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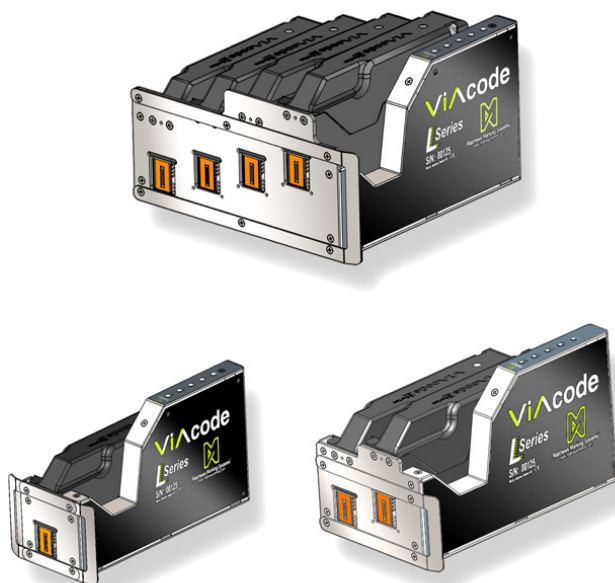
sales@getpacked.com.au

Thank you for choosing an ink jet printer

We sincerely hope you find this document to be informative and useful.

Comments regarding our documentation are always welcome and appreciated.

techdoc@matthews.se



L-Series PTM

User Guide

Version 1 Issue 2

Order number: 795 210.02

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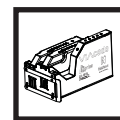
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Introduction



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Safety Considerations

Safety considerations specific to the operation of the *L-Series* PTMs are provided under the section "Safety Requirements" on page 3. Before installing or operating a *L-Series* PTM read and adhere to all of the safety instructions. Failure to read all safety instructions could lead to death, personnel injury, or damage to equipment.

The following paragraph formats are used throughout this manual to highlight safety issues and risk of damage to the equipment.



Warning

This symbol and text format is used throughout the manual to highlight warnings. A Warning is provided where circumstances could lead to personal injury or death.



Caution

This symbol and text format is used throughout the manual to highlight cautions. A caution is provided in circumstances where damage could occur to the equipment.

The following paragraph format is used throughout this manual to draw the reader to points of interest or notes.



Note

This symbol and text format is used throughout this manual to draw your attention to important information and tips.

Certification

The *L-Series* PTMs are certified in accordance with the requirements for CE marking. The equipment complies with the EMC Rules for a Class A (industrial environment) computing device.

Operation of the equipment in a residential area may cause unacceptable interference to radio and TV reception.

Matthews Marking Products disclaims all responsibility regarding the CE directive if the printer is used, altered, or installed in any way other than described in this manual.

About this Manual

This manual contains technical information with regard to safety, installation, and printer settings for the *L-Series* PTMs. It is important that all information regarding safety is read and adhered to. It is recommended that the reader begins by reading the section named 'Safety Requirements'

For information regarding the creation of messages, please refer also to the Operator's quick reference guide that is delivered with the *L-Series* PTMs.

Technical Support

For technical support within the USA call:

Table 1 - - Technical support details

| Time | Telephone number |
|---|------------------|
| 8:00 AM to 5:00 PM Eastern Time USA-weekdays | 1+ 412 665-2500 |
| 5:00 PM to 8:00 AM Eastern Time USA-and weekends | 1+ 412 365-8324 |

Safety Requirements



The following safety requirements are **important**. Read and adhere to the safety requirements before installing or operating a *L-Series* PTM.

Failure to read the safety requirements can lead to death, personal injury, or damage to the equipment.

Handling the Equipment



Warning

- *To avoid injury to personnel or damage to equipment, always use proper lifting and carrying techniques with the equipment.*
- *The L-Series PTMs must be properly mounted. There is a risk of injury to personnel or damage to the equipment if they are mounted incorrectly.*
- *Safety glasses and solvent resistant gloves must be used when contact with ink or solvent liquids is possible. If cleaning solution comes in contact with skin, wash immediately. If contact is made with eyes or mouth, wash them for at least 15 minutes and seek medical advice.*
- *All cables connected to a PTM must be located out of travel zones. They must be free from potential damage.*
- *Do not expose a PTM to smoke or naked flames. Ink and cleaner are flammable substances.*
- *If equipment is used in a manner not specified by Matthews Marking, the protection provided by the equipment may be impaired.*
- *Never ship or transport a PTM without following the procedures outlined in the maintenance section. Failure to correctly prepare a PTM can cause damage or injury.*
- *Do not open or interfere with a PTM's internal components. Only Matthews certified technicians are permitted to service the PTM.*

General Considerations



Caution

- *Use only Matthew's inks and cleaners. Use of other inks and cleaners could cause damage to the PTM or pose safety hazards and void the warranty.*
- *In the event of either a spillage or leak, PTMs must be shutdown immediately and isolated from any sources of heat, spark, or flames. Refer to ink MSDS for cautions, warnings, and appropriate clean up procedures.*
- *Good housekeeping practices and proper containment of ink, ink residuals, and incidental line leakage is critical. The customer is responsible for ensuring proper*

Safety Requirements

care and procedures are followed to ensure that PTMs and ancillary equipment are kept clean and well maintained.

- *In accordance with applicable federal and state environmental laws, the customer is responsible for properly disposing of the waste generated by the printing equipment. Refer to the relevant ink and cleaner MSDS sheets for cautions, warnings, and proper handling procedures.*

Overview



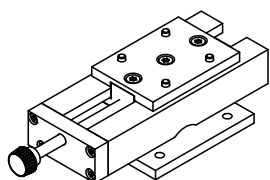
In the Box

Carefully remove the *L-Series* Print Technology Module (PTM) from its packaging and inspect it to make sure that no damage has occurred as a result of shipping. If there are any discrepancies, please contact your local Matthews dealer for further advice.

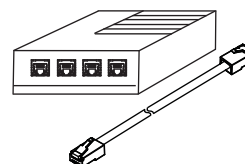
Ink-Cartridges and additional equipment, as shown below, are ordered separately to the PTMs.

Additional Equipment

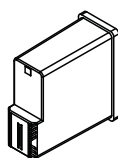
The following equipment can be ordered separately to the PTM. For further information contact your local dealer.



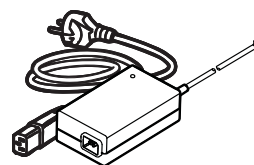
Head Mounting Bracket
and Post clamp



Ethernet cable/switch for connecting
PTMs to a Viacode PCM



Ink Cartridges



PTM Power-Supply-Pack
AC to DC

Figure 1 - Additional equipment

PTM Description

The *L-Series* PTMs are high resolution, thermal ink-jet print heads. The three models: *L12*, *L25*, and the *L50* are named in relation to the number of *Ink-Cartridges* they contain and the maximum print height, as listed below in Table 1.

Table 1 - *L-Series* model specification

| Model | Number of <i>Ink-Cartridges</i> | Maximum Print Height |
|------------|---------------------------------|----------------------|
| <i>L12</i> | 1 | 12,7 mm |
| <i>L25</i> | 2 | 25,4 mm |
| <i>L50</i> | 4 | 50,8 mm |

Each *Ink-Cartridge* has 320 nozzles, although only 300 are used for printing. The remaining twenty are used for head adjustment purposes. All models have the same resolution (600 dpi), it is simply the print height that differs. The *L25* and the *L50* are the same in all other respects as the *L12*.

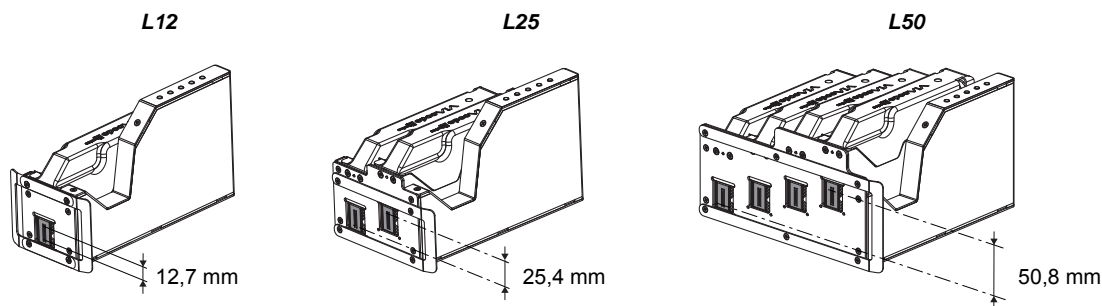


Figure 2 - *L-Series* models

External Components

Provided below is an overview of the *L12* PTM and its main components. A description of the connections on the PTM are also provided.

