



# **ELEMENT ID<sup>®</sup>**

## **Quick Start Guide**



**HF Series<sup>™</sup>**


**RFID Reader**  
**Model HF1/HF1-B**

## WARNINGS AND COMPLIANCE

Please read all the items in this "Quick Start Guide" prior to operating your HF1/ HF1-B RFID Reader. Damage may occur to the reader if the installation and set-up procedures are not correctly followed.

### FCC Compliant:

This device complies with Part 15 of the FCC rules subject to the following two conditions:

1. This device may not cause harmful interference
2.  This device must accept all interference received, including interference that may cause undesired operation.

This equipment complies with Part 15 of the FCC rules. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## WARNINGS AND COMPLIANCE

### Warning:



The HF1/HF1-B reader can only be used with Element ID supplied antennas and cables. Use of other antennas and cables is a violation of FCC rules and may cause damage to the HF1/HF1-B Reader.

**Note:** The “Quick Start Guide” is intended as a basic introduction to the most common HF1/HF1-B applications. This guide only touches the surface of the capabilities of the HF1/HF1-B Reader. Please consult the “HF1/HF1-B Service Manual” for a complete hardware and software description.

Approved antennas include:

ANT-2.5

ANT-4.5

ANT-0606S

ANT-1205R

If you have any questions, please feel free to contact Element ID at 1-888-EID-RFID or 1-610-419-8822.

Visit our website at: [www.element-id.com](http://www.element-id.com)



## WELCOME

Thank you for your interest in Element ID and our products. Our goal is to provide you with the highest possible RFID reader performance while offering ease of installation and highly configurable features for your application. We want to provide a complete data collection system that easily integrates into the rest of your automation/manufacturing process and allows you to focus on how to use the information to improve your business and solve problems – while we worry about how to reliably acquire, filter, compile, and deliver that data, and only the specific data, that you need.

Our extensive experience in automation is unique in the RFID industry. We invite you to draw on that experience. This HF1/HF1-B reader offers the ability to eliminate layers of hardware and software that have typically been required to mate RFID into existing systems. The HF1/HF1-B has been specifically engineered for demanding industrial applications. Features include: rugged construction and shielding, a real time interface, and advanced connectivity and configurability. Most of all, patent pending data association and processing capabilities turn the significant amount of data generated by an RFID reader into focused information that can improve your business.

Thank you for purchasing the HF1/HF1-B Reader!

The HF1/HF1-B RFID Reader from Element ID.  
Engineered For Performance™.



## TABLE OF CONTENTS

Warnings and Compliance .....	2-3
Welcome .....	5
Unpacking .....	7
IP Address Set-Up/Basic Cabling .....	8-9
Mounting Procedures	
Mounting the Antenna .....	10
Mounting the Reader .....	11
Optional Hardware Mounting	
Mounting the Photo-Eye .....	12
Mounting the Pulse Position Indicator .....	13
Cabling Connections .....	14
Cabling (Optional) .....	15
Device Configuration .....	16
Host Communication Set-Up .....	17
Tracking Set-Up (HF1 Only) .....	17-18
Testing the HF1/HF1-B Reader .....	19-20
Diagnostics .....	21
Ready to Go! .....	22
General I/O Wiring Guide .....	23

## UNPACKING

## UNPACKING



Your HF1/HF1-B reader system comes in one or two boxes. One box may include the antenna(s) appropriate to your kit selection.

The main box contains:

- HF1/HF1-B Reader

- 24V, 30W DC power supply

- AC Power cord for power supply

- 3ft. coax cable (hard-wired to reader)

- Reference RFID Tag (HF1 only)

- This "Quick Start Guide"

- May contain the antenna if not packed separately

## IP ADDRESS SET-UP/BASIC CABLING

Before mounting your HF1/HF1-B, we recommend setting up the IP address so it will communicate with your network. This step is done using any PC, the HF1/HF1-B, the supplied power supply and AC cable, and the supplied Ethernet cable.

