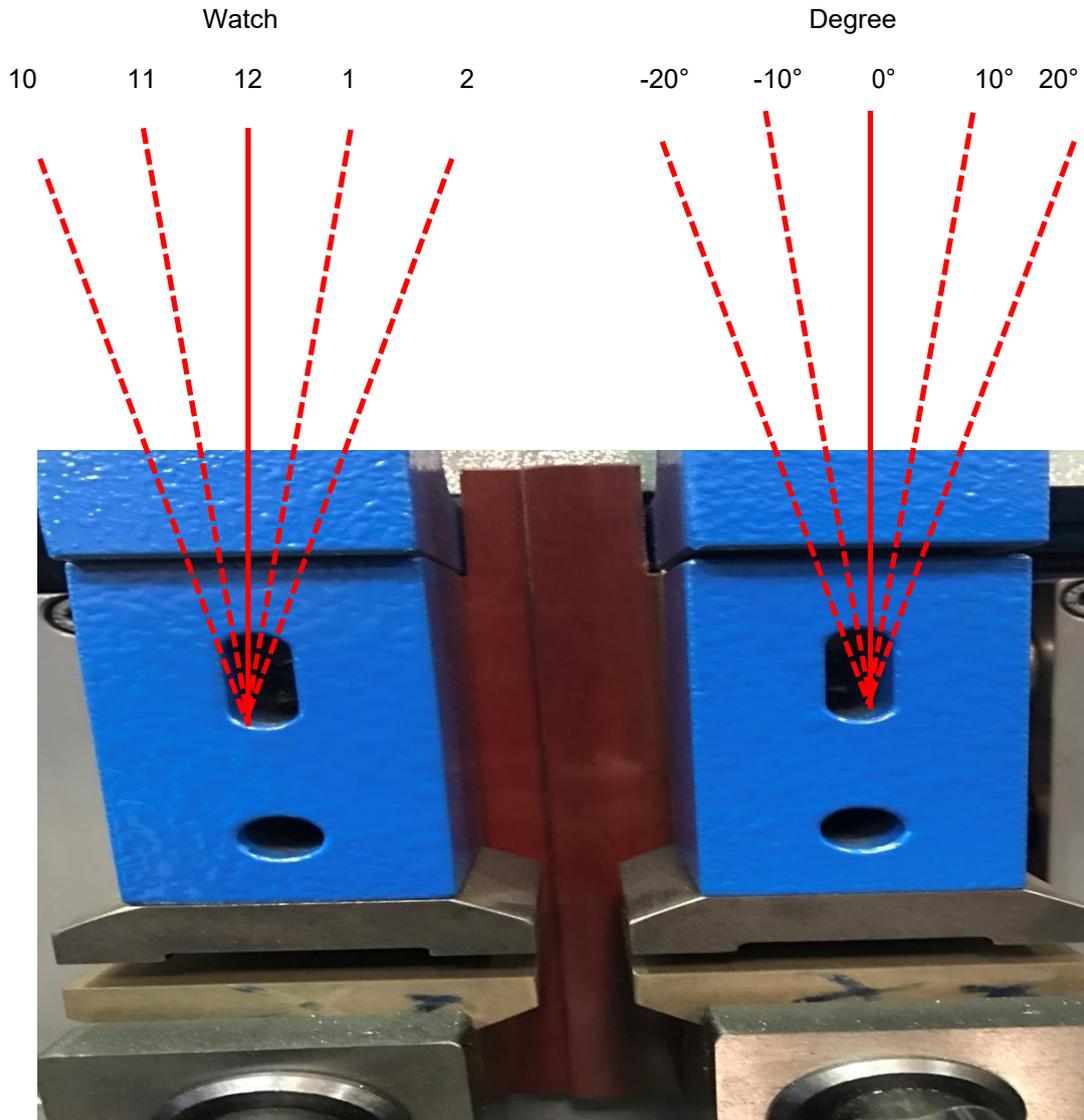


Picture # 2 **Improper Adjustment**

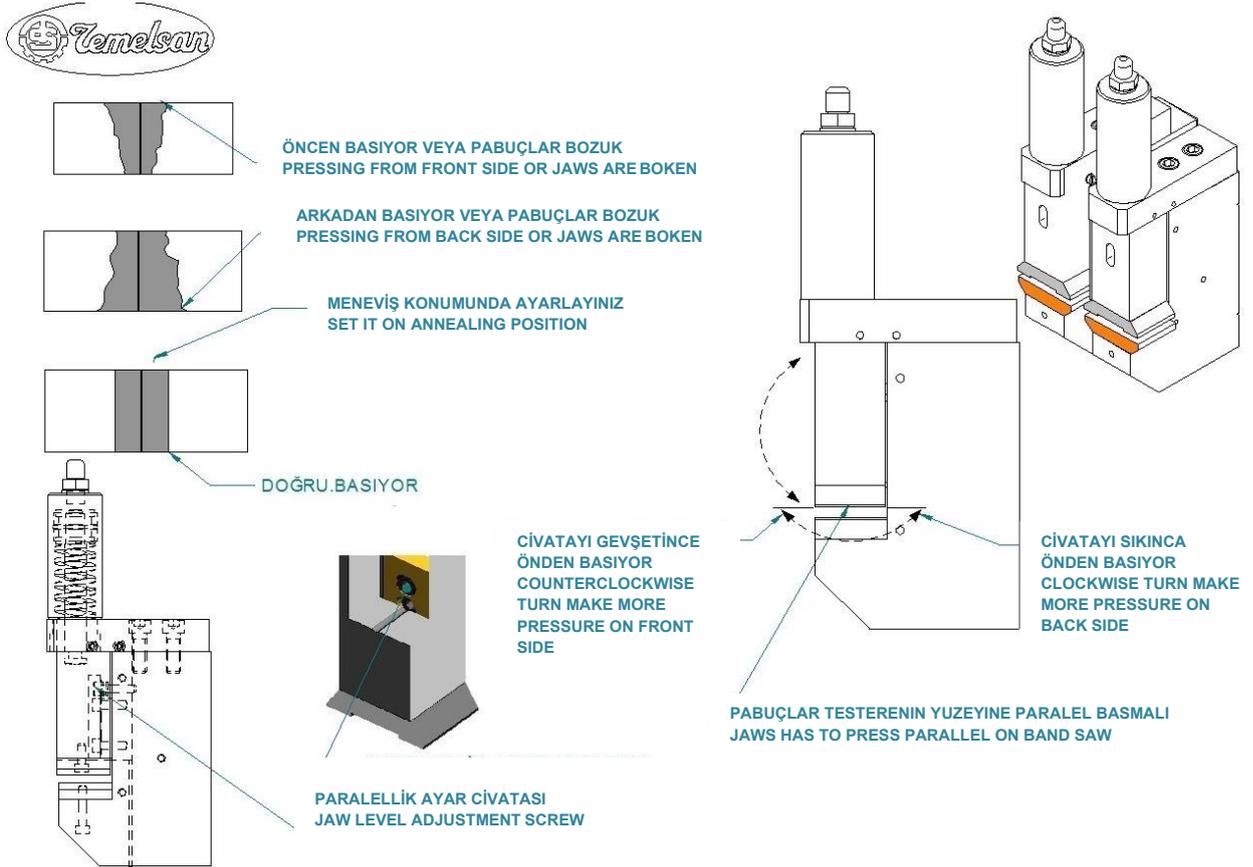


To keep similar Annealing clamping Press Point on both Clamping Jaws it's always recommended independently how tight the screws are turn able to work with an Allen key and using it as an dial like on a watch or dial indicator, in 5 minutes steps or 10 degree.

