



**InData Systems LDS Product Family
4600, 4620, 4800, FM500**

**With Interchangeable Optics
M3, V2, UV (Ultra Violet)**

and

Self Contained 4600 with Fixed Optic

Direct Part Mark Readers

Users Manual

and

Installation Guide

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OVERVIEW

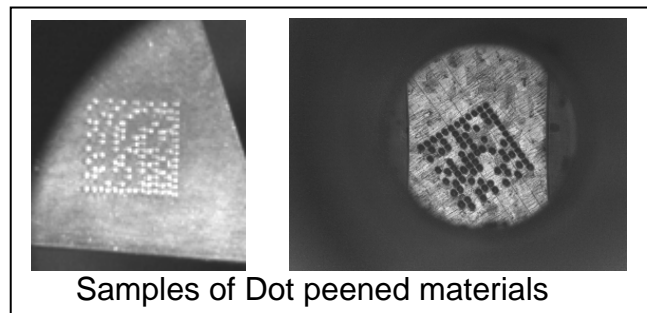
Direct Part Mark Bar Code according to InData Systems

Direct Part marking with bar code symbols has had increasing momentum in recent years as the need for traceability of parts history (manufacturer, materials used, etc), long after they have been put into service, has become necessary. Marks made with ink jet printing, laser etching, chemical etching, dot peening, and fluorescing inks are a few of the methods adopted so far. We will mainly focus on the use of Data Matrix since it appears to be the bar code of choice by most small parts marking applications.



Data Matrix bar code, like that pictured above, can be printed with virtually any size element as long as the rest of the criteria for the bar code is followed accurately. AIM (Automatic Identification Manufacturers) has established a standard for Data Matrix bar codes and we will assume the use of the ECC-200 (Error Correction Code methodology) standard for this document, although it is really not a restriction. The air transportation industry has adopted their ATA SPEC 2000, which is one of the first attempts of the industry to address quality aspects of direct part marking. The U.S. Government has also released their IUID (Item Unique Identification) directives through their MIL-STD-130M, which draws on the 14514 ANSI Standard for labeling on AN9132 direct part marks.

Quality has been the biggest issue in the use of direct part marks. If the mark is printed with a ribbon onto a paper label, there are many fine software products that can create a barcode with very accurate dimensions. The problem of etching directly onto a part causes not only the material, but the finish of the material, to assume some of the quality of the imprinting. Based on the metallurgical or chemical composition of the part to be identified, the best method of directly marking it varies. Some materials (like softer metals and some plastics) react very well with a low energy laser beam, while other materials require significant care (like directly etching glass due to the "crazing" or micro-fractures that can occur under the instantaneous high heat of a laser).



The actual accuracy of the etched mark depends on the correct choices of power, frequency and software, as it relates to the material being etched when using lasers, and similar considerations when using chemical etching and dot peening. It is easy to under-etch or over-etch the bar code if quality is not monitored closely. Over or under etching causes the individual elements to be outside the parameters outlined by the AIM and other specifications. Some decoding schemes do

not consider a dot peened mark like that on the left of the photo above, to be a “legal” formation of the code, due to the “L-pattern” (which is used as a finder pattern for data matrix identification) having breaks between each dot instead of being a continuous, solid line, like the one shown in the image above on the right.

A data matrix mark is either a square symbol, like above, or a rectangular format being twice as wide as it is high, but in both cases, it is formed by two sides being a “solid L-pattern”, with alternating timing marks on the other two sides. Marks are made with light and dark elements (reversed images are acceptable) but the ratio of dark and light elements should be 50% (with a minimum of 35% to maximum of 65% per the AIM standard). Please consult the AIM standard for more details at <http://www.aimusa.org/> or <http://www.aimglobal.org/> on the Internet.

Media on which you print plays a large part in the quality of your image in ink jet printing. Two factors affect that quality of image. Those factors are: brightness and absorption.

Brightness is determined by the surface of the media. A coarse surface will scatter light in several directions, while a smooth surface will reflect more light back in the same direction. This makes the surface appear lighter, which makes the image appear brighter.

