



H-400R

RFID Guide



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Section 1: RFID Printer Overview

The Tharo H-400R is designed to print and encode Ultra High Frequency (UHF) 96-bit Gen2 Smart Labels. Smart Labels are labels with an embedded RFID tag. The H-400R can encode data into the RFID tag of a Smart Label and print on the surface of the label. The printed information can include text, bar codes, graphics and a copy of the data encoded in the RFID tag of the Smart Label.

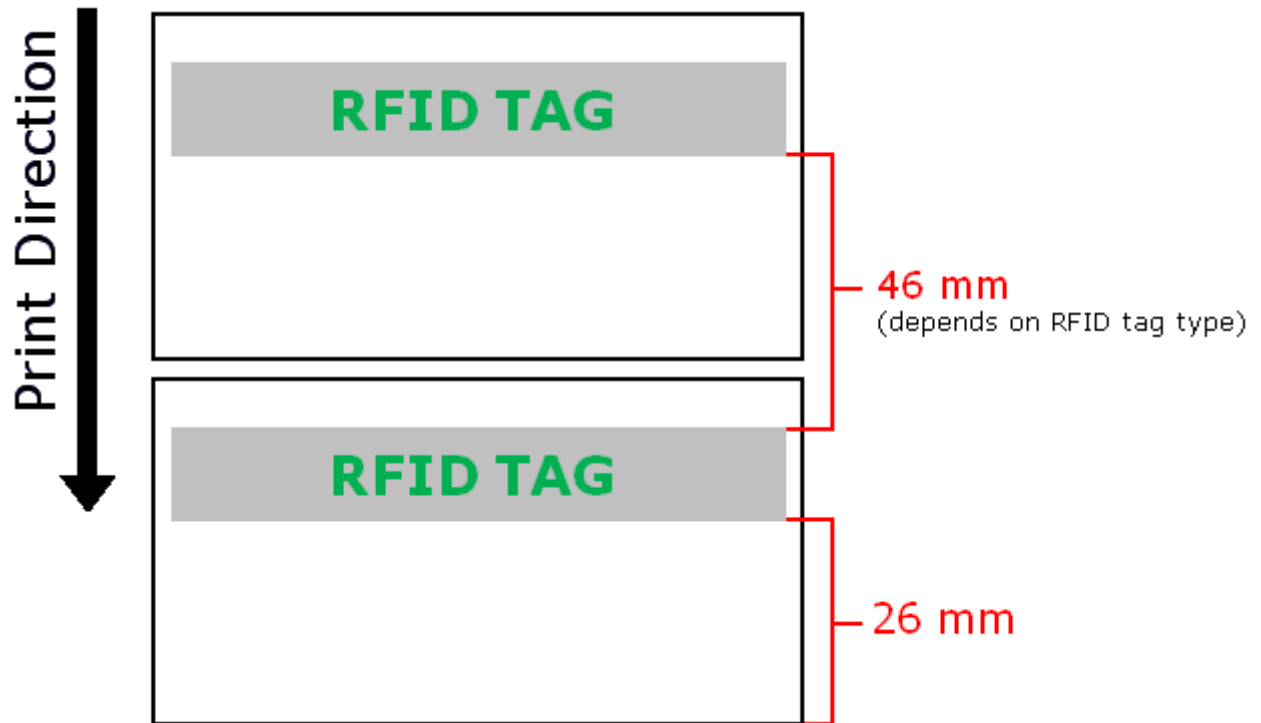
The type of RFID tag and placement of the tag within a Smart Label is important. To encode or read RFID data, the RFID tag has to line up with the RFID antenna inside of the printer. For optimum operation, the RFID tag should be directly above the printer's RFID antenna, when the Smart Label is ready to be printed. Detailed information regarding RFID tag placement can be found in Sections 2 of this guide.

The printer's Radio Frequency(RF) signal strength is also an important factor when encoding and reading RFID tags. Different Gen2 RFID tag types require various RF signal strengths to encode data and read the data within the RFID tag. If the printer's RF signal is too weak, the RFID tag cannot be encoded or read. If the RF signal is too strong and a second RFID tag is within range of the signal, it is possible that the incorrect RFID tag will be encoded or read. Detailed information regarding the RF signal strength can be found in Section 3.4 of this guide.

Various factors can reduce the performance of RFID enabled printers. One of these factors is radio frequency interference. It is possible that devices such as other RFID printers, RFID readers, wireless phones, or equipment emitting RF signals can interfere with the printer's RFID encoder. A second factor for poor performance can be the quality of the RFID tags or the separation distance between the tags. Some RFID tags may require too much power to encode or only function intermittently. Smart Labels with insufficient separation between the RFID tags will also result in poor performance. When a print job is sent to the printer and an RFID tag is not detected, a gray box will print on the smart label. Detailed information for troubleshooting printer RFID problems can be found in Section 4 of this guide.

