Selective Perforating Unit

Instruction Manual

Another quality product from:

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Dear Customer

Thank you for purchasing a Selective Perforating Unit system. The Selective Perforating Unit provides the Technology you need to print and process at high speeds. With this system, your company will increase throughput and quality.

The Selective Perforating Unit is one of many high-quality, innovative systems available from Matti Technology AG, Switzerland. If you would like information on our other systems or require technical assistance or spare part replacement, please contact one of our field service or customer service specialists at:

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Again, thank you and welcome to the growing family of Matti Technology AG customers. We appreciate your current and continued business.

Sincerely,

Dr. Dieter Woschitz
President

Pascal Fäh
Vice President of Operations
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Selective Perforating Unit Instruction Manual

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1.2 List of tables
2 Forward

The purpose of this manual is to provide the necessary information to enable experienced personnel to safely install, operate and maintain the Selective Perforating Unit.

It is assumed that all necessary tools, precision measuring devices and equipment for safely moving and installing this system will be available. Information and data is based on the latest product information available at the time of writing.

The right is reserved to make changes at any time, in materials, specifications, models or to discontinue models.

Note: In order to show clearly the details of this system some covers, shields, doors or guards have either been removed or are shown in an open position. All such protective devices must be installed in the closed position before operating the system.

2.1 Important

Carefully read the instructions and safety precautions given in this manual. Do not attempt to install this system until you have thoroughly read and understood the data contained in this manual.

At the time of writing, this manual was completely up-to-date. However, due to continued product development, some illustrations or descriptions contained herein may vary slightly to the system delivered to you. This merely implies that the system has been improved to better fulfil your requirements. If there are any questions, you are encouraged to contact our field service personnel for assistance at:

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2.2 Compliance statements

2.2.1. FCC compliance statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

2.2.2. European EMI compliance statement

This equipment generates, uses, and can radiate radio frequency energy. When this equipment is not installed in accordance with instructions in the installation chapter and is not used in accordance with the instructions in the operator safety information, the radio frequency energy may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user, at the user's own expense, will be required to take whatever measures may be required to correct the interference.

2.3 Inspection of shipped parts

Please inspect all packed materials carefully so that small parts are not inadvertently thrown away. Report any shortage or damage to Matti Technology AG and the carrier.

All equipment is shipped on one or two pallets and should contain the following parts:

- Selective perforating unit
### 3.1 General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. web width</td>
<td>200 mm (8&quot;)</td>
</tr>
<tr>
<td>Maximum Paper Width</td>
<td>520mm (20.5&quot;)</td>
</tr>
<tr>
<td>Operating speed</td>
<td>150 m/min (500 ftm)</td>
</tr>
<tr>
<td>Paper Weights</td>
<td>Coated and uncoated; 70 – 163 gr/m²</td>
</tr>
<tr>
<td>Repeat length</td>
<td>11”–17”</td>
</tr>
<tr>
<td>Perforating tool</td>
<td>Etched steel plate (0.48mm) or perf blades</td>
</tr>
<tr>
<td>Register tolerance</td>
<td>≤ ±0,5 mm (±0,02&quot;)</td>
</tr>
<tr>
<td>Input</td>
<td>Low Tension</td>
</tr>
<tr>
<td>Output</td>
<td>Tension less</td>
</tr>
<tr>
<td>Weight</td>
<td>980kg (2160.5lbs)</td>
</tr>
<tr>
<td>floor load</td>
<td>≤ 250 kg per pad (≤ 551,2 lbs per pad)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>3x400/480VAC (+/- 5%); 20A, 50/60Hz; (3 phase, ground)</td>
</tr>
<tr>
<td>Speed Control</td>
<td>by dancer</td>
</tr>
<tr>
<td>Unit Dimension</td>
<td>1130 (44.5&quot;) x 1560 (61.5&quot;) x 1320mm (52&quot;) (LxWxH)</td>
</tr>
<tr>
<td>Crate Size</td>
<td>1300 (51,2mm) x 1750 (68.9&quot;) x 1500mm (59&quot;)</td>
</tr>
<tr>
<td>power control cabinet</td>
<td>Integrated</td>
</tr>
<tr>
<td>Noise level</td>
<td>≤ 78 dB (A)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>40-104°F (5-40ºC) @ 10-90% RH</td>
</tr>
<tr>
<td>Agency compliance</td>
<td>CE; UL; CSA</td>
</tr>
<tr>
<td>Compressed air</td>
<td>External, Min. 6.0 bar (87 psi)</td>
</tr>
<tr>
<td>Air Flow</td>
<td>14lt/min (0.5 cfm)</td>
</tr>
</tbody>
</table>
4 Safety information

4.1 General

The Selective Perforating Unit is designed for safe operation. Nevertheless, installation, maintenance and operation of the system can be dangerous for a careless operator or maintenance person. For your safety and the safety of others, please read the instructions of this INSTRUCTION MANUAL and follow the safety practices, which will help to prevent accident or injury.

4.2 Safety information for the owner

The owner of the system must ensure that the system is only used in good operating condition which adheres to the safety regulations. Only trained and qualified personnel which are totally familiar with all the safety and mechanical instructions and devices should operate the system. Supervisors must ensure that they are familiar with all the chapters of operating and safety of the equipment. Furthermore they should be familiar with the general requirements of accident prevention and preservation of the environment.

4.3 Safety information for the operator

The Operator of the equipment must read and understand the operating instructions, especially the paragraphs regarding safety. This is especially important for shift personal that might not be involved with this equipment on regular basis. The Operator must be familiar with the safety and accident prevention information, and should avoid any functions on the machine that are doubtful or in violation of the operating procedures.

4.4 Specific security advices

Prior to any kind of repair, the MAIN SWITCH must to be turned off. The location of the main switch is to be secured with a padlock to prevent accidental switch on. Only original parts used in maintaining / repairing the machine will ensure correct functionality and protect warranties. Any changes to the system, including components requires prior written approval from the manufacturer.

4.5 Guarding

Main Switch:
The main switch for the Selective Perforating Unit is mounted on the drive side of the frame, at the paper entry end. This switch turns the systems on and off.
4.6 Mechanical safety

Wear safety shoes and safety glasses at all times.
Remove or secure items that could be caught, fall into, or become entangled in the mechanisms, including jewellery, loose clothing, and long hair.
Keep all equipment covers closed when operating the printer.
After a fast stop or emergency stop, make sure all error conditions are corrected before trying to restart the machine.
In the event of leaks or breaks at pressure relief valves, automatic pressure regulators, limit sensors, and other automatic safety features, turn off all compressed air to the system.
The air expandable shafts require the same action if a leak or break occurs.
Watch your feet when loading, unloading and handling the paper roll.
Do not touch any moving parts.
Do not remove any cover of the unit.
If any unsafe situation is possible or recognized, stop the machine immediately and switch it off. Do not run the machine again until the situation is safe.

4.7 Electrical safety

There is danger of electrical shock when servicing this unit. Even when the circuit breaker of the control cabinet is in the OFF position, there is live HIGH VOLTAGE present at the power entry of the circuit breaker.

**WARNING!**

ALWAYS disconnect the external power prior to servicing the system.

NEVER operate the system with the doors of the control cabinet or transport open.

**DANGER!**

Power terminals remain live up to 3 minutes after mains disconnection.
5 Labels

The following chapters explains the different labels used on the transport system.

5.1 Safety Labels

5.1.1. Dangerous voltage

Illustration 1: Dangerous voltage

Dangerous voltage. Contact may cause electric shock or burn.

**DANGER!** Power terminals remain live up to 3 minutes after mains disconnection.

5.1.2. Burn hazard

Illustration 2: Burn hazard

Burn hazard, hot surface. Do not touch the surface of this component during equipment operation. Allow to cool down before servicing.

5.1.3. Danger of cuts from moving paper

Illustration 3: Danger form cut of moving paper

Danger of cuts from moving paper. Keep body away from edge of moving paper.
5.1.4. Danger of crushing

Illustration 4: Danger of crushing

Danger of crushing from moving paper roll. Stand back from the lift arms and paper roll during operation.

5.1.5. Pinch pint rollers

Illustration 5: Pinch point rollers

Pinch point danger from rollers. Keep hands and clothing away from rotating rollers.