The external parts are the same for all models, it is only the number of *Ink-Cartridges* that differ.

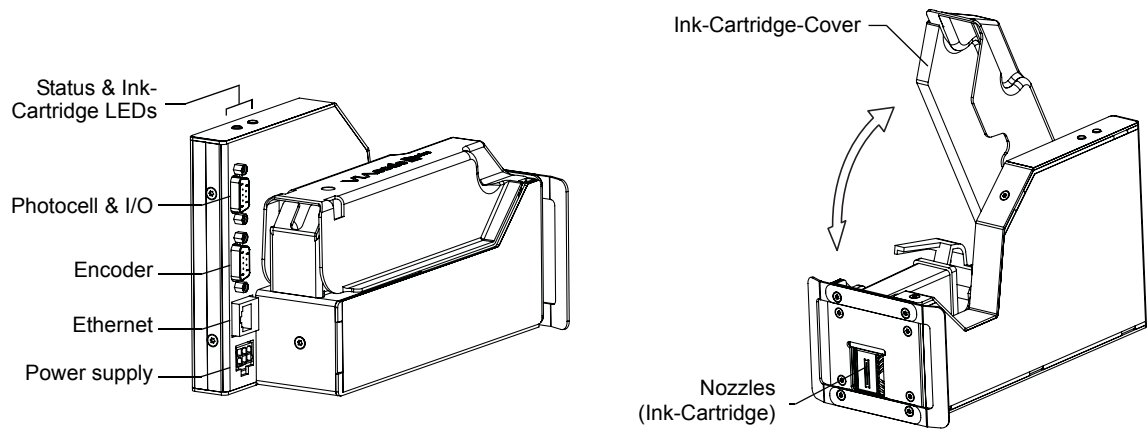


Figure 3 - External components

LEDs – All PTMs have a *Status* LED and a LED for every *Ink-Cartridge*. The *L12* has one *Ink-Cartridge* LED, as shown above. The *L25* has two *Ink-Cartridge* LEDs, and the *L50* has four.

The *Status* LED is lit green whenever power is supplied to a PTM — it will blink when printing. The *Ink-Cartridge* LEDs have the following states:

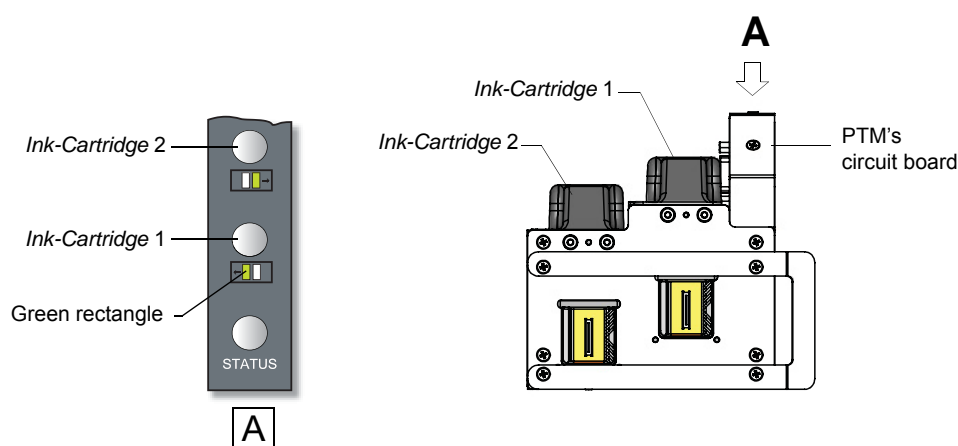
Table 2 - *Ink-Cartridge* LED states

| LED State | Meaning |
|--------------|------------------------------------|
| Not lit | The <i>Ink-Cartridge</i> is OK. |
| Constant red | There is no <i>Ink-Cartridge</i> . |

Table 2 - *Ink-Cartridge* LED states

| LED State | Meaning |
|------------------------|--|
| Fast blinking red | There is a fault with the <i>Ink-Cartridge</i> . |
| Slow blinking red | Low ink — approximately 10% remaining. |
| Two-pulse blinking red | The <i>Ink-Cartridge</i> is empty. |

Each *Ink-Cartridge*, in the *L25* and in the *L50*, is identified by a green rectangle below its corresponding LED, as shown below.

Figure 4 - *Ink-Cartridge* numbering (*L25*)

The left most green rectangle, under the first *Ink-Cartridge* LED, as shown above, corresponds to *Ink-Cartridge* number one.

The *Ink-Cartridge* nearest the PTM's circuit board, as shown above, is always number one. All other *Ink-Cartridges* are numbered consecutively, downwards.

As there is only one *Ink-Cartridge* in the *L12*, there is only one *Ink-Cartridge* LED, that is simply named *PEN*.

PHOTOCELL & I/O – Used to connect a photocell. A photocell detects an approaching print target on a production line and sends a signal to the PTM. The PTM will then print the selected message one or more times as specified in the PCM's (Print Control Module) installation settings.

The connection can also be used for an output signal — typically a warning beacon that is used to signal low ink. Configuration of the output signal is done in the PCM's *Configuration* menu under *External I/O*. Refer to the PCM's Technical Manual for further information.

ENCODER – Used to connect a Matthews speed encoder. An encoder monitors the speed of the print target on a production line and sends a signal to the PTM. The signal from the encoder ensures that the speed of printing corresponds to the print target's speed.

ETHERNET – Used to connect PTMs to a PCM. The PCM is used to configure PTM installations and the messages they will print. Matthews Ethernet cable is used to connect the PTMs to the PCM and create a dedicated network. If more than one PTM is used, they must be connected to a Matthews Ethernet switch first.

POWER SUPPLY – Used to connect the Power-Supply-Pack to a PTM.

Labeling

A PTM’s serial number is located on the side of it, as shown below.

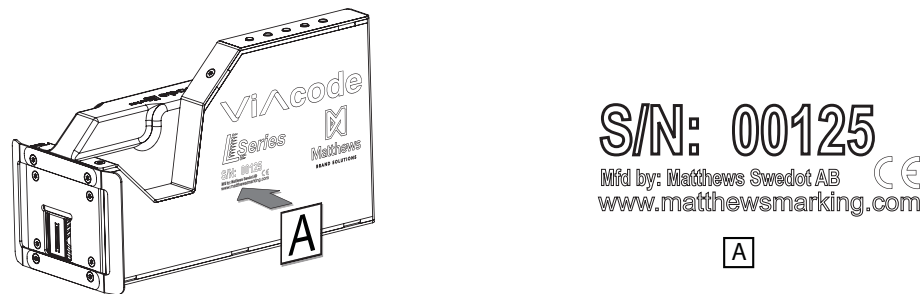


Figure 5 - Serial number

Operating Requirements.

Before installing or operating a PTM, read and adhere to all of the safety instructions as provided under “Safety Requirements” on page 3.

The operating and power supply requirements for the *L-Series* are provided below in Table 3. Strictly obey the electrical specifications provided in this manual.

Table 3 - Operating requirements

| Feature | Specification |
|---------------------------|--|
| Operating Temperature: | 50°F – 104°F (10°C – 40°C) |
| Main power supply | Matthews power supply pack used: Single phase 110 – 240 VAC, 50 – 60 Hz, 0.8 A Direct connection: 24 VDC ± 0,5 V, 90 W, filtered DC |
| Enclosure Classification: | None |
| Operating Environment: | The PTM must be free from vibration or the possibility of being hit. It must be correctly mounted as described in this manual. |

System Overview

The *L-Series* PTMs are configured and controlled using a Matthews Viacode PCM (Print Control Module), which is sold separately. Communication with PTMs is done over a Viacode dedicated Ethernet network. A single PTM can be connected to the PCM either directly or via a Matthews Ethernet switch. If more than one PTM is installed they must be connected to a switch first and then to a PCM.

