

To enable or disable Sleep Mode, send the `power.sleep.enable` command to the printer using Zebra Setup Utilities (ZSU) and set it to either “on” or “off”. (The default setting is “on”.) To set the time after which the printer will enter Sleep Mode, send the `power.sleep.timeout` (in seconds) to the printer using the ZSU.

Power Save Mode

Power Save Mode refers to a state the printer will enter when the battery is under duress. Under normal operation with a healthy fully charged battery, the printer will load the entire print-head while printing a line of data.

As the battery’s health declines (due to low voltage or cold temperature) the printer will change its printing strategy in a way that breaks up the print line into smaller segments that it can print safely without shutting down the battery. In this mode the user may experience slower printing.

The Power Save icon  will be displayed on the LCD as this is occurring and the printer may have an audible sound change due to the altered motor step rate while in this mode.

Draft Mode

The user can configure the printer to print in Draft Mode via SGD command `media.draft_mode` (default is “off”), which optimizes the printer for text-only printing. While in Draft Mode, print speed increases from 4 inches per second (ips) to 5 ips with approximately a 22% reduction in optical density. When a printer is in this user setting, a Draft Mode icon  will be displayed. If the printer is in both Power Save mode and Draft Mode, the Power Save icon will display. If the printer is in Draft Mode during a media out condition, the blinking Media Out icon will be displayed.



Note • For an explanation and a list of all SGD commands, please refer to the Programming Guide (p/n P1012728-xxx) at:

<http://www.zebra.com/us/en/support-downloads.html>



Note • For detailed information on sending SGD commands to the printer using Zebra Setup Utilities, please refer to the Wireless Configuration for 802.11n and Bluetooth Radios for Link-OS Mobile Printers (p/n P1048352-001) at: <http://www.zebra.com/us/en/support-downloads.html>

Verify Printer is Working

Before you connect the ZQ500 Series printer to your computer, make sure that the printer is in proper working order. You can do this by printing a configuration label using the “two key” method. If you can’t get this label to print, refer to the “Troubleshooting” section of this manual.

Printing a Configuration Label

1. Turn the printer off. Load the media compartment with journal media (media with no black bars printed on the back).
2. Press and hold the Feed Button.
3. Press and release the Power button and keep the Feed button pressed. When printing starts, release the Feed button.

The unit will print a line of interlocking “x” characters to ensure all elements of the print head are working, print out the version of software loaded in the printer, and then print the report.

The report indicates model, serial number, baud rate, and more detailed information on the printer’s configuration and parameter settings. (Refer to the Troubleshooting section for sample print-outs and a further explanation on how to use the configuration label as a diagnostic tool.)

Connecting the Printer

The printer must establish communications with a host terminal which sends the data to be printed. Communications occur in four (4) basic ways:

- ZQ500 Series printers can communicate by cable via either a standard USB 2.0 or micro USB protocols. USB drivers are included in the Zebra Designer Driver which can be downloaded from www.zebra.com/drivers.
- By means of a wireless LAN (Local Area Network) per 802.11 specifications. (Optional)
- By means of a Bluetooth short range radio frequency link.
- WinMobile®, Blackberry®, and Android® devices use standard Bluetooth protocol.
- ZQ500 Series printers are compatible with iOS devices, therefore printing via Bluetooth to an Apple® device is possible.



Cable Communication

Caution • The printer should be turned off before connecting or disconnecting a communication cable.

The standard cable connection for the ZQ500 Series printers is USB. The USB port provides 500mA to the A/B port when in host mode and can connect a printer to a PC via a Type A plug to Micro B plug. The cable has a plastic twist lock cap that provides strain relief and locks the cable into the printer housing (see below). Refer to Appendix A for part numbers.