5.1.6. Pinch point from moving parts

Illustration 6: Danger from moving parts

Danger from moving parts. Moving parts can crush and cut. Do not operate with guard removed. Follow lockout procedure before servicing. Disconnect main power before servicing.
5.1.7. **Danger of entanglement from belt drive**

Illustration 7: Danger of entanglement from belt drive

Danger of entanglement from belt drive. Shear hazard. Moving part can crush and cut. Keep hand clear. Do not operate with guard removed. Follow lockout procedure before servicing.

5.1.8. **Danger of entanglement from rotating gear**

Illustration 8: Danger of rotating gear


5.1.9. **Danger of cutting blade**

Illustration 9: Danger of cutting blade

5.1.10. Danger of cutting of fingers or hand

Illustration 10: Danger of cutting of fingers or hand / angled blade

Danger of cutting of fingers or hand. Moving parts can crush and cut. Do not operate with guard removed. Follow lockout procedure before servicing.

5.2 Text warning Labels

5.2.1. Running with different voltages and frequencies

Illustration 11: Running with different voltages and frequencies

ATTENTION!

Follow the instructions in the manual for running with different voltages and frequencies.
Suivez les directives dans le manuel pour l'utilisation avec des voltages et des fréquences différents.
Beachten Sie die Hinweise im Manual um mit verschiedenen Spannungen und Frequenzen zu arbeiten.
5.2.2. Disconnect main switch before servicing

**ATTENTION!**

Disconnect main switch before servicing!

Débranchez le commutateur principal avant l'entretien!

Hauptschalter ausschalten bevor irgendwelche Servicearbeiten durchgeführt werden!

Illustration 12: Disconnect main switch before servicing

5.2.3. This switch does not disconnect all power of this machine

**ATTENTION!**

This switch does not disconnect all power of this machine. Make sure all power switching off before servicing!

Cet interrupteur principal ne met pas l'appareil entier hors circuit. Il faut mettre hors circuit important interrupteurs principaux avant que des travaux de service ne soient effectués!

Dieser Hauptschalter schaltet nicht die ganze Maschine aus. Es ist wichtig alle Hauptschalter auszuschalten bevor irgendwelche Servicearbeiten durchgeführt werden!

Illustration 13: This switch does not disconnect all power of this machine
5.2.4. Inside the dryer it is maybe very hot

ATTENTION!

Inside the dryer it is maybe very hot. Please wait for about 15min. to cool down until opening the dryer or carry heatproof gloves.
À l'intérieur du sécheur c'est peut-être très chaud. S'il vous plaît attendez approximativement 15min. avant d'ouvrir le sécheur et porter des gants résistants à la chaleur.
Im Innem des Trockners kann es sehr heiss sein, warten Sie für 15min. um abzukühlen oder benutzen Sie hitzebeständige Handschuhe.

Illustration 14: Inside the dryer it is maybe very hot

5.2.5. Compressor installed under the cover

ATTENTION!

Compressor installed under the cover. Please refer to the manual for maintenance
Le compresseur est sous la couverture installé. Veuillez considérer les indications dans le manuel d'entretien.

Illustration 15: Compressor installed under the cover
6 Site preparation / Installation instruction

6.1 Electrical

Voltage: 3 x 400 / 480 V ± 10 %
Frequency: 50 / 60 Hz ± 0.5 %
Fusing:
- 400V / 25 A
- 480V / 25 A
short circuit capacity of Breaker/Fuses: 10 kA

6.2 Compressed air

Min. compressed air: 6.1 kg/cm², 6.0 bar (87 psi)
Max. compressed air: 7.1 kg/cm², 7.0 bar (101 psi)

6.3 Mechanical / Physical

Working space front side: 1500 mm (59“)
Working space back side: 1000 mm (40“)
Spacing between units: 760 mm (30“)
Floor loading capacity: > 500 kg / m²
Floor loading per pad: ≤ 250 kg (≤ 550 lb)

Ambient temperature and relative Humidity

transport: 15 – 29°C (60 – 85°F) @ 10 – 90 % RH
15 – 40°C (60 – 104°F) @ 10 – 90 % RH
operating: 15 – 29°C (60 – 85°F) @ 30 – 60 % RH
best for printing: 18 – 23°C (64 – 73°F) @ 50 % RH
6.4 Position of pad

Illustration 16: Position of pad
7 Introduction

7.1 Perforation unit

The Selective Perforating Unit is a compact unit designed to be used in conjunction with digital printer systems, or other continuous processes. The machine can accept two conventional cross perforation cylinders between 11” to 17” circumference. This feature enables the customer to produce cross or lengthwise perforations. Each perforation cylinder can be operated (thrown on or off) independently by reading an optical mark (OMR) printed on the paper. An input/output socket is provided to enable the unit to be interfaced with the other equipment being used.

7.2 Layout requirement

The system requires a printed mark (cue mark) to be able to register the perforation to the form. A second cue mark is also necessary to identify the form that must be perforated (selective perforation).

When ordering a perforating plate, be sure how the manufacturing company needs the layout. Most manufacturing companies use the layout of the printed paper and convert it to a perforation plate layout themselves. We recommend using a perforation plate of the same size (circumference) as the magnetic cylinder.
8 Install perforation unit

The installation of the Perforating Unit is relatively straightforward if the following procedures are undertaken.

8.1 Positioning of the unit

The Selective Perforating Unit will be supplied on a wooden pallet. Remove any packing material and lift the machine off the pallet using a fork lift or suitable lifting equipment. The Perforating Unit must be positioned as required in conjunction with the other process units being used. However, the following factors should be taken into consideration:
   a) Sufficient space for safe operation of the machine.
   b) Paper path to subsequent operations.
   c) Adequate space for the operator.
   d) Proximity of auxiliary equipment i.e.: optional perf cassettes, work benches etc.
   e) Sufficient space for the removal of guards to enable maintenance on the machine.
   f) Proximity of electric supply.
   g) Proximity of air supply required if the vertical perforation option is fitted.

8.2 Preparation

Remove all protective covers (sheeting etc) and clean down the machine. To remove protective wax from metal parts use a suitable solvent such as white spirit. Pay special attention to the following:
   a) The anvil cylinder and perforation cylinders must be absolutely clean - wax tends to trap dirt and may contaminate the paper stock when in use.
   b) All path rollers and shafts are to be clear of wax "drips" on their undersides.
   c) Remove all guards; check that no foreign matter is in the gears or belts etc.
   d) Check all screws are tight and that belt tensions are correctly adjusted.

8.3 Leveling of the unit

a) With the machine in its final position, leveling can be carried out using the adjustable feet provided.
   b) Leveling should be carried out using a quality precision engineer's level. The machine should be leveled by placing the level on the anvil cylinder.

Note: The level should be re-checked after the machine has been in position for 2 or 3 days. The leveling feet supplied with the machine will be adequate for all solid floors, but if wooden floors or other flexible flooring is in use, it is recommended that steel plates at least 160 x 160 x 10mm (6" x 6" 3/8") should be placed under each foot.
# 8.4 Electrical connections

Pass the Power supply cable through the cable support into the power control cabinet and connect the cables to the clamp bar:

To connect the main Power:
- Check that there is no power on the cable
- Connect the ground cable first, and then the three phases to the terminal block.

---

**ATTENTION!**

See installation instructions before connecting to the power supply.
This transport system supports different voltages and frequencies.
Be sure that the correct settings are made before you turn on the main switch.

---

The electrical control equipment is housed in the cabinet on the drive side of the machine. A key lock is fitted to the access door, which should only be opened when the isolator is switched off.

The isolator is mounted on the drive side of the frame, at the paper entry end. Before switching the isolator on, ensure all other equipment being used in conjunction with the Selective Perforating Unit is connected via the interface cable.

# 8.5 Air connections

A source of clean dry compressed air at 6 to 7 bar pressure is connected to the machine via the quick release connector, situated on the infeed gear side of the unit.

There is a pressure regulator installed behind the front door. The pressure should be adjusted to 6bar (87Psi).