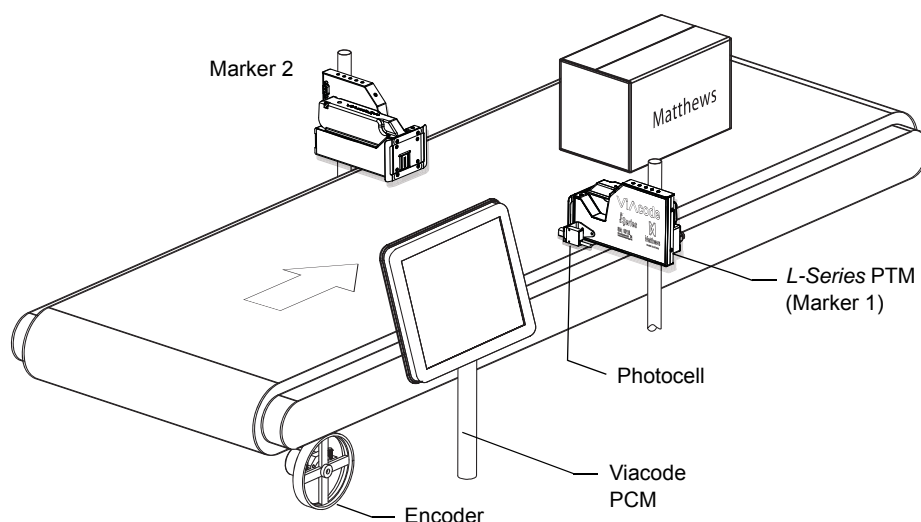


Figure 6 - System overview – typical set up

Message creation and editing is done in the graphical user interface (GUI) of the PCM. Information regarding the control and creation of messages can be found in the Technical Manual for the Viacode PCM.

A typical print system for a production line would consist of one or more PTMs, an encoder, and a photocell, as shown above.

In the example shown above there are two Markers: *Marker 1* and *Marker 2*. Each *Marker* prints the text *Matthews* on to the respective side of the print target. Both *Markers* are controlled by the same photocell and the same encoder, which are connected to *Marker 1*. All configuration settings for the two markers are managed from within the *Configuration* menu of the PCM.

The photocell and the encoder are sold separately and can be purchased from Matthews. The photocell is used to detect an approaching print target and signal that a printout should be made.

An encoder is used to monitor the speed of an approaching print target. The signal from the encoder is used to ensure that the print speed is matched to the print target's. An encoder is particularly important in installations where the speed of the production line (print target) is unpredictable. Matthews Marking recommends that an encoder is always used.

Dimensions

Provided below are the external dimensions of the *L-Series* PTMs. All dimensions are provided in [inches] and mm.