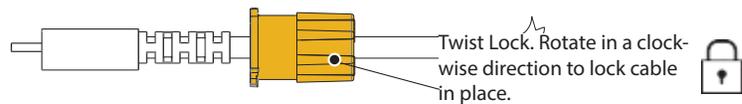
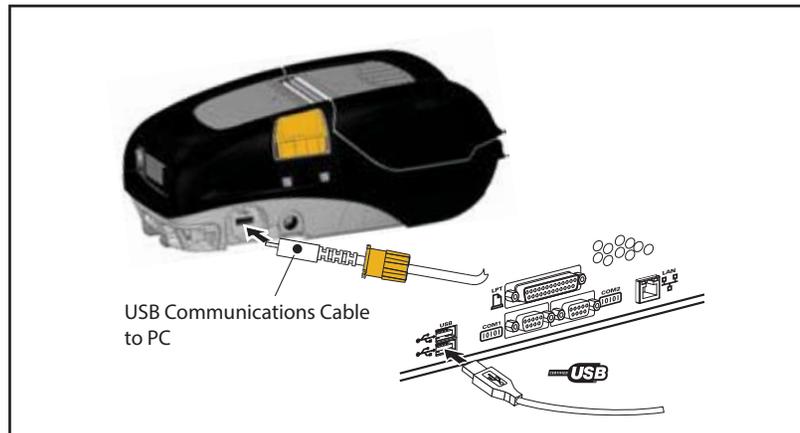


Figure 10: Cable Communication with PC



The small 5-pin connector on the USB cable plugs into the printer, and the connectors are keyed to ensure correct alignment. Do not try to force the cable if it does not plug in as this could damage the pins.

The other end of the cable plugs into the USB port on a computer as shown in Figure 10. The ZQ500 Series printers are configured with the USB Open HCI interface allowing them to communicate with Windows® based devices.

USB drivers are included in the Zebra Designer Driver which can be downloaded from the Zebra website.

Wireless Communications with Bluetooth

Bluetooth is a worldwide standard for the exchange of data between two devices via radio frequencies. This form of point-to-point communication does not require access points or other infrastructure. Bluetooth radios are relatively low powered to help prevent interference with other devices running at similar radio frequencies. This limits the range of a Bluetooth device to about 10 meters (32 feet). Both the printer and the device it communicates with must follow the Bluetooth standard. Other than conditions specified elsewhere in this manual, only one of the radio options can be installed in the printer at one time and the antenna used for these transmitters must not be co-located or must not operate in conjunction with any other antenna.

Bluetooth Networking Overview

Each Bluetooth enabled ZQ500 Series printer is identified by a unique Bluetooth Device Address (BDADDR). This address resembles a MAC address whereby the first three bytes are vendor, and the last three bytes are device (e.g. 00:22:58:3C:B8:CB). This address is labeled on the back of the printer via a barcode for ease of pairing. (See Page 34.) In order to exchange data, two Bluetooth enabled devices must establish a connection.

Bluetooth software is always running in the background, ready to respond to connection requests. One device (known as the master or the client) must request/initiate a connection with another. The second device (the slave or the server) then accepts or rejects the connection. A Bluetooth enabled ZQ500 Series printer will normally act as a slave creating a miniature network with the terminal sometimes referred to as a "piconet".

Discovery identifies Bluetooth devices that are available for pairing whereby the master device broadcasts a discovery request and devices respond. If a device is not discoverable, the master cannot pair unless it knows the BDADDR or has previously paired with the device.

Bluetooth 2.1 or higher uses Security Level 4 Secure Simple Pairing (SSP), a mandatory security architecture that features four (4) association models: Numeric Comparison, Passkey Entry, Just Works (no user confirmation), and Out of Band (pairing info transmitted OOB, e.g. via Near Field Communication).

Figure 11: Bluetooth Security Modes

Security Mode 1	Security Mode 2	Security Mode 3
If a BT \geq 2.1 device is pairing with a BT \leq 2.0 device, it falls back to BT 2.0 compatibility mode and behaves the same as BT 2.0. If both devices are BT \geq 2.1, Secure Simple Pairing must be used according to the BT spec.	If a BT \geq 2.1 device is pairing with a BT \leq 2.0 device, it falls back to BT 2.0 compatibility mode and behaves the same as BT 2.0. If both devices are BT \geq 2.1, Secure Simple Pairing must be used according to the BT spec.	If a BT \geq 2.1 device is pairing with a BT \leq 2.0 device, it falls back to BT 2.0 compatibility mode and behaves the same as BT 2.0. If both devices are BT \geq 2.1, Secure Simple Pairing must be used according to the BT spec.
Security Mode 4: Simple Secure Pairing		
Simple Secure Pairing: a new security architecture introduced supported in BT \geq 2.1. Service-level enforced, similar to mode 2. Mandatory when both devices are BT \geq 2.1. There are four association models currently supported by mode 4. Security requirements for services must be classified as one of the following: authenticated link key required, unauthenticated link key required, or no security required. SSP improves security through the addition of ECDH public key cryptography for protection against passive eavesdropping and man-in-the-middle (MITM) attacks during pairing.		