---

![Illustration 17: Pressure regulator](image-url)
8.6 Final checks

a) Make sure machine turns over.
   Note: turn over by hand to ensure there are no obstructions that may cause damage to the machine.

b) Inspect the machine for any loose bolts.

c) Make sure all gears are greased and all moving parts are lightly oiled.

d) Before switching machine on check all electrical and pneumatic connections.
9 Starting up

9.1 Paper layout

The system requires a printed mark (cue mark) to be able to register the perforation to the form. A second mark is also necessary to identify the form that has to be perforated (selective perforation).

9.2 Position of cue mark for registration and perforation

The cue mark must be placed on the head of the form in an area between 0mm to 25 mm from the edge. The mark must be placed on a free area and must have a minimum dimension of 4 x 6mm. Cross perforation can be done in any place, except in the area 12mm from each end of the form.

For details please refer to Illustration 18: Page layout and Illustration 19: Cue mark position at head of form.

We recommend using a perforation plate of the same size (circumference) as the magnetic cylinder. Each magnetic cylinder has a mark (line) indicating the “0” position. Place the head of the plate matching this mark. See Illustration 20: Mounting perf plate at “0” position on cylinder.
Illustration 19: Cue mark position at head of form

Illustration 20: Mounting perf plate at “0” position on cylinder
10 Operating

10.1 Paper path through the selective perf unit

Illustration 21: Web path of selective perf unit
10.2 Paper path through the inline selective perf unit

Illustration 22: Web path of inline selective perf unit
10.3 Paper bypass through the selective perf unit

Illustration 23: Bypass web path for light weight dancer input on next unit
10.4 Touch screen

10.4.1. Operator screen

1. Operator screen
This is the main screen to operate the unit.

Illustration 24: Operator screen

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull wheels</td>
<td>Press ON to lower the pull wheels</td>
</tr>
<tr>
<td>Register</td>
<td>Move the register forward and backward with the arrows left and right</td>
</tr>
<tr>
<td>Selec. Perf.</td>
<td>To enable or disable the selective perf unit</td>
</tr>
<tr>
<td>Register</td>
<td>To enable or disable the unit to register on a cue mark. Switch OFF when webbing paper after a web break.</td>
</tr>
<tr>
<td>EV Override</td>
<td>Press ON to switch the perforating cylinder permanently on. No action on cue marks or print will be made.</td>
</tr>
<tr>
<td>Side</td>
<td>Press F4 to enter the cue mark side selection screen (only available on systems without switches on the electrical panel).</td>
</tr>
</tbody>
</table>
2. Cue mark side selection screen
   This screen is only active if the sensor selection menu option “screen” is selected. On this screen it can be selected if the cue mark sensors are reading from front (up) or back (down). Each sensor can be selected individually, so all sensors can be up or down, or any combination in between. Press F5 to go back to the operator screen.

Illustration 25: Cue mark side selection screen (Read Side)

3. Cue mark side electrical panel

Illustration 26: Cue mark sensor selection

The up/down cue mark sensor and the register mark sensor can be selected by the switches “Cylinder 1”, “Register” and “Cylinder 2” on the paper inlet side of the control cabinet next to the main switch.
10.4.2. Setup screen

1. Start-up screen
On the first screen the software version of the PLC and the touch screen is shown. To enter the setup menu press “SETUP”.

Illustration 27: Start up screen

2. Settings screen
On this screen the units should be selected. According to the selection the register and the cut size will be in “mm” or “inch”. The other values should not be changed as they are essential for the function of the unit.

Illustration 28: First setup screen

The standard values are:
- Encoder direction: Right
- Speed: Feet
- Cut unit: “mm” or “inch”
- Web break: ON
- Work system: Dancer

By selecting “Adjust Cut size” the next screen will show up.
3. Cut cylinder size adjustment screen
   On this screen the size of the perforating cylinder can be set. The size selected needs to be the same size of the perforating cylinder. Important: If using 2 different cylinder sizes, select one cylinder at a time and change the size on the touch screen according to the cylinder size being used.
   It may be necessary to change the position of the cue mark sensors. For more details please refer to chapter 15.1 Change of cassettes on page 61.

![Illustration 29: Cut cylinder size adjustment screen](image)

4. Maintenance screen
   The encoder position shown in the “Posit.” display is used for the zero adjustment.

![Illustration 30: Maintenance screen](image)

The standard values are:

- “Cyl. Input and Output” 1: 165
- “Cyl. Input and Output” 2: 320
- Speed compensation: 600
5. Operator screen
On This screen is as the normal operator screen, so the unit can be set to ready if this is necessary while doing some adjustment.

Illustration 31: Operator screen

10.4.3. Setup screen password protected

1. Password screen
When selecting “Advanced Functions” on the settings screen the password screen will be displayed. To enter the password, touch the numbered area and a key pad will be displayed, then the password can be entered.

Illustration 32: Maintenance operating screen
2. Selective Perf. Motor
These values do not need to be changed and are important for the motor function.

![Illustration 33: Selective Perf. Motor screen](image)

The standard values are:
- Motor reduction gear: 4.000
- Enc./Infeed Reduc. Gear: 1.000
- Motor Direction: Right

3. Infeed Motor
These values do not need to be changed and are important for the motor function.

![Illustration 34: Infeed Motor screen](image)

The standard values are:
- Motor reduction gear: 4.000
- Encoder Reduction Gear: 1.000
4. Maximum Speed
   These values do not need to be changed and are important for the machine function.

   ![Illustration 35: Maximum speed screen](image)

   The standard values are:
   - Meters: 180
   - Feet: 590
   - Out Register Control: ON

5. Sensor selection
   On this screen the number of photocells can be selected, the standard is 6.
   The selection “Screen” or “Switch” is to select if the cue mark selector “Up” and “Down”
   is on the touch screen or on the electrical panel.

   ![Illustration 36: Sensor selection screen](image)
10.4.4. Screens on inline selective perf units

1. Operator screen for inline selective perforating unit with vertical perforation
   This screen is, with some exception, the same as the operator screen described in chapter 10.4.1 Operator screen on page 31. The different is the “Long Perf” for to enable the vertical perforation and the “EV Override” for the vertical perforation.

   Illustration 37: Operator screen for inline selective perforating unit with vertical perforation

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Register</td>
<td>This register allows you to move the vertical perforation forward and backward. The maximum values they can keyed in are +100/-100 and equal about +20mm/-20mm</td>
</tr>
<tr>
<td>Long perf</td>
<td>Press ON to activate the vertical perforation</td>
</tr>
</tbody>
</table>

2. Read side screen
   This screen is, with some exception, the same as the Read side screen described in chapter 10.4.1 Operator screen on page 31. The different is the “Long Perf Up/Down” to select if the vertical perforation cue sensor is up or down.

   Illustration 38: Cue mark selection screen for inline selective perforating unit
3. Maintenance web length compensation screen
This screen is to change the gear ratio between the outfeed nip of the print unit and the outfeed nip of the inline selective perf unit. This value only needs to be changed if one of the cylinders would have been modified in its circumference.

![Illustration 39: Maintenance web length compensation screen](image)

10.5 Position and use of the cue mark sensors

The position of the different cue mark sensors are:

![Illustration 40: Cue mark sensor selection](image)
1. Sensor: Cylinder 1 ON/OFF. This mark is used to perforate with the first cylinder on a page.

2. Sensor: Registration mark. This mark need to be on every page to register the cylinder to the page.

3. Sensor: Cylinder 2 ON/OFF. This mark is used to perforate with the first cylinder on a page.

10.6 Interlock switch

For safety reasons, interlock switches have been fitted to the top covers of the machine. Note: The machine will stop if any of these covers are opened whilst the machine is running.

10.7 Web break sensors

Web break sensors are mounted at the paper outlet side of the machine under the cover, and are adjusted so that paper breaks will stop the machine.

