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1. Adaptation IP 350

It is not possible to adapt to another X-Y unit. The engraver used on IP 350 is mainly designed for the engraving of plastic labels. Appropriate multi-layered material is commercially available.

We do not assume any responsibility when other materials, such as, e.g., aluminum, brass, steel or glass are used.

The application of grease and coolants is not recommended, because the attached vacuum system cannot collect liquid materials.

Note: only use engraving styluses supplied by us. We do not accept any responsibility for the engraving quality when other styluses are used.

Please read this manual prior to operation and comply with the safety instructions given. WAGO Kontakttechnik GmbH & Co. KG will not be held liable under any circumstances for damages and injuries resulting from neglect or non-compliance of the safety instructions and/or incorrect operation.
2. **Scope of supply**

Engraver EG 450

- Engraving spindle
- Engraving head
- Thrust bearing engraver head
- Connecting cable engraver spindle
- Suction tube engraving unit
- Cover
- Control unit EC 450
Connecting cable EC 450 - IP 350
Power cable EC 450

Support pipe / mount for cable and hose support
Clamp for hose and engraver spindle cable

Engraving stylus 0.4 and 0.5 mm 15°

Vacuum VC450
Vacuum connecting cable

Calibration block
Setting aid for engraving stylus
3. Connecting and installing the EG 450 to the IP 350

3.1. Connecting and installing at plotter IP 350 DIN A4 and DIN A3

Installation and connection of the engraver to the IP 350 is easy. Handle the components carefully to avoid damage. Installation of the engraver:

3.1.1. Assembly of support, cable and hose support

First, slide the support over the base plate and press the support into the side profile as shown in the illustration.

Insert the aluminum pipe into the support.

Insert the clamp for the engraver cable and the suction hose into the aluminum pipe.

3.1.2. Removal of the pen lowering unit from the IP 350

Pull off plastic cover and remove safety pin.

Detach lowering unit from the guidance by slightly "tilting" and remove it.

The unit may sit very tight. Detach the lowering unit very carefully to avoid damage to the support.
3.1.3. **Mounting the engraver head**

When placing the engraver head, make sure that the head is inserted into both guides.

Press the engraver until it catches. During the installation, push the support up from below to avoid damage to the engraver arm guide (illustration 2).

**Securing the engraver head**

To avoid a detachment of the engraver head during operation, the safety pin must be inserted as per illustration 3.

Verification of proper seating.

**Screw thrust bearing as per illustration**

The thrust bearing will determinate the horizontal orientation of the engraver.
3.1.4. **Placement of vacuum VC 450 and control unit EC 450**

Place the devices next to the IP 350 as shown in the illustration.

**Connection of the interconnecting lines**

Connecting the vacuum to the control unit.

Connect the appropriate cable to the VC 450 and EC 450 and screw the connections in tightly.

**Connection of Plotter IP 350 to control unit EC 450**

Connect the supplied connection cable to the plotter and the control unit (as per illustration) and secure the connection by tightening the thumb screws on each connection.
**EC 450 Power Supply**
Plug the power cable supplied into the control unit EC 450. In addition to the "ON/OFF" switch, a fine-wire fuse (4A) is available at the connection.

**Inserting the engraver spindle into the engraver head**
As shown in the illustration, insert the engraver spindle into the engraver head and close the clamp of the engraver spindle. The engraver spindle is pre-equipped with an engraving stylus. The red marker on the depth regulator must be aligned with the arrow on the engraver head.

**Aligning the engraver**
First, mount the calibration aid to the plotter IP 350, as shown in the illustration. Push the engraver arm (the plotter must be turned off) with the engraver head against the stop. Now align the engraver head using the thrust bearing and tighten the thrust bearing.
**Connections at the engraver head**
Move the engraver head manually (the plotter must be turned off) into the lower right corner. Mount the suction hose onto the engraver head, arrange the hose in a slight curve, as shown in the illustration, and clamp the hose into the clamp at the support. Then insert the hose into the vacuum.

The engraver spindle is connected in the same manner. Connect the other end of the connection to the control unit EC 450 and tighten the plug screws.

**Placing the cover**
Place the cover in the correct position on top of the engraver head and push until it catches.

**Test run**
First, turn on the control unit EC 450 by actuating the power switch on the rear of the device. Then turn on the plotter IP 350. The engraver will move into the Zero position, emitting a short "hum". Now, the plotter moves to the Zero position and you turn the plotter off.

**Placing engraving material**
Place the supplied holder with the engraving material on the plotter. Move the engraver head manually (the plotter must be turned off) over the engraving material.

The space between the bottom end of the spindle and the engraving material must be approximately 2 mm. If the space is larger or smaller, verify the rectangular alignment of the engraver with the calibration aid.

Upon turning the plotter on, the engraver is ready for operation.
3.2. **Functions and indications on the EC 450**

The controller EC 450 is turned on at the rear, the readiness is indicated by the green LED on the front. The EC 450 automatically controls the vacuum VC 450. When required, the EC 450 can be switched manually via the buttons "ON" and "OFF", for, e.g., removing remaining particles after the engraving process.

