

RFID Printer User's Manual

Applicable Models

MB241 RFID Series
TH240T RFID Series
Alpha-40L(R)
PEX-2000 Series

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1 Reference Note

1.1 Overview

This manual covers the RFID functions available in the TSC RFID printers. It is to be used in conjunction with information provided in each printer's User Manual. For the latest version of this reference manual and the User's Manual for each of the printers, visit the Support/Downloads page at www.tscprinters.com.

TSC Auto ID is a proud member of the RAIN RFID global alliance, formed to promote the universal adoption of UHF RFID technology. RAIN uses the GS1 UHF Gen2 protocol which ISO/IEC has standardized as part of ISO/IEC 18000-63:2015. The word RAIN is an acronym derived from RADio frequency Identification.

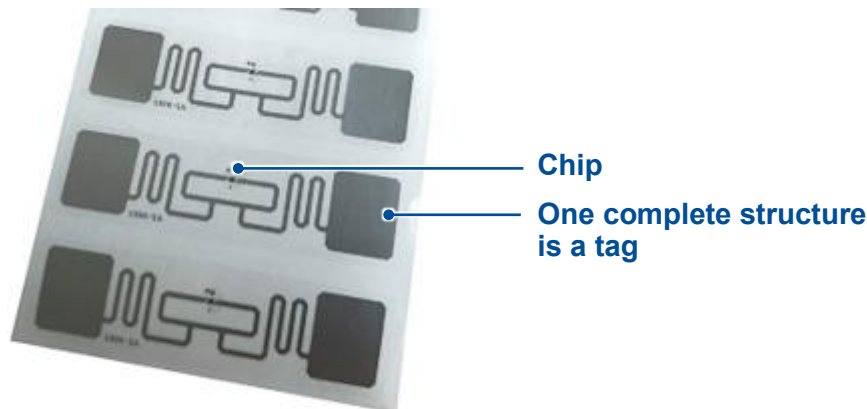
GS1's EPC Gen2 protocol defines the physical and logical requirements for RFID systems and passive tags, operating in the 860 MHz - 960 MHz UHF range Industrial, Scientific, and Medical (ISM) band used in item management applications. GS1 maintains an [overview of frequency allocations](#) supporting RFID at UHF bands around the world.

1.2 Basic Terms

Here are some basic RFID terms:

1) **Chip and Tag:**

An RFID tag consists of a chip connected to an antenna and then this construction is placed on some type of substrate. The chip consists of an RF front-end, a power converter, and a relatively small memory bank to store the unique tag number, the unique item number or even additional data in a user-memory portion. The chip is essentially a small microchip to store data. In the picture below, the chip is the barely visible tiny black dot (circled in red) in the middle of the squiggly antenna. A tag is the chip + antenna + substrate:



2) **Inlay and Smart Label:**

The terms tag and inlay are often used interchangeably, but an inlay specifically refers to a tag that gets sandwiched between a label carrier and the label itself. This produces what we call a smart label as shown below:



3) **Antenna, Encoder, Reader:**

An antenna receives and sends radio waves; an encoder (a specialized radio) programs the chip; a reader reads the chip. An RFID-enabled thermal printer actually contains all three of these elements. The antenna (or coupler) is positioned within the path of the labels. The reader and encoder are contained within a combined module that is mounted in the printer's electronics bay and is connected to the antenna by a small coaxial cable. In the RFID printer, the antenna mounted in the path of the label "talks" with the antenna embedded within the smart label as the label moves through the printing process.

Readers are also available in handheld, portable models as well as fixed readers that can be mounted at a warehouse entrance, etc. Fixed readers generally have better performance and range but lack mobility.

1.3 What to Expect when Running an RFID Application

The TSC printers with the RFID option perform two separate functions. The first is thermal label printing. The second is the encoding of an embedded RFID tag within the smart label. Smart labels are based on an EEPROM technology that requires time to be programmed. When dealing with smart labels, it is possible that an occasional RFID tag may need to be written and verified more than once (retry) before being considered acceptable. In this event each retry time will be added to the inter-label pause. This added pause is necessary to better ensure consistent quality and improved reliability.

Static electricity can damage the smart labels. Open the media cover of the printer and touch an unpainted metal part of the printer before you handle smart labels. This will discharge any static electricity that may have built up on your hands.

- **Smart Label Characteristics**

TSC Auto ID printers with the RFID option have been tested for compatibility with a wide range of smart label constructions and tags from multiple makers.

- **On-Metal Tags**

Metal can interfere with radio signals and thus impact an RFID solution. For this reason, special tags and labels have been developed for application to metal surfaces. These tags and labels are called "on-metal" and are not only designed to function well in metal-rich environments, but many of them actually exploit the presence of metal to achieve better performance. The MB241 and TH240 are available for on-metal/selected on-metal tag applications.

NOTE:

- You may purchase additional smart labels directly from TSC Auto ID to assure the highest level of performance and reliability.
- It is recommended to test RFID media on your printer before bulk purchase of media.

1.4 Label Size

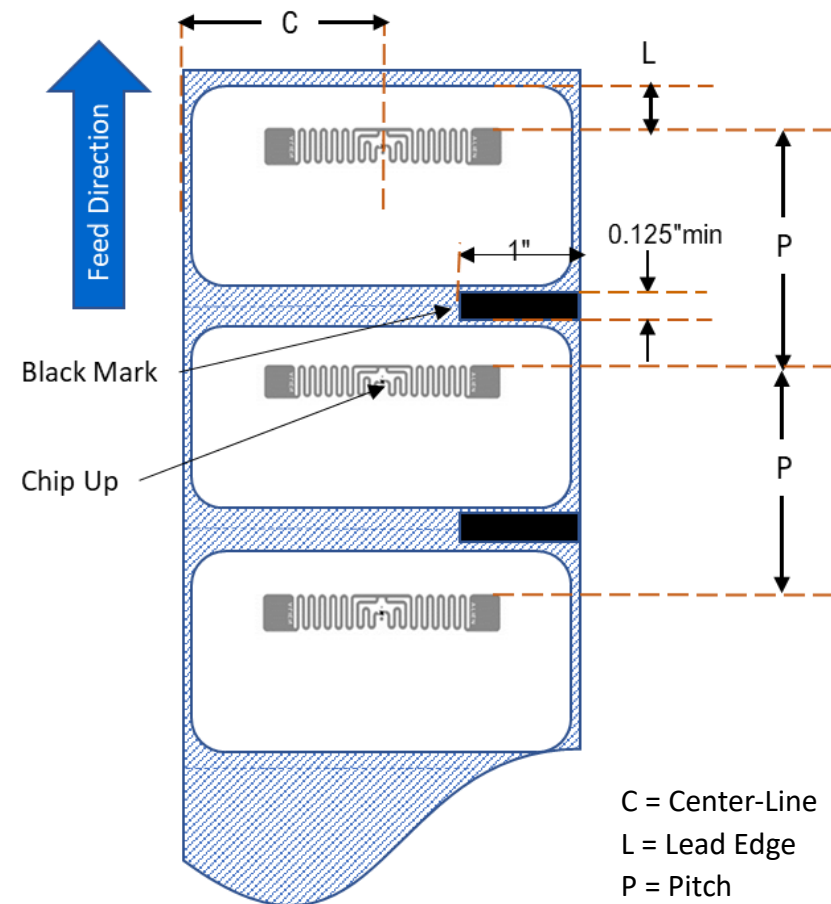
TSC Auto ID RFID printers are compatible with the latest chips (IC's) and inlays from the major suppliers in the RFID industry. The printers are equipped with an Auto-Calibration feature for easy setup eliminating the need to specify exact inlay placement or RFID power settings. The calibration routine has been tested with most major inlays embedded in typical label sizes and will work with many other inlays as well. Here are a few things to consider for optimum performance.

Referring to the diagram at right:

- Inlays should be centered horizontally across the media (dimension "C"). Consistent, tag-to-tag placement of the inlays is more important than how close to center the inlays are actually placed.
- The pitch (overall distance from inlay to inlay) is shown as dimension "P".
- The inlay should be set back from the lead edge of the media (dimension "L") a constant distance tag to tag.
- **Always test RFID media on your printer before purchasing large quantities of media.**

Disclaimer:

The guidelines and suggestions for developing converted RFID labels, are provided by TSC Auto ID on an "as is" basis and without warranty, expressed or implied. TSC Auto ID disclaims any implied warranty of merchantability or fitness for a particular purpose. TSC Auto ID will not be liable under any circumstances for any damages or losses related in any way to use of these guidelines, specifications or other information, including damages which may be incurred as a result of labels not working properly in a specific application. All specifications are subject to change without notice. Testing of the converted labels in the printer is strongly recommended prior to production quantities.



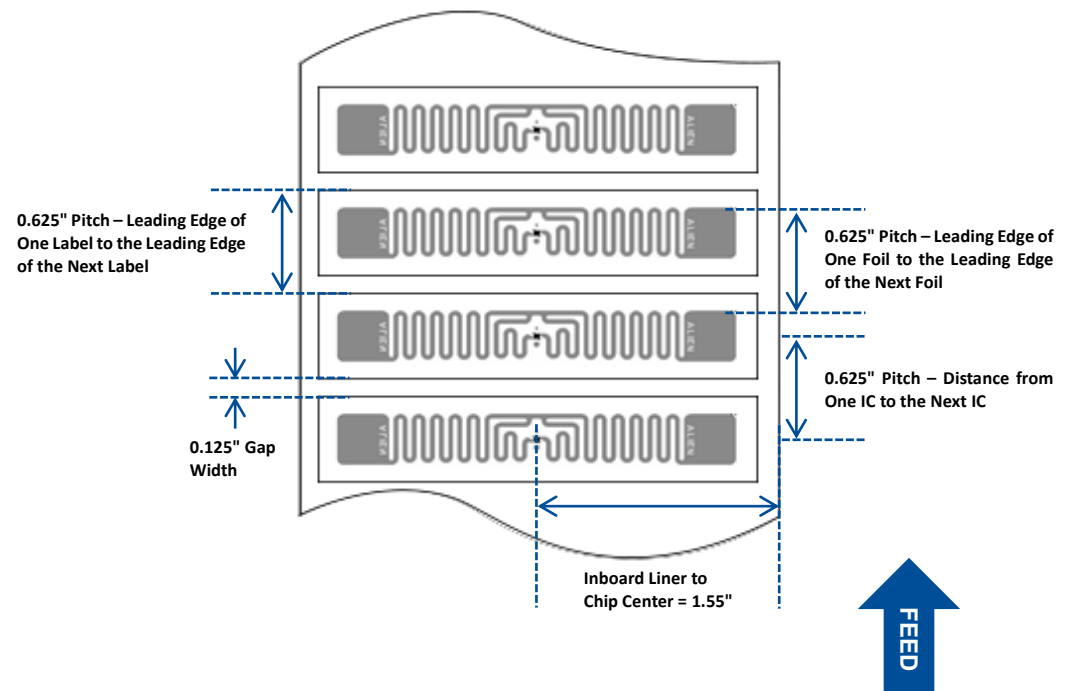
1.5 RFID Inlay Pitch

Pitch is defined as the distance from one point on an inlay to the same point on the next inlay. The reference point can be any point on the inlay: leading (or trailing) edge of the antenna (often described as the foil), leading (or trailing) edge of the antenna substrate, or the distance between ICs.

- **On-Pitch RFID Labels**

Refer to the figure for a clearer understanding of the various points that can be used to determine pitch. The figure shows that the minimum distance our printers can handle between inlays is 0.625 inches.

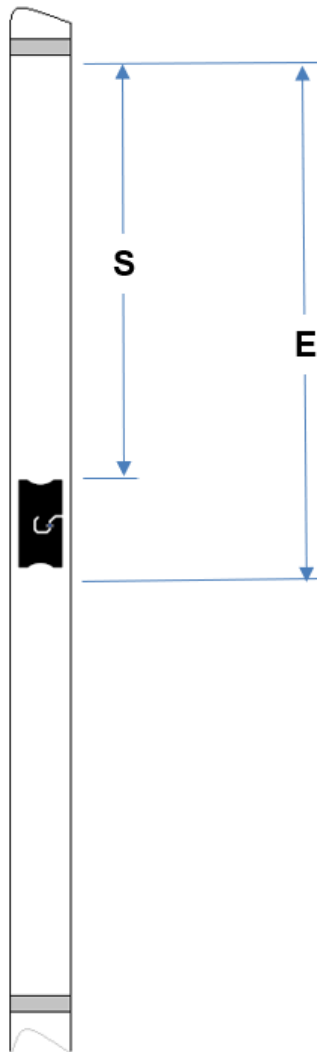
The reason for this is to prevent the printer's coupler from talking to two or more tags at once. Any closer together and the coupler in the printer would be broadcasting to the tag in back or in front at the same time.



**On-Pitch Label Configuration Using
Alien 9730 Squiglette Inlay**

- **Longer Pitch Tags**

When running long tags, such as airline baggage tags or tags where the RFID inlay pitch is greater than 2 inches, you can adjust the Start and End Position for the RFID calibration routine to significantly reduce the time it takes. Menus for adjusting these dimensions are located in the "Tag Calibration" Submenu. Refer to the diagram for explanation of these features.



S – Start Position

Using a scale or tape measure, measure the distance from top of form (TOF) to the upper-most edge of the inlay within the label. Enter this value using the Start Position menu.

E – End Position

Measure the distance from top of form (TOF) to the lower-most edge of the inlay within the label. Enter this value using the End Position menu.

When running RFID Calibration, using these settings will significantly speed up the label calibration routine. The calibration tests will be concentrated between the Start and End Position dimensions instead of over the full length of the tag.

1.6 RFID Tag Validation (RTV)

TSC RFID Tag Validation (RTV) provides several validation mechanisms to improve encoding reliability and reduce the use of defective or incorrectly encoded RFID tags. Depending on the printer model and hardware configuration, the following validation features are available.

RTV Level	Function	Description	Availability	TH240T Series RFID	MB241 Series RFID	Alpha-40L RFID	PEX-2000 Series RFID
RTV1 (one antenna)	Unique TID check	Verifies that each tag has a unique TID during encoding to prevent duplicate tag IDs.	Ready	V	V	△	V
			FW Version	V2.19	V2.19	-	V2.19
	Marginal encoding position check	Checks whether the tag is located within the acceptable encoding position range.	Ready	V	V	△	V
			FW Version	V2.19	V2.19	-	V2.19
	Encoding Position Check During Operation	Continuously verifies the encoding position during printer operation to maintain encoding accuracy.	Ready	V	V	△	V
			FW Version	V2.19	V2.19	-	V2.19
	Tag Profile Check	Verifies that the detected RFID tag matches the configured tag profile when the printhead is closed.	Ready	V	V	△	V
			FW Version	V2.19	V2.19	-	V2.19
RTV2 (dual antennas)	Dual Antennas Validation	Uses the internal antenna for encoding and the external antenna for independent validation of the encoded data.	Ready	△	-	-	-
			FW Version	-	-	-	-

Notes:

V: Feature supported.

△: Feature is technically supported but is not yet available, and is currently under development or validation.

- : Feature not supported.

2 Setting up an RFID Printer

2.1 MB241 Series Printers with External RFID Module

Refer to the MB241 printers User Manual for full details on loading media, loading ribbons, and other printer adjustments to set up the printer for proper operation.

1. Powering up the printer

The MB241 RFID printers feature an external RFID antenna coupler affixed to the RFID tear-off module or RFID cutter module. The system can automatically detect an installed RFID encoder and enable the RFID function when the printer is powered up.

The status of the RFID features can be observed from the screen shown as the  icon.

If the RFID is not enabled somehow, you can go to **Menu > Interface > RFID > RFID Active** to enable the RFID function.

2. Media Sensor Calibration

Perform the black mark or gap calibration routine before beginning the RFID calibration procedure. It is necessary to have the label length set properly or the results of the RFID calibration will not be optimal.