Numeric Comparison	Passkey Entry	Just Works	Out of Band (OOB)
Designed for situation where both devices are capable of displaying a six-digit number and allowing user to enter “yes” or “no” response. During pairing, user enters “yes” if number displayed on both devices matches to complete pairing. Differs from the use of PINs in legacy (BT \leq 2.0) pairing because the number displayed for comparison is not used for subsequent link key generation, so even if it is viewed or captured by an attacker, it could not be used to determine the resulting link or encryption key.	Designed for situation where one device has input capability but no display (e.g. keyboard), while other device has a display. The device with a display shows a six-digit number, then the user enters this key on the device with input. As with numeric comparison, the six-digit number is not used in link key generation.	Designed for situation where one (or both) of the pairing devices has neither a display nor keyboard for entering digits (e.g. Bluetooth headset). It performs authentication step 1 in the same manner as numeric comparison, but the user cannot verify that both values match, so MITM (man-in-the-middle) protection is not provided. This is the only model in SSP that does not provide authenticated link keys.	Designed for devices that support a wireless technology other than Bluetooth (e.g. NFC) for the purposes of device discovery and cryptographic value exchange. In the case of NFC, the OOB model allows devices to pair securely by simply tapping one device against the other, followed by the user accepting the pairing via a single button push. Security against eavesdropping and MITM attacks is dependant on the OOB technology.

Each mode, except for Just Works, has Man-In-The-Middle (MITM) protection, meaning no third device can view the data being passed between the two devices involved. The SSP mode is usually negotiated automatically based on the capabilities of both the master and slave. Lower security modes can be disabled via the `bluetooth.minimum_security_mode` SGD. The `bluetooth.minimum_security_mode` SGD sets the lowest security level at which the printer will establish a Bluetooth connection. The printer will always connect at a higher security level if requested by the master device. To change the security mode and security settings in the ZQ510 printer, use Zebra Setup Utilities.

Figure 12: Bluetooth Minimum Security Modes

	BT Version of Master Device (>2.1)
<code>bluetooth.minimum_security_mode=1</code>	Secure Simple Pairing Just Works/Numeric Comparison
<code>bluetooth.minimum_security_mode=2</code>	Secure Simple Pairing Just Works/Numeric Comparison
<code>bluetooth.minimum_security_mode=3</code>	Secure Simple Pairing Numeric Comparison
<code>bluetooth.minimum_security_mode=4</code>	Secure Simple Pairing Numeric Comparison
<code>bluetooth.bluetooth_PIN</code>	Not Used

 `bluetooth.minimum_security_mode` sets the lowest security level at which the printer will establish a Bluetooth connection. The printer will always connect at a higher security level if requested by the master device.

The ZQ500 Series printers also feature bonding for Bluetooth. The printer caches pairing info so devices stay paired through power cycles and disconnects. This eliminates the need to re-pair on every connection establishment.

The `bluetooth.bonding` SGD is on by default.

 **Note** • For detailed information on Bluetooth, please refer to the *Bluetooth Wireless User Guide (P1068791-001)* at: <http://www.zebra.com/us/en/support-downloads.html>

In addition, the ZQ500 Series printers support Near Field Communication (NFC) technology. Using the “Print Touch” feature located on the side of the printer, end-users can automatically connect via Bluetooth from a handheld device that supports NFC technology. The NFC tag has the printer’s BDADDR encoded in a URL on the tag. Simply touching the NFC handheld device to the “Print Touch” icon on the printer will connect and pair the handheld device to the printer.

WLAN Overview

ZQ500 Series printers can be equipped with a Dual Radio option, meaning a radio that uses both the industry standard 802.11 protocols and Bluetooth 3.0. All radios units are shipped with the 802.11n radio enabled (default) and the BT radio disabled. However, users have the option to enable BT if they wish to use the dual feature. They will have the FCC ID number on the serial number label on the back of the unit.

- ZQ500 Series Wireless Network Printers with the Zebra 802.11 WLAN radio module can be identified by the text “Wireless Network Printer” on the serial number label on the back of the printer.