Fault-free spindle operation is indicated by the yellow LED. If a fault has occurred, the red LED will light up and engraving is blocked.

3.2.1. **Setting the engraving depth**

The engraving depth can be set via the depth regulator on the engraver spindle. Depending on the width and the grinding angle of the stylus used, and also the penetration depth of the material, various font weights can be achieved.

We recommend the use of an engraving stylus with a grinding angle of 15° for standard applications.

The engraving depth is set by turning the depth regulator. A right turn increases the engraving depth, whereas a left turn reduces it. When operating the depth regulator, you will feel a ratcheting.
Each ratchet moves the stylus by 0.05 mm higher or lower. When you have turned the depth regulator for one complete rotation to the right, you obtain an engraving depth of 1 mm (20 ratchets of 0.05 mm each)

The depth can be read out on the scale to the left of the engraver spindle.

![Warning: Engraver stylus tips are very sensitive and require careful handling. Avoid damage to the tip. A damaged tip will adversely impact the inscription quality.]

**Changing the engraver stylus**

Use the following procedure when changing the engraver stylus:

1. Detach the fastening on the engraver head and remove the engraver spindle.
2. It is not necessary to remove the connecting cable.
3. Unscrew the depth regulator from the engraver spindle.
4. Now loosen the collet chuck using the turning knob on the spindle end. For this, you must press the knob down and turn to the left. The collet chuck opens and the engraving stylus can be removed.
All engraving styluses are equipped with a catch, automatically forcing an insertion into the correct position. Please, only use engraving styluses supplied by us. If products from other manufacturers are used, we will not assume any liability for the engraving quality and any possible damage to the units.

When you have inserted a new stylus using the setting aid, re-tighten the collet chuck. Screw the depth regulator back onto the engraver spindle. The depth regulator will be in the Zero position when a distance of approx. 3 mm has been obtained between depth regulator and engraver spindle. You may ensure the proper distance by using the open side of the setting aid as a spacer, as shown in the illustration.

![Images showing the insertion of an engraving stylus](image1.png)  
![Images showing the setting aid](image2.png)  

Re-insert the engraver spindle into the engraver head and align the markings on the depth regulator and engraver head.

![Images showing the re-insertion of the engraver spindle](image3.png)

Re-tighten the clamp.

### 3.3. Maintenance for engraver EG 450

The vacuum was developed purposely for use with the EG 450 engraver, in order to collect grinding dust directly at the engraver stylus. Special filters trap the dust.
3.3.1. **Dust filter exchange**

Commerically available vacuum bags are used in the vacuum. You may purchase replacement bags from WAGO or commercial suppliers. For the bag exchange, operate the ratchet on the vacuum. The cover with the suction hose and vacuum bag opens. Remove the suction hose prior to pulling the bag from its holder. For this, you simultaneously turn and pull the hose. The re-assembly is performed in the reverse order.

3.3.2. **Changing or cleaning the motor filter**

When you have opened the cover, as described above, you can remove the motor protective filter. It is sufficient to clean the filter from time to time.

Replacement filters are available at WAGO.

3.4. **Handling the engraver spindle**

The engraver spindle is a very sensitive item and should be handled with extreme care. Use the spindle only in dust-free spaces. A high dust level results in the dust accumulating in the sensitive bearings, quickly wearing them out. Never clean the spindle using compressed air, because this would remove the grease in the ball bearings. When engraving, do not use lubricants. Never clean the engraver spindle with water.
4. Accessories

258-452 Engraving stylus set 15° (0.2 / 0.3 / 0.4 / 0.5 / 0.7 / 1.0 mm)
258-452/000-002 Engraving stylus 15° - 0.2 mm
258-452/000-003 Engraving stylus 15° - 0.3 mm
258-452/000-004 Engraving stylus 15° - 0.4 mm
258-452/000-005 Engraving stylus 15° - 0.5 mm
258-452/000-007 Engraving stylus 15° - 0.7 mm
258-452/000-010 Engraving stylus 15° - 1.0 mm
258-383 Universal plot and engraving holder DIN A4
258-472 Universal plot and engraving holder DIN A3

5. Technical data

5.1. Environmental conditions for all devices

Operation: 10°C to 35°C / 35% to 75% rel. humidity
Storage: -10°C to +50°C / 10% to 90% rel. humidity

5.2. Engraver spindle

Speed: min. 5,000 RPM, max. 50,000 RPM
Torque: 6 Ncm
Frequency: 83 – 830 Hz
Energy consumption: max. 60 W
Collet chucks: shaft diameter 3 mm
Clamping mechanism: Head clamping
Rotation with collet chuck: 0.03 mm
Motor type: AC current, asynchronous, brushless
Enclosure: Aluminum
Chuck diameter: 25 mm
Ball bearing type: steel, permanently lubricated, double
Cooling: Internal air via integrated fan
Weight: 280 g approx.
Overall length: 175 mm approx.
Application: only engraving
Guaranteed bearing operation: 1,000 hours min., with proper application
5.3. **Control unit VC 450**

Input voltage: 110-240 V ~ 50-60 Hz
Fuse: 4 A, slow-acting
Energy consumption: max. 150 W
Dimensions: 180mm x 250mm
WEIGHT: 2.7 kg approx.