Section 2: RFID Tag Position

For optimum operation, the RFID tag should be directly above the printer's internal antenna, when the Smart Label is ready to be printed. The optimal RFID tag position for the H400R is 26 mm (~1 inch) from the leading edge of the Smart Label. Depending on the RFID tag type, the distance between the RFID tags should be a minimum of 46 mm.



The H-400R can be calibrated to encode and read RFID tags located further than 26 mm from the leading edge of the Smart Label. This feature requires the printer to start printing a label, stop to encode the RFID tag and then resume printing the label. A copy of the data inside of the RFID tag cannot be printed on the label until after the RFID tag has been encoded. Section 3.2 explains how to calibrate the RFID tag position.

Section 3: Printer RFID Features

This section explains the RFID features and settings of the H400R printer. These features and settings are only available when an RFID module is connected to the printer. Information regarding the printer's non-RFID functions is available in the standard H-400/H-600 Series User Manual.

Most of the RFID features and settings are available in the printer's setting mode. To enter setting mode:

1. Confirm that the LCD screen shows "Ready to print"
2. Press and hold the PAUSE key until the LCD screen shows "Setting Mode"



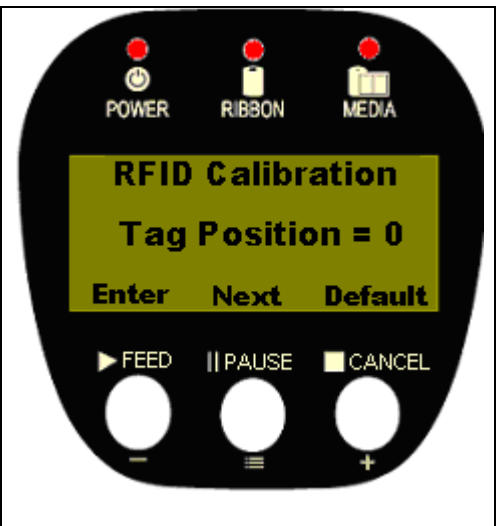
3.1 Calibrating RFID Tag Position

If you are using Smart Labels that comply with the printer's optimal RFID tag position described in Section 2, you do not need to do an RFID tag calibration. If the printer's default RFID tag position has been changed by a previous RFID tag calibration or with a software command, you will need to perform an RFID tag calibration. Alternatively, you may also set the correct RFID tag position using label printing software.

The RFID tag calibration will slowly feed one smart label forward while continuously attempting to detect an RFID tag. Based on the results of this scan, the printer will set itself to use the best possible RFID tag position.

To perform an RFID tag calibration, enter the printer's setting mode. The first option will be "RFID Calibration" and display the current RFID tag position stored in the printer. This value should be zero, if the Smart Labels meet the H-400R optimal RFID tag position specification.

- Press the **FEED** button to start RFID calibration
- Press the **PAUSE** button to advance to the next option
- Press the **CANCEL** button to set the RFID tag position to zero



3.2 Confirming RFID Tag Position

This option is used to check if the printer's current RFID configuration will detect your RFID tags, without wasting any of your Smart Labels. A Smart Label will feed through the printer and the LCD screen will display the data in the RFID tag. If the RFID tag was not detected, the LCD screen will display "RFID Tag Not Detected".

To perform an RFID read verification, enter the printer's setting mode. The first option will be "RFID Calibration", press the PAUSE button once to advance to the "RFID Read" option.

- Press the **FEED** button to start RFID read verification
- Press the **PAUSE** button to advance to the next option
- Press the **CANCEL** button to exit the printer's setting mode



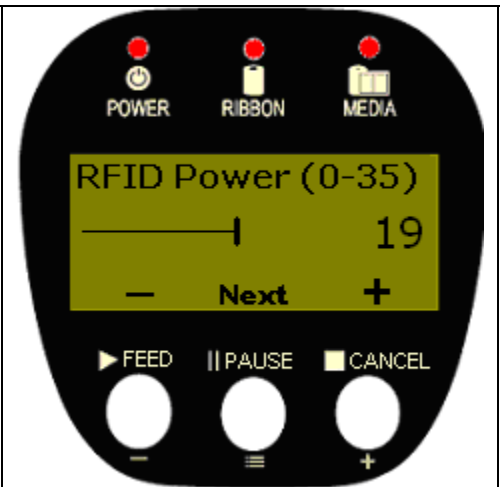
3.3 Setting RFID Power Level

Depending on the RFID tag type, you may need to adjust the printer's RF signal strength to properly encode and read your RFID tags. If the RF signal is too weak, the RFID tag will not communicate with the printer. If the RF signal is too strong, more than one RFID tag might communicate with the printer. The RFID Power option has to be set in such a way that the printer only communicates with the RFID tag directly above its internal antenna.