To calibrate the media sensor, go to **Menu > Sensor > Preprint Calibration**.

NOTE: Be sure to use **Preprint Calibration** to calibrate the RFID media.

3. RFID Calibration

To perform RFID calibration, go to **Menu > Interface > RFID > Tag Calibration > RFID Calibrate**.

Depending on the tag type and tag length, the calibration can take several minutes. It can take longer depending on the inlay antenna design, inlay IC type, and label length. Progress will be displayed on the control panel. At the end of calibration either a green or red window pops up. A green window signifies successful calibration and a red window means calibration has failed.

If calibration fails, try the following steps:

- I. If the media sensor was calibrated with Menu > Sensor > Auto Calibration, use the Menu > Sensor > Preprint Calibration instead. The Preprint Calibration is more accurate with RFID inlays. After running the Preprint Calibration, press the feed key a few times and make sure that the media is presented to the correct place. If the media is not presented to the correct place when the form feed is pressed, check if the media sensor fork requires adjustment. Make sure that the black arrow on the media sensor fork aligns with an area of the RFID tag where the black mark or the gap can be sensed well.
- II. The RFID calibration might have encountered some weak or dead tags during the calibration process. Try running calibration again on a different area of the label roll. If the preprint calibration works well and the RFID calibration fails twice in a row, it may be due to an incompatibility between the tag and the reader."

2.2 TH240 RFID Printers

Refer to the TH240 series printers User Manual for full details on loading media, loading ribbons, and other printer adjustments to set up the printer for proper operation.

You can also refer to the TH240 How-to video on TSC's YouTube channel.

[How to calibrate the RFID tags](#)

1. Powering up the printer

The TH240 RFID printers feature an internal RFID antenna. The system can automatically detect an installed RFID encoder and enable the RFID function when the printer is powered up.

The status of the RFID features can be observed from the screen shown as the  icon.

If the RFID is not enabled somehow, you can go to **Menu > Interface > RFID > RFID Active** to enable the RFID function.

2. Media Sensor Calibration

Perform the black mark or gap calibration routine before beginning the RFID calibration procedure. It is necessary to have the label length set properly or the results of the RFID calibration will not be optimal.

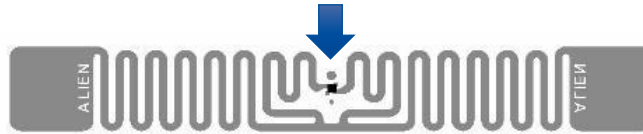
To calibrate the media sensor, go to **Menu > Sensor > Preprint Calibration**.

NOTE: Be sure to use **Preprint Calibration** to calibrate the RFID media.

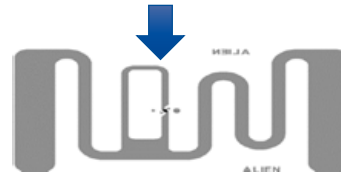
3. RFID Calibration

For TH240 RFID printers, please select the internal (adjustable) antenna coupler position before performing RFID calibration.

- 1) Visually inspect the label, locating the antenna loop within the tag to determine the best position for the antenna. In most cases, the antenna loop will be directly above or below the chip.



The loop may be off to one side of the chip in some tags:



- 2) Open the printer cover to access the antenna slide. Move the slide so that the position indicator aligns with the center of the loop in the tag.



- 3) Close the printer cover. To perform RFID calibration, go to **Menu > Interface > RFID > Tag Calibration > RFID Calibrate**.

Depending on the tag type and tag length, the calibration can take several minutes. It can take longer depending on the inlay antenna design, inlay IC type, and label length. Progress will be displayed on the control panel. At the end of calibration either a green or red window pops up. A green window signifies successful calibration and a red window means calibration has failed.



If calibration fails, try the following steps:

- I. If the media sensor was calibrated with Menu > Sensor > Auto Calibration, use the Menu > Sensor > Preprint Calibration instead. The **Preprint Calibration** is more accurate with RFID inlays. After running the Preprint Calibration, press the feed key a few times and make sure that the media is presented to the correct place. If the media is not presented to the correct place when the form feed is pressed, check if the media sensor requires adjustment. Make sure that the media sensor aligns with an area of the RFID tag where the black mark or the gap can be sensed well.
- II. The RFID calibration might have encountered some weak or dead tags during the calibration process. Try running calibration again on a different area of the label roll. If the preprint calibration works well and the RFID calibration fails twice in a row, it may be due to an incompatibility between the tag and the reader."

2.3 TH240 Series Printers with External RFID Module

Refer to the TH240 series printers User Manual for full details on loading media, loading ribbons, and other printer adjustments to set up the printer for proper operation.

You can also refer to the TH240 How-to video on TSC's YouTube channel.

[Loading tags with external RFID module](#)

1. Powering up the printer

The TH240 series printers feature an external RFID antenna coupler affixed to the RFID tear-off module or RFID cutter module. The system can automatically detect an installed RFID encoder and enable the RFID function when the printer is powered up.

The status of the RFID features can be observed from the screen shown as the  icon.

If the RFID is not enabled somehow, you can go to **Menu > Interface > RFID > RFID Active** to enable the RFID function.

2. Media Sensor Calibration

Perform the black mark or gap calibration routine before beginning the RFID calibration procedure. It is necessary to have the label length set properly or the results of the RFID calibration will not be optimal.

To calibrate the media sensor, go to **Menu > Sensor > Preprint Calibration**.

NOTE: Be sure to use **Preprint Calibration** to calibrate the RFID media.

3. RFID Calibration

To perform RFID calibration, go to **Menu > Interface > RFID > Tag Calibration > RFID Calibrate**.

Depending on the tag type and tag length, the calibration can take several minutes. It can take longer depending on the inlay antenna design, inlay IC type, and label length. Progress will be displayed on the control panel. At the end of calibration either a green or red window pops up. A green window signifies successful calibration and a red window means calibration has failed.



If calibration fails, try the following steps:

- I. If the media sensor was calibrated with Menu > Sensor > Auto Calibration, use the Menu > Sensor > Preprint Calibration instead. The **Preprint Calibration** is more accurate with RFID inlays. After running the Preprint Calibration, press the feed key a few times and make sure that the media is presented to the correct place. If the media is not presented to the correct place when the form feed is pressed, check if the media sensor requires adjustment. Make sure that the media sensor aligns with an area of the RFID tag where the black mark or the gap can be sensed well.
- II. The RFID calibration might have encountered some weak or dead tags during the calibration process. Try running calibration again on a different area of the label roll. If the preprint calibration works well and the RFID calibration fails twice in a row, it may be due to an incompatibility between the tag and the reader."

2.4 Alpha-40L RFID Printers

Refer to the Alpha-40L(R) series printers User Manual for full details on loading media and other printer adjustments to set up the printer for proper operation.

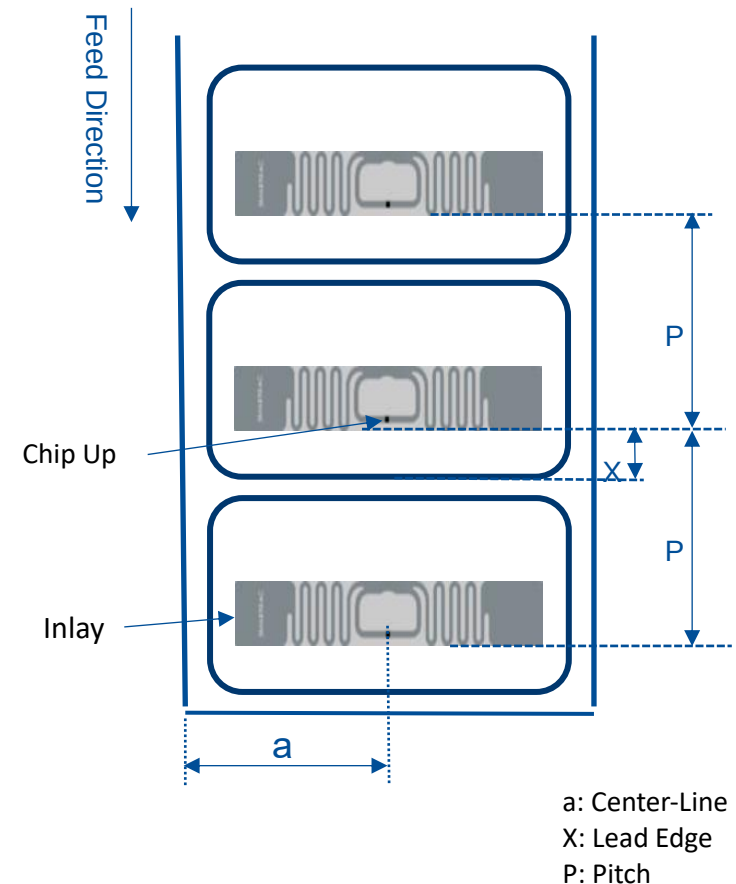
NOTE: This RFID model is only sold in certain countries/regions.

RFID Media Guideline for Alpha-40L(R)

Here are a few things to consider for optimum performance.

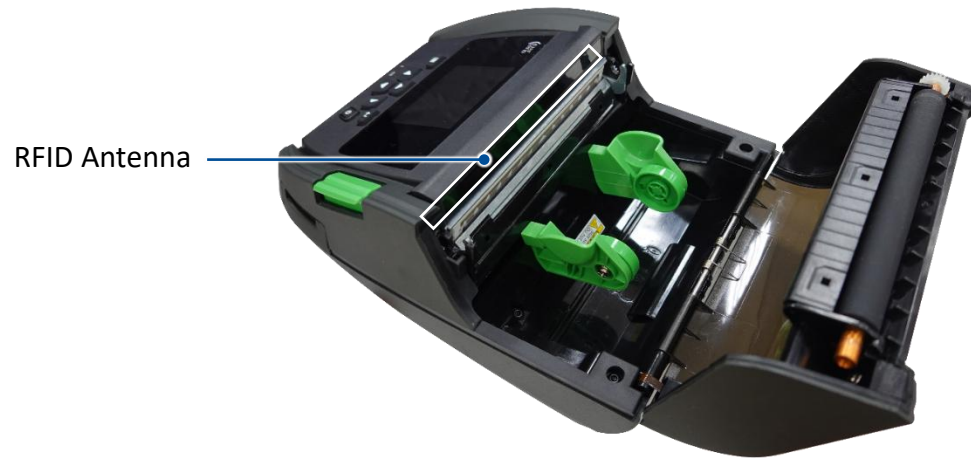
Referring to the diagram on the right

- Inlays should be centered across the media width with a production tolerance of less than +/- 2mm (dimension "a"). Consistent, tag-to-tag placement of the inlays is more important than how close to center the inlays are actually placed.
- Only Direct thermal media are supported. Minimum black bar size is 8 mm(w) x 2 mm(h) and position is centered.
- Maximum roll OD is 62 mm (2.44"). Media should be wound on 1", 0.75" or 1.5" ID core.
- The pitch (overall distance from inlay to inlay) is shown as dimension "P". Tags with pitch less than 1" may require the printer to back-feed during the encoding and printing process, thus slowing the throughput of the printer. The pitch should be greater than 1", if possible to avoid this condition.
- The inlay should be set back from the lead edge of the media (dimension "X") a constant distance tag to tag. The "X" distance should be more than 5 mm to prevent pre-peel.



1. Powering up the printer

The Alpha-40L RFID printer has an RFID antenna coupler design that supports a wide variety of tag types. The antenna is affixed to the front of the printhead.



The system can automatically detect an installed RFID encoder and enable the RFID function when the printer is powered up. The status of the RFID features can be observed from the screen shown as the  icon.

If the RFID is not enabled somehow, you can go to **Menu > Interface > RFID > RFID Active** to enable the RFID function.

2. Media Sensor Calibration

Perform the black mark or gap calibration routine before beginning the RFID calibration procedure. It is necessary to have the label length set properly or the results of the RFID calibration will not be optimal.

To calibrate the media sensor, go to **Menu > Sensor > Auto Calibration** or **Preprint Calibration**.

NOTE: It is recommended to select **Preprint Calibration** for RFID gap media.

3. RFID Calibration

To perform RFID calibration, go to **Menu > Interface > RFID > Tag Calibration > RFID Calibrate**.

Depending on the tag type and tag length, the calibration can take several minutes. It can take longer depending on the inlay antenna design, inlay IC type, and label length. Progress will be displayed on the control panel. At the end of calibration either a green or red window pops up. A green window signifies successful calibration and a red window means calibration has failed.

If calibration fails, you will see a red screen. In some case it may be due to an incompatibility between the tag and the reader. After calibration is complete, press the  key to continue, the RFID calibration values will be preserved.

2.5 PEX-2000 RFID Printers

Refer to the PEX-2000 series printers User Manual for full details on loading media, media calibration and other printer adjustments to set up the printer for proper operation.

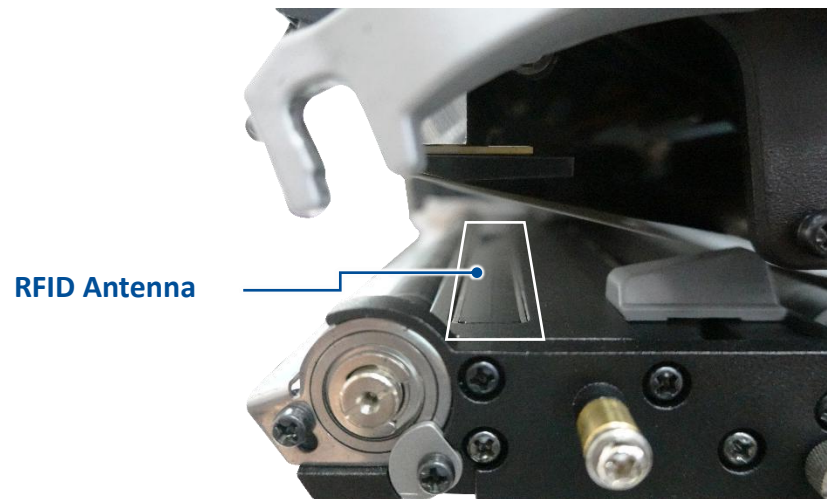
1. Powering up the printer

The PEX-2000 printer features an internal RFID antenna with an antenna coupler design that supports a wide variety of RFID tag types. The system can automatically detect an installed RFID encoder and enable the RFID function when the printer is powered up.

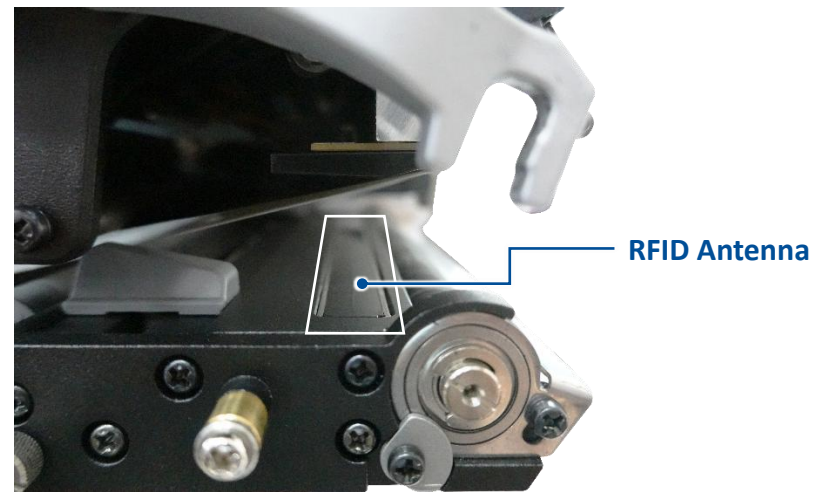
The status of the RFID features can be observed from the screen shown as the  icon.

If the RFID is not enabled somehow, you can go to **Menu > Interface > RFID > RFID Active** to enable the RFID function.