10.8 Pull wheels

Illustration 41: Cue mark sensor selection

The nip rollers can be moved sideways by loosening their grey handles. The nip roller pressure can be adjusted by turning the knob. Turning clockwise will increase the pressure, counterclockwise will reduce the pressure. If the pressure is adjusted too high, creases and wrinkles may occur.
10.9  **Vertical perforation adjustment**

To adjust the position of the vertical perforation the approximate position must be adjusted mechanically. To do this, follow these steps:

1. Run some perforations with the “LONG REGISTER” set to 0.
2. Measure the distance between the perforation and the desired position. If this distance is less than 15mm go direct to step 8. Otherwise follow the complete procedure.
3. Measure the distance between the dancer and a fix point above it.
4. Slacken the paper. If there is tension on the paper it is possible to break the paper of the tension can twist the dancer. This will result to creases and wrinkles.
5. Loosen the grey handle behind the gear.
6. Divide the distance you measured between the perforation and the desired position by two. This value the dancer needs to be moved from its position.
7. Added or subtracted of the distance calculated from the distance measured from the fix point to the dancer.
   - If the perforations need to move forward the dancer need to moved up. So the value needs to be subtracted.
   - If the perforations need to move back the dancer need to be moved down. So the value needs to be added.

   This setting is only approximately on big movement or if the dancer is in an extreme position. It is recommended to have the dancer at about center position. This is due to the form of the dancer as it does a circular movement.

8. Do again some perforation and check if they are in less then 15mm of the desired position. If the position is more then 17mm repeat step 2 to 8.
9. Minor adjustment (max. 20mm) can be done on the touch screen with the “LONG PERF”.

Illustration 42: Vertical perforating adjustment
10.10 Sensitivity adjustment of the cue mark sensor

Description: The cue mark sensor is a compact system, containing an optical lens and a signal-amplifier.

Specification of cue marks:
Length: 0.25” (in the run direction)
Width: 0.25” (across the paper)
Color: Black

10.10.1. Procedure

Follow this procedure to adjust the cue sensor with Two-point Teaching:

1. Set the mode selector to “TEACH”.
2. Locate the mark to the sensing position and press the “SET” button. All the red threshold indicators will turn ON.
3. Move the mark and press the “SET” button.
4. If teaching is successful, all the green detection level indicators are ON. If teaching is unsuccessful, all the red threshold level indicators flash.
5. If teaching is successful, set the mode selector to “RUN” to complete the teaching operation. If teaching is unsuccessful, restart from the above step 2.

Note: Follow the above steps so that the output will be turned ON whenever the mark is detected. By taking the opposite steps, the output will be turned OFF whenever the mark is detected and turned ON whenever the base is detected.
### Adjustment Steps

1. Install, wire, and turn ON the E3M-M.
2. Perform teaching (mark registration). Refer to Mark Registration (Teaching).
3. Make fine adjustments of the threshold level if necessary. Refer to Threshold Level Adjustments.
4. Check that the mode selector is set to RUN.

### Mark Registration (Teaching)

Refer to the following for ideal teaching.

<table>
<thead>
<tr>
<th>Application</th>
<th>The base has a color pattern. The mark and base are clearly different in color.</th>
<th>The base has no color pattern. The mark and base are slightly different in color.</th>
<th>The base has no color pattern. Remote teaching with no positioning is desired.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>One-point teaching</th>
<th>Two-points teaching</th>
<th>Auto-teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>The default level is set and the output is ON when the mark is detected.</td>
<td>The threshold level is set between the color of the mark and base. The output is ON when the mark is detected.</td>
<td>The threshold level is set between color of the mark and base. The output is ON when the mark (i.e., the color with shorter passing time) is detected.</td>
</tr>
</tbody>
</table>

Refer to the following for each teaching method. Remote one- or two-point teaching is possible. Refer to Remote Control Function.

### One-point Teaching

1. Set the mode selector to TEACH.
2. Locate the mark to the sensing position and press the SET button. All the red threshold indicators will turn ON.
   - If teaching is successful, move the mark and press the SET button at the base.
   - If teaching is successful, all the green detection level indicators are ON.
   - If teaching is unsuccessful, all the red threshold level indicators flash.
3. Set the mode selector to RUN. The output will be ON whenever the set mark is detected.

Note: By teaching on the base, reversed output as shown above (base: ON, mark: OFF) can be obtained.

### Two-point Teaching

1. Set the mode selector to TEACH.
2. Locate the mark to the sensing position and press the SET button. All the red threshold indicators will turn ON.
3. If teaching is successful, move the mark and press the SET button at the base.
   - If teaching is successful, all the green detection level indicators are ON.
   - If teaching is unsuccessful, all the red threshold level indicators flash.
4. Set the mode selector to RUN to complete the teaching operation. If teaching is unsuccessful, restart from the above step 2.

Note: Follow the above steps so that the output will be turned ON whenever the mark is detected. By taking the opposite steps, the output will be turned OFF whenever the mark is detected and turned ON whenever the base is detected.

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10.11 Change of perforating blade

10.11.1. Calculated life time of perforating blades

The main rule is: Per inch of perf you should have a minimum 1/4" tie in total, and the edges tied about 3/32".

RECOMMENDED BLADE SIZES

<table>
<thead>
<tr>
<th>Teeth/inch</th>
<th>Tie Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.060&quot;</td>
</tr>
<tr>
<td>6</td>
<td>0.040&quot;</td>
</tr>
<tr>
<td>8</td>
<td>0.032&quot;</td>
</tr>
<tr>
<td>10</td>
<td>0.032&quot;</td>
</tr>
<tr>
<td>10</td>
<td>0.030&quot;</td>
</tr>
<tr>
<td>12</td>
<td>0.032&quot;</td>
</tr>
<tr>
<td>12</td>
<td>0.030&quot;</td>
</tr>
<tr>
<td>Micro-perf</td>
<td>0.008&quot;</td>
</tr>
</tbody>
</table>

Micro-perf blades must have a 0.008" tie. Note that the quality of microperf blades available varies greatly and some blades may produce excessively weak perforations which can lead to web breakages.

Perforating blades are normally changed when paper fibers are hanging in the cut area. We can confidently expect, even on difficult materials, to achieve a minimum life of 250000 perforations and a maximum life of 750000 with a correctly set blade.

Therefore with running at speeds up to 150m/min, at maximum utilization, the interval between blade changes will be approximately: 11 to 33 hours assuming an 80% uptime.

In practice, production is likely to be less, and perf life could be longer, so intervals will almost certainly be greater.

10.11.2. Change of perforating blade

When a perforating blade is worn out it needs to be replaced. To do so follow these steps:

1. Disable the unit by switching it OFF or pressing the E-Stop button.
2. Release the air pressure from the perforating cylinder. For details see: Illustration 46: Air supply to the perforating cylinder.

Illustration 44: Air release on perforating cylinder
3. Change the perforating blade by pulling the old blade out and replacing it. Make sure the new blade is seated properly. The beveled edge of the blade must be facing the oncoming paper as the blade perforates. If the old blade has been raised during production it will be necessary to adjust the new blade. To do so please refer to chapter 10.12 Adjustment of perforating blade on page 46.

Illustration 45: perforating blade slope

4. Supply pressured air into the cylinder. To do so press the air gun firmly onto the valve and press the supply button on the air gun. Fill until a pressure of 6bar (87Psi) has been reached. Then remove the air gun whilst releasing the supply button.

Illustration 46: Air supply to the perforating cylinder

5. Run the unit for several turns and then recheck the blade and perforation. If some adjustment is necessary, go to chapter: 10.12 Adjustment of perforating blade on page 46.
10.12 Adjustment of perforating blade

All these steps must be done with paper in the unit to minimize damage to the perforating blade.

Illustration 47: Adjustment of perforating blade

Note: The perforating cylinder can be turned by hand whilst in the E-Stop condition. It is recommended to do the settings with a wide blade and change it after adjustment if necessary.

1. Make sure the air is released in the clamp bar.
2. Lift the blade to the maximum with the outermost height adjustment screws.
3. Supply air into the valves.
4. Turn all height adjustment screws counterclockwise till the screws are hard to turn or they are level on top of the clamp bar so the blade has the possibility to lower itself.
5. Jog three turns with the perforating cylinder lift off the anvil cylinder (Cylinder OFF, EV Override OFF).
6. Jog two turns with the perforating cylinder lowered onto the anvil cylinder (Cylinder ON, EV Override ON).
7. Turn all height adjustment screws until the blade begins to rise. The easiest way to do this is to place a finger on the blade to feel when the blade rises.
8. Turn the height adjustment screws about 1/8 turn back.
9. Do some perforations to see where blade requires adjustment.
10. Adjust the height adjustment screws in the areas noted in step 9 by turning the screw(s) at/next-to the desired place about 1/8 to ¼ turn. Note, turning the height adjustment screws clockwise will create a deeper perforation cut. After every adjustment release the air in the clamp bar, press the blade down by hand and inflate the clamp bar again.
11. Repeat steps 9 to 10 until the perforation is ok.