- *L12* PTM

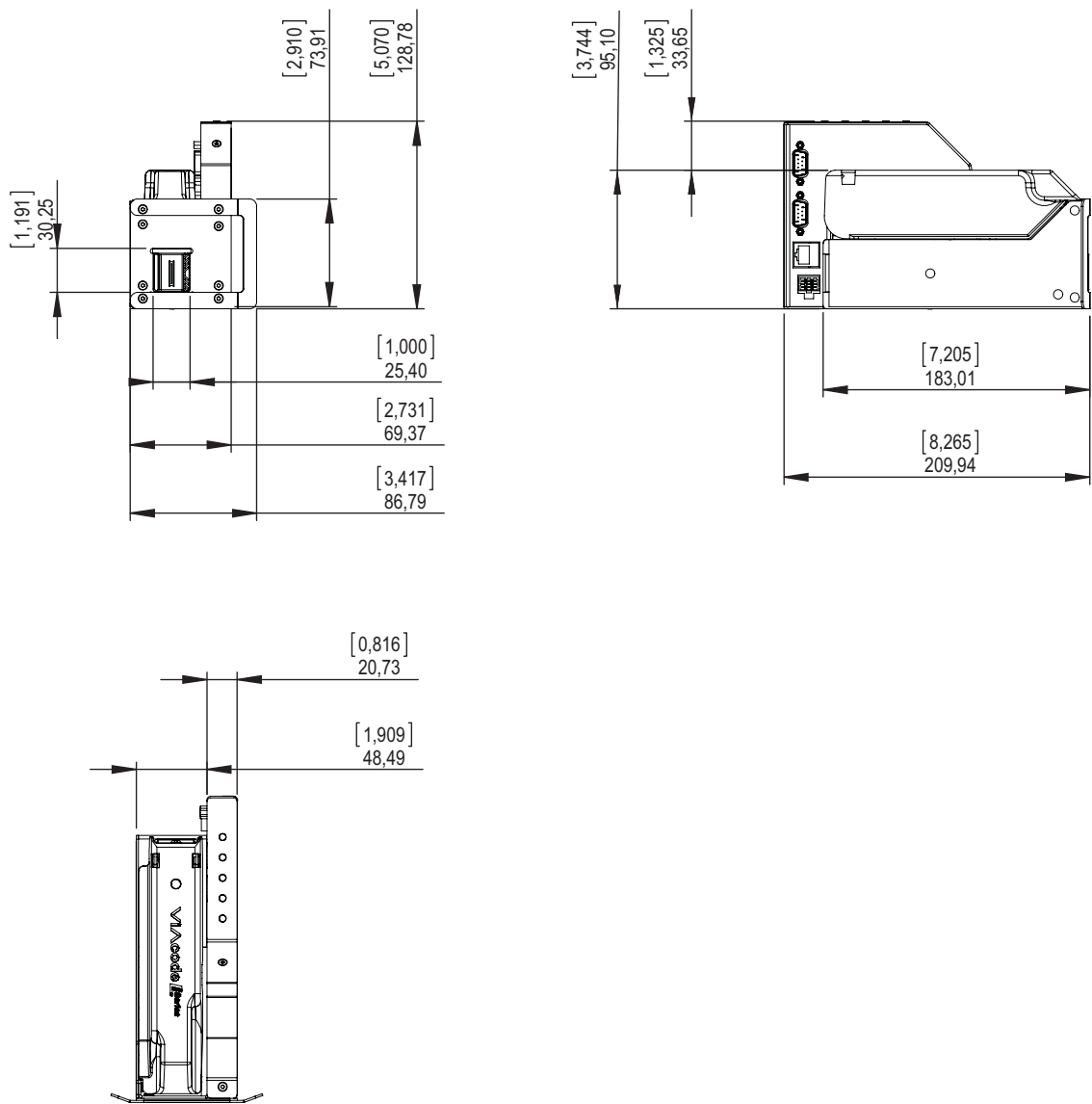


Figure 7 - *L12* dimensions

• L25 PTM

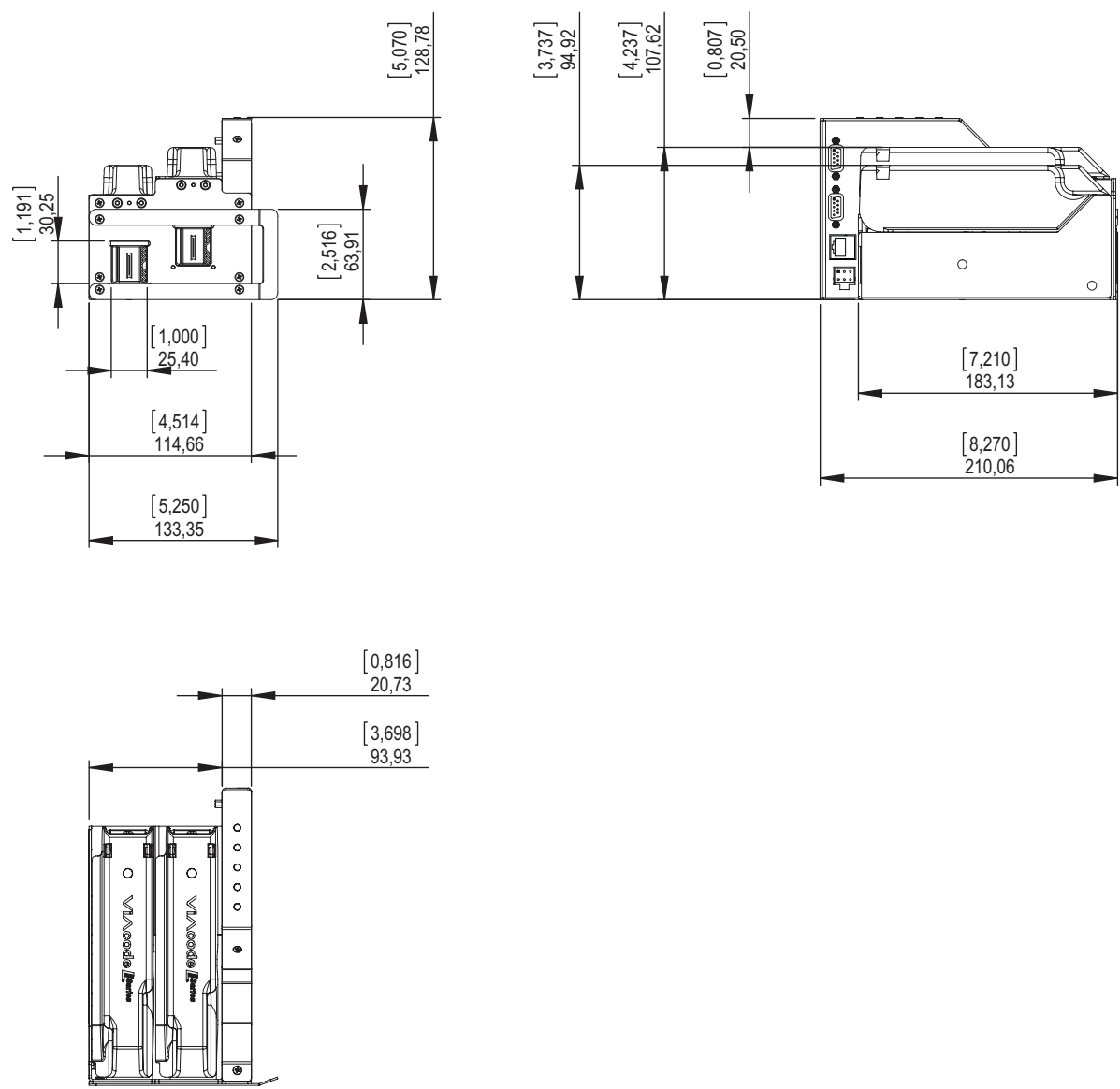


Figure 8 - L25 dimensions

- L50 PTM

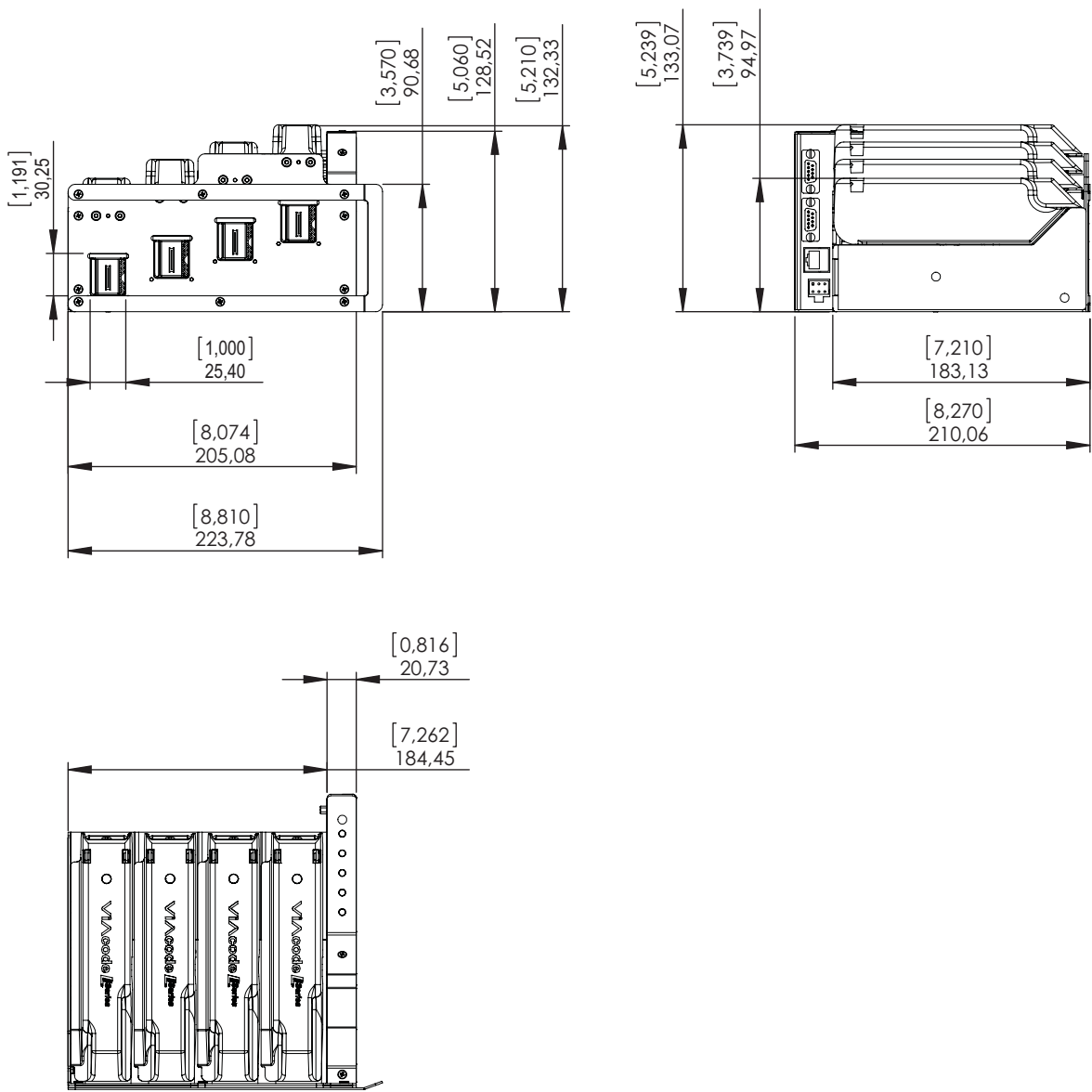


Figure 9 - L50 dimensions

Mounting Holes

The *L-Series* PTMs have mounting holes that are intended for use with a Matthews: photocell, mounting-bracket, or mounting-post. The pre-manufactured M4 holes are the same for all models. The holes are hidden behind the labels that are stuck on to the sides of a PTM. Simply pierce the labels to access them.

Provided below is an overview of the *L12* model, however the mounting holes are the same for all models.