Left-hand model



Right –hand model



2. Media Sensor Calibration

Perform the black mark or gap calibration routine before beginning the RFID calibration procedure. It is necessary to have the label length set properly or the results of the RFID calibration will not be optimal.

To calibrate the media sensor, go to **Menu > Sensor > Preprint Calibration**.

NOTE: Be sure to use **Preprint Calibration** to calibrate the RFID media.

3. RFID Calibration

To perform RFID calibration, go to **Menu > Interface > RFID > Tag Calibration > RFID Calibrate**.

Depending on the tag type and tag length, the calibration can take several minutes. It can take longer depending on the inlay antenna design, inlay IC type, and label length. Progress will be displayed on the control panel. At the end of calibration either a green or red window pops up. A green window signifies successful calibration and a red window means calibration has failed.



If calibration fails, try the following steps:

- I. If the media sensor was calibrated with Menu > Sensor > Auto Calibration, use the Menu > Sensor > Preprint Calibration instead. The **Preprint Calibration** is more accurate with RFID inlays. After running the Preprint Calibration, press the feed key a few times and make sure that the media is presented to the correct place. If the media is not presented to the correct place when the form feed is

pressed, check if the media sensor requires adjustment. Make sure that the media sensor aligns with an area of the RFID tag where the black mark or the gap can be sensed well.

- II. The RFID calibration might have encountered some weak or dead tags during the calibration process. Try running calibration again on a different area of the label roll. If the preprint calibration works well and the RFID calibration fails twice in a row, it may be due to an incompatibility between the tag and the reader."

3 Smart Label Operation

3.1 Overview

This chapter describes the function of the RFID encoder module. The RFID encoder is designed to be transparent to the printer operation. It provides the capability of programming smart labels (with embedded RFID tags) while printing the label format.

There are several ways to program RFID tags in smart labels:

- Incorporate RFID commands into new or existing TSPL2 programs.
- Incorporate RFID commands into new or existing ZPL programs to seamlessly upgrade from Zebra™ printers.
- There are commercial label making software packages available that support the creation and programming of RFID tags that are compatible with all TSC Auto ID RFID printers.

Refer to the **TSPL/TSPL2 Programming Manual** for a complete list of supported RFID commands and instructions. **TSPL/TSPL2 Programming Manual** is available from our website at www.tscprinters.com.

Supported RAIN Class 1 (UHF Class 1 Gen2) Tag Types

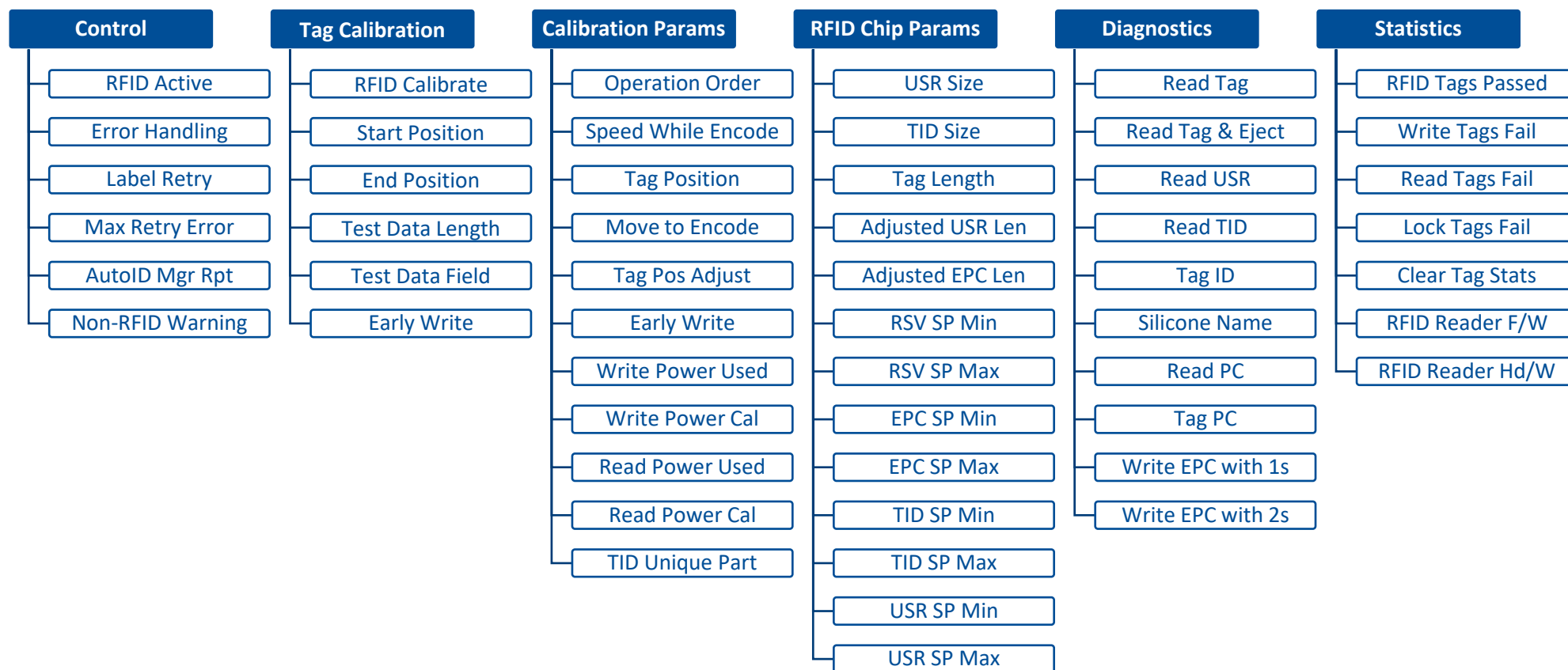
The TSC Printronix Auto ID RFID Printer and Label Validation Lab is continually testing new tags as they come on the market.

For RFID Solutions and Printronix Auto ID RFID Label and Verification Lab information, go to <https://usca.tscprinters.com/en/rfid-solutions>.

3.2 RFID Menu Overview

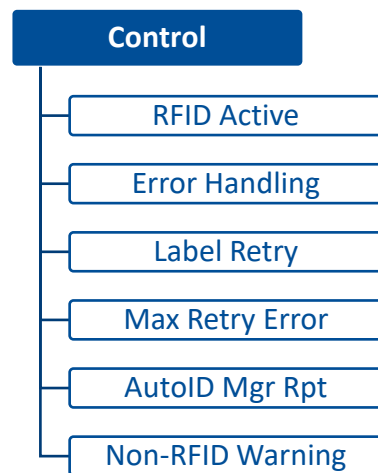
The RFID menu is structured into six submenus described below, Go to **Menu > Interface > RFID** to view all RFID's configurable items.

NOTE: This menu item may vary depending on the printer model, firmware version, or the type of RFID tag used.



3.3 "Control" Submenu

A number of RFID options which define specific parameters for certain print jobs can be set from the RFID > Control submenu. Menus within this submenu are common for all UHF models.



3.3.1 RFID Active

Printer can automatically detect an installed RFID reader when the printer is powered up. This item enables/disables the RFID function. Users need to enable it manually once it is disabled.

Menu > Interface > RFID > Control > RFID Active	
Item	Description
ON (Default)	The RFID function is enabled and active.
OFF	The RFID function is disabled and not active

3.3.2 Error Handling

If an RFID tag within a smart label is deemed unacceptable after the defined number of retries, this menu item selects the error handling mode.

Menu > Interface > RFID > Control > Error Handling	
Item	Description
Overstrike* (Default)	Each failed label prints with the Overstrike pattern and the form retries on a new label until the Label Retry count is exhausted. Whether or not an error message will display or the failed label will reprint depends upon the Max Retry Error setting.
None	No specific action is taken when a tag fails to be programmed.
Stop	The printer will halt and display the error message “RFID Error: Check Media.” The label is discarded and reprinting of the label (if desired) must be initiated from the host. When the error is cleared, the label with the failed tag moves forward until the next label is in position to be printed.

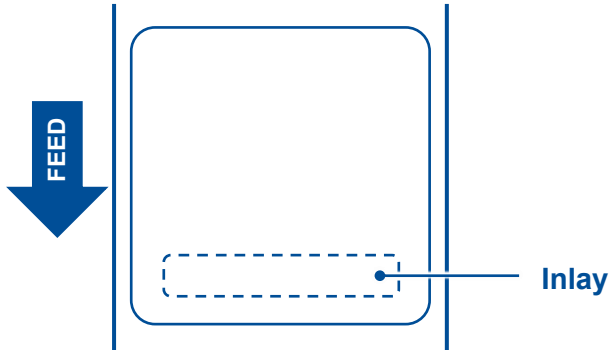
*** NOTE:**

- For the MB241 printer with the RFID option at the factory, it supports long-distance backfeed. The maximum overstrike backfeed distance is 6 inches (152.4 mm).
- For the standard MB241 printer with the RFID option module and the TH240 printer with internal RFID module, it does not support long-distance backfeed. The maximum overstrike backfeed distance is 1.5 inches (38.1 mm). This means that if the inlay is located near the trailing (bottom) edge of the label, a larger portion of incorrect label content will not be overstruck. Therefore, if you expect full-label overstrike capability, we recommend using labels with the inlay positioned near the leading edge.
- For Alph-40L(R) printer, it does not support long-distance backfeed. The maximum overstrike backfeed distance is 1.0 inches (25.4 mm). This means that if the inlay is located near the trailing (bottom) edge of the label, a larger portion of incorrect label content will not be overstruck. Therefore, if you expect full-label overstrike capability, we recommend using labels with the inlay positioned near the leading edge.
- For the PEX-2000 printer with internal RFID module, it supports long-distance backfeed. The maximum overstrike backfeed distance is 6 inches (152.4 mm).

Actual Example Photo of TH240 RFID:

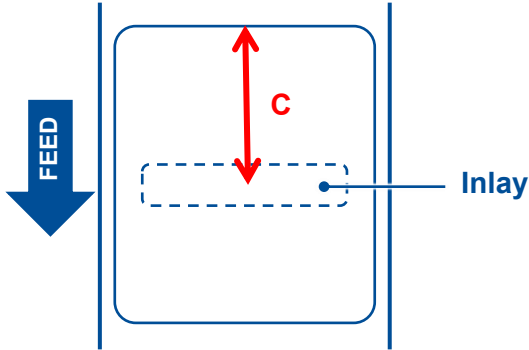


Labels with the inlay positioned near the leading edge (recommended)

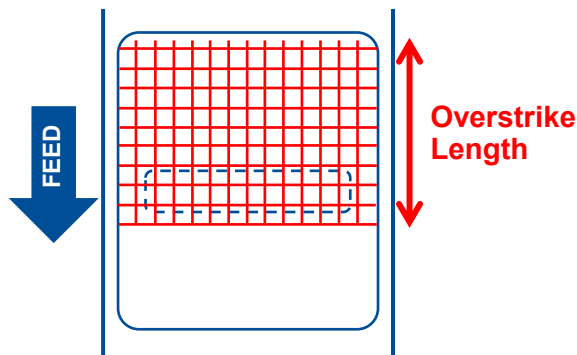


Inlay near label bottom edge: Partial label overstrike	Inlay near label leading edge: Full label overstrike

- The extent of overstrike incorrect label content may differ depending on the antenna position of the printer and the inlay placement within the label. Refer to the information below for detailed calculation.

RFID Models	Maximum Backfeed Length (A)	Printhead to Antenna Distance (B)	Inlay-to-bottom Length (C)
MB241 supports long-distance backfeed	+ 6 inches (+ 152.4 mm)	Tear mode: - 1.05 inches (- 26.67 mm)	C = Length from the center of the inlay to the bottom of the label. Measure the actual label to obtain this data. 
MB241 printer with the RFID option module	+ 1.5 inches (+ 38.1 mm)	Cutter mode: - 0.83 inches (- 21.08 mm)	
TH240 printer with internal RFID module	+ 1.5 inches (+ 38.1 mm)	+ 0.8 inches (+ 20.32 mm)	
TH240 printer with external RFID module	+ 1.5 inches (+ 38.1 mm)	Tear mode: - 1.15 inches (- 29.21 mm) Cutter mode: - 0.86 inches (- 21.84 mm)	
Alpha-40L(R)	+ 1.0 inches (+ 25.4 mm)	- 0.5 inches (- 12.7 mm)	
PEX-2000 printer with internal RFID module	+ 6 inches (+ 152.4 mm)	+ 0.67 inches (+ 17mm)	

Overstrike Length = A + B + C



NOTE:

- If the RFID antenna is located at the front end of the printhead (for example, attached to an RFID module at the front of the printer), the value of "B" will be negative.
- If the overstrike length is greater than the label length, it will be equal to the label length (full label overstrike).

3.3.3 Label Retry

This item sets the number of label retries that the RFID encoder will attempt before declaring a fault. This may indicate a problem with the RFID encoder, the coupler assembly, the printer setup, or the label stock.

IMPORTANT: This item only applies when **Error Handling** is set to **Overstrike**.

Menu > Interface > RFID > Control > Label Retry	
Item	Description
Minimum	1
Maximum	10 (Default)

3.3.4 Max Retry Error

This item determines if errors are declared when the Label Retry count is exceeded.

Menu > Interface > RFID > Control > Max Retry Error	
Item	Description
ON (Default)	Errors are declared when the tag cannot be programmed within the Label Retry count.
OFF	Errors are not declared and the print content for the current label is discarded.

3.3.5 AutoID Mgr Rpt

This menu item enables/disables AutoID and label information to be sent out the network port. This information can be used by an RFID tag data and labels manager program.

IMPORTANT: This item must be set to **ON** before starting a print job in order to collect and review the encoded data written in the RFID labels.

Menu > Interface > RFID > Control > AutoID Mgr Rpt	
Item	Description
OFF (Default)	No data is sent out the network port.
ON	Data is sent out the network port. Users are able to review the RFID label information on the TSC Console PC or TSC Console Web utility.

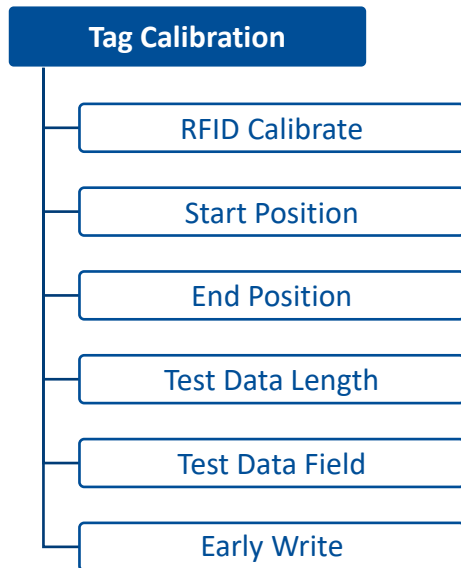
3.3.6 Non-RFID Warning

This item enables/disables the printer to release a warning if the printer receives a print job that does not contain any RFID commands when RFID media is installed in the printer.

Menu > Interface > RFID > Control > Non-RFID Warning	
Item	Description
OFF (Default)	No warnings will be produced when data is received.
ON	Warnings will be produced when the condition is met.

3.4 "Tag Calibration" Submenu

All configurable items in the Tag Calibration submenu are used to do RFID calibration. The tag calibration must be performed when installing a new tag in the printer. RFID calibration operation determines the RFID chip type, the optimum write/read power levels, programming position, and length of the EPC/User field.



3.4.1 RFID Calibrate

Press this item to perform the RFID calibration. This item should be executed when changing the RFID tag type.

NOTE: Before performing RFID calibration, the sensor type must be determined according to the RFID label type and run a media sensor calibration.

3.4.2 Start Position

This item determines the RFID calibration start location on the tag. This value can be left at the default value.