When ink is sprayed onto a surface, it should stay in a tight symmetrical dot, and not be absorbed into the media. If too much ink is absorbed, a phenomenon called feathering occurs, and the ink spreads out in an irregular fashion and covers a larger area than the printer expects it to. Thus, the image looks fuzzy, especially at the edges. One way to reduce the feathering effect is to ensure a non absorbing surface as in high quality ink jet paper. Low absorption is the key to the high resolution capabilities of many of today’s inkjet printers.



The dot on the left is on coated paper, and the dot on the right is on low-grade copier paper. Notice how irregular and larger the right dot is compared to the left one.

Inkjet printers are capable of printing on a variety of media from paper to labels, to adhesive backed labels.

2D Direct Parts Marking Guideline for Surface Curvature

For marking and reading, flat surfaces are preferred over curved surfaces because the curvature of an item may interfere with proper marking and thus can distort the code. If the mark is made on a round or curved surface, the symbol height should be less than 16 percent of the diameter of the part, which is approximately 5% of its circumference. For Data Matrix codes, a rectangular symbol may be considered to provide greater readability on smaller circumference parts. Use of rectangular format should only be used as a last resort and should be agreed upon by all trading partners. Neither QR Code nor Aztec code, are available in a rectangular form. Figure 4 below illustrates the proper method for marking and lighting curved surfaces.

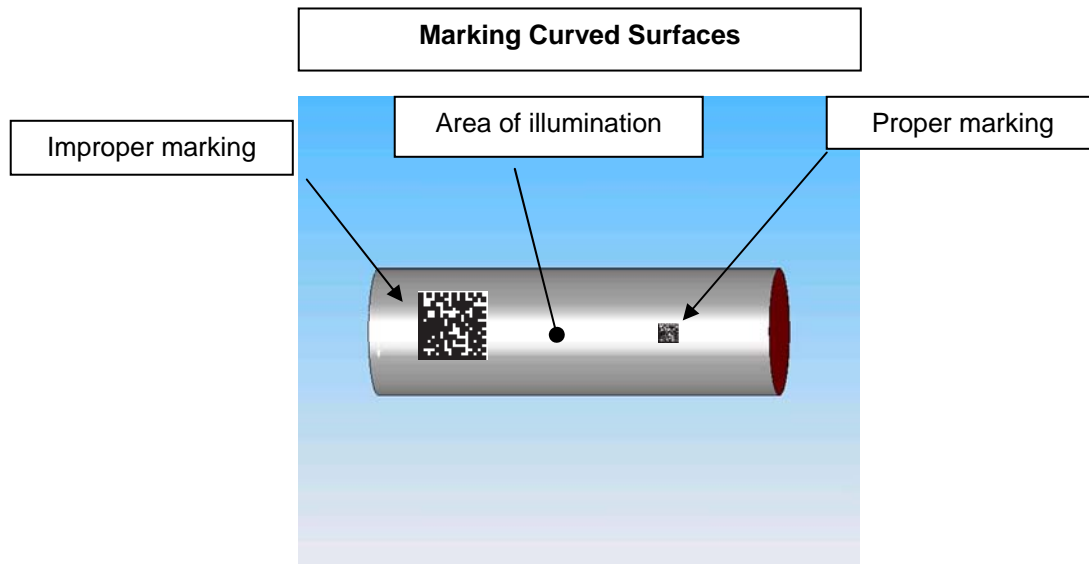


Figure 4

Thickness

Part or surface thickness must be taken into account when applying intrusive markings to prevent deformation or excessive weakening of the part. The degree of thickness required for intrusive marking is directly related to the heat, depth, or force applied. In most applications, the marking depth should not exceed 1/10 the thickness of the part. Part thickness is generally not a concern when applying non-intrusive markings such as a chemical etching.