Caution: Do not try to over use the perforating blades, readjusting them when failing to cut. Change to new blades instead, otherwise serious damage may occur to the bar if too much pressure is applied to the height adjustment screws.

When using partial (narrow) perforating blades, it is recommended to fill the empty side with a lower blade (a blade without teeth). Doing this will eliminate the potential problems of bar deformation or perforation blade side movement.
The magnetic cylinder must be adjusted to the height of the perforating plate. The adjustment is done with the screws marked on Illustration 48: Adjustment of perforating blade.

1. Open the lock nuts for the cylinder that needs to be adjusted.
2. Adjust the distance between the perforating cylinder and the anvil cylinder to 0.5mm on both sides of the cylinder. Turning the screws counter-clockwise will create a deeper perforation cut.
3. Place the perforating plate on the magnetic cylinder.
4. Engage the perforating cylinder (Cylinder ON, EV Override ON), jog the paper and observe the perforation.
5. Adjust the screws until the perforation is ok.
6. Tighten the locknuts without moving the screws. Important: Tighten the locknuts at maximum 15Nm. Over tightening the locknut can break the adjustment screws.

**IMPORTANT:**
Tighten the locknuts at maximum 15Nm. Over tightening the locknut can break the adjustment screws.
10.14 Adjustment of vertical perforating blade

Illustration 49: Adjustment of vertical perforating blade

1. Make sure the maximum limit stop block (mounted at the gear side) is well fixed.
2. Open the thumb screw “15” and position the vertical perforating block the desired position.
3. Make sure the pressure on the spring below the nut “14” is released. To do this turn the nut “14” counterclockwise to the top.
   The function of this spring is to lift the perforating wheel in case of loss of air pressure.
4. Loosen the screw “11” and adjust the position of the perforating wheel by moving the support “105”.
   To get the right height position place two sheet of paper below the perforating wheel.
   Then adjust the up/down position of the support “105” so that the blade is cutting the top sheet, but not the lower one.
5. Once this point is reached, lock the support with screw “11”. This fixes the position of the support to a fix position.

ATTENTION:
To much distance between the perforating wheel and the anvil cylinder will result in excessive wear of the perforating wheel.
Too close adjustment of the perforating wheel to the paper will result in permanent perforation.
6. The strength of the perforation can now be adjusted by setting the perforating wheel permanent ON (EV override on the touch screen).
   By turning the screw “12” counterclockwise the perforation will be stronger, by turning the screw “12” clockwise the perforation will be less.
7. The perforating wheel can be sideways adjusted by loosening the set screw next to the adjustment screw “16”.
   Turning the adjustment screw “16” clockwise will move the perforation to the gear side. Turning the adjustment screw “16” counterclockwise will move the perforation to the operator side.
   Move the adjustment screw “16” only when the perforation wheel is not in the lowered (perforating) position.

Illustration 50: Sideways adjustment of vertical perforating blade
Illustration 51: selective perforating unit electrical cabinet

For details about the electrical cabinet please see the electrical schematic.
12 Maintenance

Before doing any maintenance, switch off the machine and guard the main switch with a pad lock. This Maintenance plan is based on a 40 hour week.

12.1 General

- Always keep the machine as clean as possible.
- Always look out for loose or worn parts and report them to a supervisor.
- Never abuse or misuse the machine.

12.2 Every month

- The fresh air filter in control cabinet must be cleaned or changed.
- The fresh air ventilator on the servo-drives must been cleaned.
- The belts on the gear side of the unit must be checked.
- Check the distance between the anvil cylinder and the perforating cylinder guide ring see chapter: 15.2 Adjustment of distance between perforating cylinder and anvil cylinder on page 62.
- Lubricate at the grease nipple inside the perforating cylinder cassettes. Important: Use only mineral oil based grease.

12.3 Every 1 year

- Check the gas strut on the top cover.

12.4 Every 2 year

- The battery in the CPU must be changed.
12.5 Pictures for maintenance

Illustration 52: Control cabinet air filter

Illustration 53: Air ventilator servo-drives

Illustration 54: Belts on gear side

Illustration 55: Lubricating the cassettes

Illustration 56: Gas strut on the top cover

Illustration 57: CPU battery
12.6 CPU battery

Illustration 58: CPU battery location in main control cabinet

Note: The CPU battery is necessary to save program/parameters in switched off mode. The CPU will lose the program/parameters if the machine / CPU are not in use for 2 years.

12.7 Spare parts

For details please refer to the spare part manual.

When ordering spare parts, it is important to note the type number and serial number of the machine together with the Part No. to facilitate correct identification of parts.

The type number and the serial number are written on the type plate at the drive side of the machine.
13 Trouble shooting

13.1 Printing problem
For printing problems please refer to the print head manual from Kodak Versamark.

13.2 Electrical control problem
If electrical problems occur please check the following points:
- All fuses are OK
- All cables connected
- Power supply OK (For details see: electrical schematic)
- Main switch is turned ON
- CPU fault; indicated with a red error light on the CPU
- Communication between Kodak Versamark controller and machine OK
- No drive fault

13.3 Machine running problem
If the machine will not run please check the following points:
- Main switch is turned ON
- Emergency stop button not released or reset
- No drive fault
- Nip roller are in correct position
- No web break

13.4 Paper processing problem
If paper running problems occur please check the following points:
- Correct web path
- Machine alignment
- Side guiding ring adjusted to paper width
- Web path is not obstructed
- All rollers turn easily
- No dryer drive fault
13.5  Perforating process problem

Possible solutions for perforation problems.

13.5.1. Second perforation not in the same position as the first perforation

Please check the following:
1. Are all belts correctly adjusted?
   They need to be very tight to minimize any disparity between the two cylinders.
2. Are the perforating blades worn out or incorrectly adjusted?
   If so please refer to chapter 10.11 Change of perforating blade on page 44
3. Are the pull wheels correctly adjusted?
   If there is too much pressure creases may occur on the paper, if there is too little pressure the paper may slip on the roller.
4. Are the perforating cylinders (cassettes) correctly mounted?
   Please do a complete factory setting. To do so refer to chapter 15.1 Change of cassettes on page 61 and following.
5. Check that the cassette positioning screws on the clamp bar are tight. Please refer to chapter 15.1 Change of cassettes on page 61.

13.5.2. Both perforations are at the same place but with variations on the layout

Please check the following:
1. Are all belts correctly adjusted?
   They need to be very tight to minimize any disparity between the two cylinders.
2. Are the perforating blades worn out or incorrectly adjusted?
   If so please refer to chapter 10.11 Change of perforating blade on page 44
3. Are the pull wheels correctly adjusted?
   If there is too much pressure creases may occur on the paper, if there is too little pressure the paper may slip on the roller.
4. Is the registration cue mark reader in the correct position?
   a. The mark needs to be in a clear area with no other marks or prints in between the register mark.
   b. The register mark needs to be of a minimum size of 4mm by 6mm.
   c. For a layout of where the cue marks need to be placed please refer to chapter 9.1 Paper layout on page 25.
5. Is the 0 position of the perforating cylinder correctly adjusted?
   Please refer to chapter 15.3 0-point setting of perforating cylinder on page 63
6. Is the In-and-Out-position correct adjusted?
   Please refer to chapter 15.3 0-point setting of perforating cylinder on page 63
7. Is the form length the same as the circumference of the cylinder?
   Please check the form length and change the cylinder if necessary.
8. Check that the cassette positioning screws on the clamp bar are tight. Please refer to chapter 15.1 Change of cassettes on page 61.
13.5.3. **Unit does not always perforate when it should**

Please check the following:

1. Does the paper move sideways in the unit?
   a. Please check that the moving dancer arm is parallel to the fix dancer arm.
   b. Please make sure that the unit is exactly in line with the rest of the machine.