Menu > Interface > RFID > Tag Calibration > Start Position	
Item	Description
Minimum	0.05 inches (Default)
Maximum	Label length as determined by media calibration

3.4.3 End Position

This item determines the RFID calibration end location on the tag. This value can be left at the default value.

Menu > Interface > RFID > Tag Calibration > End Position	
Item	Description
Minimum	0.00 inches
Maximum	Label length as determined by media calibration (Default)

3.4.4 Test Data Length

This item determines the size of the test data that will be used to perform the RFID calibration. It can be increased to improve the accuracy of the RFID calibration, but it should not be increased to a value greater than the maximum data length that the current tag type can support.

Menu > Interface > RFID > Tag Calibration > Test Data Length	
Item	Description
Minimum	16 bits
Maximum	256 bits
Default	96 bits

3.4.5 Test Data Field

It determines the field that will be used to perform the RFID calibration. Not all tag types support all of the various types of RFID fields.

Menu > Interface > RFID > Tag Calibration > Test Data Field	
Item	Description
Options	EPC, USR, ACS, and KIL
Default	EPC

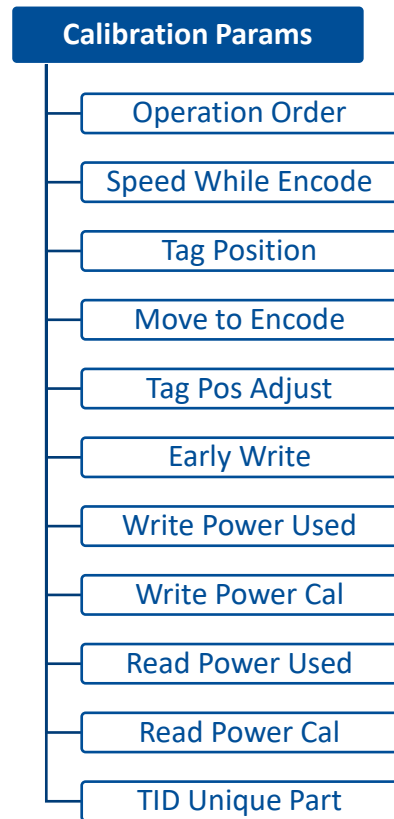
3.4.6 Early Write

This item enables/disables the RFID calibration to calculate an appropriate distance for attempting early writing during printing. Early writing may increase overall throughput speed in certain cases but should not be used if the label sensed distance is less than 2.0 inches. To set up the distance, go to **Menu > Interface > RFID > Calibration Params > Early Write**.

Menu > Interface > RFID > Tag Calibration > Early Write	
Item	Description
OFF (Default)	Disables Early Write .
Options	Enables Early Write .

3.5 "Calibration Params" Submenu

Calibration Params are settings saved on the printer to optimize RFID encoding.



3.5.1 Operation Order

This item determines when the RFID encoding operations will be performed relative to any printing operations on RFID tags during host jobs. It will be updated automatically after every RFID Calibration.

IMPORTANT: Some types of jobs and operations will only be compatible with **Encode Before Printer**. When such operations are received, the printer will proceed with **Encode Before Print** and ignore the value of the **Operation Order** menu. The menu will NOT be changed after the operations are processed, and the printer will adhere to the menu again once compatible operations are received. If **Encode During Print** is selected, depending on the amount of data to be encoded on the tag, there can be a slight pause during encoding, which may distort or cause a break in the printing on the label. If this occurs, this setting can be manually changed to either Encode Before or Encode After Print.

Menu > Interface > RFID > Calibration Params > Operation Order	
Item	Description
Encode Before Print	When processing RFID jobs, the printer will attempt the RFID operations before the print operations for each label. Mode used with the internal antenna coupler.
Encode After Print	When processing RFID jobs, the printer will attempt the RFID operations after the print operations for each label. Mode used with the external antenna coupler.
Encode During Print	When processing RFID jobs, the printer will initiate the print operations, then perform the RFID operations when the label reaches the encoding position. After the encoding operations have been completed, the printing operations will resume.
Default	Encode Before Print (may change after RFID calibration routine)

3.5.2 Speed While Encode

This menu determines how fast the media will move during RFID operations. Substantial RFID operations on one tag may cause the media to stop moving during the encode process.

Menu > Interface > RFID > Calibration Params > Speed While Encode	
Item	Description
Minimum	1 ips
Maximum	6 ips (Default)

3.5.3 Tag Position

This item displays how far the RFID tag encoding position of the currently installed tag should be offset from Top of Form. This value will be set when RFID calibration is executed.

3.5.4 Move to Encode

This item displays the distance required in additional movements during RFID encoding. It is set automatically based on the RFID calibration results and the value of **Operation Order (RFID > Calibration Params > Operation Order)** and cannot be changed manually.

3.5.5 Tag Pos Adjust

This item selects the amount of movement the printer will perform to move beyond the RFID programming position (**RFID > Calibration Params > Tag Position**) during RFID operations. Modifications to this menu can impact the accuracy of RFID operations, and it is recommended to keep this value set to zero.

Menu > Interface > RFID > Calibration Params > Tag Pos Adjust	
Item	Description
Minimum	-3.00 inches
Maximum	3.00 inches
Default	0.00 inches

3.5.6 Early Write

This item is used to set up an appropriate distance for attempting early writing during printing. To enable this function, go to **Menu > Interface > RFID > Tag Calibration > Early Write**.

Menu > Interface > RFID > Calibration Params > Early Write	
Item	Description
Minimum	0.00 inches
Maximum	3.00 inches
Default	0.00 inches

3.5.7 Write Power Used

This item configures the write power level to be used in the RFID encoder. The adjustment range for different models may vary.

Menu > Interface > RFID > Calibration Params > Write Power Used		
Model	Minimum	Maximum
Alpha-40L	0	27
MB241	0	27
TH240	0	27
PEX-2000	-10	30

3.5.8 Write Power Cal

This item displays calibration results of the write power level.

3.5.9 Read Power Used

This item configures the read power level to be used in the RFID encoder. The adjustment range for different models may vary.

Menu > Interface > RFID > Calibration Params > Read Power Used		
Model	Minimum	Maximum
Alpha-40L	0	27
MB241	0	27
TH240	0	27
PEX-2000	-10	30

3.5.10 Read Power Cal

This item displays calibration results of the read power level.

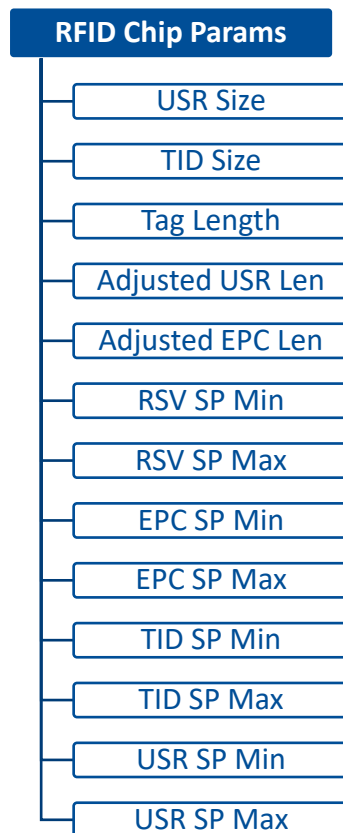
3.5.11 TID Unique Part

This item indicates the amount of memory in the TID bank that is dedicated to a unique serial number on this silicon type.

3.6 "RFID Chip Params" Submenu

The values in these menus should only be changed if the silicon type being used is not yet supported by the printer. If the silicon type is not yet supported or recognized by the printer, the printer will set the values of the menus in this section to small values that are supported by almost all silicon types. After calibration is complete, if the silicon type is not recognized or unknown, the values of these menus can be manually set to utilize the tags.

NOTE: The configurable items under **RFID Chip Params** may vary according to the types of label.



3.6.1 USR Size

This item configures the size in bytes of the USR block within the RFID tag memory. Normally, this value is set automatically by the RFID calibration process.

IMPORTANT: This value will be hidden if Higgs3 or Higgs 9 tags are detected, and the Adjusted USR Len menu will be unhidden instead.

Menu > Interface > RFID > RFID Chip Params > USR Size	
Item	Description
Minimum	0 bytes
Maximum	8836 bytes
Default	8192 bytes

3.6.2 TID Size

This item indicates the size of the memory block within the RFID tag memory that contains the Tag ID. Normally, this value is set automatically by the RFID calibration process.

Menu > Interface > RFID > RFID Chip Params > TID Size	
Item	Description
Minimum	0 bytes
Maximum	65535 bytes
Default	12 bytes

3.6.3 Tag Length

This item configures the number of bytes in the EPC block within the RFID tag memory. Normally, this value is set automatically by the RFID calibration process.

IMPORTANT: This value will be hidden if Higgs3 or Higgs 9 tags are detected, and the Adjusted EPC Len menu will be unhidden instead.

Menu > Interface > RFID > RFID Chip Params > Tag Length	
Item	Description
Minimum	8
Maximum	64
Default	12

3.6.4 Adjusted USR Len

This item displays the adjusted USR length. The value may vary according to the value of adjusted EPC length.

3.6.5 Adjusted EPC Len

Higgs 3 and Higgs 9 tags differ from other RFID tags in that its memory bank size is not fixed. To accommodate EPC lengths longer than 96 bits, Higgs 3 and Higgs 9 borrow memory from the USR bank. This item selects the number of bits dedicated to the EPC block within the RFID tag memory.

IMPORTANT: This menu will only be shown if a Higgs 3 or Higgs 9 tag is detected. Otherwise, it will be hidden. When an EPC length is selected by the user in this menu, the USR length will change automatically according to the EPC, USR, and PC value tables. The EPC length in this menu must be set to a value that is equal to or longer than all EPC value lengths to be written by the application. Since the PC value indicates the length of the EPC in the Higgs 3 and Higgs 9, the PC value must be 29 programmed when programming the EPC (if the EPC value has changed from its factory state). The PC value to be programmed for each of the supported EPC lengths is shown in the table below.

Menu > Interface > RFID > RFID Chip Params > Adjusted EPC Len	
Item	Description
Minimum	96 (Default)
Maximum	496

Higgs 3 EPC/USR Lengths and PC Values

EPC Length	USR Length	PC Value
96	512	0x3000
112	448	0x3800
128	448	0x4000
144	448	0x4800
160	448	0x5000
176	384	0x5800
192	384	0x6000
208	384	0x6800
224	384	0x7000
240	320	0x7800
256	320	0x8000
272	320	0x8800

EPC Length	USR Length	PC Value
288	320	0x9000
304	256	0x9800
320	256	0xA000
336	256	0xA800
352	256	0xB000
368	192	0xB800
384	192	0xC000
400	192	0xC800
416	192	0xD000
432	128	0xD800
448	128	0xE000
464	128	0xE800
480	128	0xF000

3.6.6 RSV SP Min

This item indicates the lower limit of address values for special memory in the Reserved bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special RSV memory.

3.6.7 RSV SP Max

This item indicates the upper limit of address values for special memory in the Reserved bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special RSV memory.

3.6.8 EPC SP Min

This item indicates the lower limit of address values for special memory in the EPC bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special EPC memory.

3.6.9 EPC SP Max

This item indicates the upper limit of address values for special memory in the EPC bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special EPC memory.

3.6.10 TID SP Min

This item indicates the lower limit of address values for special memory in the TID bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special TID memory.

3.6.11 TID SP Max

This item indicates the upper limit of address values for special memory in the TID bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special TID memory.

3.6.12 USR SP Min

This item indicates the lower limit of address values for special memory in the USR bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special USR memory.

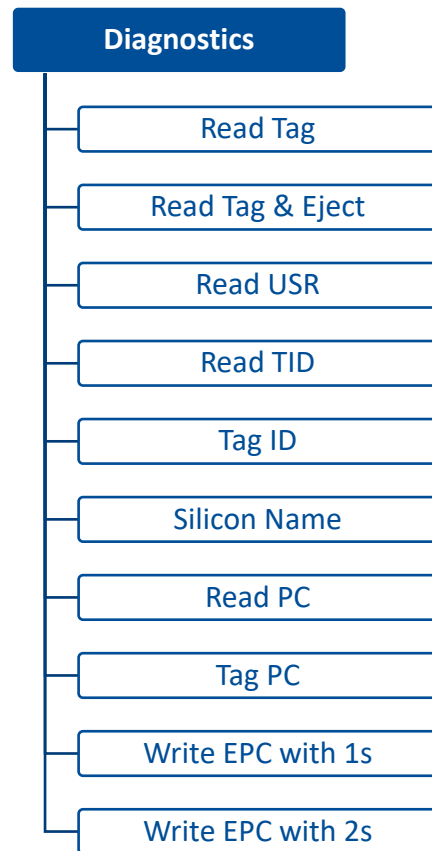
3.6.13 USR SP Max

This item indicates the upper limit of address values for special memory in the USR bank of the currently installed RFID tags. Address values between and including the Min and Max may be used in RFID Write and Read commands.

NOTE: This value will be hidden if the currently installed tags do not have special USR memory.

3.7 "Diagnostics" Submenu

The items under **Diagnostics** are used to run tests that help determine the accuracy and troubleshoot the RFID system.



3.7.1 Read Tag

This executable item reads the tag in range of the internal RFID coupler and reports the tag data to the debug port and momentarily displays it on the control panel. It is primarily intended for development verification by checking that the system is working.

NOTE: This item does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.7.2 Read Tag & Eject

This executable item works exactly the same as **Read Tag**, except that after the printer reads the tag, it feeds the label to the next top-of-form.

NOTE: This menu does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.7.3 Read USR

This executable item reads the User Memory bank of the tag in range of the internal RFID coupler and reports the data to the debug port and momentarily displays it on the control panel. It is primarily intended for development verification by checking that the system is working.

NOTE: This menu does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.7.4 Read TID

This executable item reads the TID (Tag ID) from the tag in range of the internal RFID coupler and displays the value read in **Tag ID**.

NOTE: This item does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.7.5 Tag ID

This item displays the first TID (Tag ID) read since power-up, or if using **Read TID**, the most recently read TID. If no tag is in range of the internal RFID coupler, “Unknown” will be displayed on the control panel.

NOTE: This item does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.7.6 Silicon Name

This item shows the name of the silicon (or chip type) that was most recently read and recognized by the printer. The silicon name is the name of the microchip that is embedded in the RFID tags.

3.7.7 Read PC

This executable item reads the PC (Protocol Control) field from an RFID tag in range of the internal RFID coupler and displays the value read in Tag PC.

NOTE: This item does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.7.8 Tag PC

This item shows the last PC (Protocol Control) field read from an RFID tag. If no tag is in range of the internal RFID coupler, “Unknown” will be displayed.

3.7.9 Write EPC with 1s

This executable menu writes all ones to the tag in range of the internal RFID coupler. It is primarily intended for development verification by checking that the system is working.

NOTE: This item does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

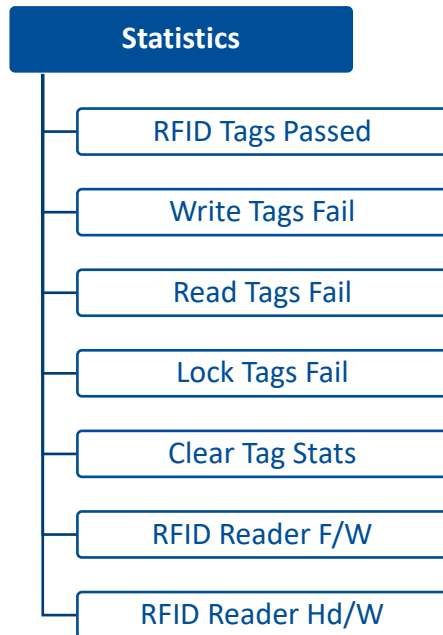
3.7.10 Write EPC with 2s

This executable menu writes all twos to the tag in range of the internal RFID coupler. It is primarily intended for development verification by checking that the system is working.