About Bar Codes

Data Matrix

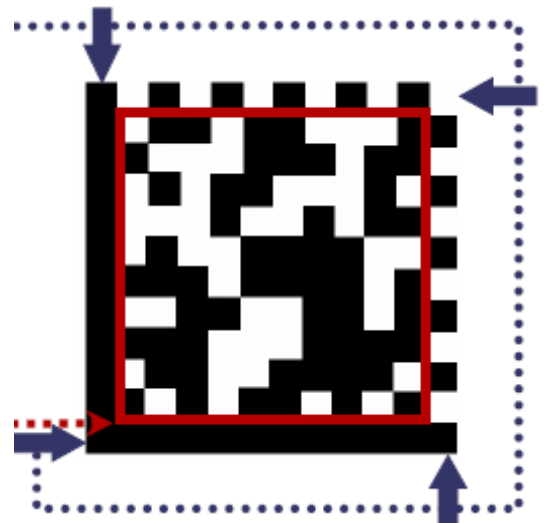
Data Matrix is a high density 2 dimensional matrix style bar code that was first introduced in 1995. It uses symbology that can encode up to 3116 characters from the entire 256 byte ASCII character set. In the United States and much of the world, data matrix bar code is one of the most widely used 2D barcodes.

Element (module)

The symbol is built on a square grid arranged with a finder pattern around the perimeter of the bar code symbol which is used for determining size, orientation, and symbol distortion. Around the perimeter is a required 'quiet zone'. Within each bar code is an area known as an element, or a square shaped cell that encodes one bit of binary data.



The symbol is structured with the Finder Pattern comprised of two solid lines and two alternating dark/light lines. It defines the physical size, orientation, distortion, and the number of rows and columns.



The Data Region is inside the pattern finder and contains data and error correction code words.

There are two types (square and rectangular) of Data Matrix symbols (or several if referring to ECC000 to 140 as one) each using a different error checking and correction scheme (ECC). The different types of Data Matrix symbols are identified using the terminology "ECC" followed by a number representing the type of error correction that is used by the encoding software. ECC 000 to ECC 140 are the original type of Data Matrix symbols, and are now considered obsolete. The newest version of Data Matrix is called ECC 200 and is recommended for all new Data Matrix applications.

The ECC 200 version of Data Matrix uses a much more efficient algorithm for encoding data in a symbol as well as an advanced error checking and correction scheme.

The symbol can have multiple data regions. The alignment pattern separates the regions. The maximum capacity for a single data region is 88 for numeric, and 64 for alphanumeric. The symbol shape can be square (Figure 7) or rectangular (Figure 8). However, the rectangular shape is only applicable to ECC 200.



Figure 7



Figure 8

A symbol can encode 50 characters in a 6mm x 6mm square, and is readable in 360° with 2D CCD technology.



Field of View

Each optic has a field of view based on the focal length of the lens. The longer the focal length of the lens, the larger the field of view. InData Systems optics, each with its specialized type of lens allow the ability to see different types of direct part marks as well as different sizes of Data Matrix and linear bar codes. See the chart below for specific examples of which lens reads a particular size of barcode. In some cases an even smaller barcode can also be read.

The following Field of View Charts apply to both linear code and data matrix code:

M3	30 mm optic		40 mm optic		80 mm optic	
	in	mm	in	mm	in	mm
square	.25	6.2	.35	9	.6	15
narrow bar element	.005	.15	.007	.19	.010	0.25

V2	40 mm optic		80 mm optic	
	in	mm	in	mm
square	.35	9	.6	15
narrow bar element	.007	.19	.010	.25

The FAQ's in Appendix F of this manual give a verbal description of the reading capabilities of each lens.

Field of View for Interchangeable UV Optics

The suggested maximum size bar code for the interchangeable UV optic is .65 in. (16mm) square. The minimum size is affected by characteristics of the ink in which the fluorescing ink may cause the bar elements to appear significantly larger than the space elements. Fluorescing bar code marks created with an individual element of .010 in. (.38mm) or larger, are usually read easily. Reading of bar codes created with smaller elements may depend on the ink due to the 'blooming' effect of the fluoresced ink.

QR Code

QR Code is most often used in the Far East and the Pacific Rim countries rather than in the US.

While conventional bar codes are capable of storing a maximum of approximately 20 digits, QR Code is capable of handling several dozen to several hundred times more information.

QR code is capable of handling all types of data, such as numeric and alphabetic characters, Kanji, Kana, Hiragana, symbols, binary, and control codes. Up to 7,089 characters can be encoded in one symbol. QR Code is one of the many codes that InData Systems products are capable of decoding. However, it should be noted that QR code can only be read by the LDS 4600 and LDS 4800 scanners.