### Hardware Set-Up:

A) Connect the Ethernet cable from your PC to the HF1/HF1-B

*Note: A crossover cable must be used if connecting directly to a PC.*



B) Connect the AC cable to the power supply and plug into an available AC outlet.



C) Connect the locking barrel connector to the input on the lower right side of the HF1/HF1-B front panel. Hand tighten only.



Configure the PC to be on the same net as the reader (192.168.1.100)  
(See your in-house IT professional or follow these steps for PCs running Windows XP)



- Select "Start", "Control Panel", "Network and Internet Connections", "Network Connections"
- Right click on the "Local Area Connection" icon, then select "Properties"
- Scroll down through the menu of options and left click "Internet Protocol (TCP/IP)". This should highlight "Internet Protocol (TCP/IP)"
- Select the "Properties" control button
- A new window will open. Select "Use the following IP address"
- Enter "192.168.1.100" in the box to the right of "IP Address"
- Enter "255.255.255.0" in the box to the right of "Subnet mask"
- Click "OK" to close the top window
- Click "OK" to close the "Local Area Connection Properties" window

### **Communicating with the HF1/HF1-B**

- Open your preferred Internet browser
- In the address box, enter the HF1/HF1-B default address "192.168.1.74"
- Your browser should display the HF1/HF1-B home screen
- The default password is "eid"
- You now have access to the HF1/HF1-B set-up screen

### **Configuring the HF1/HF1-B for your Application**

- If you would like to configure your HF1/HF1-B reader for you application now, rather than after it is on your network, please see the "Device Configuration" section later in this guide

### **Setting the IP address to match your network**

- From the HF1/HF1-B home page, select "Menu"
- Select "Network Set-Up"
- Enter the IP address, network mask, and other info needed for the HF1/HF1-B to function on your network.
  - See your in-house IT professional for this information
  - Note: Each HF1/HF1-B device must have a unique address

## MOUNTING PROCEDURES

### Mounting the Antenna

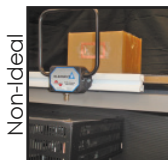
- Mount the antenna using the two mounting holes on the ABS plastic housing so the RFID tags to be decoded pass within the specified range of the antenna loop. The antenna loop should be oriented in a plane parallel to that of the tag path.



- The mounting height of the antenna should be such that the center of the antenna is the "sweet spot" of the tag presentation area

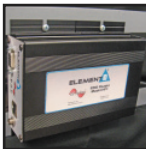


- Mount the antenna where it has maximum clearance from nearby metal. The system will perform better if the antenna is mounted in such a way to minimize the presence of metal in all directions for a distance equal to the specified read range



## Mounting the HF1/HF1-B Reader

- Attach the reader to a stable surface using the mounting flanges



- Be sure the reader is no farther away from the antenna than the enclosed 3' antenna cable (6' and 12' cables available at an additional charge).
- Mount the reader so access can be made to all of the reader connections.

## OPTIONAL HARDWARE MOUNTING

Only applicable if you have purchased these optional accessories

### Mounting the Photo-Eye

The photo-eye is used for product detection and is a critical part of the product tracking system.

- Mount the photo-eye and reflector on opposite sides of the conveyor making sure adequate product clearance is provided
- Position the photo-eye such that product will break the beam 1-2" before it reaches the antenna's read zone if you are using "Position Tracking" mode and at the center of the antenna if you are using "Event" mode
- Be sure the photo-eye beam is perpendicular to conveyor travel (any angle will reduce product tracking accuracy)
- Test the alignment between the photo-eye and reflector using the diagnostic LED on the back of the photoeye (the photo-eye must be connected to a powered HF1/HF1-B reader for this test – see "Cabling Connections (optional)" section for details)



## Mounting the Pulse Position Indicator (PPI)

The pulse position indicator is a critical part of the product tracking system.