NOTE: This item does not position the RFID tag over the coupler. Make sure to position the tag over the coupler to receive an accurate reading.

3.8 "Statistics" Submenu

The items under **Statistics** are used to store statistics about the RFID system activities. The statistics can be reset by executing **Clear Tag Stats** which is also under **Statistics**.



3.8.1 RFID Tags Passed

This item displays the number of tags with successful RFID operations since the last **Clear Tag Stat** operation.

3.8.2 Write Tags Fail

This item displays the number of failed RFID write tags since the last Clear Tag Stat operation.

3.8.3 Read Tags Fail

This item displays the number of failed RFID read tags since the last Clear Tag Stat operation.

3.8.4 Lock Tags Fail

This item displays the number of failed RFID lock tags since the last Clear Tag Stat operation.

3.8.5 Clear Tag Stats

This executable item clears all count items under **Statistics**.

3.8.6 RFID Reader F/W

This item shows the RFID firmware version installed in the encoder.

3.8.7 RFID Reader Hd/W

This item shows the RFID hardware version installed in the encoder.

4 RFID Setting Commands

For RFID setting commands, please refer to the "RFID Setting Commands" section in **TSPL/TSPL2 Programming Manual**.
You can download the manual from [TSC website](#).

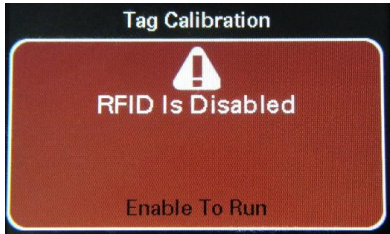
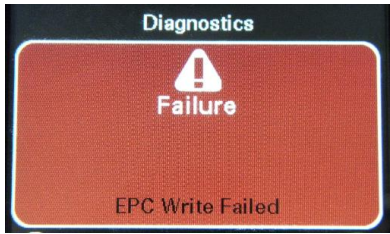
RFID Setting Commands	376
RFID ON/OFF	376
RFID ERROR	377
RFID RETRY	378
RFID RETRYERROR ON/OFF	379
RFID POSITION	380
RFID POWER	381
RFID COUNTRESET	382
RFID READ/WRITE	383
RFID RFLOCK	390
RFIDDETECT	393

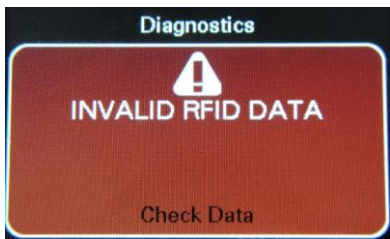
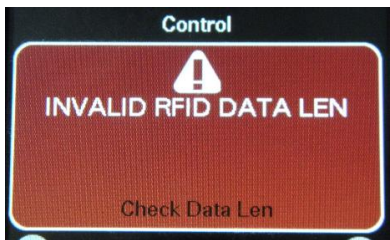
5 RFID Error Messages

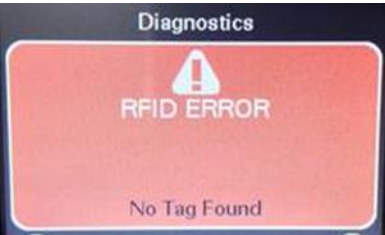
The RFID encoder can detect a number of errors. When one of these errors occurs, the RFID encoder alerts the printer to perform the currently selected error action and display the appropriate error message on the control panel.

For more information about how to configure the RFID functions, you can download **TSPL/TSPL2 Programming Manual** from [TSC website](#).

The table below describes the sequence of the images and their corresponding functions.

Screen	Error Message	How to Recover
	RFID is disabled.	The RFID function may not be turned on. Go to RFID > Control > RFID Active to enable the RFID function.
	Write EPC with 1s or Write EPC with 2s is not successful.	- The label could be misaligned. - Go to Menu > Sensor > Auto Calibration to run a media calibration ensuring that the label is at top-of-form. - Go to Menu > Interface > RFID > Tag Calibration > RFID Calibrate to run the RFID calibration. - Check if the correct RFID media sensor is selected and the RFID tags are located in the correct position against the media sensor. - The tag could be defective. Try another tag.
	RFID Calibrate is not successful.	- The label could be misaligned. - Go to Menu > Sensor > Preprint Calibration to run a media calibration ensuring that the label is at top-of-form. - Go to Menu > Interface > RFID > Tag Calibration > RFID Calibrate to run the RFID calibration. - Check if the correct RFID media sensor is selected and the RFID tags are located in the correct position against the media sensor.

Screen	Error Message	How to Recover
		The tag could be defective. Try another tag.
 The screen shows a red background with a white warning icon (exclamation mark inside a triangle) at the top center. Below the icon, the text "RFID Disabled" is displayed in white. At the bottom, it says "Enable RFID to Process Commands". The time "04:26 PM" is visible in the top right corner.	RFID is disabled.	The RFID commands have been sent out but the RFID function may not be turned on. Go to Menu > Interface > RFID > Control > RFID Active to enable the RFID function and then send the RFID commands again.
 The screen shows a red background with a white warning icon (exclamation mark inside a triangle) at the top center. Below the icon, the text "NON-RFID DATA" is displayed in white. At the bottom, it says "On RFID Tag". The word "Control" is visible in the top left corner.	NON-RFID Data	When Non-RFID Warning is set to ON, this warning message will be displayed on the control panel when the printer receives a print job that does not contain any RFID commands. To turn on this function, go to Menu > Interface > RFID > Control > Non-RFID Warning.
 The screen shows a red background with a white warning icon (exclamation mark inside a triangle) at the top center. Below the icon, the text "INVALID RFID DATA" is displayed in white. At the bottom, it says "Check Data". The word "Diagnostics" is visible in the top left corner.	Invalid RFID data	The tag data sent does not match the job that was sent. Please check the tag data of the RFID commands.
 The screen shows a red background with a white warning icon (exclamation mark inside a triangle) at the top center. Below the icon, the text "INVALID RFID DATA LEN" is displayed in white. At the bottom, it says "Check Data Len". The word "Control" is visible in the top left corner.	Invalid RFID data length	The RFID data length for the RFID tag does not match the setting. You may need to check the data length for the RFID commands.

Screen	Error Message	How to Recover
	RFID tag failed	The tag cannot be written. • The label could be misaligned. 1. Go to Menu > Sensor > Auto Calibration to run a media calibration ensuring that the label is at top-of-form. 2. Go to Menu > Interface > RFID > Tag Calibration > RFID Calibrate to run the RFID calibration. • Check if the correct RFID media sensor is selected and the RFID tags are located in the correct position against the media sensor. • The tag could be defective. Try another tag. • Check if your application sends correct number of digits to the RFID tag. • Check if the RFID commands are correct.
	RFID Error no tag is found	The tag cannot be read. • Check if the correct RFID media sensor is selected and the RFID tags are located in the correct position against the media sensor. • The tag could be defective. Try another tag.

6 TSC Console Utility

6.1 Overview

The TSC Console series offers two management approaches to meet different work environments and needs:

- **TSC Console PC**

TSC Console (PC Version) is designed specifically for a wide range of TSC printers, enabling IT staff to deploy, manage, monitor, and troubleshoot both wired and wireless connections for single or multiple printers. With its out-of-the-box installation and simplified Windows graphical interface, it streamlines printer setup and daily management. The PC version is ideal for IT environments that require in-depth configuration and continuous monitoring, enhancing robustness through integrated management capabilities to ensure printers remain available, reliable, and easy to maintain.

- **TSC Console Web**

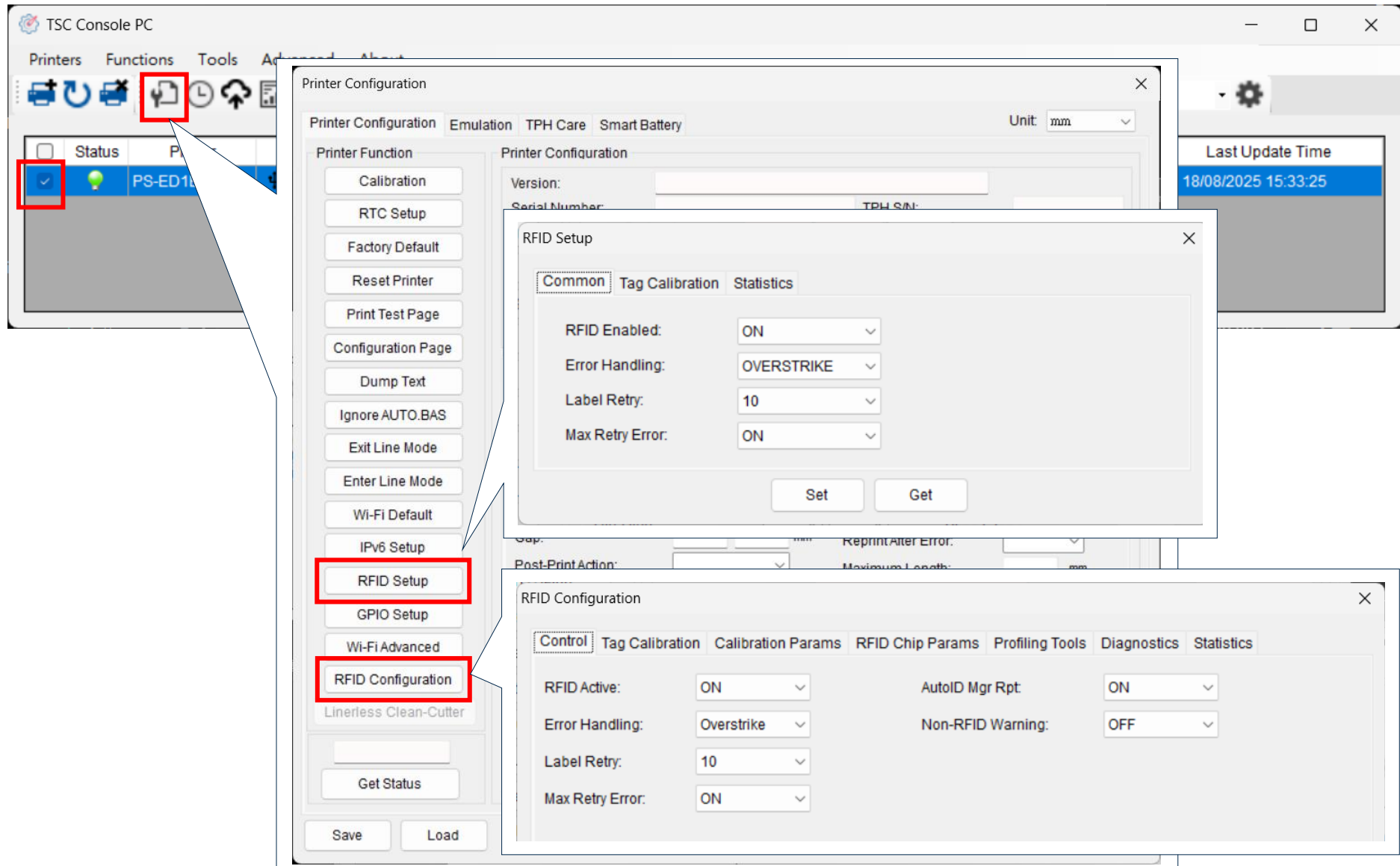
TSC Console Web (Web Version), on the other hand, is a browser-based solution that requires no installation, allowing users to manage printers from anywhere. In addition to remote configuration, quick implementation, troubleshooting, and preventive maintenance, it supports centralized monitoring and cross-device management for both TSC Auto ID and Printronix Auto ID printers. Its intuitive data visualization and collaborative features make it especially suited for teams that need real-time, cross-location printer management with greater flexibility.

Whether you need the in-depth control of the PC version or the flexibility and real-time access of the Web version, TSC Console provides an efficient, stable, and versatile printer management experience for your business.

This chapter describes the RFID functions available in the TSC Console. It is to be used in conjunction with information provided in each TSC Console User Manuals.

6.2 TSC Console PC

After adding your RFID printers into TSC Console, select **Printer > Printer Configuration** to view configurable options and configuration data for the RFID functions. Click **Set / Get** to configure or retrieve RFID settings.



6.2.1 RFID Setup

Tab	Description		
Common	RFID Enabled:	OFF / ON	Enables/Disables the RFID encoder module.
	Error Handling:	OFF / STOP/ OVERSTRIKE	This item selects the error handling mode for RFID failures.
	Label Retry:	1 – 10	This item selects the number of label retries that the RFID encoder will attempt before declaring a fault.
	Max Retry Error:	OFF / ON	This item determines if errors are declared when the <i>Label Retry</i> count is exceeded.
Tag Calibration	Tag Position: 232 dot RFID Calibration Write Power: 18 Read Power: 16		
	This item is used to do RFID calibration and get the three parameters through RFID calibration. Note: Before performing an RFID calibration, please select the correct sensor for your RFID labels and run a media sensor calibration.		
Statistics	Tag Write Count 285 Tag Failed Count 55 Tag Read Count Reset Counter		
	This item is read-only and used to show the number of tags attempted to be written/ failed/ read RFID tags since the last Clear Tag Stat operation has been initiated. Press the “Reset Counter” button to Clear Tag Stat.		

6.2.2 RFID Configuration

Tab	Description																					
Control	This item is used to define specific parameters for certain print jobs can be set from here. Menus within this submenu are common for all UHF models. <table><tr><th>Item</th><th>Settings</th><th>Description</th></tr><tr><td>RFID Active</td><td>OFF / ON</td><td>Enables/Disables the RFID encoder module.</td></tr><tr><td>Error Handling</td><td>OFF / STOP/ OVERSTRIKE</td><td>This item selects the error handling mode for RFID failures.</td></tr><tr><td>Label Retry</td><td>1 – 10</td><td>This item selects the number of label retries that the RFID encoder will attempt before declaring a fault.</td></tr><tr><td>Max Retry Error</td><td>OFF / ON</td><td>This item determines if errors are declared when the <i>Label Retry</i> count is exceeded.</td></tr><tr><td>AutoID Mgr Rpt</td><td>OFF / ON</td><td>This item enables AutoID and label information to be sent out the network port. When this setting is ON, users can review the RFID label information on the TSC Console utility.</td></tr><tr><td>Non-RFID Warning</td><td>OFF / ON</td><td>This item enables a warning to appear if the printer receives a print job that does not contain any RFID commands when RFID media is installed in the printer.</td></tr></table>	Item	Settings	Description	RFID Active	OFF / ON	Enables/Disables the RFID encoder module.	Error Handling	OFF / STOP/ OVERSTRIKE	This item selects the error handling mode for RFID failures.	Label Retry	1 – 10	This item selects the number of label retries that the RFID encoder will attempt before declaring a fault.	Max Retry Error	OFF / ON	This item determines if errors are declared when the <i>Label Retry</i> count is exceeded.	AutoID Mgr Rpt	OFF / ON	This item enables AutoID and label information to be sent out the network port. When this setting is ON, users can review the RFID label information on the TSC Console utility.	Non-RFID Warning	OFF / ON	This item enables a warning to appear if the printer receives a print job that does not contain any RFID commands when RFID media is installed in the printer.
Item	Settings	Description																				
RFID Active	OFF / ON	Enables/Disables the RFID encoder module.																				
Error Handling	OFF / STOP/ OVERSTRIKE	This item selects the error handling mode for RFID failures.																				
Label Retry	1 – 10	This item selects the number of label retries that the RFID encoder will attempt before declaring a fault.																				
Max Retry Error	OFF / ON	This item determines if errors are declared when the <i>Label Retry</i> count is exceeded.																				
AutoID Mgr Rpt	OFF / ON	This item enables AutoID and label information to be sent out the network port. When this setting is ON, users can review the RFID label information on the TSC Console utility.																				
Non-RFID Warning	OFF / ON	This item enables a warning to appear if the printer receives a print job that does not contain any RFID commands when RFID media is installed in the printer.																				
Tag Calibration	This item is used to get the information of the RFID after calibration. Refer to "Tag Calibration" Submenu section for more details.																					
Calibration Params	Settings saved on the printer to optimize RFID encoding. Refer to "Calibration Params" Submenu section for more details.																					
RFID Chip Params	A number of RFID options which define specific parameters for custom RFID tags can be set from the printer menu and here. Refer to "RFID Chip Params" Submenu section for more details.																					