5.4. **Vacuum VC 450**

Input voltage: 24 VDC
Energy consumption: max. 50 W
Vacuum bags: Swirl Type Y98
Dimensions: 350mm x 250mm
Weight: 4.6 kg approx.

6. **Safety information**

6.1. **General safety information**

**Attention! Read prior to operation!**

When using machinery, electric tools and electrical devices, collectively called "electrical devices", the following general safety measures must be taken as protection against electric shock, potential injury or fire. Read and comply with all those instructions before using the electrical device. 

*Keep the safety instruction secure.*

- Use electrical devices only as recommended and in compliance with the general safety and accident prevention instructions.

- **Keep your work area in order.**
  Untidy workplaces can result in accidents.

- **Consider environmental conditions.**
  Do not use this device in a damp or wet environment. Provide appropriate lighting. Outdoor operation is not permitted. Do not use the electrical device near inflammable liquids or gases.

- **Protect yourself against electric shock.**
  Avoid body contact with grounded parts, e.g. conduits, heating elements, stoves or refrigerators. The electrical device is equipped with a safety ground conductor and the plug should be connected only to a socket with ground contact. The electrical device must be operated using a 30mA residual-current protective device at the supply system. Fehlerstrom-Schutzeinrichtung am
Do not permit other persons to touch the electrical device or the cable. Keep other persons away from your workplace. Give the electrical device only to trained personnel. Youth may operate the electrical device only when older than 16 years, required for obtaining the vocational training certificate and if they are supervised by experienced personnel.

**Keep your electrical device safe.**
Unused electrical devices should be placed and stored respectively, in a dry, elevated or secluded area, beyond the reach of children.

**Do not overload your electrical devices.**
They operate better and more safely in the rating range indicated. Renew outworn tools early.

**Select the correct device.**
Use the engraver with the plotter (electrical device) only for the applications described in the manual!

**Wear proper work wear.**
Do not wear loose clothing or jewelry, they could be caught in moveable parts. Wear a hairnet if you have long hair.

**User personal protective equipment.**
Wear safety goggles. Wear hearing protection to protect against noise > 85 dB (A). Wear a mask when generating dust during work.

**Do not use the cable for other purposes.**
Never carry the electrical device at its cable. Do not use the cable when pulling the plug from the socket. Protect the cable against heat, oil and sharp edges.

**Never insert your fingers into revolving parts.**

**Secure the material to be processed.**
Assure the proper adhesion of the universal holding plate and clean it regularly under running water (dust-free). Use only and exclusively those holding plates manufactured by the EK-Team for the holding of materials to be processed.

**Avoid abnormal posture.**
Assure safe footing and keep your balance all the time.
Carefully maintain your tools
Keep your tools honed and clean for safer and better work. Comply with the maintenance instructions and advises in respect to tool change. Check regularly the cable of the electrical device and have it renewed by a recognized expert when damaged. Check regularly the extension cables and replace them when damaged. Keep the devices dry and free of oil and grease.

Remove the plug from the socket.
Remove the plug from the socket during all work described under operation and maintenance, when changing tools and when the device is not in use.

Avoid unintentional starts.
Do not carry the electrical device with your finger at the ON/OFF switch when connected to the power source. Make sure that the switch is in the OFF position when the device is plugged into the socket.

Be attentive.
Pay attention to your work. Attend to your work with thought. Do not use an electrical device when your concentration lags.

Inspect the electrical device for possible damages.
Prior to any use of the electrical device, carefully examine protective installations or easily damaged parts for their proper and fault-free function. Check whether moveable parts work properly and do not jam and whether parts are damaged. All parts must be assembled properly and comply with all conditions, in order to assure the fault-free operation of the electrical device. Damaged protective installations and parts must be repaired or exchanged in a suitable manner by a recognized specialist shop, if not indicated differently in the operating instructions. Damaged switches must be replaced by a service center. Do not use electrical devices where the power switch cannot be turned on or off.

Attention! You must adhere to the following!
For your personal safety and to assure the proper functioning of the electrical device, only original accessories and original replacement parts must be used. The utilization of other tools and any other accessory can result in a health hazard for you. Only an authorized EK-Team Service Center should repair the electrical devices. This electrical device complies with the applicable safety regulations. Maintenance and repair work, especially interventions into the electrical system must be performed only by specialist or trained personnel and utilizing solely original replacement parts; otherwise accidents can occur to the operator.

Any arbitrary modification on the electrical device is expressively forbidden for safety reasons!
6.2. Special safety information for the operation of the engraver spindle

The engraver spindle may only be operated in the engraver head intended. During operation the temperature at the spindle will raise, which will make an exchange of the engraving stylus to be dangerous. It is recommended to let the spindle cool down after operation and prior to an exchange of the engraving stylus or disassembly of the engraver head.