2. Is the registration cue mark reader in the correct position?
   a. The mark needs to be in a clear area with no other marks or prints in between the register mark.
   b. The register mark needs to be at a minimum size of 4mm by 6mm.
   c. For a layout of where the cue marks need to be placed please refer to chapter 9.1 Paper layout on page 25.

3. Is the 0 position of the perforating cylinder correctly adjusted?
   Please refer to chapter 15.3 0-point setting of perforating cylinder on page 63

4. Is the In-and-Out-position correct adjusted?
   Please refer to chapter 15.3 0-point setting of perforating cylinder on page 63

5. Is the form length the same as the circumference of the cylinder?
   Please check the form length and change the cylinder if necessary.

13.5.4. **The unit perforates when it shouldn’t**

Please check the following:

1. Where are the cue sensors positioned?
   a. Please make sure the register cue sensor is positioned correctly above the register cue mark.
   b. Please make sure the perforating cue sensors are positioned correctly above the selective cue mark.
   c. Please make sure there are no other marks or prints in the same area the sensors are reading. For a layout of where the cue marks need to be placed please refer to chapter 9.1 Paper layout on page 25

2. If the sensors are positioned outside the paper it may be that they are always on (always read a cue mark). Please move the sensors above a white area.

13.5.5. **The perforation depth is not equal**

Please check the following:

1. Are the perforating blades worn out, or incorrectly adjusted?
   If so please refer to chapter 10.11 Change of perforating blade on page 44

2. Is the distance between the perforating cylinder and the anvil cylinder correctly adjusted?
   Please refer to chapter 15.1 Change of cassettes on page 61.

3. Check that the cassette positioning screws on the clamp bar are tight. Please refer to chapter 15.1 Change of cassettes on page 61.
14 Pneumatic locking bar

14.1 Overview

Illustration 59: Pneumatic locking bar
14.2 Vertical blade specification

The hardness of the anvil cylinder is 62 to 63 Rockwell C. Standard blades have hardness between 59 to 61 Rockwell C.

14.3 Blade specification

Perforating blade dimensions:
High = 19mm
Thickness = 0.7mm

Teeth: Any number of teeth per inch or millimeters can be used, depending on thickness of the paper. For micro perforation blades with 30-50 teeth per inch are recommended.

The advantages are:

1) Speed
   Saving a great deal of time when changing blades.
2) Low noise level operation
   Due to the shock absorbing system under the height adjustment screws.
3) Profitability
   The initial investment is quickly recuperated.
4) Safety
   Greater safety for the operator by eliminating any adjustment operations near the cutting blade edge.
5) Maintenance
   No maintenance is required. There are no locking nuts or bolts to service, as opposed to conventional bars.

14.4 Adjustment

1. Clean the slots.
   Care should be taken when cleaning, they may have a sharp edge or rough surface.
2. Install the bar and the safety side rings or safety side hold down bar locks.
3. Pre-adjust the bar height in the slot, lifting it by the two adjusting screws. The bar should be flush the cylinder perimeter.
4. Mount the perforating blade, resting it against the bar lip and side stops.

5. Use the air gun to supply air pressure into the pneumatic bladder. The gun nipple must be perfectly connected to the air valve while pressing the gun button for 3 or 4 seconds. In order to achieve the correct bladder pressure, first remove the air gun and then release the air trigger.

6. Undo the two adjusting screws previously adjusted (step 3) to allow self adjustment of the blade height when turning the cylinder for one revolution.

7. Throw-on the cylinder in the perforation position and inch forward one revolution to allow for self adjustment of the blade.

8. Screw in all the adjusting set screws to push the cushioned feet so they touch the bottom of the slot. Now the blade is ready for cross perforating the web. After a test, a slight fine adjustment might be required.

**14.4.1. Important remarks**

In order to achieve good results with this system:
1. Always use new blades and the same blade height.
2. Do not overrun perforating blades by readjusting them when failing to cut correctly, change to a new blade instead. If too much cutting pressure is applied due to blade defects, serious damage may occur to the bar lip.
3. Even if the bars are not used, keep them inflated inside the slots to avoid height miss adjustment.
14.4.2. General Description

The fast insertion system eliminates the slow and often complicated operation of changing and setting cross perforation blades once for all. The system only needs to be adjusted when installed. After installation changing the blades becomes a fast and simple operation taking only a few seconds owing to its pneumatically operated locking system. The bar is made from hard aluminum and the internally mounted pneumatic bladder is made from silicone rubber. The necessary air pressure is applied to each bar individually with a pneumatic gun. Once in the slot the bar height can be adjusted by a series of setting screws, each one resting upon oval cushioned feet. This absorbs the hit of the perforation blade against the anvil cylinder.

14.4.3. Slot dimension for pneumatic locking bar

Illustration 60: Slot dimension for pneumatic locking bar

<table>
<thead>
<tr>
<th>A min=22.5mm</th>
<th>B min=15mm</th>
<th>C min=1mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A max=No limitation</td>
<td>B ideal=19mm</td>
<td>C max=3mm</td>
</tr>
<tr>
<td>B max=No limitation</td>
<td>P1=19mm</td>
<td></td>
</tr>
<tr>
<td>X=No limitation</td>
<td>P2 min=0.7mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P2 ideal=0.7mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P2 max=1mm</td>
<td></td>
</tr>
</tbody>
</table>
15 Change of cassettes

Attention:
This procedure is only for trained service personnel. When removing parts we recommend the placement of all parts in order of their mounting, this will enable easier reassembly. It’s also recommended to check all bearings during disassembly. Before doing any maintenance work, switch off the machine and guard the main switch with a pad lock. For ease of access and to show details clearly, some covers have been removed. All covers must be remounted and in their closed position before restarting the machine.

15.1 Change of cassettes

To change the perforating cylinders follow these steps:

1. Remove the upper front cover.
2. Remove the two clamp bars holding the cassettes.
3. Disconnect the air hoses (four hoses) on both air cylinders.
4. Take out the two screws (two different size of screws) between the clamp ring and the cardan joint. Do not loose the clamp ring.

Illustration 61: drive shaft and clamp ring

5. Move the cassette away from the anvil cylinder and slide it out.
6. Lift the perforating cylinder cassette out of the unit with a hoist or a forklift.
7. Place the new cassette into place.
8. Fix the drive shaft (cardan shaft) and the air hoses.
9. Attach the clamp bars by tightening all screws equally.
10. Set the vertical grub screws to touch the cassette.
11. Tighten the angled grub screws.
12. Tighten the vertical grub screws.
13. It may be necessary to change the position of the cue mark sensors support. The distance between the cue mark sensor and the point of perforation of the perforating cylinder should be slightly more then 1 ½ of the document length.
14. Change the cylinder size on the touch screen according to the cylinder used.
15. When 2 different cylinder sizes are installed, only one cylinder can be used at a time.

If the tensioner mechanism does not give you enough belt slack then you can move the motor using the 4 motor mounting screws in the sloted holes.
15.2 Adjustment of distance between perforating cylinder and anvil cylinder

1. Switch the perforating cylinder you need to adjust “ON”. Switch the “EV Override” for this cylinder “ON”. This will force the perforating cylinder to be in its perforating position.

2. a) **Perforating Cylinder;** Adjust the distance between the anvil cylinder and the cross perforating cylinder guide ring to 0.1mm as shown on Illustration 62: Height adjustment with feeler gauge. The distance can be adjusted by the upper adjustable stop screw. Attention: This adjustment must be done on the perforating cylinder guide ring and not on the orange perforating cylinder.
   
b) **Magnetic Cylinder;** The magnetic cylinder needs to be adjusted to the height of the perforating plate. Start with 0.5mm on each side of the cylinder and then adjust the cylinder slowly until the perforation is good.

Illustration 62: Height adjustment with feeler gauge

Tighten the locknuts without moving the screws. Important: Tighten the locknuts at maximum 15Nm. Over tightening the locknut can break the adjustment screws.

**IMPORTANT:**
Tighten the locknuts at maximum 15Nm.
Over tightening the locknut can break the adjustment screws.
3. Switch the perforating cylinder you need to adjust “OFF”. Switch the “EV Override” for this cylinder “OFF”. This will force the perforating cylinder to be in its stand by position.