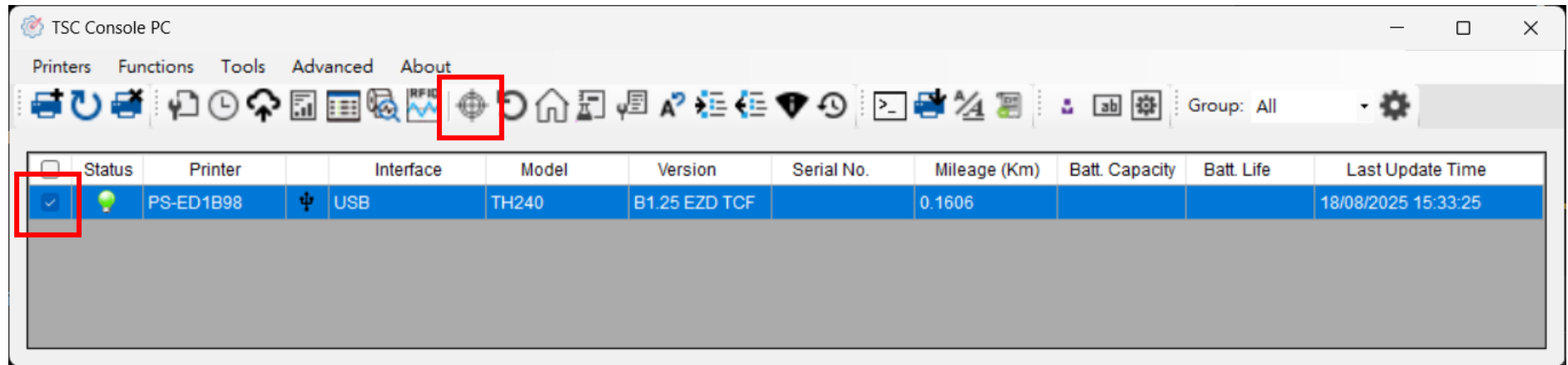
Tab	Description		
Profiling Tools	This item is used to set the printers parameters for the RFID Profile test.		
	Item	Settings	Description
	Seek TOF	Yes / No	This item is used to set whether the tag is fed to the TOF before detection starts.
	Step Size (inch)	0.05/ 0.1	The Step Size is the distance travelled between each sample position tested in the profile. If you wanted to profile more samples for the tag you would set the step size to 0.05 inches and if you wanted less samples, you would set the step size to 0.10 inches.
	Total Distance (inch)	0.50 – 50.00	This parameter allows you to set the duration of the profile test. The total distance for the profile will vary depending on the form’s length, as determined by the gap/mark sensed distance. Ideally, we want to capture a profile for multiple tags so you need to ensure the distance is long enough that you will see a pattern from the graph. The best way to set this is to multiply the number of tags you want to profile by the sensed distance.
Diagnostics	The items under Diagnostics are used to run tests that help determine the accuracy and troubleshoot the RFID system. Refer to "Diagnostics" Submenu section for more details.		
Statistics	The items under Statistics are used to store statistics about the RFID system activities. Refer to "Statistics" Submenu section for more details.		

6.2.3 RFID Profiler

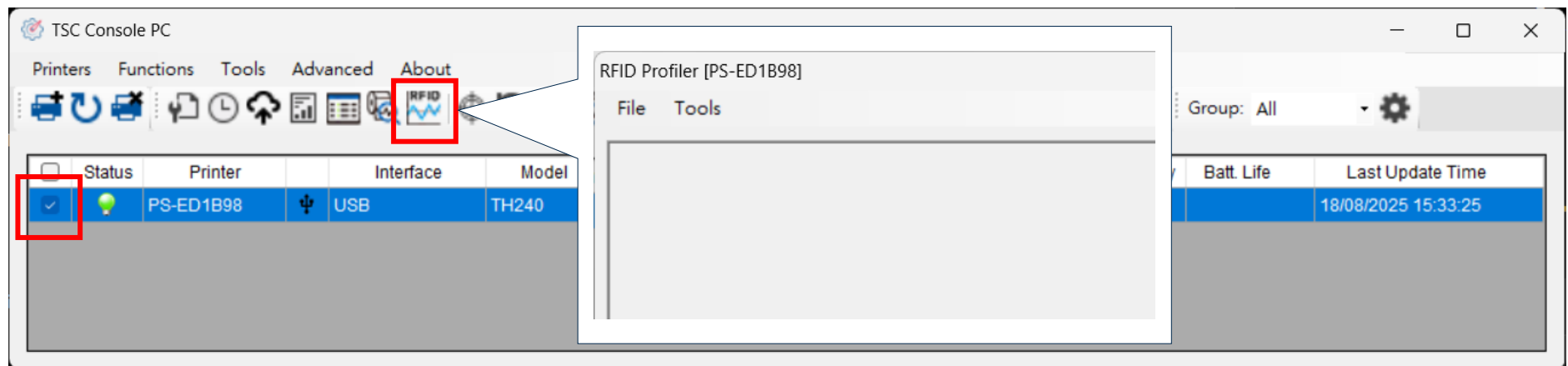
The RFID Profiler is a diagnostic tool that allows the user to profile RFID tags and diagnose any issues that may occur with those tags. This application works with the printer to create a tag profile that allows you to analyze successful write/read powers at each position on the tag. With the RFID Profiler you can execute the RFID/Media profile tests, capture profile data, save profiles for later viewing, and open existing profiles in the form of a graph.

Please follow the steps below to access the RFID Profiler.

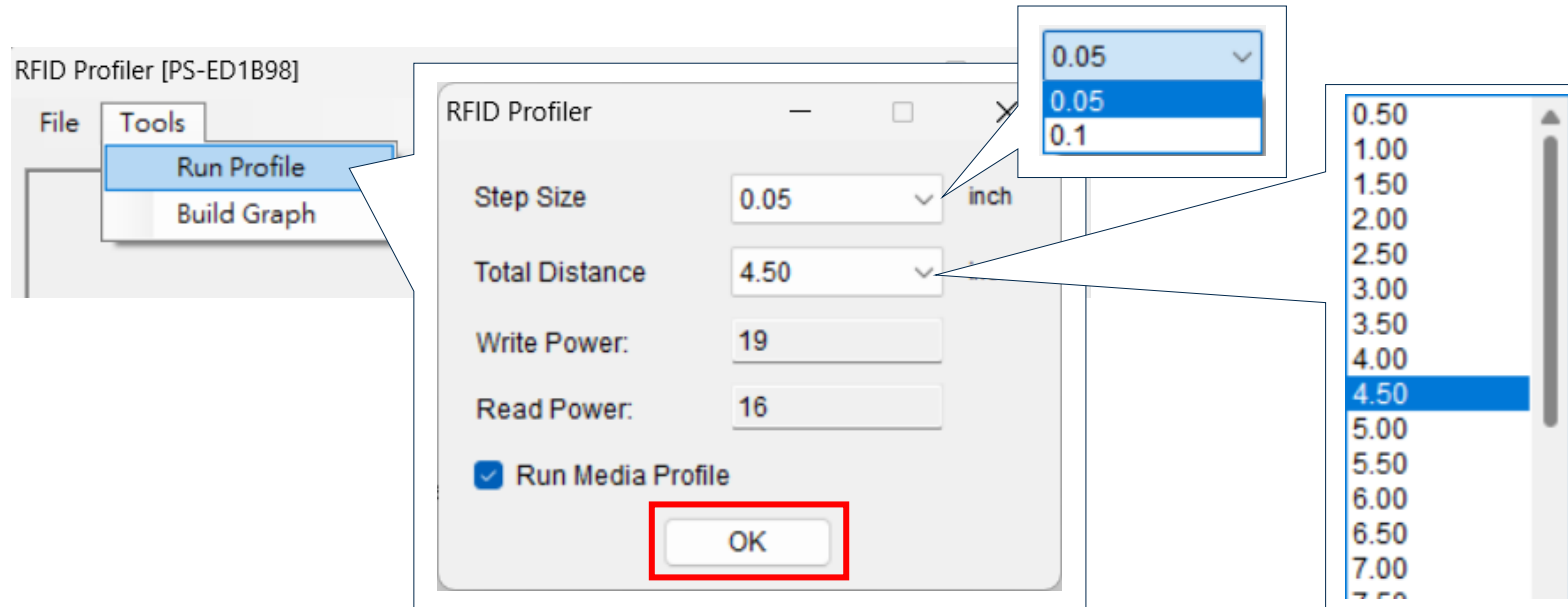
- 1) Add your RFID printer to TSC Console. Then go to **Printer > Calibration** to complete the media calibration for this RFID tag before running the RFID profiler.



- 2) Select **Printer > RFID Profiler** to open the settings window.

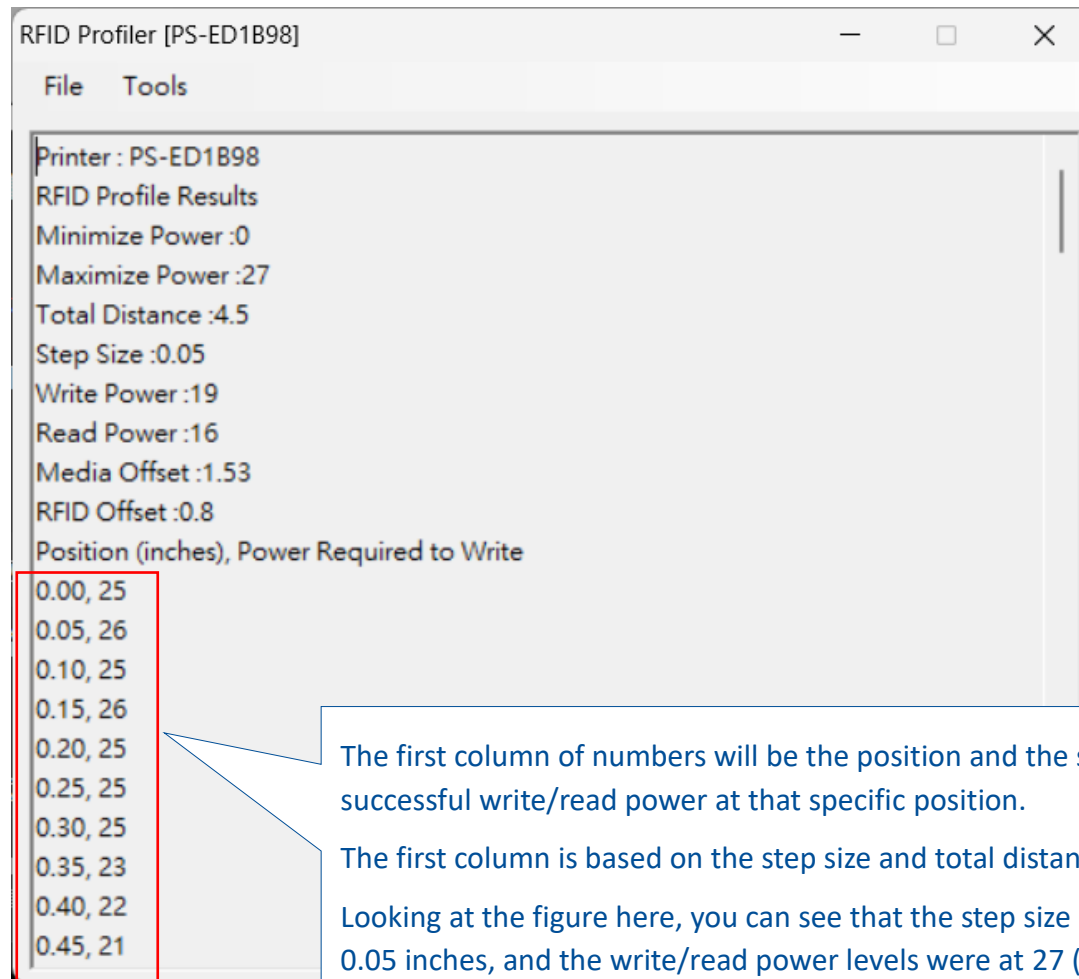


- 3) Go to **Tools > Run Profile** to set the **Step Size** and **Total Distance**.
 Check/Uncheck the **Run Media Profile** checkbox for the media profile test.
 Click the **OK** button to start the test.



Item	Settings	Description
Step Size (inch)	0.05/ 0.1	The Step Size is the distance travelled between each sample position tested in the profile. If you wanted to profile more samples for the tag you would set the step size to 0.05 inches and if you wanted less samples, you would set the step size to 0.10 inches.
Total Distance (inch)	0.50 – 50.00	This parameter allows you to set the duration of the profile test. The total distance for the profile will vary depending on the form's length, as determined by the gap/mark sensed distance. Ideally, we want to capture a profile for multiple tags so you need to ensure the distance is long enough that you will see a pattern from the graph. The best way to set this is to multiply the number of tags you want to profile by the sensed distance.
Run Media Profile	Check/ Uncheck	The checkbox indicates whether you want to run the media profile along with the RFID profile.

- 4) The profile test will take a couple of minutes depending on the total distance set.
- 5) After completion, the RFID Profile data will be displayed as shown in the figure below.



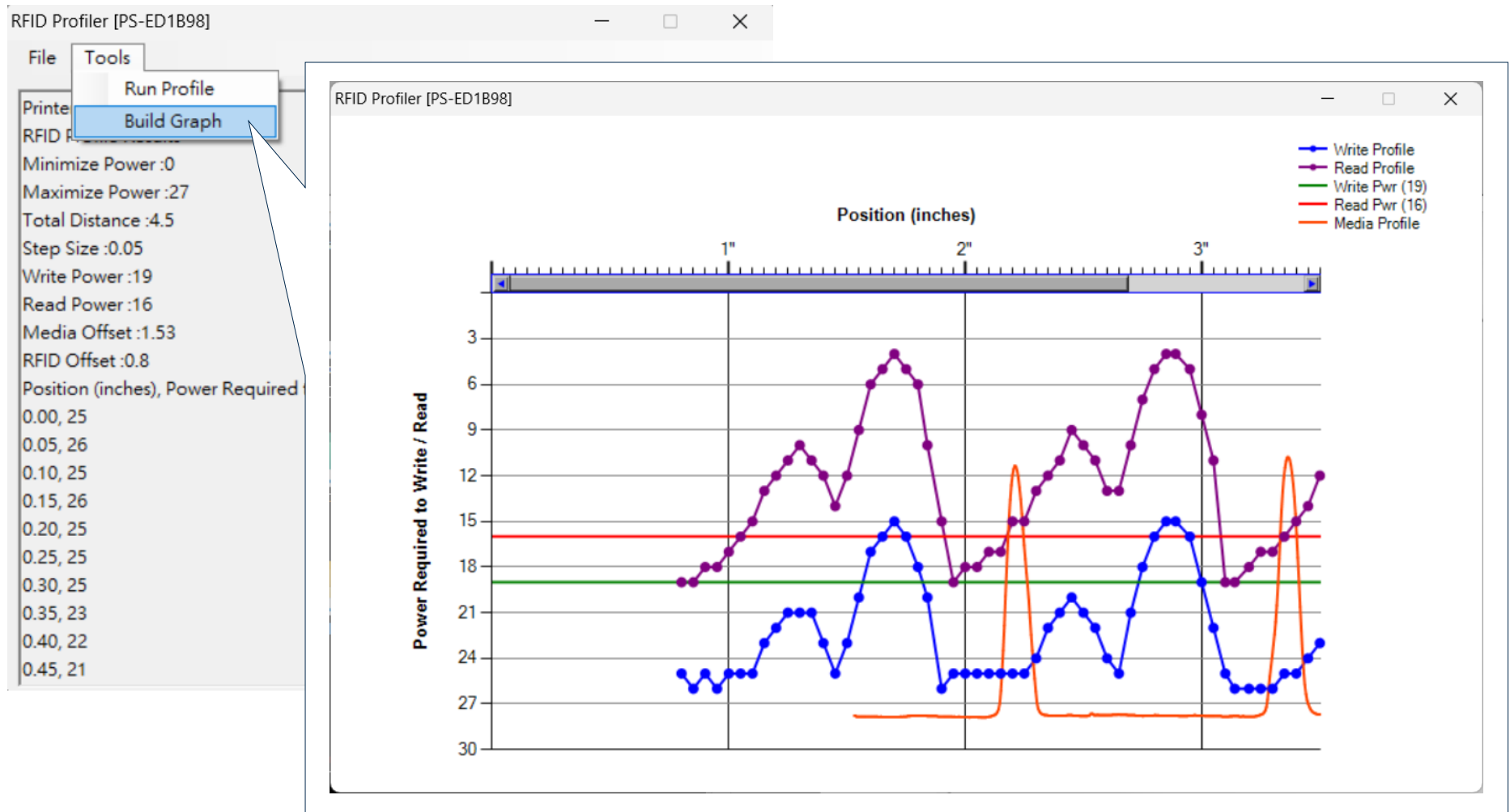
The first column of numbers will be the position and the second column will be the successful write/read power at that specific position.