**IMPORTANT ALWAYS BOTH SCREWS ARE TO TURN AND ALWAYS SAME WAY THE SAME QUANTITY!**



## JAW BLOCK LEVEL ADJUSTMENT



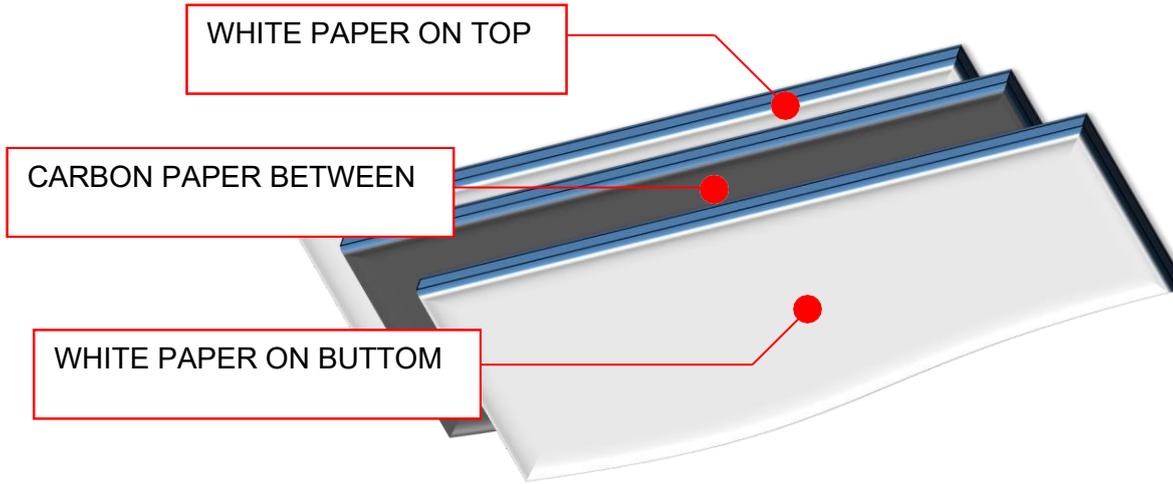
Turn the Jaw Level Adjustment Screw clock wise (to the right side) the Upper Jaw will create more clamping pressure on the front side. Turn the Jaw Level Adjustment Screw opposite direction (to the left side) the back clamping pressure between jaws will increase.

## CLAMPING JAW CALIBRATION BY CARBON PAPER

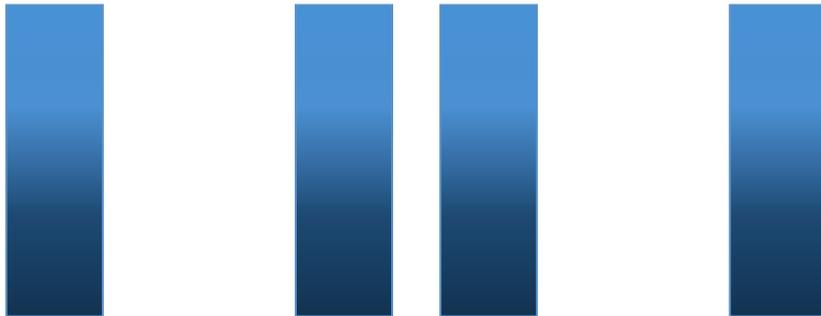
The calibration by Carbon paper brings more precision and is to use frequently after several position changings but for sure after Jaw replacement.

1. Position the Jaw Blocks to Annealing Ready Position
2. Adjust the Clamping Pressure to 300 Bar
3. Place the carbon paper package between jaws
4. Clamp both Jaws and wait few seconds
5. Take out the carbon paper package and study the picture
6. Adjust the jaws until you gain similar clamping picture over all width of both jaws
7. Place an 27mm Band, run an Annealing and watch where the heat starts, back edge or teeth edge side, depends adjust both Jaws to center the heat start to middle of Band.

### Carbon Paper Sandwich

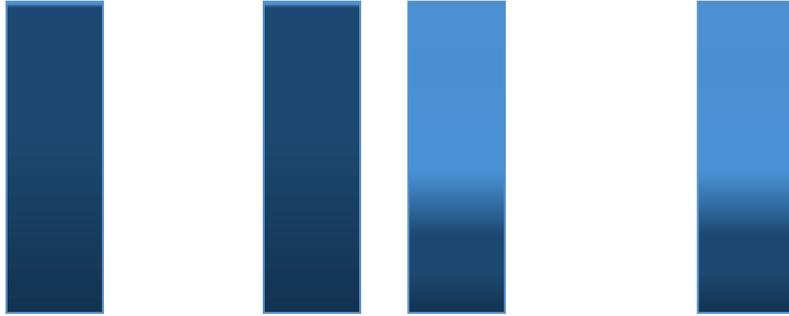


The Carbon Paper Print is showing similar print picture on both clamping jaws as an perfect similar adjustment.



