

# Technical passport

## DS-ECO HOT STAMPING MACHINE



Poznan, July 2025

## Contents

1. General Description .....	3
1.1 Purpose and Design .....	3
1.2 Machine Components and Controls .....	4
2. Manufacturer Details .....	5
3. Directives and Standards Applied during the Construction and Conformity Assessment of the Machine .....	5
4. Safety .....	5
4.1 General Guidelines for Maintaining Safety .....	5
4.2 Residual Risks .....	6
5. Technical Specifications .....	6
6. Installation and Description of Machine Controls .....	6
6.1 Operator Panel Button Functions: .....	7
7. Construction of the Machine .....	8
8. Start-up, Adjustment and Operation .....	10
8.1 Insertion and Replacement of Colour Ribbon .....	10
8.2 Start-up .....	10
8.3 Temperature Control .....	11
8.4 Adjusting the Tension of the Thermal Transfer Film .....	12
8.5 Hot-stamping Drum Pressure Adjustment .....	13
8.6 Adjustable Hot-stamping Speed .....	13
8.7 Emergency Switch-off .....	14
9. Machine Repairs and Servicing .....	15
The repairs of the machine made independently during the warranty period without written permission from the manufacturer may result in the loss or limitation of the warranty. ....	15
9.1 Silicone Drum Replacement .....	15
9.2 Replacement of Infrared Radiators .....	16
10. List of Spare Parts and Electrical Diagram .....	17
10.1 Mechanical Parts .....	17
10.2 Electric Parts: .....	18

## **1. General Description**

### **1.1 Purpose and Design**

The device is designed to coat the embossed registration number of aluminium licence plates with colour thermal transfer film, i.e. using the technology of applying the film at high temperature and under appropriate pressure (hot-stamping).

The machine is suitable for on-site work, such as: in offices, production areas, service points. The high torque of the hot-stamping drum and the precise temperature control system make it possible to use the machine for both continuous and intermittent operation, e.g. in service point conditions.

The body consisting of steel plates is the supporting unit of the machine. The working plates (right and left), the elements of the hot-stamping unit with rubber-coated top drum, steel bottom drum and the film feed unit are attached to the body. The box with control elements is located inside.

The work surfaces are made of wear-resistant plate so that the embossed licence plates may slide on the plate. The upper drum is a cylinder covered with a layer of technical silicone, which is heated to a temperature of approx. 220°C where the licence plate makes contact with the drum.

The radiators with a power of 1.3kW, heat up the hot-stamping drum. The drum temperature is controlled by a processor-based temperature controller. The clamping force of the upper drum is set by two knobs. The movement of the thermal transfer film is made by the connected axis of the waste thermal transfer film winder with the main drive of the machine through a polyurethane belt.