- These printers allow communication as a node within a wireless local area network (WLAN). Methods of establishing communications to the printer will vary with each application.

More information and LAN configuration utilities are included in the Zebra Net Bridge™ program (version 2.8 and later). Zebra Setup Utilities (ZSU) can also be used to configure WLAN communications settings. Both Net Bridge and ZSU may be downloaded from the Zebra Web site.

Setting Up the Software

ZQ500 Series printers use Zebra’s CPCL and ZPL Programming languages which were designed for mobile printing applications. CPCL and ZPL are fully described in the ZPL Programming Guide (p/n P1012728-008) available on-line at www.zebra.com/manuals.

You can also use Designer Pro, Zebra’s Windows® based label creation program which uses a graphical interface to create and edit labels in either language.

Refer to Appendix G for tips on downloading the Designer Pro application from Zebra’s Web site.

Near Field Communication (NFC)

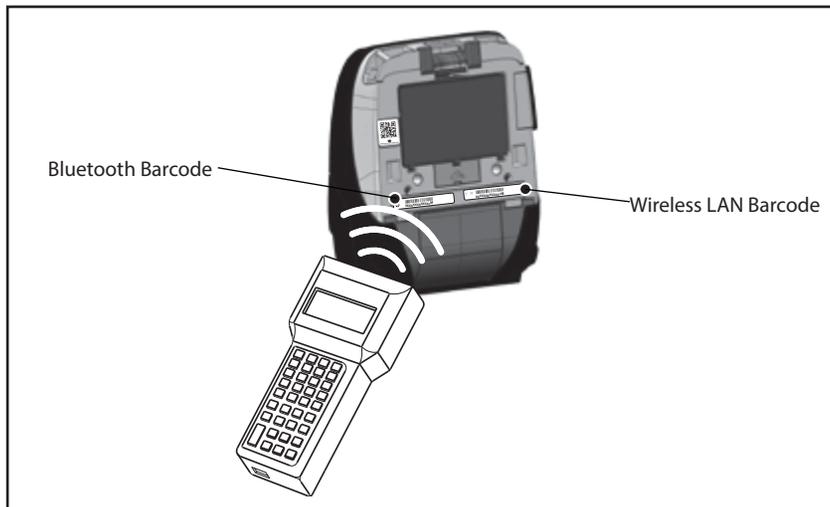
Much like Bluetooth and Wi-Fi technologies, Near Field Communication (NFC) allows wireless communication and data exchange between digital devices like smartphones. Yet NFC utilizes electromagnetic radio fields while technologies such as Bluetooth and Wi-Fi focus on radio transmissions instead.

NFC is an offshoot of Radio Frequency Identification (RFID), with the exception that NFC is designed for use by devices within close proximity to each other, i.e. a smartphone and a ZQ500 Series printer. NFC allows these devices to establish communication with each other by touching them together or bringing them into proximity, usually no more than 7.62 centimeters (3 inches). Three forms of NFC technology exist: Type A, Type B, and FeliCa. All are similar but communicate in slightly different ways. FeliCa is commonly found in Japan.

Devices using NFC may be *active* or *passive*. A passive device, such as a ZQ500 Series printer with an NFC tag, contains information that other devices can read but does not read any information itself. An active device, such as a smartphone, can read the information on the printer’s NFC tag, but the tag itself does nothing except transmit the info to authorized devices.

Active devices can read information and send it. An active NFC device, like a smartphone, would not only be able to collect information from NFC tags, but it would also be able to exchange information with other compatible phones or devices. An active device could even alter the information on the NFC tag if authorized to make such changes.

Figure 13: BT/WLAN Communications



In order to obtain the Bluetooth address or the Wireless LAN address, use a mobile computer to scan the Bluetooth barcode or the WLAN barcode on the bottom of the printer where shown in Figure 13.

To ensure security, NFC often establishes a secure channel and uses encryption when sending sensitive information.

Figure 14: Near Field Communication (NFC) Pairing



Note • Tapping the Zebra Print Touch™ icon with a Near Field Communication (NFC) enabled smartphone will provide instant access to printer-specific information. For more information about NFC and Zebra products, go to <http://www.zebra.com/nfc>. Bluetooth pairing applications via NFC is also possible. Please see Zebra Multi-platform SDK for more information.