Left and right Jaw are not correct adjusted

Left Jaw too much back pressure or the right jaw too much front pressure, depends the band width

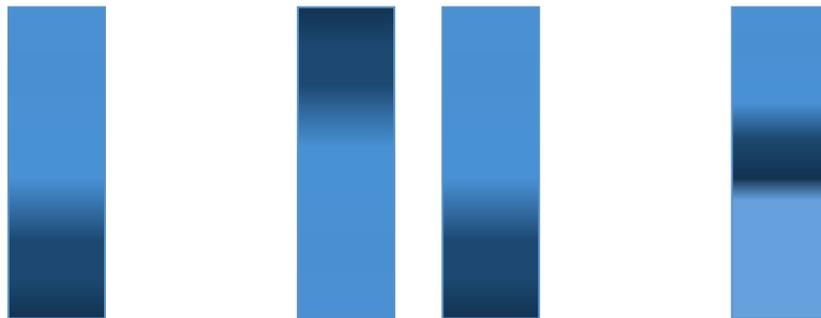


Left or right Jaw is not correct adjusted

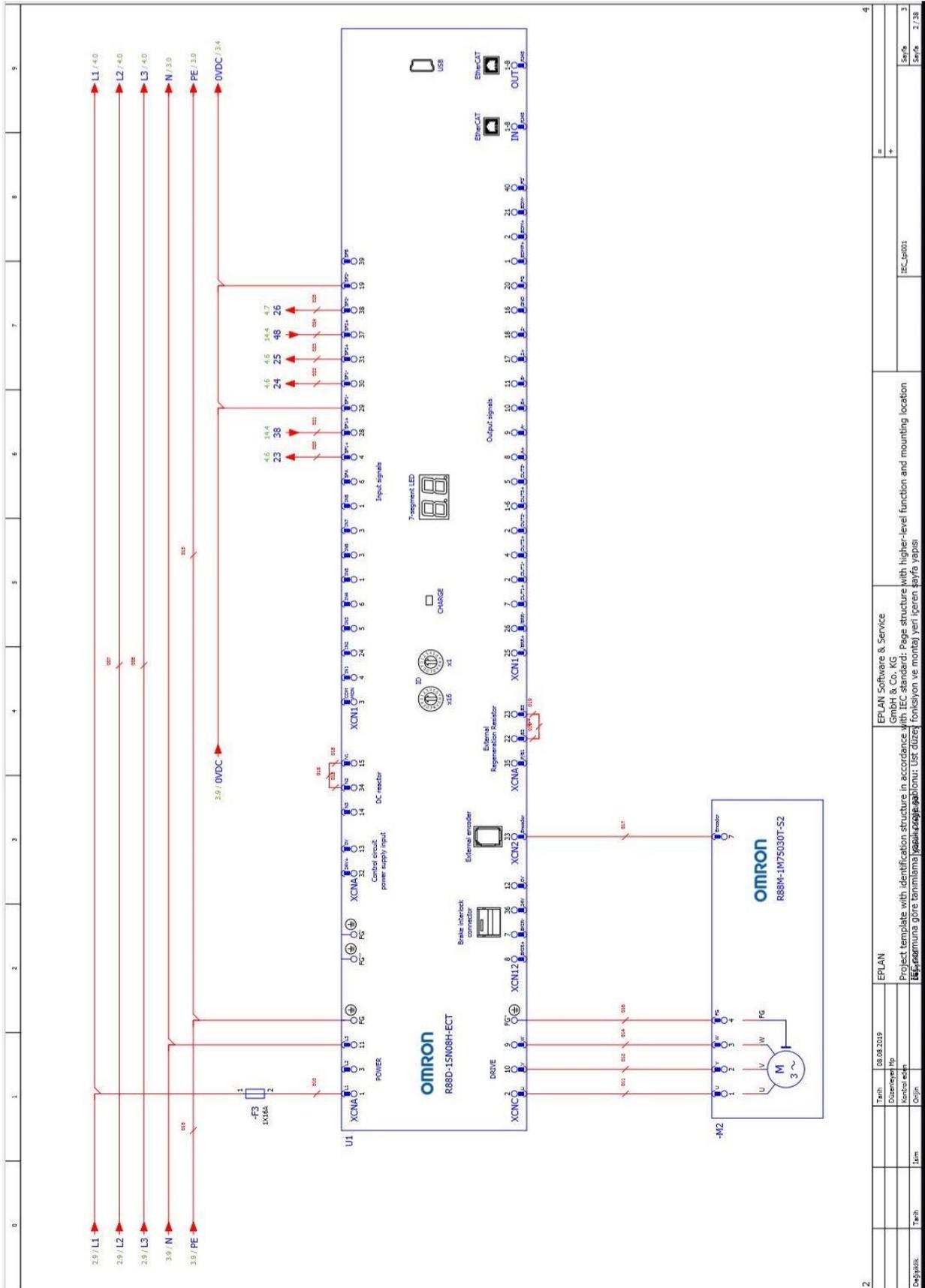
Cross clamping; this type of adjustment can show when annealing an perfect center adjustment but the weld is not precise. Breakage it's possible.