## 1.2 Machine Components and Controls

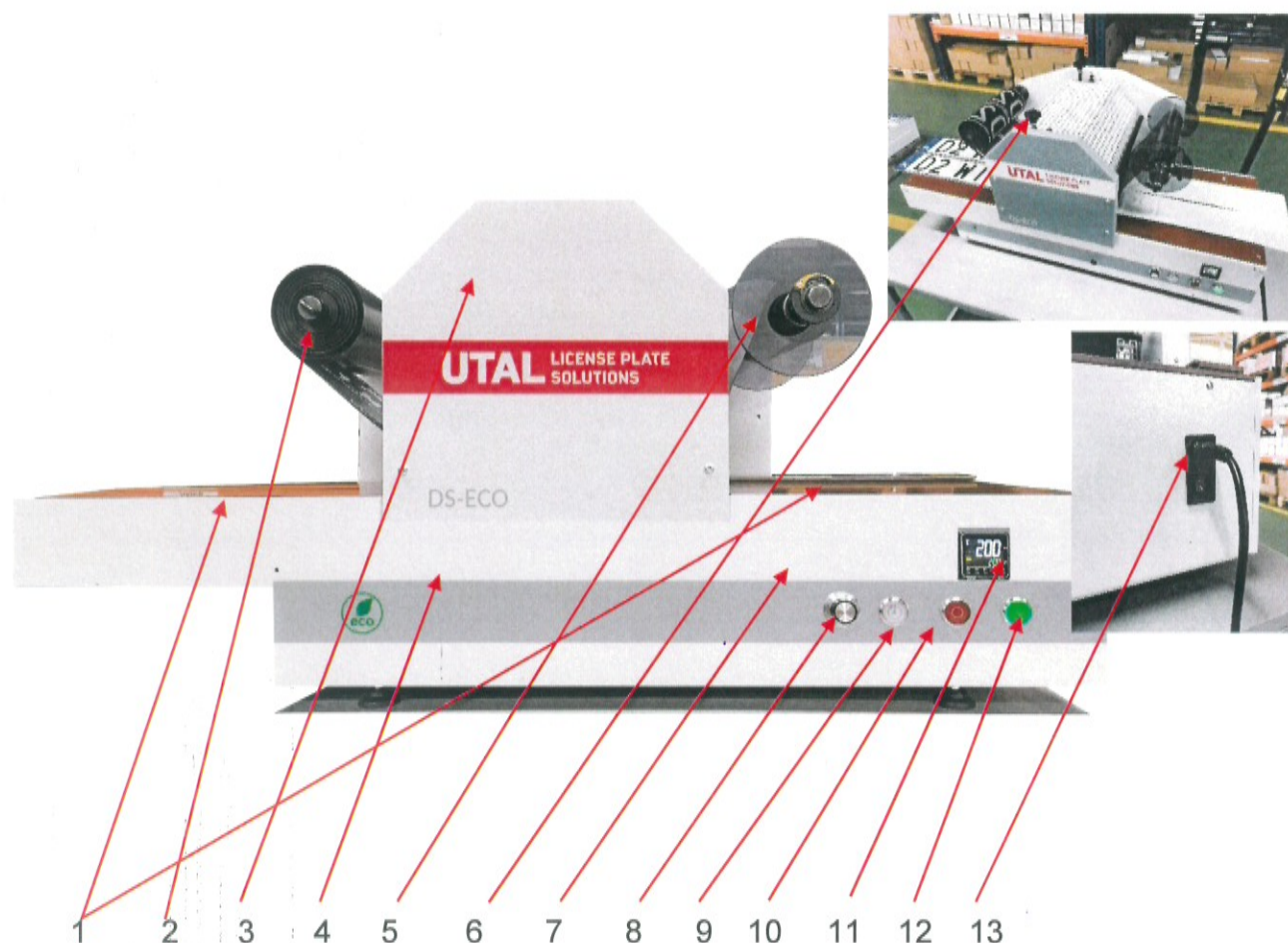


Figure 1 – Hot-stamping machine components -  
(the colours of the machine may differ from those shown in the photo).

1. Working plates,
2. Used thermal transfer film winder axis,
3. Heating unit and hot-stamping drum cover,
4. Machine front plate,
5. Thermal transfer film unwinder axis,
6. Hot-stamping drum pressure adjustment screws,
7. Control box (accessed from the right side of the machine),
8. Hot-stamping speed controller,
9. Timer switch,
10. Machine switch - STOP (red),
11. Processor-based temperature controller,
12. Machine switch - START (green),
13. Main power switch.

## 2. Manufacturer Details

The machine is designed and made by:

**UTAL** sp. z o.o., ul. Katarzyńska 9, 62-006 KOBYLNICA

Phone: +48 61 817 37 02; www.utsal.pl; [utsal@utsal.pl](mailto:utsal@utsal.pl)

## 3. Directives and Standards Applied during the Construction and Conformity Assessment of the Machine

- EC Machinery Directive 2006/42/EC
- EC Electromagnetic Compatibility Directive 2014/30/EU
- EN ISO 12100:2010 - Safety of Machinery - Basic Concepts, General Principles for Design - Risk Assessment and Risk Reduction,
- EN ISO 13857:2008 - Safety Of Machinery - Safety Distances To Prevent Hazard Zones Being Reached By Upper And Lower Limbs,
- EN 349:1993+A1:2008 - Safety of machinery - Minimum gaps to avoid crushing of parts of the human body,
- EN 60204-1:2006/AC:2010 - Safety of machinery – Electrical equipment of machines – Part 1: General Requirements.
- EN 61000-6-2:2005/AC:2005 - Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4:2007/A1:2011 - Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments.

## 4. Safety

### 4.1 General Guidelines for Maintaining Safety



- Use the machine as intended. The misuse of the machine or failure to follow the instructions provided in this manual may result in burns, electric shock, fire or other serious injury.
- Only authorised and properly trained persons may operate the machine.
- It is forbidden to leave a running machine unattended.
- The operation, maintenance and repair may only be performed by persons with appropriate authorisations and qualifications.
- Any alterations in the mechanical unit, changes in the electrical system, or changes in the operating parameters of the machine require UTAL's written consent under pain of releasing UTAL from any responsibility for proper operation and safety of the unit.
- Flammable materials and substances must not be placed in the area of the work surfaces except for hot-stamped licence plates and consumables (i.e. thermal transfer film rolls).



- Storage of products near the machine must not restrict the operator's access to the machine.
- It is unacceptable to leave a live electrical system unattended (e.g., after the operator has finished their work).
- The manufacturer is not responsible for damage caused by improper use of the device.

## 4.2 Residual Risks



- Due to the weight of the machine (ca.108Kg), it should be moved with extreme caution. Hold the machine with both hands grasping it by the body.
- It is prohibited to move the machine using the following elements to lift it: the elements of the heating unit (3), unwinder axes (2) and winder (5) - see Figure 1.
- Due to the heating elements, even despite their covers and limited access to them, there is a risk of burns by touching directly to the surface of the hot-stamping drum.
- It is forbidden for an operator to work with loose parts of clothing (long sleeves, loose cuffs, ties, necklaces, etc.), long unbound hair, due to the risk of entanglement in the drive elements of the hot-stamping drum.
- Any abnormalities noticed, in the functioning of the machine or damage to, for example: covers, power cables, controls (buttons, knobs, switches) must be immediately diagnosed and removed, before further work is undertaken.

## 5. Technical Specifications

<b>Hot-stamping machine weight:</b>	<b>108Kg,</b>
<b>Power consumption:</b>	
Max. power consumption (during warm-up):	1.47kW,
Power consumption during stabilised operation	0.54kW,
Power consumption, in ECO mode	0.33kW,
<b>Capacity:</b>	<b>ca. 850 pieces/h</b>
Heating time 22°C+200°C:	20 minutes,
Heating time from stand-by mode 120°C+200°C:	7 minutes,
Cooling down time to stand-by mode 200°C+120°C	ca. 25 minutes,
Stand-by mode transition time:	5 minutes*),
Time for the machine to switch off since entering the stand-by mode:	30 minutes*),
Time for the drum in the bottom position since licence plate detection	ca. 9s*),
<b>Hot-stamping speeds</b>	
Max. linear speed:	7.4cm/s (4.44m/s)
Min. linear speed:	2.1cm/s (1.26m/s)

*\*) Only the service centre may change these parameters.*

## 6. Installation and Description of Machine Controls

- It must be placed on a dedicated table (accessory) or other stable table with a carrying capacity of at least 150Kg.