ZQ500 Series Accessories

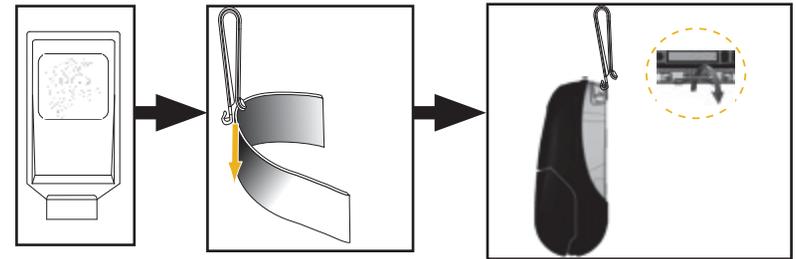
Belt Clip

The ZQ510 and ZQ520 printers come with a plastic Belt Clip (p/n P1063406-040) as a standard feature.

To use:

1. Slide the plastic Belt Clip securely onto your belt (Fig. 15).
2. Insert the hook on the belt clip into the opening of the printer's front bumper as shown.

Figure 15: Using the Belt Clip



Hand Strap

The ZQ500 Series Hand Strap accessory (p/n BT16899-1) attaches to the front posts of the printer to provide the user with a convenient and secure method of carrying the printer. To attach the Hand Strap to the printer:

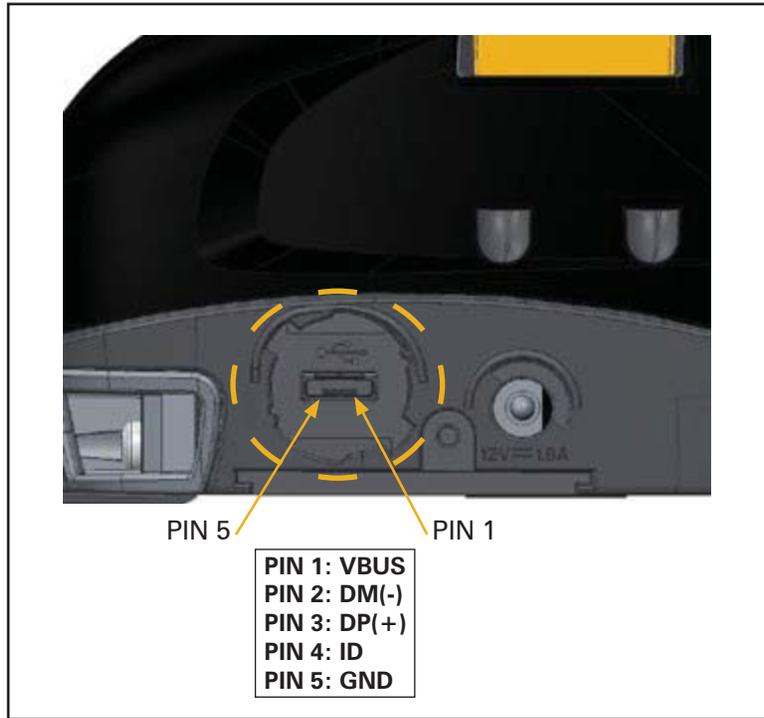
1. Attach one swivel snap hook to its corresponding post on the front of the printer (Fig. 16).
2. Attach the opposite end of the strap to its corresponding post on the front of the printer where shown.