To adjust the RF signal strength, enter the printer's setting mode. The first option will be "RFID Calibration", press the PAUSE button twice to advance to the "RFID Power" option.

The power level found to work with most RFID tag types is 19.

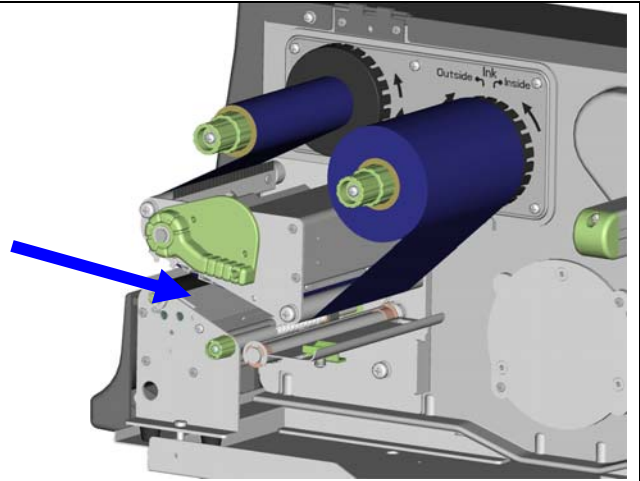
- Press the **FEED** button to decrease the RF signal strength
- Press the **PAUSE** button to advance to the next option
- Press the **CANCEL** button to increase the RF signal strength



3.4 Reading RFID Tag Data

The H-400R can read data encoded in a Gen2 RFID tag and display it on the LCD screen. This feature can be used to confirm that the printer can communicate with the RFID tag and also to check the data encoded in the RFID tag.

Position the Smart Label with the RFID tag directly above the printer's antenna. The antenna is located 26 mm (~1 inch) behind the print head, but will not be visible. The illustration on the right shows where the RFID tag should be placed.



To start reading the RFID tag, confirm that the printer is not processing a print job and press the CANCEL button. If an RFID tag is within the read range of the printer's antenna, the tag data will be displayed on the LCD screen in hexadecimal format. To stop reading RFID tags, press the CANCEL button a second time.

If the printer displays "*****" it is not detecting an RFID tag. In this case you may need to adjust the RFID tag's position or increase the RFID power level.



Section 4: Troubleshooting

This section explains techniques to identify and solve RFID related printer issues. Many of these issues can be avoided by using proper smart labels and correctly configuring the Tharo H-400R printer. Read Section 2 of this guide to configure the printer's RFID settings.



To troubleshoot RFID printer related issues you must first confirm that the printer can communicate with your RFID tags. Reading the RFID tag as described in Section 3.4 is the easiest method to do this. Keep in mind that you may have to boost the RFID power to read the RFID tag.

Problem	Solutions
My printer voids smart labels	Use Smart Labels with 96 bit UHF Gen2 RFID tags.
	Use Smart Labels that meet the optimal RFID tag placement specifications outlined in this guide.
	Perform the printer's RFID calibration and confirm the RFID tag position using the RFID Read option in the printer's menu.
	Adjust the RFID power setting as described in this guide.
	Confirm that your label software's RFID settings are correct. Software settings will override printer settings.
Text and bar codes that copy RFID tag data do not print	Use a printer internal font for text fields that copy RFID tag data.
	Use bar codes that can encode hexadecimal digits.
	Use Smart Labels that meet the optimal RFID tag placement specifications outlined in Section2 OR Move the affected text or bar codes to a position that prints after the RFID tag is encoded.

Problem	Solutions
<p>The encoded or printed RFID tag data is incorrect</p>	<p>The RFID data is represented in a different format than you are expecting to see. Most RFID readers, including the RFID reader in the H-400R, display RFID data in a hexadecimal format. The H-400R can print a copy of the RFID tag's data in hexadecimal or ASCII format.</p>
	<p>Perform the printer's RFID calibration and confirm the RFID tag position using the RFID Read option in the printer's menu.</p>
	<p>Use Smart Labels that meet the RFID tag separation outlined in this guide.</p>
	<p>Reduce the printer's RFID power level.</p>
	<p>Confirm that your label software's RFID settings are correct.</p>