Illustration 63: adjust the stop screw

4. Set the stop screw so the distance between the anvil and perforation cylinders is 0.9mm
5. Mount all covers and switch on the unit.
6. If necessary, change the cut size on the touch screen in the “set cut size menu”.

15.3 0-point setting of perforating cylinder

1) Switch the unit off.
   a) **Perforating Cylinder**, manually turn the first cylinder until the blade matches the 0-point (180 degrees from the perforating point, see Illustration 64: Position for zero marks on cylinders).
   b) **Magnetic cylinder**, manually turn the first cylinder until the reference line approximately reaches the point of perforation, see Illustration 64: Position for zero marks on cylinders.

Illustration 64: Position for zero marks on cylinders
2) Loosen the screw that holds the magnetic sensor arm and place the arm in front of the magnetic sensor. It is recommended to place the first edge (in running direction) in front of the sensor. See the 3rd Picture of Illustration 66: Position for zero marks on cylinders. Be sure not to move the cylinder while doing this.

Illustration 65: Placing the reference mark in front of the magnetic sensor

3) Retighten the magnetic arm (0-point plate).
4) Do the adjustment of the encoder to the perforating cylinder. For details see chapter 15.4 Adjusting the encoder to the perforating cylinder on page 64.

15.4 Adjusting the encoder to the perforating cylinder

1. Switch the unit off and on.
2. Enter the setup menu and press the button “adjust cut size”, then select the right arrow twice.
3. Press the E-Stop button.
4. Rotate the cylinders in running direction one complete turn.
5. Rotate the cylinder in running direction to the position as described in point a) or b) depending on your cylinder.
   a) **Perforating Cylinder**, manually turn the first cylinder until the blade matches the 0-point (180 degrees from the perforating point, see Illustration 64: Position for zero marks on cylinders).
   b) **Magnetic Cylinder**, turn the first cylinder until the reference line approximately reaches the point of perforation, refer to Illustration 64: Position for zero marks on cylinders.
6. Open the screw holding the encoder and turn the encoder till you get the encoder position in the maintenance screen to 165 ± 5.
7. Retighten the screw after adjustment and mount all the covers.
8. Switch the unit off and on, then go into the operator screen.

Illustration 66: Position for zero marks on cylinders
15.5 Adjustment of both perforating cylinder to each other

1. Do some perforations using both cylinders. Make sure which perforation mark is from cylinder 1 and cylinder 2.
2. Open the clamp ring between the cardan joint and the perforating cylinder (see Illustration 67: Clamp ring between the cardan joint and the perforating cylinder on page 65) of the perforating cylinder 2 and turn the cylinder as much as necessary.
3. Do some test perforations, if required repeat step 2 until both perforations are in the same position.
4. Adjust the cue mark readers to the corresponding marks.

Illustration 67: Clamp ring between the cardan joint and the perforating cylinder
16 Change of cylinders in cassette

16.1 Change of perforating cylinder bearings

When changing the bearings on the perforating cylinder it is important to mount them the correct way as shown in Illustration 68: Inner spacer and outer spacer for perforating cylinder. The inner spacer (PSSC-2004-04) and outer spacer (PSSC-2004-05) must always be changed in pairs.

16.2 Backlash adjustment

When a cylinder bearing or a cylinder itself is changed, it is important to adjust the backlash. To adjust the backlash on the perforating cylinder it is important that the slotted round nut for hook spanners is not too tight. The calculated force to tighten the nut is 5 Nm. The screw should only be as tight as is needed to eliminate the backlash on the bearings. If the nut is too tight, the bearings may be damaged or create excessive heat.
17 Interface type 1

The following description shows the specification for the Type 1 Interface for digital printing machines.

17.1 Signals used on the Type 1 Interface

Slave connected The Slave connected signal is received from the slave unit and shows the master unit that a Slave is connected. As soon as the signal is on “high level”, the contact (NO) has been closed the Master know that an additional slave is connected or switched on otherwise the “Ready”, “Stop” and “Jog from Slave” signals will be ignored from this slave.

Ready The Ready signal is received from the slave unit and shows the master unit that everything is ok with this slave unit. The ready signal has to be on “high level”, the contact (NO) has to be closed. As soon as the ready signal is on “low level”, the contact (NO) is open the transport will do an E-Stop (Fast Stop). The ready signal is used for signals like:
- Web break
- E-Stop
- Drive fault
- Paper jam
- …

Stop The Stop signal is received from the slave unit and shows the master unit that everything is ok with this slave unit. The Stop signal has to be on “high level”, the contact (NO) has to be closed. As soon as the Stop signal is on “low level”, the contact (NO) is open the transport will do a Normal Stop. The stop signal is used for signals like:
- End of Roll
- Full Roll
- Stacker full
- Pack splicer empty
- …

Jog from Slave The Jog from Slave signal is received from the slave unit and tells the master unit to start jogging. The jog signal has to be on “high level”, the contact has to be closed. The master unit starts jogging after the following timing sequence: 3s ON, 0.5s OFF, Xs ON. X is the time how long the transport will jog. After stop jogging is a delay of 2s to restart jogging again without run the timing sequence again. The operator has to do this timing sequence to make sure he gives his attention on this jogging comment.

Jog to Slave The Jog to Slave signal is sent to each slave unit and tells them to start jogging. As soon as the contact (NO) will close the slave will start jogging (if needed).
Run to Slave  The Run to Slave signal is sent to each slave unit and tells them to switch in run mode (if needed).

6ppi  The 6ppi Signal supports the Slave units with a Pulse train signal of 6 Pulse per inch. The signal runs a 50% duty cycle and a Voltage from 10V at VJ1000 and 5V at VT3000.

17.2 Power requirements Type 1 Interface

The Type 1 Interface supplies the +24V and 0V (Ground) for the communication to the Slaves. The +24V Power drop is just for the communication. Do not use this power drop for anything else.

17.3 Timing Inputs Type 1 Interface

Slave1 connected
Ready Slave 1
Stop Slave 1
Jog from Slave
Jog to Slave
Run to Slave
Run Transport
Normal Stop
E-Stop
Transport moving
Slave1 connected
Ready Slave 1
Stop Slave 1
Jog from Slave
Jog to Slave
Run to Slave
Run Transport
Normal Stop
E-Stop
Transport moving
Slave1 connected
Ready Slave 1
Stop Slave 1
Jog from Slave
Jog to Slave
Run to Slave
Run Transport
Normal Stop
E-Stop
Transport moving
### 17.4 Interface 15 pin connector for unwind and rewind units

#### 17.4.1. Connector (socket)

Connector on the printing unit 15 pin D-Sub connector female. The following description shows the pin out for this connection:

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
<th>Detail information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ready</td>
<td>As long as the unit is ready a free contact (NO) will be closed and makes a connection between pin 1 and 11 or 12. As soon as the Ready signal is lost the Transport will do an E-Stop (Signals like “E-Stop”, “Drive fault”, …)</td>
</tr>
<tr>
<td>2</td>
<td>Stop</td>
<td>As long as the unit is ready a free contact (NO) will be closed and makes a connection between pin 2 and 11 or 12. As soon as the Stop signal is lost the transport will do a normal stop (Signals like “End of roll”, “Full roll”, …)</td>
</tr>
<tr>
<td>3</td>
<td>Spare</td>
<td>Connected to PLC for additional input if needed</td>
</tr>
<tr>
<td>4</td>
<td>Spare</td>
<td>Connected to PLC for additional input if needed</td>
</tr>
<tr>
<td>5</td>
<td>Jog form Slave</td>
<td>As soon as somebody push a Jog button on the Slave a free contact on the slave unit will close to make a connection between pin 5 and 11 or 12</td>
</tr>
<tr>
<td>6</td>
<td>Jog to Slave</td>
<td>As long as the transport will jog a contact (NO) between pin 6 and 7 will close</td>
</tr>
<tr>
<td>7</td>
<td>Jog to Slave</td>
<td>As long as the transport is in jog mode (production) a contact (NO) between pin 8 and 9 will be closed</td>
</tr>
<tr>
<td>8</td>
<td>Run to Slave</td>
<td>As long as the transport is in run mode (production) a contact (NO) between pin 8 and 9 will be closed</td>
</tr>
<tr>
<td>9</td>
<td>Run to Slave</td>
<td>As long as the transport is in run mode (production) a contact (NO) between pin 8 and 9 will be closed</td>
</tr>
<tr>
<td>10</td>
<td>6ppi Speed signal</td>
<td>Pulse train signal (50% duty cycle, Output signal 5-10VDC, VJ1000 10V, VT3000 5V) 6 Pulse per inch</td>
</tr>
<tr>
<td>11</td>
<td>+24V</td>
<td>Power supply</td>
</tr>
<tr>
<td>12</td>
<td>+24V</td>
<td>Power supply</td>
</tr>
<tr>
<td>13</td>
<td>0V</td>
<td>Power supply</td>
</tr>
<tr>
<td>14</td>
<td>0V</td>
<td>Power supply</td>
</tr>
<tr>
<td>15</td>
<td>0V</td>
<td>Power supply</td>
</tr>
</tbody>
</table>