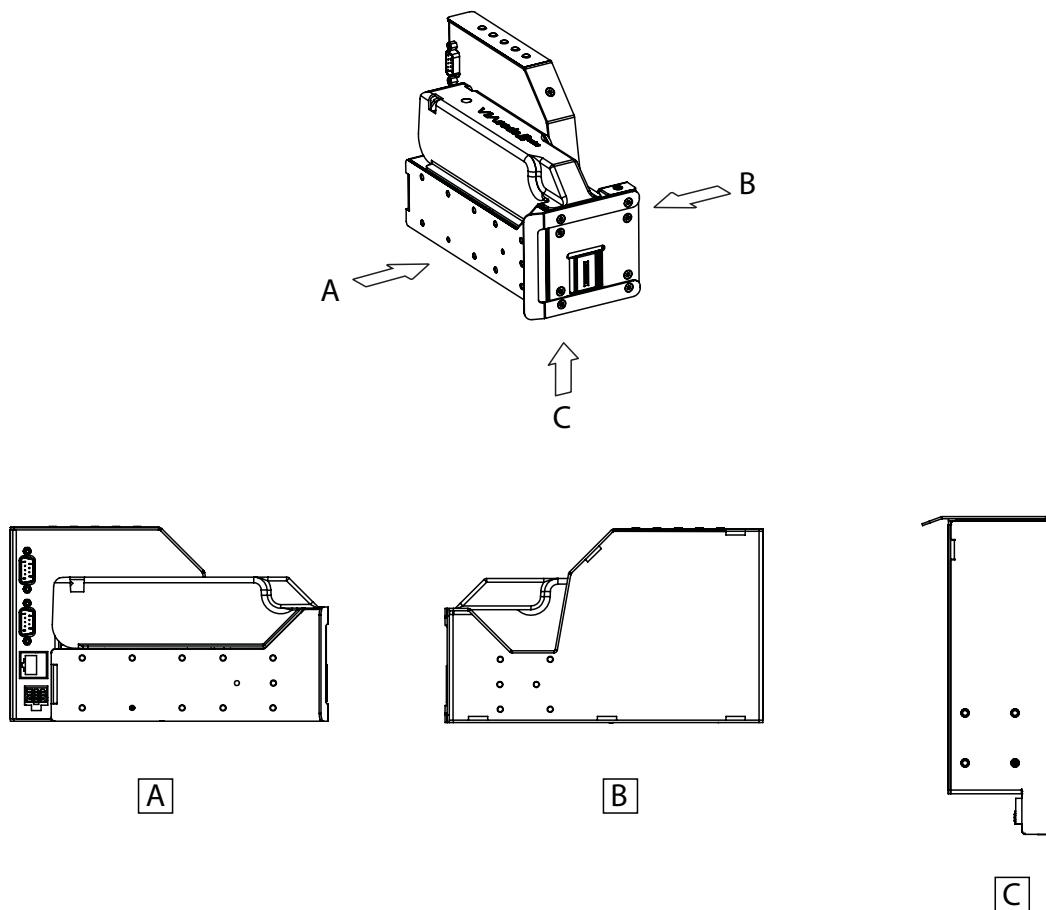
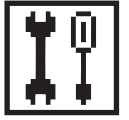


Figure 10 - Mounting holes

M4 bolts must be used in the mounting holes. The bolts must not protrude more than 1 cm in to the holes.

Installation



Mounting a PTM

Before installing or operating a *L-Series* PTM read and adhere to all safety warnings, as provided under “Safety Requirements” on page 3.



Caution

The L-Series PTMs must be installed as described below. Failure to install them correctly can lead to poor print quality.

For best results the *L-Series* PTMs should be mounted so that they are free from vibration. In addition, the following must be adhered to when mounting a *L-Series* PTM. Make sure that:

- The PTM cables are secure and safely routed.
- The PTM is protected from contact with the print target. If necessary, install guard rails to protect the PTM from impact.
- The PTM’s nozzles are positioned so that they are perpendicular to the print target’s face. The nozzles should be at zero degrees in the X, Y, and Z axis, as shown below.

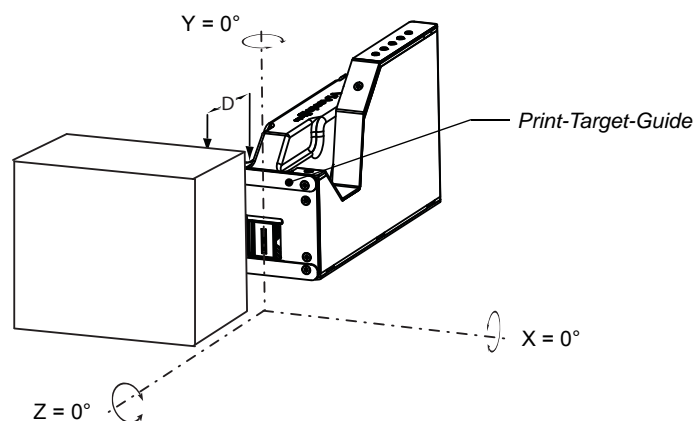


Figure 11 - Mounting a PTM

- The nozzles are as close as possible (distance D) to the print target but not in contact. Refer also to “Print/throw distance” on page 27 for specific guidelines.

Vertical or Horizontal Mounting

The *L-Series* PTMs can be mounted either horizontally or vertically so that the nozzles are pointing downwards, as shown in Figure 12 below. However, they must not be mounted so that the nozzles point upwards. The PTM will fail to print properly if the nozzles are mounted pointing upwards.

Matthews Marking can supply a mounting bracket and a post clamp, as shown below, that are specifically designed for the *L-Series* PTMs. These allow for easy mounting and adjustment of the PTMs.

They are designed to be attached to either the sides or the bottom of a PTM. The corresponding (M4) mounting holes for the bracket and post are hidden behind the Viacode labels, as shown. Refer to “Mounting Holes” on page 13.

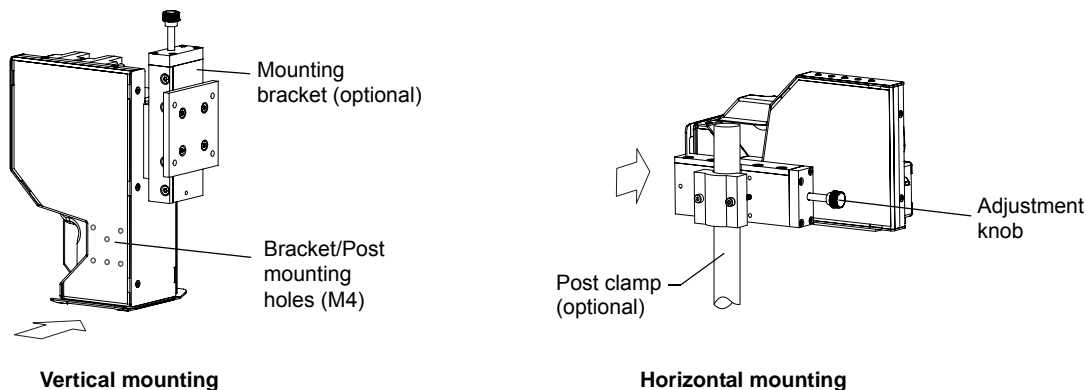


Figure 12 - PTM mounting bracket

The mounting bracket is spring loaded and allows for fine adjustment. For further information regarding this and other additional equipment please contact your local Matthews distributor.

Print Target Guide

The *L-Series* PTMs are supplied with a *Print-Target-Guide* plate. This is used to prevent the PTM from being impacted and guide the print target correctly in front of the nozzles.

The *Print-Target-Guide* should be mounted either to the right or to the left of the PTM’s nozzles, dependent upon the direction of the moving print target.

If the print target travels from right-to-left, when standing behind the PTM, the *Print-Target-Guide* must be fitted to the right of the nozzles, as shown below. Likewise if the print target travels from left-to-right it should be fitted to the left of the nozzles.

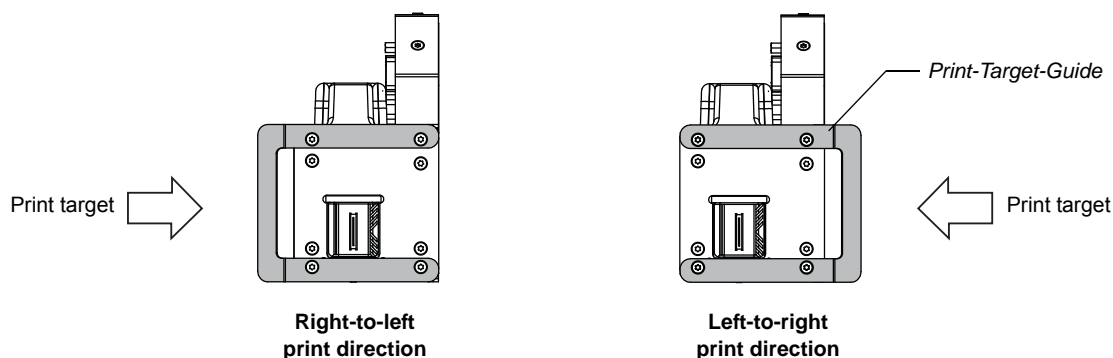


Figure 13 - Mounting the *Print-Target-Guide*

Installing a Photocell

A photocell detects an approaching print target and signals that a printout should be made. Matthews Marking recommends that a photocell is used. It is easily attached to the side of the PTM using a Mathews Mounting-Bracket, as shown in Figure 6, on page 9.