- The machine is to be connected to a 230V/50Hz electric network with a grounding pin.
- The ambient temperature range during operation should be between 10°C and 40°C.

### 6.1 Operator Panel Button Functions:

- (8) **Controller of hot-stamping speed** allows you to adjust the speed of the drum, i.e. the linear speed of hot-stamping in the following range: approx. 2.1 to approx. 7.4cm/sec.



- (9) **Two-position white button with clock symbol:**

- pressed - stand-by mode active, the button is illuminated in white,
- raised - stand-by mode inactive, the button is not illuminated,

- (10) **Button to turn off (OFF) the machine and immediately lift the hot-stamping drum:**

- the red back-light indicates that the machine is not on, but is plugged in - key power switch 13 is on,
- when the machine is running, pressing the button turns off the machine and immediately lifts the drum, e.g. in an emergency situation during hot-stamping.
- the button does not light red when:
  - the machine is not powered by 230V/50Hz electric network or switch 13 is not turned on,
  - the machine is turned on and ready to work,
  - the machine is in the stand-by mode, the temperature controller displays the stand-by temperature, i.e. 120°C.



- (12) **Button to turn on (ON) the machine and lower the hot-stamping drum:**

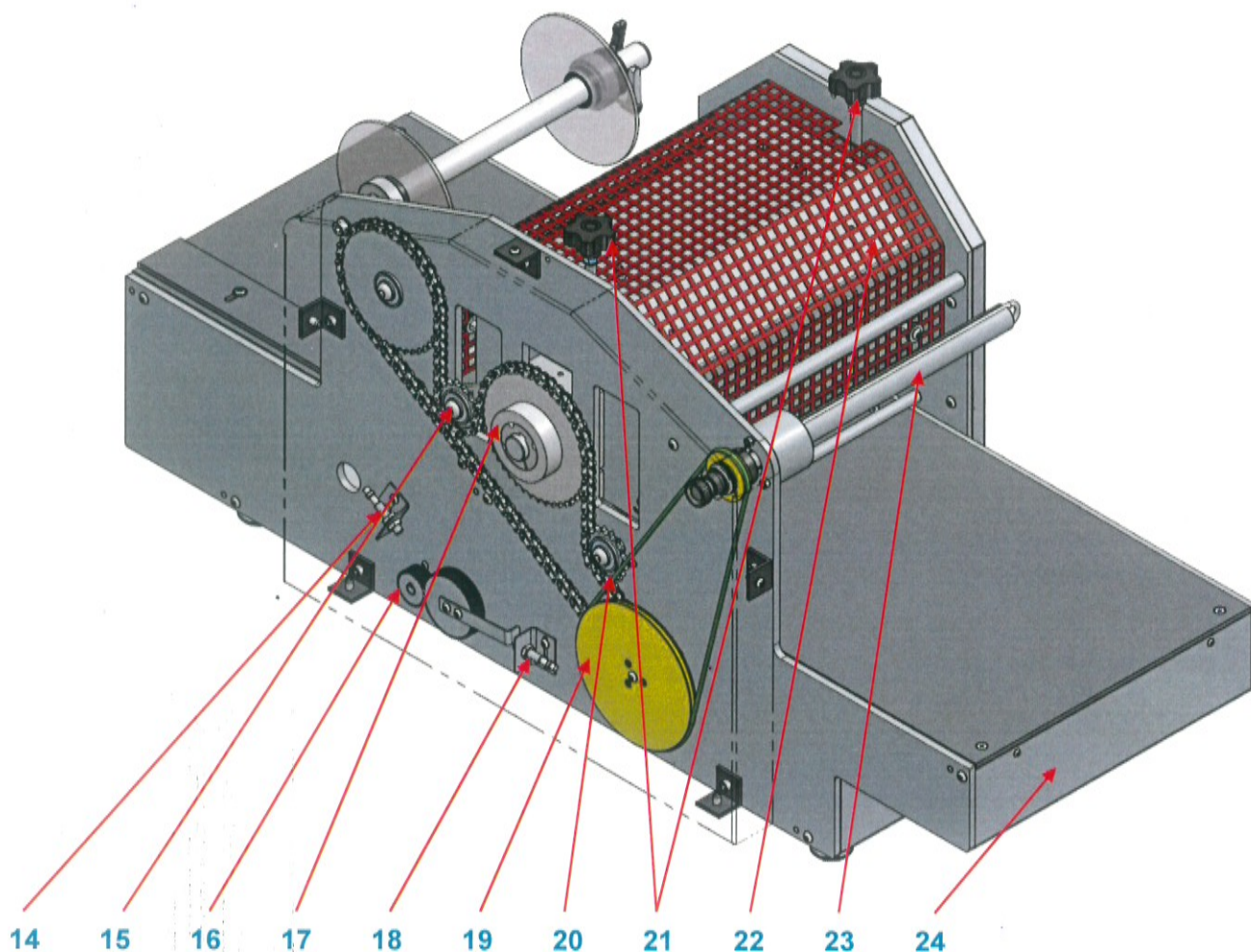
- the green back-light - the machine is on,
- the green back-light flashes periodically - the machine is in the stand-by mode.
- the green back-light is not lit - the machine is not ready for operation.