The Jaws have to be re-grinded with a high precision surface grind, have to be checked about deformation and correct fixed



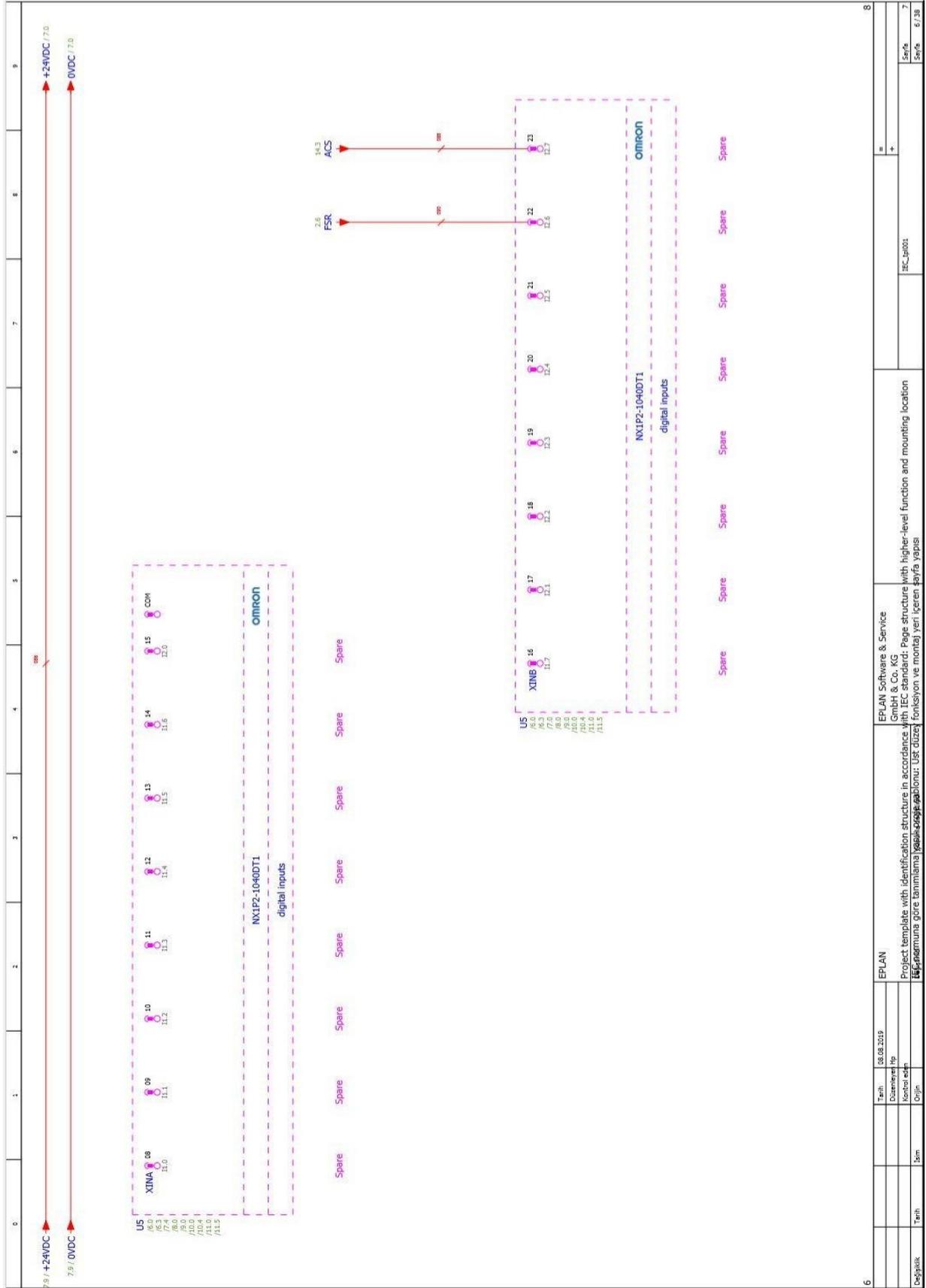




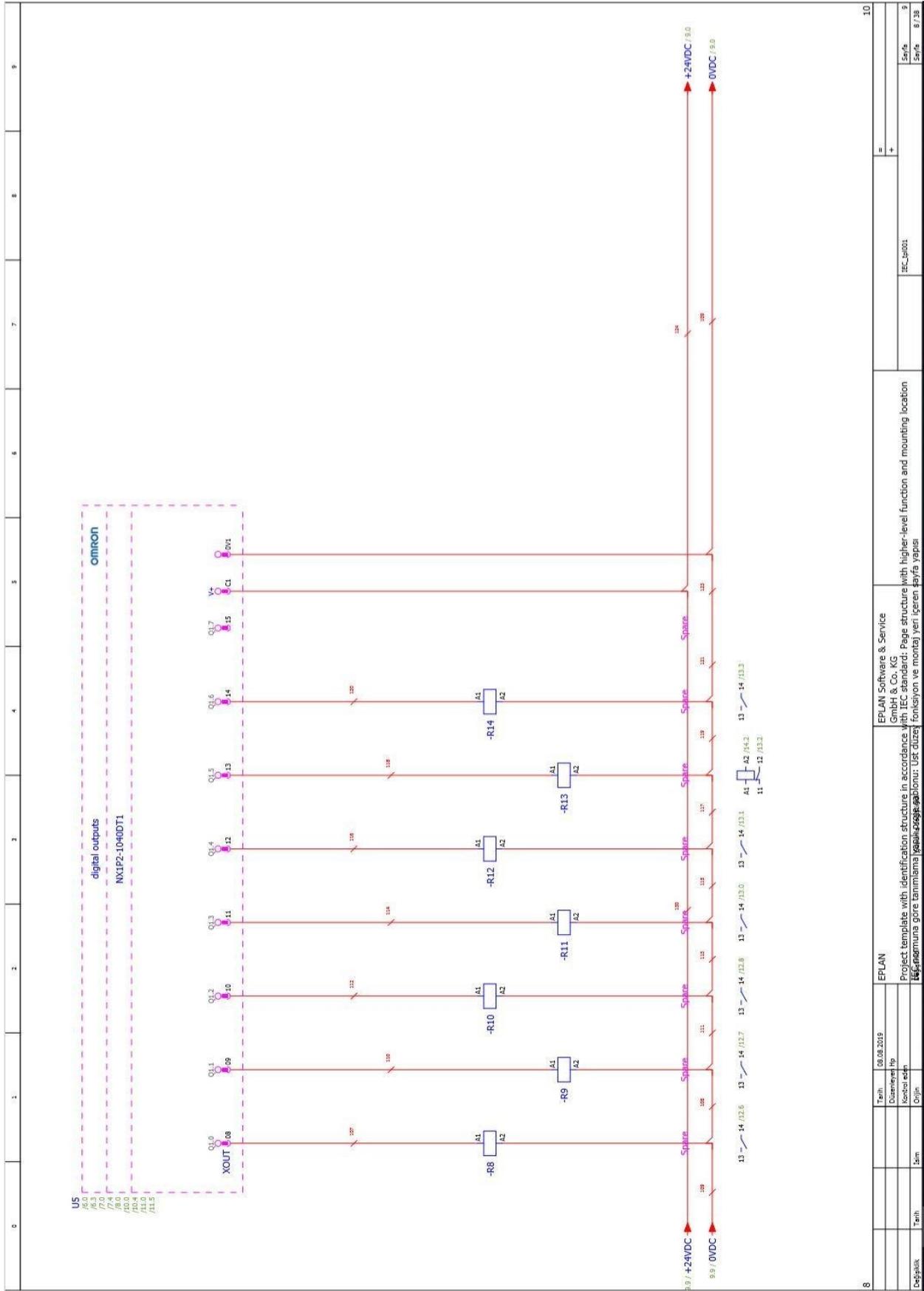