The photocell must be positioned upstream of the PTM, so that the print target passes in front of it first, before passing the PTM's nozzles. Ideally the photocell should be mounted as close as possible to the PTM.

The measured distance between the photocell and the PTM's nozzles will be required when configuring a PTM installation in the PCM.

The photocell must be connected to the DSUB connection that is labeled *PHOTOCELL & I/O* on the back of the PTM.

The PCM will list the PTM that has the photocell connected to it when configuring a print head installation. Further information regarding configuration can be found in the Technical Manual for the PCM.

Installing an Encoder

An encoder is used to monitor the speed of the approaching print target. Typically the encoder is mounted so that its wheel is rotated by the production line, as shown in Figure 6, on page 9. Where possible mount the encoder as close as possible to the PTM.

The encoder sends a signal to the PTM and ensures that the speed of printing is matched to that of the approaching print target. An encoder must be used in installations where the speed of the production line is unpredictable or uneven. If an encoder is not used printouts will be affected by uneven movements in the production line. Matthews Marking recommends that an encoder is always used.

The encoder must be connected to the DSUB connection labelled *ENCODER* on the back of the PTM.

The PCM will list the PTM that has the encoder connected to it when configuring a print head installation. Further information regarding configuration of a print installation and the encoder can be found in the PCM's Technical Manual.

Connecting to a PCM



Caution

Use only Matthew's PTM cables and switches when connecting PTMs to a PCM. The quality of printouts can be affected, or print problems can occur, if other cables/switches are used.

PTMs must be connected to a Viacode PCM in order to configure and operate them. The PCM is used to manage PTM installations and create the messages they will print.

Connection to a PCM is done using Matthews Ethernet cable. A single PTM can be connected either directly to a PCM or via a dedicated Viacode Ethernet switch.

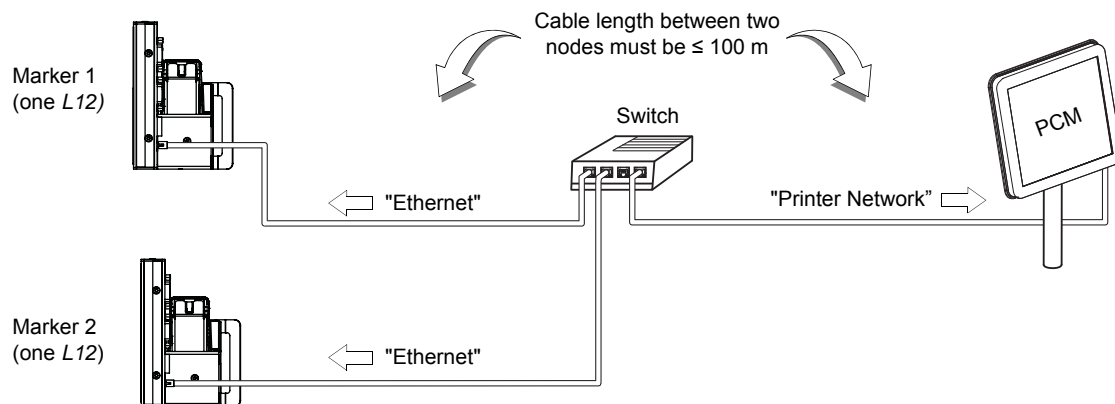


Figure 14 - Connecting a PTM to a PCM

If more than one PTM is used they must first be connected to a Viacode Ethernet switch and then to a PCM, as shown above. The maximum distance between the PTMs and the switch is 100 m. The maximum distance between the switch and the PCM is also 100 m.

PTMs are connected to the RJ-45 connection that is labelled "Printer Network" on the PCM's interface panel. This connection must be used only for Viacode devices. It is a proprietary network. Do not connect Viacode devices to any other connection.

The Ethernet cable is connected to the RJ-45 connections labelled "Ethernet" on the PTMs.

Installing Ink-Cartridges

Caution

Use only Matthews Marking Ink-Cartridges. The use of other Ink-Cartridges can result in poor print quality or damage to the PTMs. All Ink-Cartridges must be of the same ink type. Do not use different types of Ink-Cartridges in the same PTM.

Before installing or replacing an Ink-Cartridge(s) make sure that they are of the correct ink type. The type of ink used is clearly stated on the cartridge, as shown below.

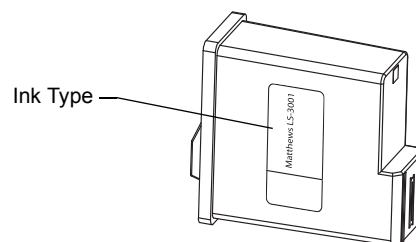


Figure 15 - Ink-Cartridge labelling

To either insert or replace an *Ink-Cartridge*, simply open the *Ink-Cartridge-Cover* and then release the *Ink-Cartridge-Lever* as shown below.

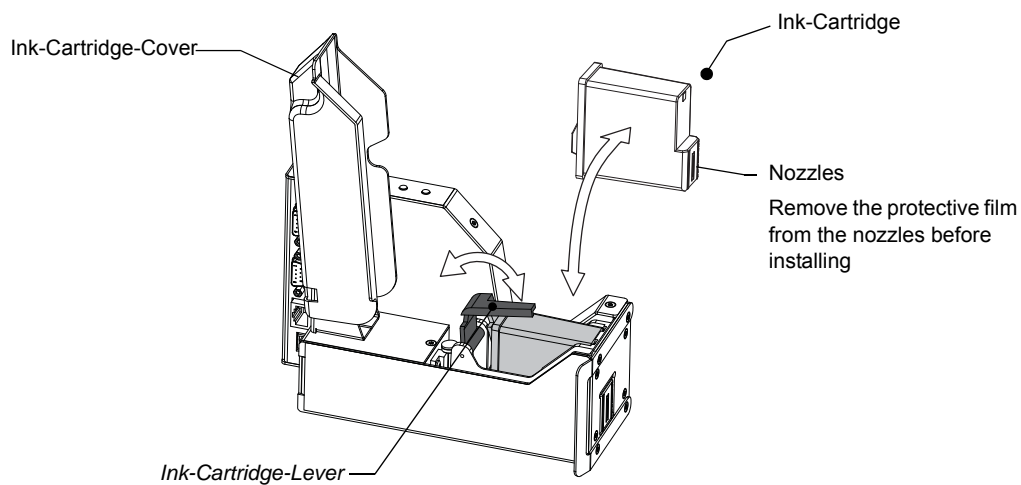


Figure 16 - Replacing an *Ink-Cartridge*

Remove and then click the new *Ink-Cartridge* in place. Secure the *Ink-Cartridge* in place with the *Ink-Cartridge-Lever* and then close the *Ink-Cartridge-Cover*.

Make a number of print test to verify that a satisfactory print is produced. If necessary, the nozzles can be adjusted as described under “Nozzle Alignment Settings” on page 20.

Nozzle Alignment

As the *L25* and the *L50* PTMs have more than one *Ink-Cartridge*, it may be necessary to make some fine adjustments in order to obtain a satisfactory print. Adjustment is normally only required when installing for the first time or after replacing an *Ink-Cartridge*.

Initial Installation

After installing a PTM for the first time, perform a number of print tests, and then inspect the quality of the printouts. If there are gaps in the text, as shown below, the PTM will require some adjustment.



Figure 17 - Poor print quality

It is recommended that the PTM is simply rotated to the left or to the right by approximately half of a degree, as shown below, to correct any initial alignment issues.

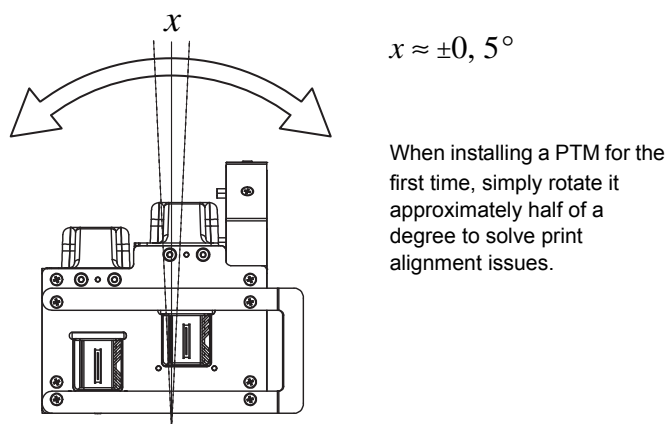


Figure 18 - Rotating the PTM

After rotating the PTM make a number of further print tests and inspect them. If the printed text still contains gaps or requires horizontal adjustment (see Figure 20, on page 21) refer to 'Nozzle Alignment Settings' below.