Short pressing of the button causes the hot-stamping drum to lower. If there are no licence plates on the hot-stamping table, the drum will be lifted after approx. 15 sec.



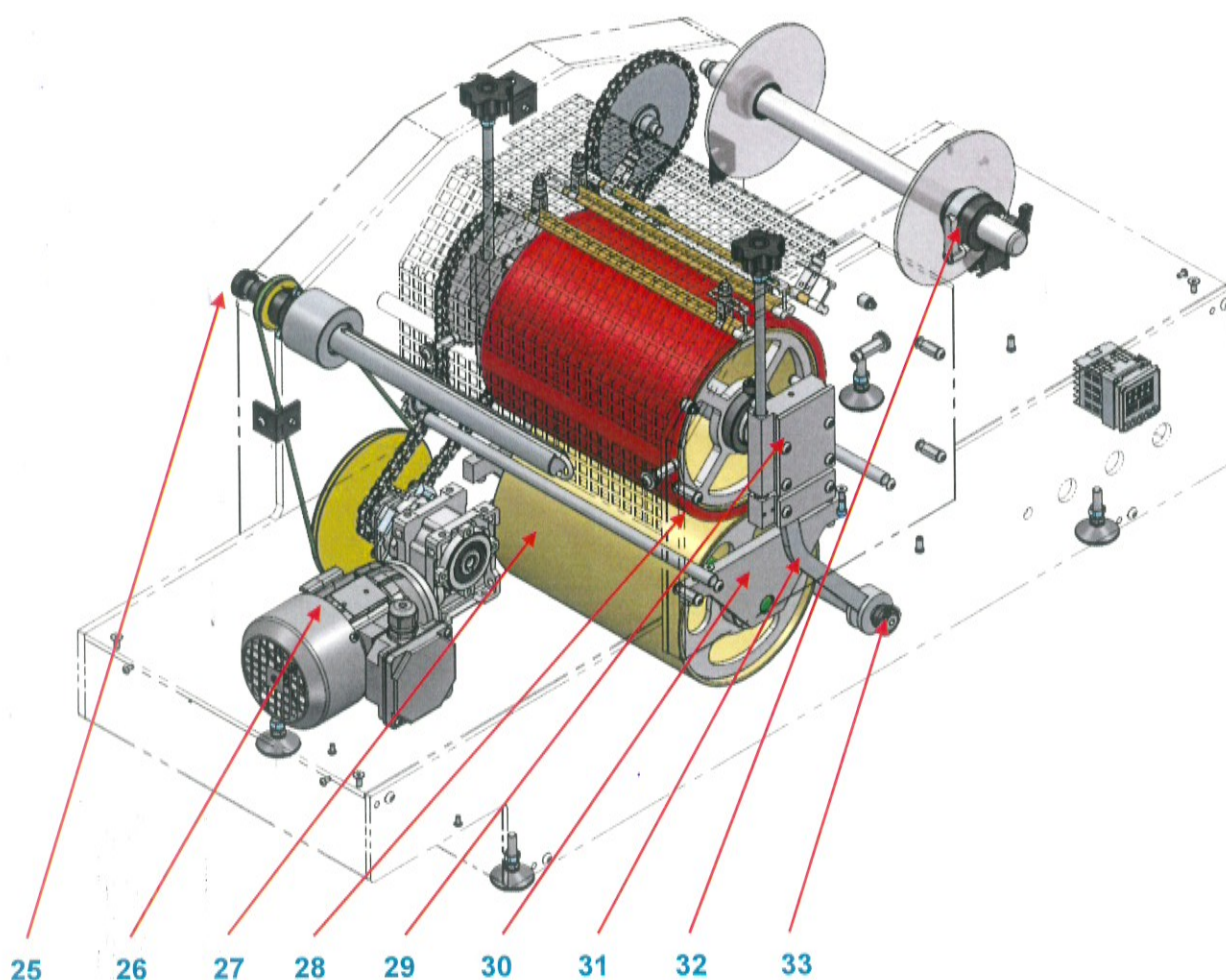
## 7. Construction of the Machine



*Figure 2 - Components of the drive system of the hot stamping machine*

- 14. Inductive sensor for the upper position of the hot-stamping unit,
- 15. Compensating chain gear wheel,
- 16. Hot-stamping unit lifting/lowering drive gear wheel,
- 17. Hot-stamping drum drive gear wheel,
- 18. Inductive sensor for the bottom position of the hot-stamping unit,
- 19. Waste heat transfer film winder drive pulley,
- 20. Waste heat transfer film winder drive V-belt
- 21. Hot-stamping drum pressure adjustment screws,
- 22. Heating unit insulation cover,
- 23. Waste thermal transfer film winder axis,
- 24. Machine main engine front cover.