Figure 16: Using the Hand Strap



Communication Port

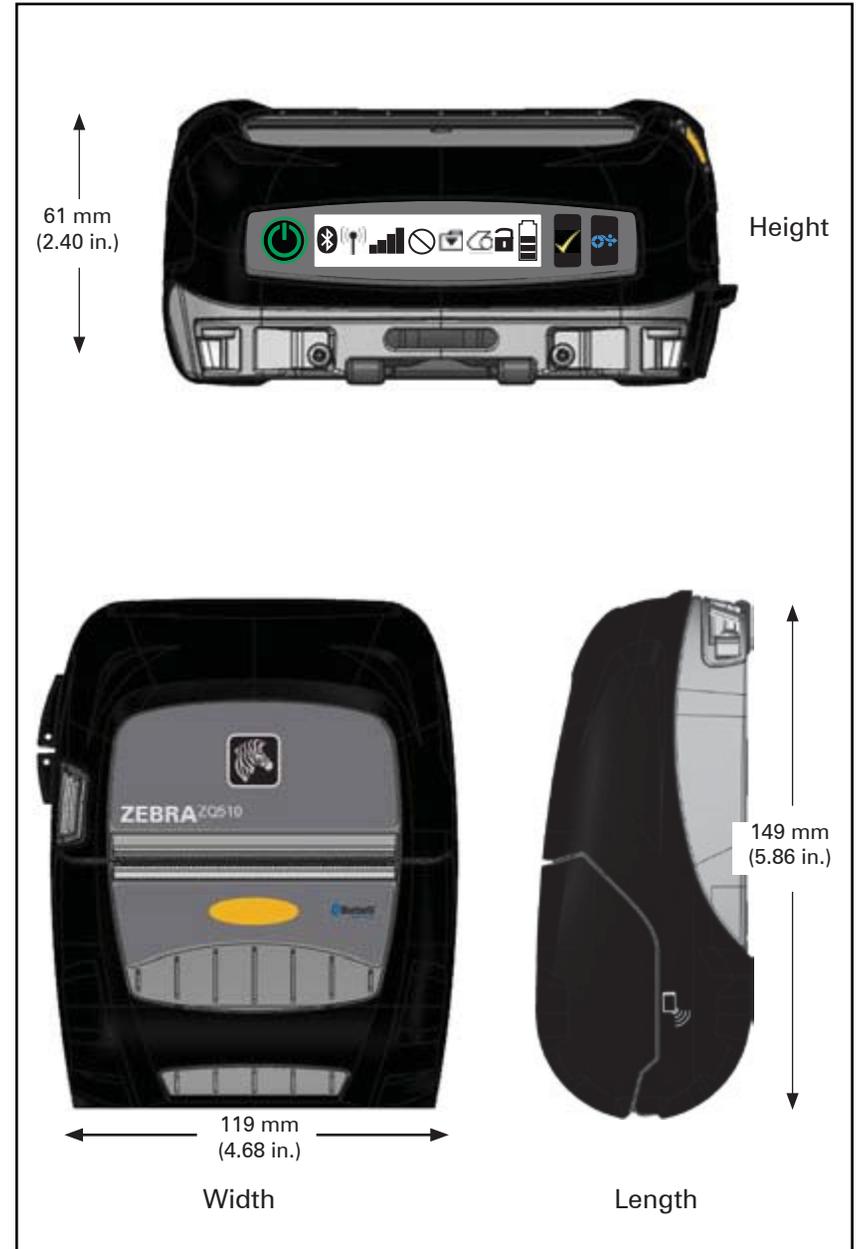
USB



Physical, Environmental and Electrical Specifications

Parameter	ZQ510	ZQ520
Weight w/ battery	1.38 lbs. (22 oz)	1.72 lbs. (27.5 oz)
Temperature	Operating: -20 °C to 55 °C (-4 °F to 131 °F)	Operating: -20 °C to 55 °C (-4 °F to 131 °F)
	Storage: -30 °C to 66 °C (-22 °F to 150.8 °F)	Storage: -30 °C to 66 °C (-22 °F to 150.8 °F)
	Charging: 0 °C to 40 °C (32 °F to 104 °F)	Charging: 0 °C to 40 °C (32 °F to 104 °F)
Relative Humidity	Operating: 10% to 90% non-condensing	Operating: 10% to 90% non-condensing
Battery	Smart Battery (2 cell or 4 cell) Lithium-Ion, 7.4 VDC (nominal); 2.45 Ahr min.	Smart Battery (2 cell or 4 cell) Lithium-Ion, 7.4 VDC (nominal); 2.45 Ahr min.
Intrusion Protection (IP) Rating	IP54 (with and without optional environmental case)	IP54 (with and without optional environmental case)