The first column is based on the step size and total distance set for the profile test.

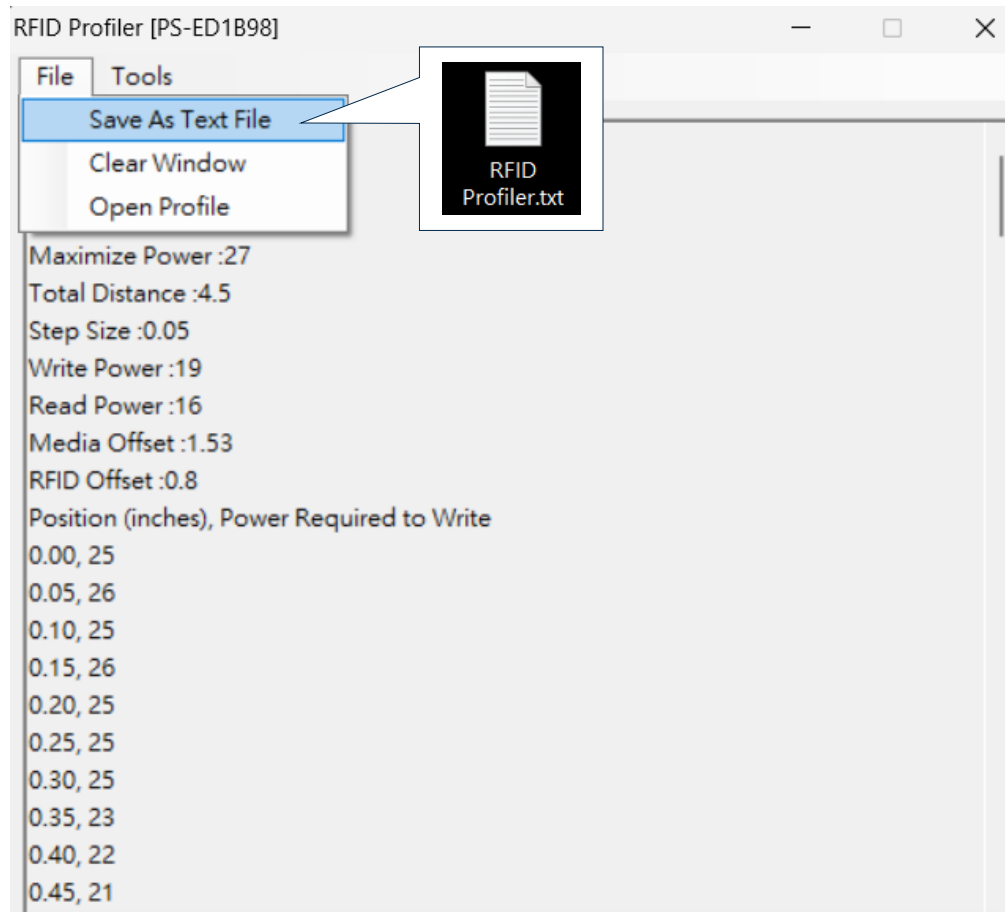
Looking at the figure here, you can see that the step size between each position was 0.05 inches, and the write/read power levels were at 27 (full power).

The ideal setting will generally be substantially below this value.

6) Go to **Tools > Build Graph** to take the raw data and build a graph visually representing the data.



7) If you are satisfied with the results you can save the profile under **File > Save As Test File** or run another.



6.2.4 AutoID Data Manager

The AutoID Data Manager is an application that can collect EPC (electronic product code) telemetry data (stored on Radio Frequency Identification [RFID] tags) from RFID enabled printers.

With this telemetry data (EPC), you can create compelling audits of label and RFID tag quality. (support csv/txt file formats)

Please follow the steps below to access the AutoID Data Manager to and perform the data validation.

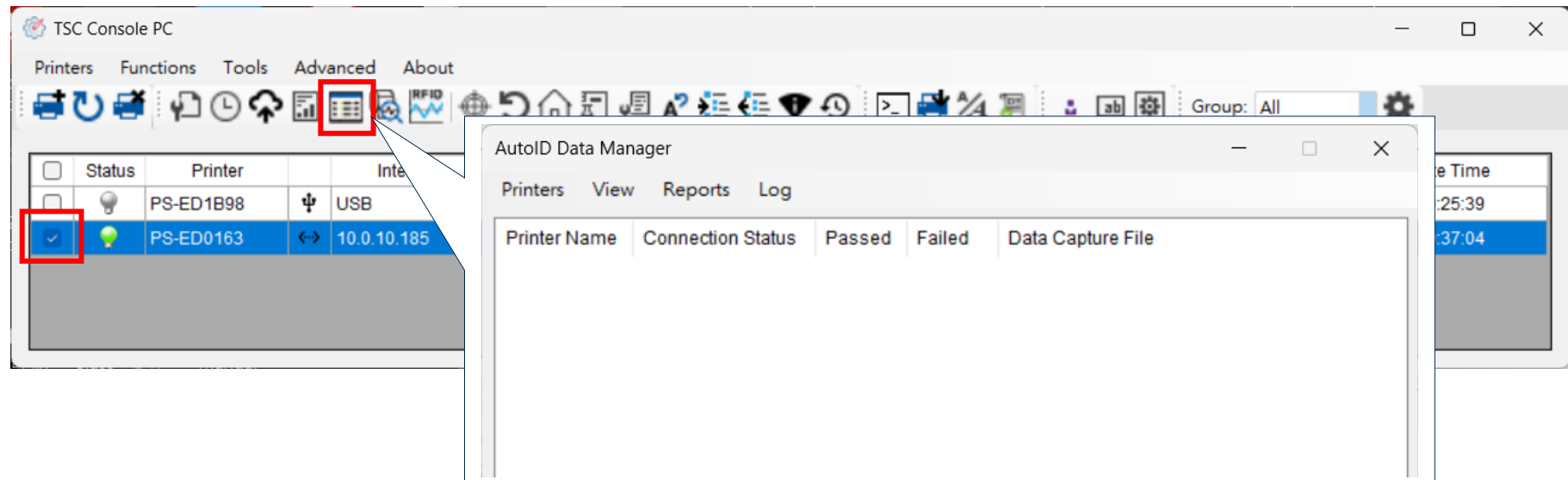
NOTE:

To collect EPC telemetry data, you must set EPC Mgr Report to Enable. (In the TSC Console PC or RFID menu within the printer)

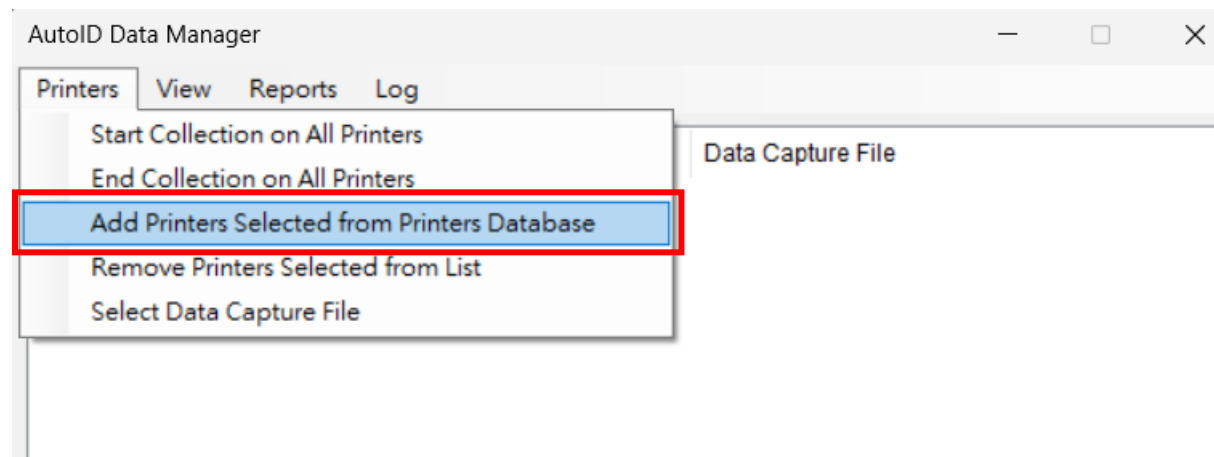
- TSC Console PC: RFID Configuration > Control > AutoID Mgr Rpt
- Printer Menu: Menu > Interface > RFID > Control > AutoID Mgr Rpt



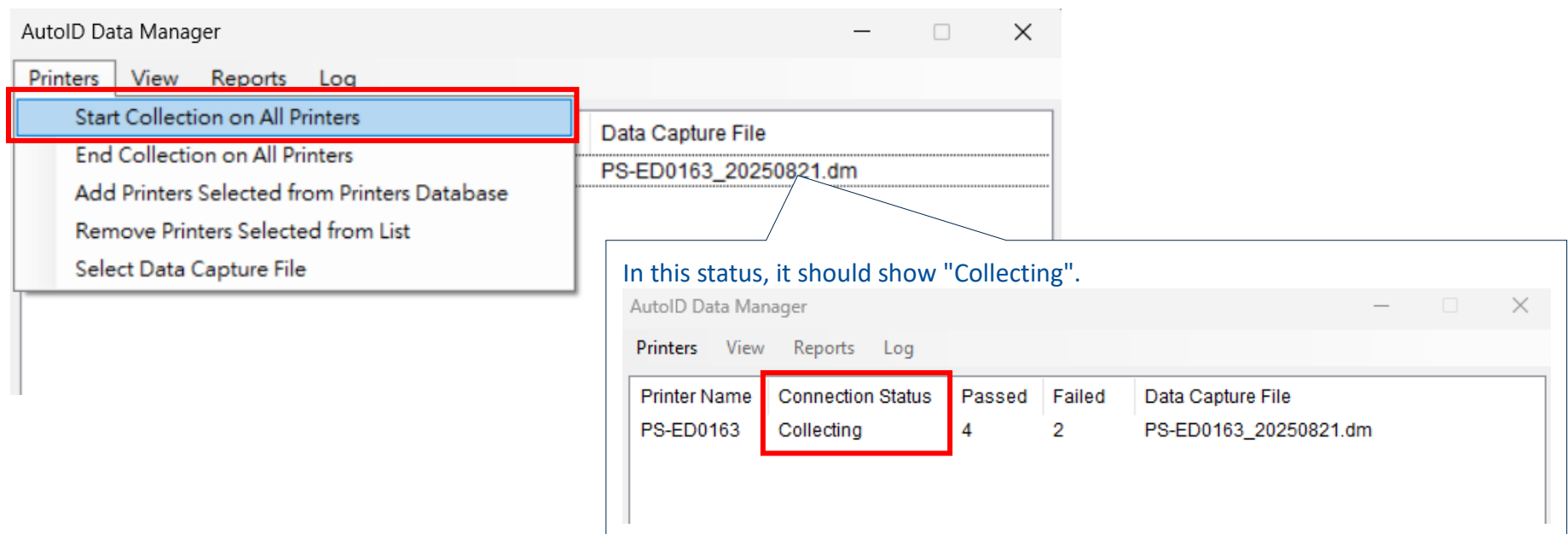
- 1) Add your RFID printer (or printers) to TSC Console PC. Select **Printer > AutoID Data Manager** to open the settings window.



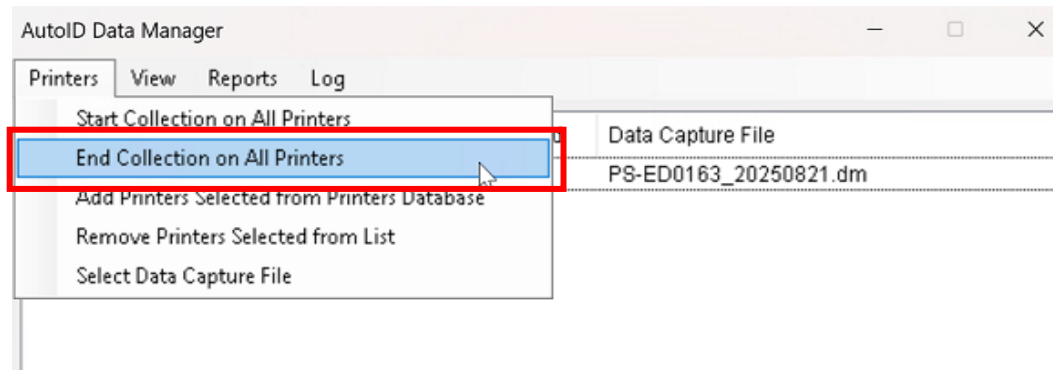
- 2) To access the AutoID Data Manager application, first select a printer or printers from the printer Database that have an RFID encoder.
(Printers > Add Printers Selected from Printers Database)



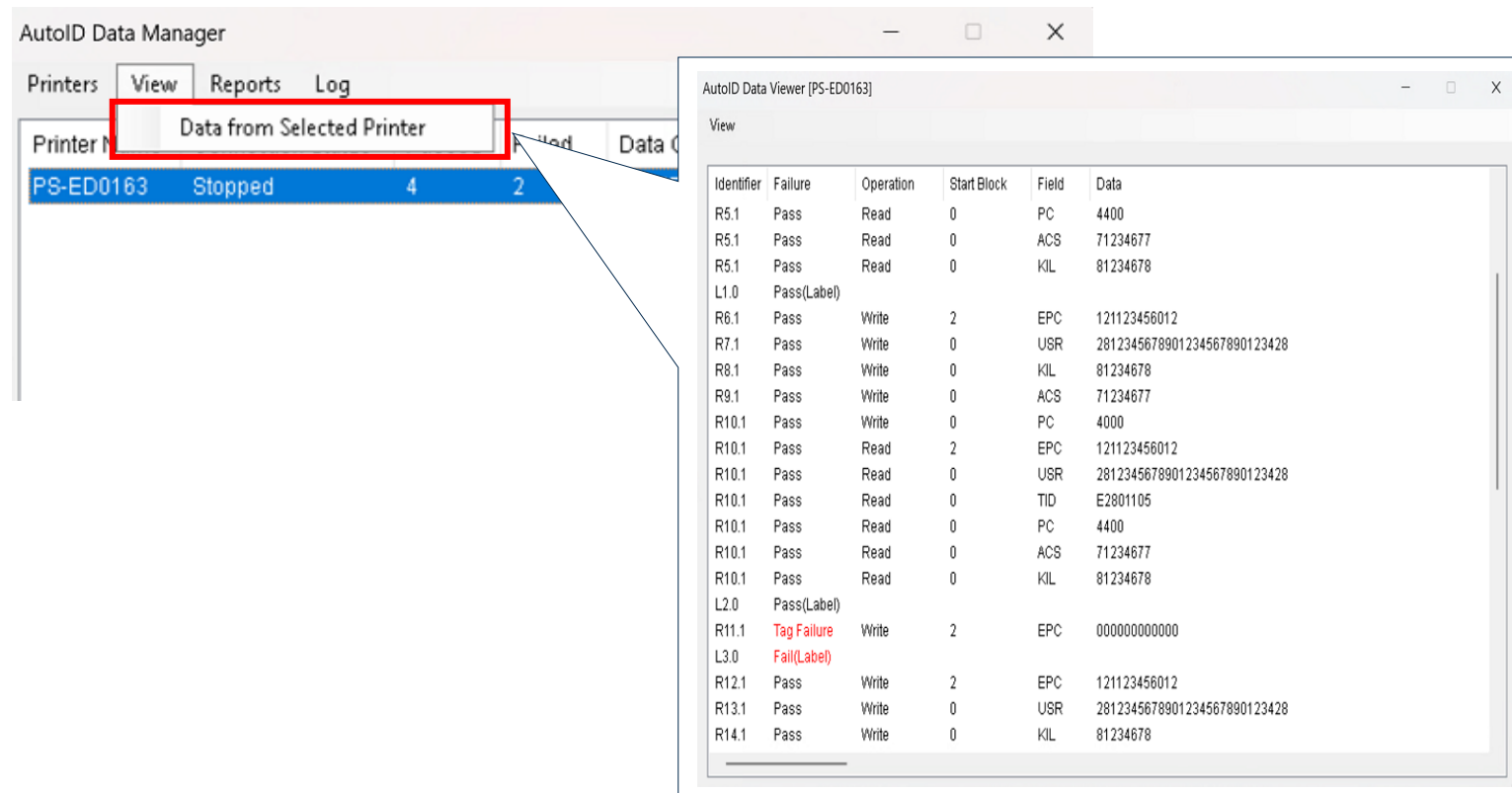
- 3) Then select **Printers > Start Collection on All Printers**. Start the collection of telemetry data from all printers in the printer list.