*Figure 3 - Components of the drive system of the hot stamping machine*

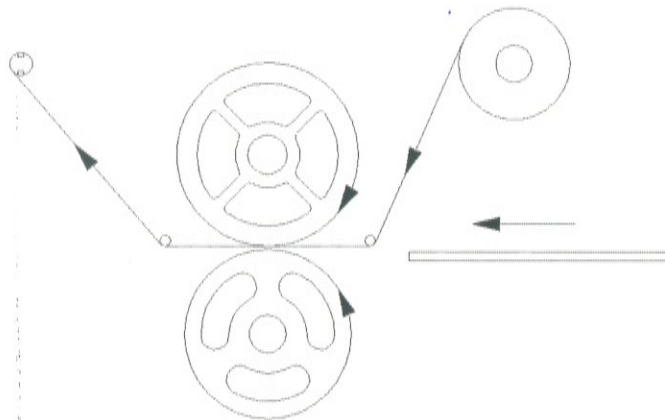
- 25. Thermal transfer film tension knob,
- 26. Machine drive main motor including the worm gearbox,
- 27. Hot-stamping unit steel bottom drum,
- 28. Replaceable silicone hot-stamping drum,
- 29. Hot-stamping drum guide bearing assembly and pressure adjustment system,
- 30. Bottom drum bearing assembly,
- 31. Hot-stamping unit lifting/lowering toggle system — driven by an electric motor,
- 32. Thermal transfer film unwinder axis,
- 33. Hot-stamping unit lifting/lowering unit electric motor axis,

## 8. Start-up, Adjustment and Operation

### 8.1 Insertion and Replacement of Colour Ribbon

Slide the new colour ribbon roll onto the axis of the thermal transfer film unwinder (5) in such a way that the pigment is on the side of the licence plate when unwound. The ribbon should be threaded according to the diagram located on the machine, and then the end of the film should be fixed on the axis winding the waste thermal transfer film (2). Removal of waste film from the winding roller is carried out by extending the spring - a U-shaped rod.

When inserting the colour film, pay attention to the position of the disks of the axis unwinding the thermal transfer film (5,32). The disks should be positioned in such a way so that the centre of the thermal transfer film is located symmetrically to the hot-stamped licence plates. The width of the thermal transfer film should be selected as per the dimensions of the licence plates to be hot-stamped.



*Figure 4 - Method of threading the colour ribbon*

### 8.2 Start-up

The electrical system that controls the system, as well as over-voltage and overload protection components, are housed in an integrated enclosure that serves as the machine's safe box.

The machine is turned on by pressing the key switch located next to the power cord socket.



Turning on the power does not start the machine, it only supplies voltage to the components that control the operation of the machine. To start the machine, press and hold the "Start" button (11). The drum of the machine begins to rotate, and the temperature controller (12) displays the set temperature and the current temperature.

After starting the machine, the temperature controller performs a display test. The settings appear only after the test.

The machine is ready to work when the set temperature is reached. By placing the licence plate on the work plate (1) on the left side, the presence of the plate is detected by the inductive sensor in the plate and the hot-stamping drum is automatically lowered, allowing the plates to be hot-stamped as long as the operator feeds more licence plates under the hot-stamping drum.

If the operator finishes the hot-stamping operation, the hot-stamping drum will be automatically lifted after approx. 15 sec. Placing the licence plates back on the work plate (1) will cause the hot-stamping drum to be lowered again and you will be able to continue working.

### 8.3 Temperature Control

The temperature is set via an electronic temperature controller. Figure 5 shows the appearance of the controller's panel, along with a description of the functions of the various buttons and display areas.

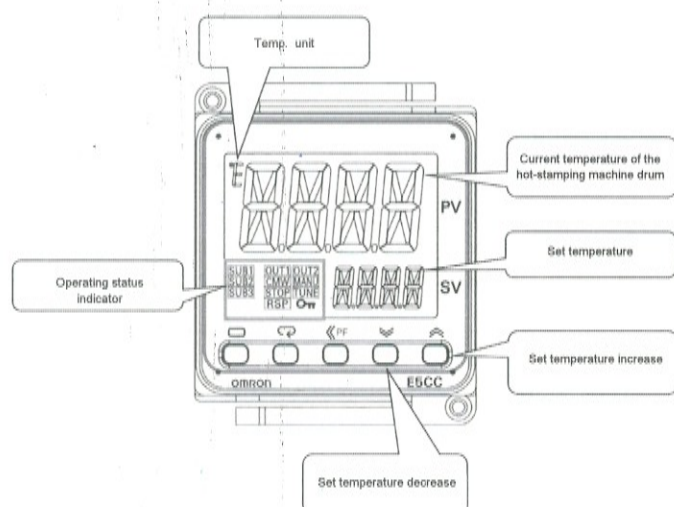


Figure 5 - Hot-stamping machine temperature controller

When the machine is started, a red field should be lit in the **operating status** field. This means that the device is working properly. The "OUT 1" indicator informs that the radiators to heat the drum are working. When the radiators are on, the indicator is active. The absence of the "OUT 1" indicator means that the radiators are not working.



Holding down the temperature increase button or the temperature decrease button changes the settings faster - the set temperature increases/decreases in 10°C increments



To set the correct operating temperature of the machine, check the temperature recommended by the thermal transfer film manufacturer. If the set temperature is too low, the film will fray, and if the set temperature is too high, the film will burn through, break, or even stick to the surface of the hot-stamping drum.

If the machine does not reach the set temperature, check that all radiators of the heating unit are working.

If, despite the correctly selected temperature, the thermal transfer film is not correctly applied to the surface of the plates, it is necessary to carry out the hot-stamping drum pressure adjustment (see section 8.5), the thermal transfer film tension force adjustment (see section 8.4) or reduce the hot-stamping speed (see section 8.6).



The operating temperature of the device should not exceed 225°C. If the machine operates at higher temperatures, it causes premature wear of the silicone drum and, in extreme cases, its destruction. Setting the temperature higher than 225°C disconnects the circuit, which is indicated by the indicator in the upper left corner of the temperature controller turning off.

## 8.4 Adjusting the Tension of the Thermal Transfer Film

The thermal transfer film tension is activated by means of the clutch knob (25) of the used thermal transfer film winder axis. The tension force should be adjusted as per the outer diameter of the film.