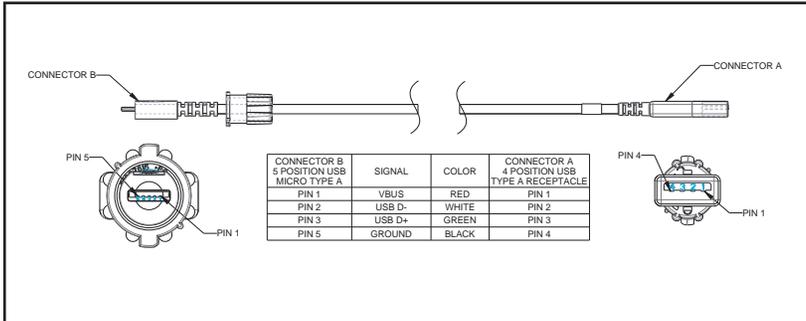
Figure 22: ZQ510 Overall Dimensions



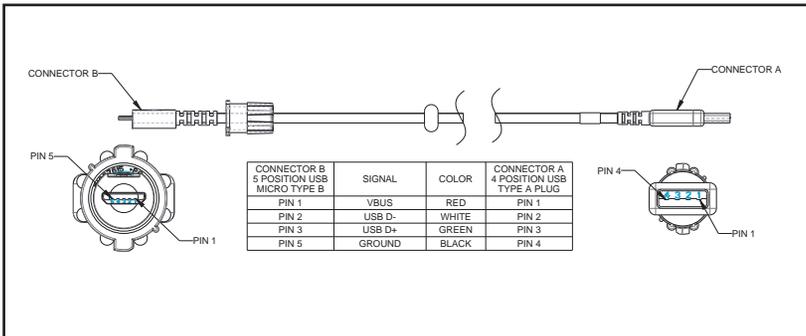
Appendix A

USB Cables

Part Number P1069394;
MICRO,USB,A,TO,USB A, REC



Part Numbers P1069329-001/-002;
MICRO,USB,B,TO,USB,A,PLUG,1.8M/3.5M



Note • Visit the Zebra website at: www.zebra.com/accessories for a listing of interface cables for all Zebra mobile printers.

Appendix B

Alert Messages

The ZQ500 Series printers will display the following alert messages to inform the user of various fault conditions that might occur with the ZQ510 and 520 printers.

Message	Text Line One	Text Line Two
HeadOverTemp	PRINT HEAD OVERTEMP	PRINTING HALTED
HeadMaintenanceNeeded	HEAD MAINTEN. NEEDED	PRINTING HALTED
BatteryHealthReplace	BATTERY DIMINISHED	CONSIDER REPLACING
BatteryHealthNearDeath	WARNING - BATTERY	IS PAST USEFUL LIFE
BatteryHealthShutdown	REPLACE BATTERY	SHUTTING DOWN
BatteryAuthenticationFail	BATTERY FAILED	REPLACE BATTERY
BatteryOverTemp	CHARGING TEMP FAULT	MUST BE 0-40°C
BatteryUnderTemp	CHARGING TEMP FAULT	MUST BE 0-40°C
BatteryChargeFault	CHARGING FAULT	REPLACE BATTERY
DownloadingFirmware	DOWNLOADING	FIRMWARE
BadFirmwareDownload	DOWNLOAD FAILED	PLEASE REBOOT
WritingFirmwareToFlash	FIRMWARE	WRITING TO FLASH
Mirroring	LOOKING FOR UPDATES	PLEASE WAIT...
MirroringApplication	RECEIVING FIRMWARE	DO NOT POWER OFF!
MirroringCommands	MIRRORING COMMANDS	
MirroringFeedback	SENDING FEEDBACK	PLEASE WAIT...
MirrorProcessingFinished	MIRROR PROCESSING	FINISHED
WlanInvalidChannels	WIRELESS ERROR	INVALID CHANNEL
WlanInvalidSecurityMode	WIRELESS ERROR	INVALID SECURITY
PauseRequest	PRINTER PAUSED	
CancelAll	ALL JOBS CLEARED	
CancelOne	ONE JOB CLEARED	
OutOfMemoryStoringGraphic	OUT OF MEMORY	STORING GRAPHIC
OutOfMemoryStoringFont	OUT OF MEMORY	STORING FONT
OutOfMemoryStoringFormat	OUT OF MEMORY	STORING FORMAT
OutOfMemoryStoringBitmap	OUT OF MEMORY	STORING BITMAP
AckAlertTooManyUsbHostDevices	TOO MANY MASS	STORAGE DEVICES
AckAlertUnsupportedUsbHostDevice	UNSUPPORTED USB	HOST DEVICE
AckAlertUnsupportedUsbHostFilesystem	UNSUPPORTED USB	HOST FILESYSTEM