Nozzle Alignment Settings

Adjustments for *Ink-Cartridges* can be made from within the *Maintenance* menu of the PCM, under *Printer Maintenance*, as shown below. This is, however, not normally required.

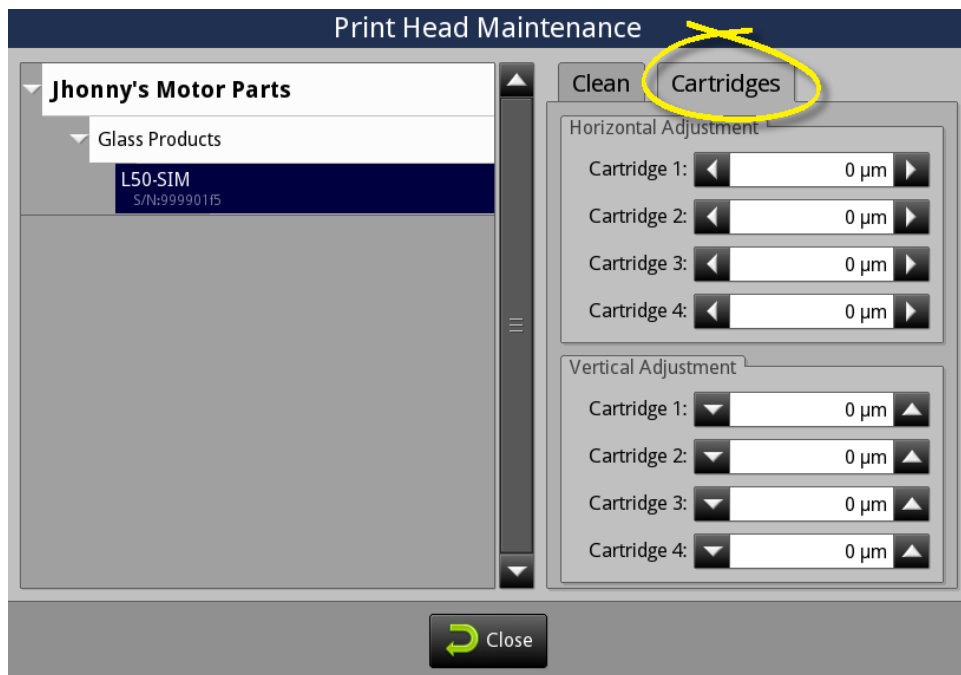


Figure 19 - Alignment settings

Selecting the actual PTM from those listed on the left, and then the *Cartridges* tab, highlighted above, will display the PTM's adjustment settings.

Cartridge 1 corresponds to *Ink-Cartridge 1*. *Ink-Cartridge 1* is the cartridge nearest the PTM's circuit board, as shown in Figure 4, on page 7. All other *Ink-Cartridges* are numbered consecutively, downwards.

Adjustments can be made both horizontally and vertically. Horizontal adjustments are made by simply entering a value in the range $-4000\ \mu\text{m}$ – $4000\ \mu\text{m}$ for a specific *Ink-Cartridge*. The entered value must be a measurement taken from an actual printout, where it can be seen that a dis-alignment exists, as shown in Figure 20 below. No physical adjustment can be made horizontally, the entered value is used to correct alignment, automatically, with respect to speed and time.

Vertical adjustments are made with respect to a physical shift of the active nozzles, either upwards or downwards. Each *Ink-Cartridge* has 320 nozzles, however only 300 are ever active.

Ten nozzles above, and ten nozzles below the active nozzles allow for a physical shift within these two margins, either up or down. When adjusting the vertical alignment settings a value of $-381\ \mu\text{m}$ – $423\ \mu\text{m}$ (integer) can be entered, which corresponds to a shift in the nozzles, either up or down.

While it is relatively simply to correct any horizontal differences, some trial and improvement may be required when correcting any vertical adjustment.

Provided below is an example of a printout that would require adjustment. Noticeably there is a gap in the text and there is a horizontal mis-alignment.

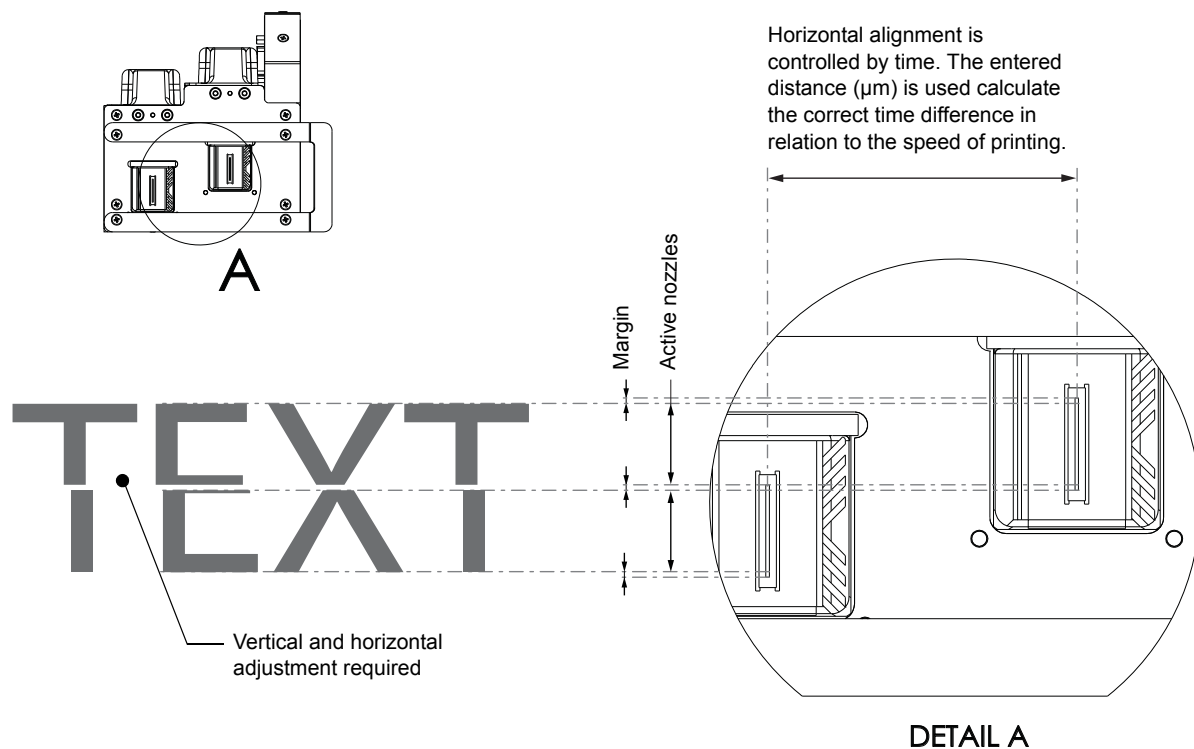


Figure 20 - Nozzle adjustments

Maintenance and Handling



Make sure that the following warnings and cautions are read and adhered to before carrying out any maintenance work on a *L-Series* PTM.

Warning

- *Safety glasses and solvent resistant gloves must be used when contact with ink or solvent liquids is possible. If cleaning solution comes in contact with skin, wash immediately. If contact is made with eyes or mouth, wash them for at least 15 minutes and seek medical advice.*
- *Do not expose a PTM to smoke or naked flames. Ink and cleaner are flammable substances.*

Caution

- *Use a lint free cloth when cleaning a PTM's nozzles. Do not use a cloth that has lint in it. The lint can lead to the nozzles becoming clogged.*
- *Never shake an Ink-Cartridge. Shaking an Ink-Cartridge can cause permanent damage to the nozzles.*

PTM Cleaning

The *Ink-Cartridges* in the *L-Series* PTMs must be cleaned whenever excess ink builds up on the nozzles. Regularly inspect the nozzles and clean if necessary. To clean an *Ink-Cartridge* follow the procedure listed below.