If the film tension is set too high, visible "lines" can be formed on the surface of the hot-stamped plates. Too little tension leads to uneven breaking off and increased film residue (fraying) on the edges of the plates coated

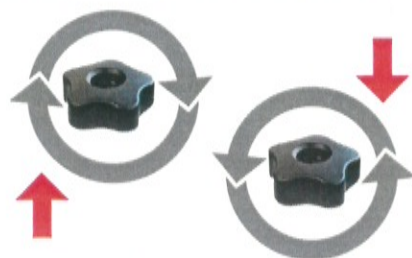




If, despite the correctly selected tension force, the thermal transfer film is not correctly applied to the surface of the plates, it is necessary to carry out the hot-stamping drum pressure adjustment, the hot-stamping drum temperature adjustment or reduce the hot-stamping speed.

### 8.5 Hot-stamping Drum Pressure Adjustment

The hot-stamping drum pressure is adjusted by adjusting two knobs (21). The pressure can be increased by loosening the screw, and it can be decreased by screwing the screw into the body according to the diagram shown in Fig.6. Adjust the pressure with two knobs at the same time. This allows you to correct different coating widths on the surface of the licence plate.



*Figure 6 - Hot-stamping drum pressure adjustment*



Too much pressure leads to premature wear of the hot-stamping drum, and in extreme cases to its destruction.

If the film sticks to the drum, remove it immediately. After the machine is turned off and the hot-stamping drum has cooled down, a soft cloth soaked in extraction naphtha or ethanol can be used for this purpose. Do not use sharp tools or aggressive liquids to clean the drum.

The silicon drum needs to be replaced periodically, the symptoms accompanying the degradation of the drum are: hardening of the cylindrical surface of the drum and the formation of perceptible surface irregularities - consequently, deterioration of the quality of the hot-stamped coating despite the adjustment of pressure and tension.

If, despite the correctly selected tension force, the thermal transfer film is not correctly applied to the surface of the plates, it is necessary to carry out the thermal transfer film tension force adjustment (see section 8.3), hot-stamping drum temperature adjustment (see section 8.3) or reduce the hot-stamping speed (see section 8.6).

### 8.6 Adjustable Hot-stamping Speed

The hot-stamping speed is adjusted using a potentiometer located next to the device's main switch (10). By increasing the speed, the efficiency of the hot-stamping process can be increased.



The hot-stamping speed increase may adversely affect the quality of colour coverage of the plates

If, despite the correctly selected speed, the thermal transfer film is not correctly applied to the plate surface, it is necessary to carry out the thermal transfer film tension force adjustment (see section 8.4), hot-stamping drum temperature adjustment (see section 8.4) or hot-stamping drum pressure force adjustment (see section 8.5)

### 8.7 Emergency Switch-off

The device will shut down automatically in the following cases:

- The stand-by function is active, and the pre-set time (35 minutes) has elapsed without activity (such as pressing of the start button or detection of a licence plate by a sensor placed in the working surface of the machine),
- A temperature controller error occurs,
- An inverter error occurs.



## 9. Machine Repairs and Servicing

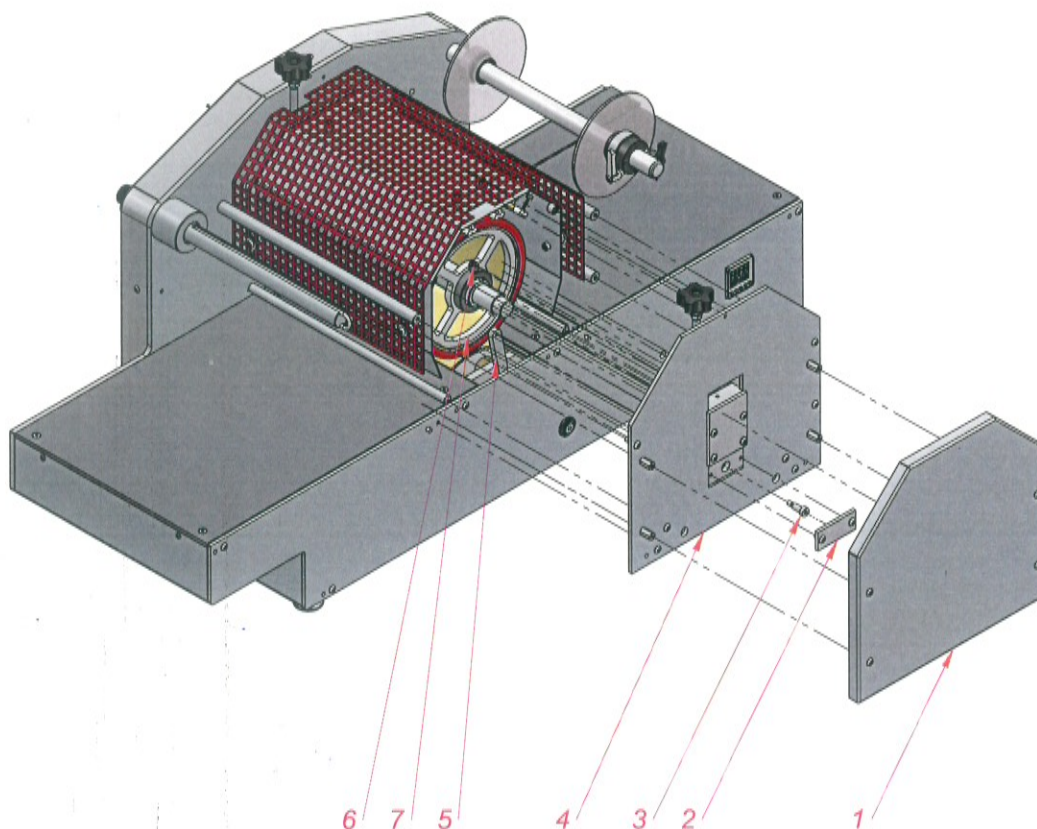


The repairs of the machine made independently during the warranty period without written permission from the manufacturer may result in the loss or limitation of the warranty.