- Mount the pulse position indicator (PPI) on the same segment of conveyor belt where the HF1/HF1-B and photo-eye are mounted
- We recommend using the optional PPI-1B mounting bracket, but any system that allows both wheels of the PPI to freely align against the conveyor belt with sufficient friction to turn the wheels is acceptable



## CABLING CONNECTIONS

### Connecting the Antenna

- Use only Element ID supplied antennas and cables (FCC requirement)
- The connection is made via the TNC connector, hand tighten only



**Warning:** The HF1/HF1-B reader can only be used with Element ID supplied antennas and cables. Use of other antennas and cables is a violation of FCC rules and may cause damage to the HF1/HF1-B Reader.

### Connecting Ethernet Communication

- Follow the same procedure used in the "IP Address Set-Up/Basic Cabling" section to connect to the HF1/HF1-B
- Connect the other end to your network device (router, hub, switch, etc)

### Connecting Power

- Follow the same procedure used in the "IP Address Set-Up/Basic Cabling" section

## CABLING (Optional)

Only applicable if you have purchased these optional accessories

### Connecting the Photo-Eye

The photo-eye is used for product detection and is a critical part of the product tracking system.

- Connect the photo-eye to the socket on the HF1/HF1-B front panel labeled "General I/O"
- See wiring diagram at the end of this guide



### Connecting the Pulse Position Indicator (PPI)

The pulse position indicator is a critical part of the product tracking system.

- Connect the PPI to the socket on the HF1/HF1-B front panel labeled "General I/O"
- See wiring diagram at the end of this guide



## DEVICE CONFIGURATION

The Element ID HF1/HF1-B Reader is easily configured using any web browser. There is never a need for special set-up software. The HF1/HF1-B offers a wide range of selectable parameters that allow for easy integration into a wide variety of applications.

**Note:** The "Quick Start Guide" is intended as a basic introduction to the most common HF1/HF1-B applications. This guide only touches the surface of the capabilities of the HF1/HF1-B Reader. Please consult the "HF1/HF1-B Service Manual" for a complete hardware and software description.

- Use your browser to address the HF1/HF1-B Reader
- Enter the password
- Select "Menu", then "Operations", then "System Mode"
  - Select "Continuous" if you want the reader to continuously attempt to read RFID tags (always on)
  - Select "Event" if you will use a hardware indicator (like a photo-eye) to tell the reader when to attempt to read RFID tags (transmitter "on" only when product present)
  - Select "Position Based" for a tracking system where physical items and RFID data are mated, tracked, and transmission to the host system occurs at a specific position downstream from the RFID reader (HF1 only)

See "Tracking Set-Up" section below



## HOST COMMUNICATION SET-UP

Communications from the HF1/HF1-B to the host system are extremely flexible and can be configured to your specific application. See the "HF1/HF1-B Service Manual" for complete system capabilities. This guide assume very basic Ethernet communication.

- Use your browser to address the HF1/HF1-B Reader
- Enter the password
- Select "Menu", then "Message Config", then "Host Format 1 Page" to set a variety of options concerning the format and content of the actual message.
- Select "Menu", then "Host Device Config", then "TCP Server", then "Server 1" to set the message framing and port.

## TRACKING SET-UP (HF1 ONLY)

Be sure your system hardware is installed and that boxes will pass through the photo-eye 1-2" before the start of the RFID antenna read zone.

- Use your browser to address the HF1/HF1-B Reader
- Enter the password
- Select "Menu", then "Operations", then "Tracking Set-Up"
- Using the drop down menu, select the edge of the box that you want to track
- Measure the distance (as accurately as possible to the nearest 1/4") from the system photo-eye to the position down the belt where you want the transmission to occur
- Enter four times the distance measured above into the field "Tx2 Off". This sets the exact location where the box data will be transmitted to the host system.

The HF1/HF1-B reader has an automated tracking set-up program. This feature will automatically calibrate the tracking system after you run test boxes through the system.