- 4) After Collecting, go to **Printers > End Collection on All Printers**. End the collection of telemetry data from all printers in the printer list. (In this status, the Connection Status should show "Stopped".)



- 5) Select the printer (highlighted in blue) and go to **View > Data from Selected Printer** to view the collected data.

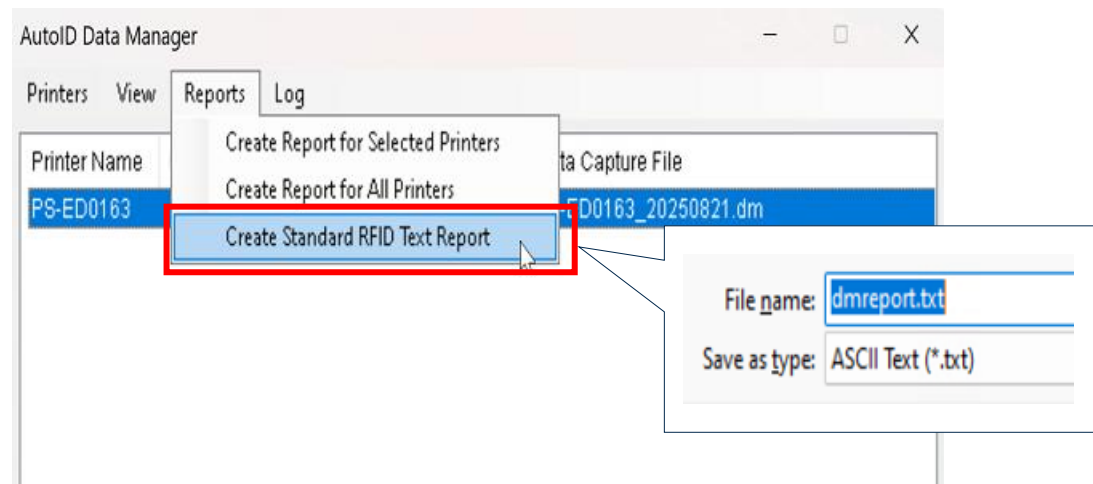
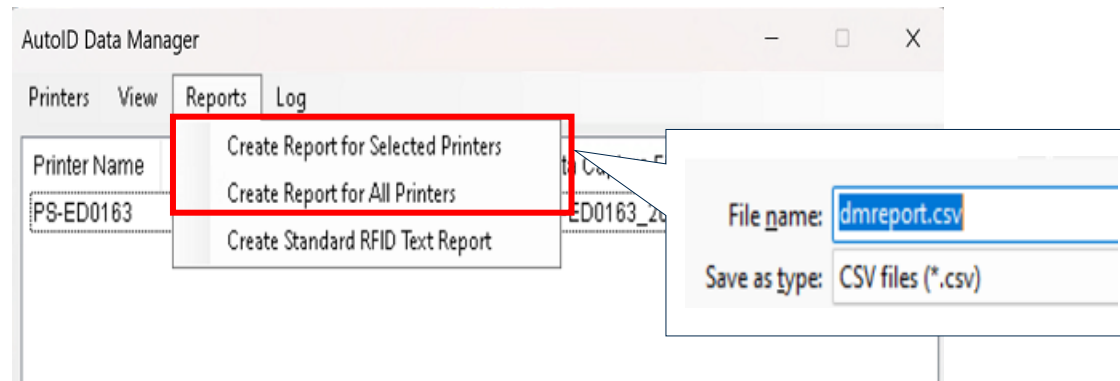


6) You can also export the collected data as a report.

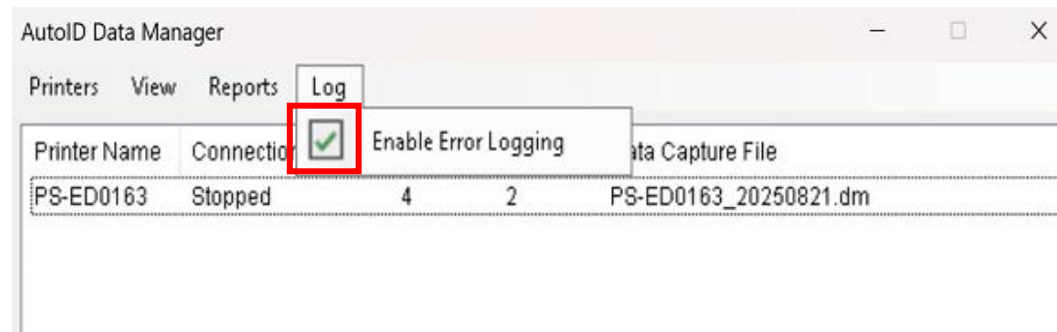
Create Report for Selected Printers: Creates an ASCII telemetry data file for all selected printers in the printer list, based on the Report Parameters settings.

Create Report for All Printers: Creates an ASCII telemetry data file for all printers in the printer list, based on the Report Parameters settings.

Create Standard RFID Text Report: Creates an ASCII telemetry data file for all selected printers in the printer list, based on predefined RFID fields.



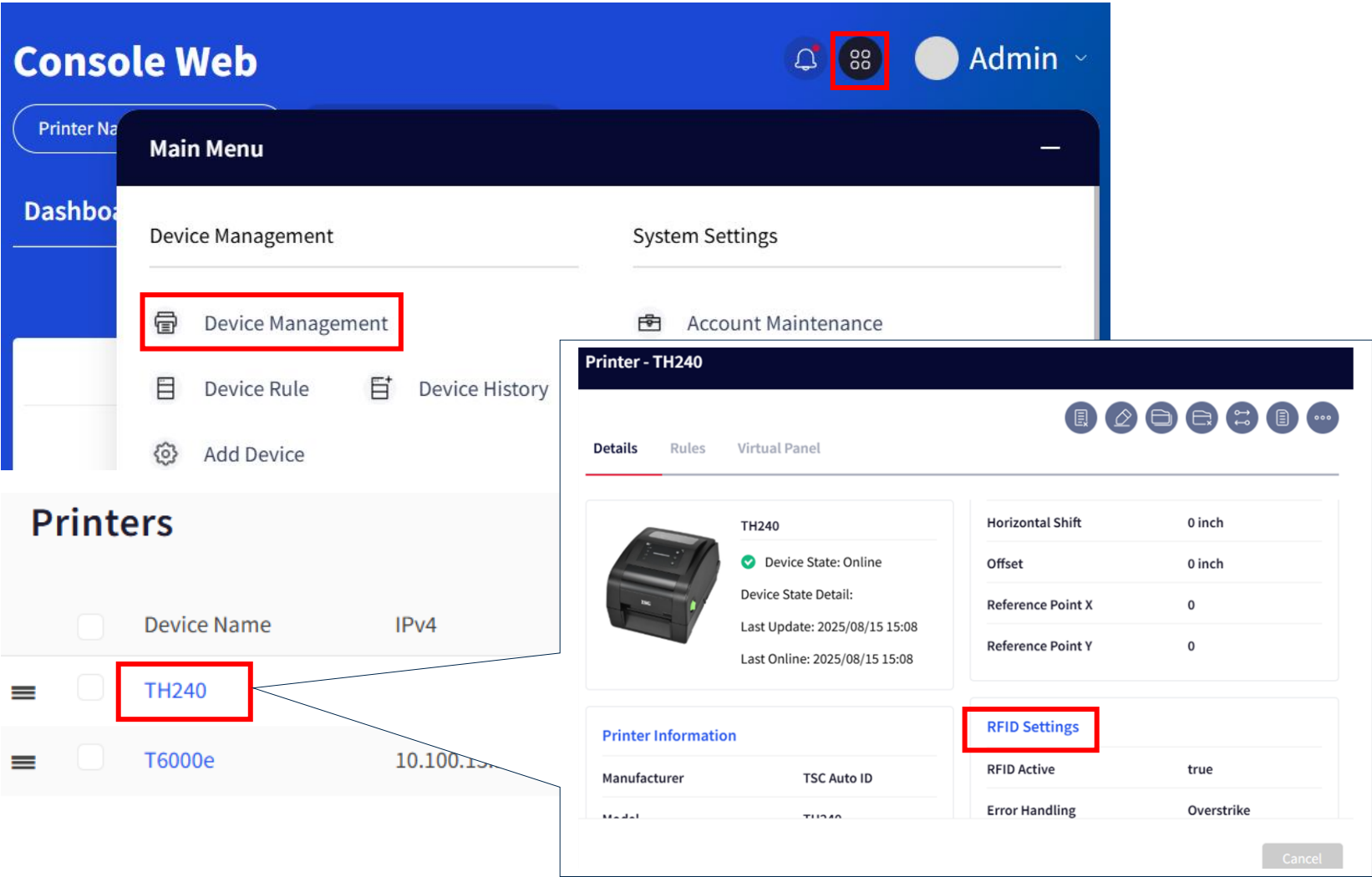
7) Logs printer errors. Options include enabling or disabling error logging.



6.3 TSC Console Web

After adding your RFID printers into TSC Console Web, select **Main Menu > Device Management > Click Printer** to view the RFID settings.

6.3.1 RFID settings



6.3.2 RFID Tag Settings

On the **Printer** page, select the **Printer Settings > Media > RFID Settings** to configure the main RFID functions.

Printer - TH240

DetailsRulesVirtual Panel



TH240

✔ Device State: Online

Device State Detail:

Last Update: 2025/08/15 15:08

Last Online: 2025/08/15 15:08

Horizontal

Offline

Reference

Reference

Printer Settings

SystemMediaConnectionStatisticsTPH Care

Print Settings

Sensor Settings

Media Settings

RFID Settings

▶ Control

▶ Tag Calibration

▶ Calibration Parameters

▶ RFID Chip Parameters

▶ Profiling Tools

On the **Printer** page, you can also select this  icon to access some commonly used RFID functions.

Printer - TH240

DetailsRulesVirtual Panel



TH240

✔ Device State: Online

Device State Detail:

Last Update: 2025/08/15 15:08

Last Online: 2025/08/15 15:08

Horizontal Shift

0 inch

Offset

0 inch

Reference Point X

0

Reference Point Y

0

More options icon

Change Printer Name

Save Configuration File

Auto Calibration

RFID Calibration

RFID Profiler

Media Profiler

Reboot Printer

Factory Default

Print Configuration Page

Ignore Auto.BAS

Enter Line Mode

Exit Line Mode

Wireless Default

Clear Resettable Cutter Counter

Clear Resettable Printer Mileage

Clear RFID Counter

Get TPH Resistance Profile

Print TPH Test Page

Dump Text

Label Preview

Bitmap Font Manager

74

6.3.3 AutoID Data Manager

Select **Main Menu > AutoID Data Manager > Click Printer** to get the data.

The AutoID Data Manager is an application that can collect EPC (electronic product code) telemetry data (stored on Radio Frequency Identification [RFID] tags) from RFID enabled printers.

Console Web

Admin

Printer Name

Main Menu

Device Management

Device Management

Device Rule

Add Device

Maintenance Information

Consumables Usage Information

AutoId Data Manager

Print

NOTE:

Please note that to enable this feature, the **AutoID Mgr Rpt** item (Menu > Interface > RFID > Control > AutoID Mgr Rpt) on the printer must be set to **ON**, and the printer setting in the **TSC Console web** must also be set to **ON**.

Control

RFID Active

ON

Error Handling

Overstrike

Label Retry

10

Max Retry Error

ON

AutoID Mgr Rpt

ON

Printers

Create Report

Clear Record

☐	Device Name	IPv4	ACTIVE	Passed	Failed
☐	TH240	10.0.10.171	ON	0	0

Click the printer link to view the data.

Autold Data Viewer [TH240]

Identifier	Failure	Operation	Start Block	Field	Data
R1.1	Pass	Write	2	EPC	960192837465
R1.1	Pass	Write	0	USR	009644335566
R1.1	Pass	Write	0	ACS	77777777
R1.1	Pass	Write	0	KIL	11111111
R1.1	Pass	Read	2	EPC	960192837465
R1.1	Pass	Read	0	TID	E28011052000
R1.1	Pass	Read	0	USR	009644335566
R1.1	Pass	Read	0	ACS	77777777
R1.1	Pass	Read	0	KIL	11111111

Revision History

Date	Description	Editor
2025/05/26	Official release.	Peter Yao
2025/8/6	- Add Reference Note section & Updated the Overview section - Add the Basic Terms section - Add the What to Expect when Running an RFID Application section	Camille Pao
2025/8/7	Add the "TH240 RFID Printers" section	Camille Pao
2025/8/12	- Add the NOTE for Overstrike on Error Handling section - Add the tree diagrams in RFID Menu sections - Add the menu path to each menu item.	Camille Pao
2025/8/14	Add the Smart Label Operation (Overview) section	Camille Pao
2025/8/18	- Add the Label Size section - Add the RFID Inlay Pitch section - Add the Alpha-40L(R) section and info.	Camille Pao
2025/8/21	- Add the Overview section for TSC Console - Update the TSC Console PC section - Add the TSC Console Web section	Camille Pao
2025/8/28	Update multiple sections	Camille Pao
2025/10/14	- Add the "TH240 Series Printers with External RFID Module" section - Update the ch. 3.3.2 Error Handling for adding TH240 external RFID info.	Camille Pao
2026/8/7	- Add the "PEX-2000 RFID Printers" section - Update the ch. 3.3.2 Error Handling to add the PTX-2000 RFID info. - Update the "Setting up an RFID Printer" section for to specify that RFID media must be calibrated using Preprint Calibration. - Add the " RFID Tag Validation (RTV)" section	Camille Pao



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