### 9.1 Silicone Drum Replacement

The drum can be replaced safely and efficiently, provided that the following recommendations are followed:

- The machine must be disconnected from the power source,
- Ensure that you wait until the machine reaches ambient temperature,



- Removal. First of all, remove the outer cover (1), then the cover of the sliding cube of the drum lift mechanism tie rods (2) to remove the screw securing it (3). Next remove the entire front support plate including the bearing holder, the drum pressure adjustment screw and the front guard of the heating unit cover (4). Tilt the tie rod (5) without unscrewing it from the rotational axis. Loosen the screw (6) and pull the drum (7) off the shaft.
- The replacement is done in reverse order, tightening the pressure screw.

- Before attaching the hot-stamping drum (7), lubricate the pivots of the shaft and the hole in the drum hub with copper grease, which will prevent the drum from seizing on the shaft.

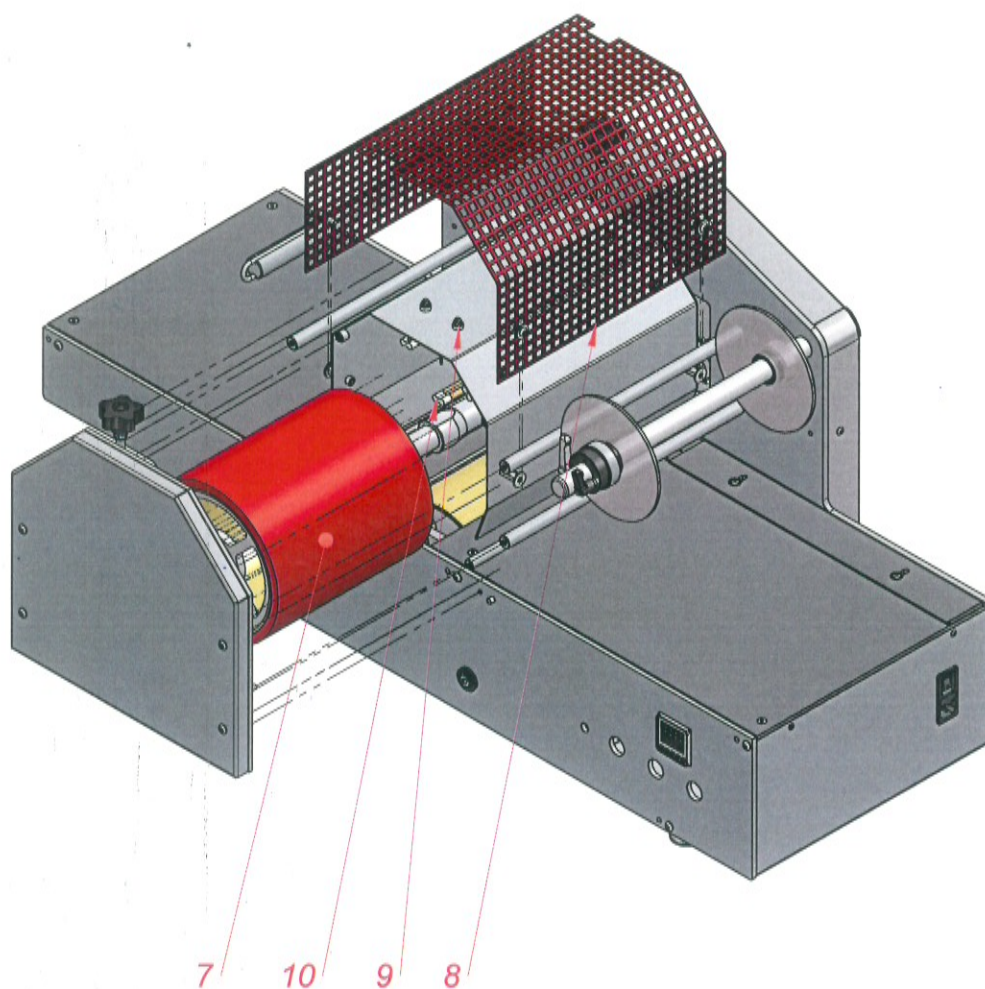
When installing the drum, pay attention to the distance of the Pt100 temperature sensor from the surface of the silicon drum. It should be no more than 2mm. Once the drum is heated, this distance is reduced due to the increase in its diameter. Do not throw away the used drum, as it is subject to regeneration by removing the old worn silicone layer and applying a new layer by vulcanization.



## 9.2 Replacement of Infrared Radiators

The radiators can be replaced provided that the following recommendations are followed:

- The machine must be disconnected from the power source,
- Ensure that you wait until the machine reaches ambient temperature,



- Removal. Beforehand, follow the same steps as for the removal of silicone drum (7). Then unscrew the thermal shield (8) and remove it along with the insulation



material, which will allow access to the radiator mount (9). Disconnect the radiators from electric energy source by unscrewing the wires from the ceramic connector blocks, unscrew the mounts and remove the radiant heaters (10).