### 17.5 Interface 37 pin connector

#### 17.5.1. Connector (socket)

Connector on the printing unit 37 pin D-Sub connector female. The following description shows the pin out for this connection:

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Free</td>
</tr>
<tr>
<td>2</td>
<td>Free</td>
</tr>
<tr>
<td>3</td>
<td>Spare</td>
</tr>
<tr>
<td>4</td>
<td>Ready</td>
</tr>
<tr>
<td>Pin</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
</tr>
<tr>
<td>5</td>
<td>Free</td>
</tr>
<tr>
<td>6</td>
<td>Free</td>
</tr>
<tr>
<td>7</td>
<td>Free</td>
</tr>
<tr>
<td>8</td>
<td>6ppi Speed signal&lt;br&gt;Pulse train signal (50% duty cycle, Output signal 5-10VDC, VJ1000 5V, VT3000 10V)&lt;br&gt;6 Pulse per inch</td>
</tr>
<tr>
<td>9</td>
<td>Slave connected&lt;br&gt;As soon as the slave is connected or switched on a free contact (NO) will make a connection between pin 9 and 23. As long as on this pin is no signal every other signal will be ignored from this connector.</td>
</tr>
<tr>
<td>10</td>
<td>Stop&lt;br&gt;As long as the unit is ready a free contact (NO) will be closed and makes a connection between pin 10 and 28. As soon as the Stop signal is lost the transport will do a normal stop (Signals like “End of roll”, “Full roll”,…)&lt;br&gt;Stop</td>
</tr>
<tr>
<td>11</td>
<td>Free</td>
</tr>
<tr>
<td>12</td>
<td>Free</td>
</tr>
<tr>
<td>13</td>
<td>Free</td>
</tr>
<tr>
<td>14</td>
<td>Free</td>
</tr>
<tr>
<td>15</td>
<td>Jog from Slave&lt;br&gt;As soon as somebody push a Jog button on the Slave a free contact on the slave unit will close to make a connection between pin 15 and 29.</td>
</tr>
<tr>
<td>16</td>
<td>Jog to Slave&lt;br&gt;As long as the transport will jog a contact (NO) between pin 16 and 17 will close</td>
</tr>
<tr>
<td>17</td>
<td>Jog to Slave&lt;br&gt;As long as the transport is in run mode (production) a contact (NO) between pin 18 and 19 will be closed</td>
</tr>
<tr>
<td>18</td>
<td>Run to Slave&lt;br&gt;Reserve for E-Stop contact for future use (NO)</td>
</tr>
<tr>
<td>19</td>
<td>Run to Slave&lt;br&gt;Reserve for E-Stop contact for future use (NO)</td>
</tr>
<tr>
<td>20</td>
<td>Reserve</td>
</tr>
<tr>
<td>21</td>
<td>Reserve</td>
</tr>
<tr>
<td>22</td>
<td>+24V Power supply</td>
</tr>
<tr>
<td>23</td>
<td>+24V Power supply</td>
</tr>
<tr>
<td>24</td>
<td>Free</td>
</tr>
<tr>
<td>25</td>
<td>Free</td>
</tr>
<tr>
<td>26</td>
<td>Free</td>
</tr>
<tr>
<td>27</td>
<td>Free</td>
</tr>
<tr>
<td>28</td>
<td>+24V Power supply</td>
</tr>
<tr>
<td>29</td>
<td>+24V Power supply</td>
</tr>
<tr>
<td>30</td>
<td>+24V Power supply</td>
</tr>
<tr>
<td>31</td>
<td>+24V Power supply</td>
</tr>
<tr>
<td>32</td>
<td>Free</td>
</tr>
<tr>
<td>33</td>
<td>Free</td>
</tr>
<tr>
<td>34</td>
<td>0V Power supply</td>
</tr>
<tr>
<td>35</td>
<td>0V Power supply</td>
</tr>
<tr>
<td>36</td>
<td>Free</td>
</tr>
<tr>
<td>37</td>
<td>Free</td>
</tr>
</tbody>
</table>
18 Paper handling and storage

18.1 Paper

There are many types and grades of paper available, e.g. bonds, carbonless, carbon coated, laids and woven, etc. Each manufacturer has their own specification for their papers. Between manufacturers you will find the paper varies, i.e. carbonless paper can have a different gramage base stock, different thickness of coating, different grade of fibres or laids and woven may vary with different percentages of cotton and paper fibre sizes etc. Always consult your paper supplier for technical handling and processing information, most suppliers will give you a handbook on their papers.

18.2 Handling

Handling of paper stocks is just as critical as storage, as poor handling practices can also damage paper stocks and consequently give rise to production problems.
Always handle packs and reels as little as possible to reduce the risk of damage.
Avoid bumping or dropping packs and reels of paper, particularly coated stocks which are pressure sensitive.
Avoid rolling reels, especially over rough surfaces.
Don’t tilt, spin or swivel reels on their edges.
Always stock packs in a sensible manner. Box finished packs as soon as possible and avoid over stacking packs.
The best way to handle reels when stripping off their protective wrappings is to keep them on one end of a pallet base, using a pallet transporter or forklift truck. Alternatively, a cradle trolley can be used, but make sure the frame is padded with a pressure absorbing material. Care should always be exercised when moving reels from a vertical to horizontal position for fitting press mandrels or airshafts etc. Ensure a pressure-absorbing pad of corrugated material or foam rubber is placed under the edge on which the tilt occurs. This will avoid crushing the edges of the web.
Always handle with care.
Note: Always consult paper manufacturers or suppliers for any specific paper handling requirements.
18.3 Storage

Paper should be stored in rooms suitable for paper storage. It should not be stored near radiators, heater blowers, water pipes, fans, open windows, in direct sunlight, next to walls or lying on the floor.

Climatic conditions should not be subject to large fluctuations. We recommend storing paper, especially chemical coated stocks under the following conditions: 18° to 20° Celsius (64° to 68° Fahrenheit) at 45 to 55% RH. To avoid processing problems, the paper should be wrapped if in pack form, until the stock is required for processing. If the stock is to be processed further at a later date, always re-box and wrap.

The paper temperature should be the same as of the processing room. Temperature changes are very significant in the cold months. Generally, paper should be stored under the above conditions for at least 130 hours before use.

As paper absorbs moisture it expands; as it loses moisture it shrinks. This movement expresses itself in one or more of the following ways: curl, waviness, or ‘tight’ edges to sheets, slack or ‘long’ edge on reels.

The result of this can cause miss-feeding, poor delivery, web wander, miss-register, creasing, etc.

Coated papers such as CB (coated back) CF, (coated front) and CFB (coated front and back) are more sensitive to humidity and temperature changes than standard plain stocks.

As full control of atmospheric conditions is rare, it is desirable to adopt certain practical procedures to inhibit the risk of any of the above faults developing.

When storing paper the following points should be considered:

- Always keep paper off the floor and away from heaters and walls.
- Always make sure reels and packs are stacked correctly. See Illustration 70: Paper storage.
- Always try to keep control of temperature and humidity – this is critical.
- Never turn heating off at night in cold or damp environmental conditions.
- If you have large opening doors, fit a draught screen around the door to reduce the effects of cold or damp air.