- Use your browser to address the HF1/HF1-B Reader
- Enter the password
- Select "Menu", then "Operations", then "Auto Track Set-Up"
- Check the box for "Auto Track Enable", then click on "Send Value"
- Select a test box and attach the "Reference RFID Tag" in the exact center of one of the box sides. The tag should be orientated so that it will be in a plane parallel to the HF1/HF1-B's antenna
- Run the box through the system five times. Be sure to leave the box in the system as it passes completely through the photo-eye and RFID read zone
- Refresh your browser window. You will note that the fields have all been populated with numbers. Check to make sure that the "ERRORS" total is zero. If there are any errors, recheck the box for "Auto Track Enable", then click on "Send Value" and repeat the procedure until no errors are reported
- The value for "Offset" should be roughly four times the distance in inches from the photoeye to the center of the antenna – this value need not be exact.
- Once "ERRORS" is zero and "Offset" seems reasonable, check the box for "Accept Values" and click on "Send Value"
- Your tracking system is now set up



Test Tag  
Placement

## TESTING THE HF1/HF1-B READER

The best method to test the HF1/HF1-B depends on your system set-up and the optional accessories you have selected. These examples cover the most common applications.

### Basic Set-Up - Not tracking - System Mode: Continuous

The transmitter is always on and waiting for a tag to enter the system.

- Hold the RFID Reference Tag in front of the antenna to generate a valid read of the tag data
  - The tag should be within the read range of your antenna
- The F1 LED on the HF1/HF1-B read panel indicates when the tag has been read
- Verify on your system that a host transmission from the HF1/HF1-B occurred in the correct format

### Basic Set-Up - Not tracking - System Mode: Event

The transmitter is only on while the photo-eye is blocked and the system will only read during this time period.

- Block the photo-eye beam while simultaneously presenting the RFID Reference Tag in front of the antenna
- The F1 LED on the HF1/HF1-B read panel indicates when the tag has been read
- Verify on your system that a host transmission from the HF1/HF1-B occurred in the correct format

## Advanced Set-Up – Position Tracking

The system will only transmit when the specified edge of the box reaches the specific transmit point you have selected.

- Attach the RFID Reference Tag to an item to be tracked
- Run the item through the photo-eye and antenna system (and run the conveyor system long enough for the host transmission to occur)
- Verify that the “Read” LED turned green as the tag passed by the antenna
- Verify the “Valid” LED turned green at the transmit point
- Verify on your system that the host transmission occurred during the expected time window and in the correct format



Idle:	Flashes green when system is operating normally
Read:	Green when tag has been read
Valid:	Tri-Color. Green when valid transmission has occurred; Red when "No Read" was transmitted

### Software Diagnostics

To view HF1/HF1-B software diagnostics;

- Use your browser to address the HF1/HF1-B Reader
- Enter the password
- Select "Menu", then "Statistics and Diagnostics"
- There are four sub-pages of diagnostic data tracked by the HF1/HF1-B

## READY TO GO!

Your system is now set up, tested, and ready for use.

For further reference and advanced set-up options:

- Please consult the "HF1/HF1-B Service Manual"
- Visit our website at [www.element-id.com](http://www.element-id.com)
- Call Element ID Customer Support at:
  - 1-888-EID-RFID (1-888-343-7343) or 1-610-419-8822

## GENERAL I/O WIRING GUIDE

### General I/O 15 Pin

1	Photoeye Input
2	+10V @ 250mA
3	Ground
4	Opto_output_collector (HF1 only)
5	Opto_output_emitter (HF1 only)
6	Speed Input
7	Ground
8	Ground
9	Ground
10	Receive RS232
11	Trans + RS422 (HF1 only)
12	Trans - RS422 (HF1 only)
13	Recv - RS422 (HF1 only)
14	Recv + RS422 (HF1 only)
15	Transmit RS232

Recommended mating connector: Kobiconn 456-1815-E 15P HD Solder male (or similar)



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