- The replacement is done in reverse order.

## 10. List of Spare Parts and Electrical Diagram

### 10.1 Mechanical Parts

No.	Item name	Catalogue / drawing number	Quantity	Company
1	Deep groove ball bearing	6202_15x35x11	2	(CNC accessories, Prema)
2	Disc spring 16,3x31,5x0,8	S22880	2	Alcomex, Libra
3	24VDC planetary gear motor i=139	PG45775246000	1	Discotech
4	Motor gear wheel	Gear_wheel_m=1mm, t=34	1	EBMiA
5	Axle gear wheel	Gear_wheel_m=1mm, t=64	1	EBMiA
6	Chain 06B-1, L=1370mm + quick chain link	Chain 06B-1_L=1370mm	1	EBMiA, Habercorn
7	Knob with grooved shank	6661 BT.25 p-M8x16	1	Elesa+Ganter
8	Positioning ring	GN 187.4-40-60-E-ST	2	Elesa+Ganter
9	Adjustable lever	GN 303.2-30-M5-32-SW-S	1	Elesa+Ganter
10	Clamping ring	GN 706.2-36-B15-ST	1	Elesa+Ganter
11	Clamping ring	GN 706.2-48-B25-AL	1	Elesa+Ganter
12	Clamping ring with lever	GN 706.4-48-B25-ST	1	Elesa+Ganter
13	Assembly angle bracket	GN 970-STB-30-30-30-B	5	Elesa+Ganter
14	Fitted bolt	ISO 7379-6-M5-10	1	Elesa+Ganter
15	Fitted bolt	ISO 7379-8-M6-16	2	Elesa+Ganter
16	Anti-slip swivel foot	LSX.A-40-10-AS-M8x30	4	Elesa+Ganter
17	Knob	VCT.50 AZ-M8-C3	2	Elesa+Ganter
18	Corrugated washer DIN 137 B M14 spring steel	37160.140.001	1	Fabory
19	Tab washer with internal tab DIN 462	38684.160.001	1	Fabory
20	Pin	39797.080.022	2	Fabory
21	Tooth sprocket t=45 to 06B-1 for taper lock	554508	1	Habercorn, EBMiA
22	Tooth sprocket t=16 for 06B-1	T13074	2	Habercorn, EBMiA
23	Tooth sprocket t=42 for 06B-1	T13095	1	Habercorn, EBMiA
24	Taper lock 1210 d=25mm	T31038	1	Habercorn, EBMiA

25	Tooth sprocket with splineway t16, d=14mm, 06B-1	T74927	1	Habern, EBMiA
26	Fixing bracket	9 758 010	3	Heraeus
27	Spring bracket	9 758 011	3	Heraeus
28	Medium-wave radiator	09765345_230V_475W_18x8_300/265mm	3	Heraeus
29	Universal friction washer	09-2230_10,5x50 (cut for 25x40)	2	Rokapil
30	Sliding flange sleeve	MFM-1622-12	2	Igus
31	Sliding sleeve	MFM_1521_15	1	Igus
32	PU 90ShA round belt in closed loop	RPN 4_L=850mm	1	Orion, CNC accessories
33	High-temperature ball bearing	6205 ZZ_25_52_15	3	Prema, CNC accessories
34	6303 ZZ bearing	6303 ZZ	2	Prema, CNC accessories
35	Deep groove ball bearing 10x35x11	6300	3	Prema, CNC accessories, etc.
36	Universal friction washer	09-2230_10,5x50 (cut for 15x32)	2	Rokapil
37	Transmission i=80	X C 30 80 56_B14 B3 SD F1D	1	Tramec
38	Motor 1400rpm; P=0,09kW; B14	SKh56-4A2	1	Tramec, Tormec, other

## 10.2 Electric Parts:

Description	Type	Catalogue No.	Number of pieces per machine
Microprocessor-based PID 24V temperature controller	E5CC-QX3D5M-000		1
Switching power supply unit (AC100-240V/1,4A - DC24V/2,1A)	RS-25-24		1
Temperature sensor:-40-400 C no 7328/09	TOPE-362-100-4-Ws Pt-100-B-2-1,5m		1
Vector frequency converter (inverter) 0.2kW-200/240V, 1 phase,	MX2	MX2-AB002-E	2
Finder time relay	62.33.9.024.0040		1
Finder base	92.03		1
Omron relay,	G2R-1-S(S)		1
Omron relay,	G2R-2-S		1
Omron base	P2RF-05-S		1
Omron base	P2RF-08-S		1
SSR solid-state relay	SSR-1028ZD3		1
Radiator	Y92B-N50		1
Wire potentiometer	5 kOhm		2
1-field switch, grey-black	P0160001.R001		1



2-field switch, yellow-red, padlock	P0160002.R004		1
green N/O button with self-return - HARMONY	XB4-BA31		1
Precision dials with scale	PPR-15/37 part. no 71 74 52-90		2
HEREAUS 300mm medium-wave special radiator	350 W / 230V		1
HEREAUS 300mm medium-wave radiator	475 W / 230V		2
Fine-wire fuse	315 mA		1
Fine-wire fuse	2,5 A		1
Motor TP63A4 0.12kW 1350 1/min, 230/400V, 0.80/0.47A, gearbox i=217:1, 70Nm	SKh63-4A2/HF40- 200F1SP		1
Tension motor, 0.55kW 230/400V 3.5/2A 1360min-1(without vent.)	SKh 71x-4C2/195		1

UTAL sp. z o.o.  
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Production Director  
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30.07.2025