Procedure – Cleaning the Nozzles

1. Remove the *Ink-Cartridge* from the PTM as described under “Installing Ink-Cartridges” on page 18.
2. Get a lint free cloth and some deionized water.
3. Moisten the cloth with the deionized water.
4. Place the tip of the *Ink-Cartridge*'s nozzles on the lint free cloth and then **slowly** and **softly** move the *Ink-Cartridge*, to wipe the nozzles clean, as shown below.

Caution: Do not use a dry cloth or one that has lint in it! Do not use excessive force when wiping the nozzles!

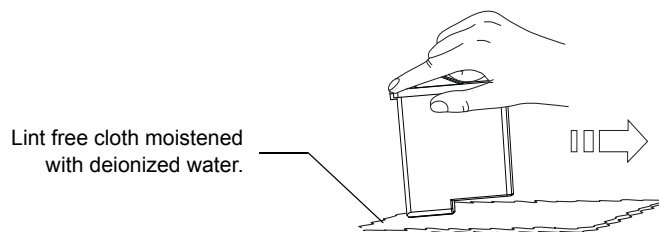
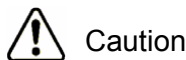


Figure 21 - Cleaning nozzles

5. Put the *Ink-Cartridge* back in to the PTM and make sure it is secure.

Replacing an Ink-Cartridge



Caution

Use only Matthews Marking Ink-Cartridges. The use of other Ink-Cartridges can result in poor print quality or damage to the PTM. All Ink-Cartridges must be of the same ink type. Do not use different types of Ink-Cartridges in the same PTM.

When an *Ink-Cartridge* is low on ink, approximately ten percent remaining, its LED will begin to blink red, slowly. It will blink two red pulses when empty.

If it blinks red fast, there exists a problem with the *Ink-Cartridge* and it should be replaced. To replace an *Ink-Cartridge* refer to “Installing Ink-Cartridges” on page 18.

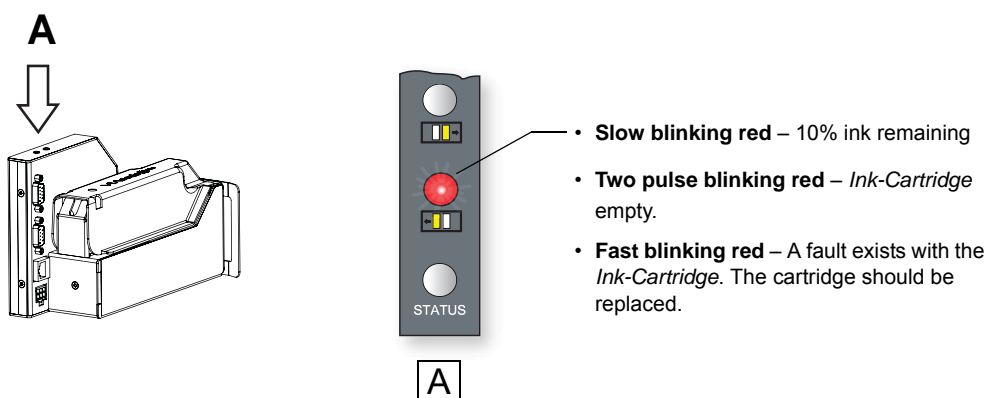


Figure 22 - Low ink warning

Storage

If a PTM is to be left inactive for less than two days, leave the *Ink-Cartridges* in it. Before using the PTM again, purge each *Ink-Cartridge* as described under 'Purging the Nozzles'.

More than Three Days

If a PTM is to be left inactive for a period of time greater than three days, the *Ink-Cartridges* should be removed and placed in an air tight container with a damp cloth or a sponge. This will prevent the ink from drying and ensure good print quality when next put in service.

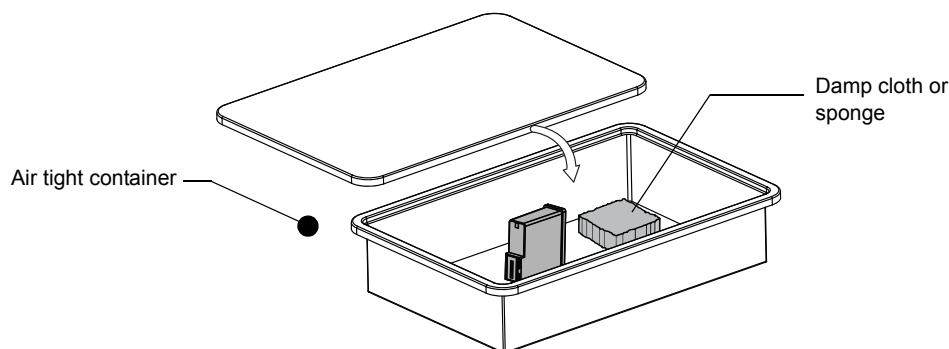


Figure 23 - Long term storage

Before using again, purge each *Ink-Cartridge* as described under 'Purging the Nozzles' below.

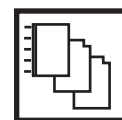
Purging the Nozzles

If a PTM is left inactive for a period of time more than three days the nozzles should be purged before use, as described below.

Procedure – Purging Nozzles

1. Clean the *Ink-Cartridge* as described under "PTM Cleaning" on page 23.
2. Create a message that contains an image with full coverage (all pixels are colored).
3. Print the message at least three times so that the nozzles are fully purged.

Appendix



Technical Specifications

Table 1 - Technical specifications

| Specification | Comment |
|----------------------------|---|
| Dimensions | See "Dimensions" on page 10. |
| Electrical | Matthews power supply pack used: Single phase 110 – 240 VAC, 50 – 60 Hz, 0.8 A Direct connection: 24 VDC \pm 0,5 V, 90 W, filtered DC |
| External Interface | Ethernet – Proprietary |
| <i>Ink-Cartridges</i> | Matthews <i>Ink-Cartridges</i> only. |
| IP classification | None |
| Maximum mark size | <ul style="list-style-type: none">• <i>L25</i> – 0.5" (12,7 mm)• <i>L25</i> – 1.0" (25,4 mm)• <i>L50</i> – 2.0" (50,8 mm) |
| Maximum print speed | 1 600 ft/min (487.68 m/min) |
| Message and object storage | Virtual – Unlimited |
| Minimum font height | All <i>L-Series</i> : 5/16" (2 mm) |
| Print direction | Bi-directional |
| <i>PTM</i> orientation | <ul style="list-style-type: none">• Horizontal• Vertical — nozzles pointing downwards only |
| Print/throw distance | <p>As close as possible but not in contact with the substrate. In addition, the following should be observed:</p> <ul style="list-style-type: none">• <i>Small text</i>: 1 mm – 1.5 mm• <i>Barcodes</i>: 1 mm – 1.5 mm• <i>Large text</i>: up to 6 mm <p>The speed of the print target will also affect print quality. The faster the speed, the closer the <i>PTM</i> should be to the print target.</p> |
| Resolution | 600 dpi (300 per <i>Ink-Cartridge</i>) |

Documentation History

Each Technical Manual has been written for a specific *L-Series* version or major hardware feature. Table 2 lists which manual should be used with which the *PTM*.

Table 2 - Document history

| Manual version number | Manual issue date (month/year) | Hardware version number | Major updates in manual |
|-----------------------|--|-------------------------|-------------------------|
| V1 I2 | 01/13 | 125 and above | See note 2 |
| V1 I1 | 01/13 | 125 and above | See note 1 |
| Note 2 | Correction made to the information regarding <i>Maximum Print Speed</i> (see P. 27). | | |
| Note 1 | First release. | | |

Notes

For the recording of miscellaneous notes

[illegible]

This image shows a full page of a handwriting practice worksheet. It consists of numerous horizontal rows, each defined by two parallel dotted lines. The rows are evenly spaced and extend across the entire width of the page, providing a guide for letter height and placement. There is no text or other markings on the page.

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