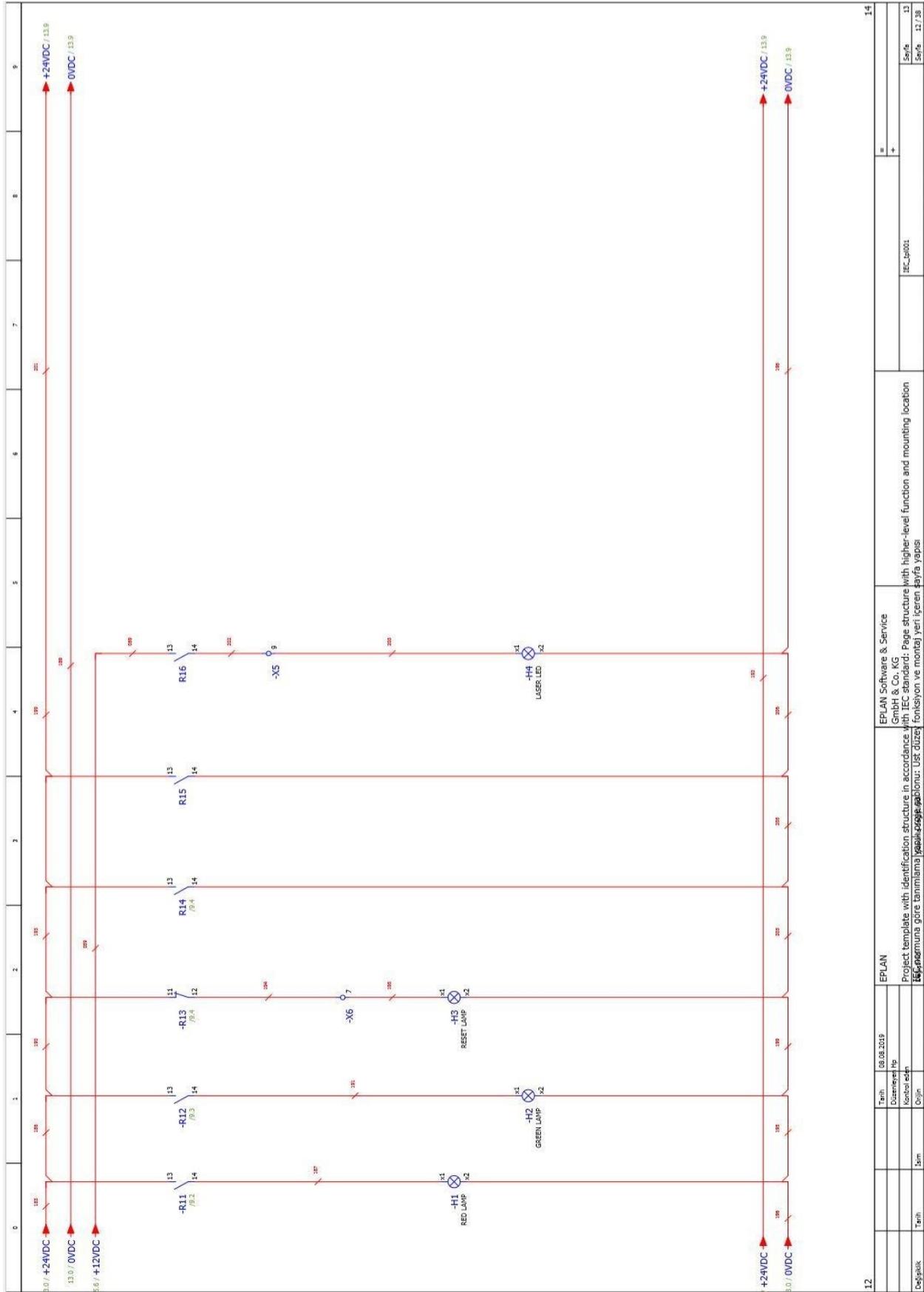












TEMELSAN MAKİNA SAN. VE TİC. LTD. ŞTİ.

Akçaburgaz Mah. Muhsin Yazıcıoğlu Cad. No:55/1 Esenyurt / İstanbul / TÜRKİYE

TEL: +90 (212) 544-2518 FAX: +90 (212) 577-6557 [www.temelsan.com](http://www.temelsan.com)

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08.08.2019

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