Since QR code carries information both horizontally and vertically, it is capable of encoding the same amount of data in approximately one-tenth the space of a traditional bar code. For a smaller printout size, Micro QR Code is available.

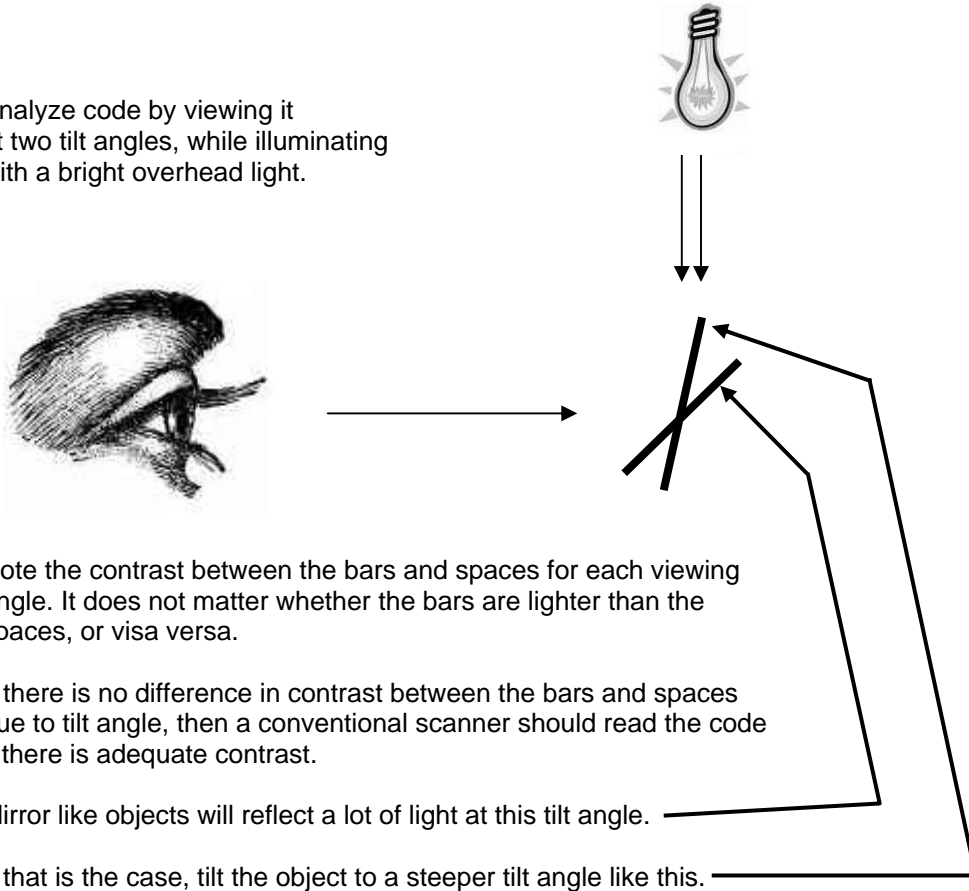
QR Code is capable of 360 degree (omni-directional), high speed reading. QR Code accomplishes this task through position detection patterns located at the three corners of the symbol. These position detection patterns guarantee stable high speed reading, circumventing the negative effects of background interference.

QR Code is established as an ISO (ISO/IEC18004) standard.

Readability

Analyzing Etched Barcode Readability

Analyze code by viewing it at two tilt angles, while illuminating with a bright overhead light.



Note the contrast between the bars and spaces for each viewing angle. It does not matter whether the bars are lighter than the spaces, or visa versa.

If there is no difference in contrast between the bars and spaces due to tilt angle, then a conventional scanner should read the code if there is adequate contrast.

Mirror like objects will reflect a lot of light at this tilt angle.

If that is the case, tilt the object to a steeper tilt angle like this.

If the contrast is greater when viewed at the first angle (45°), then an InData Systems LDS scanner with an M type optic will be required.

If the contrast is greater when viewed at the second angle, then InData Systems LDS scanner with a V type optic will be required.

While InData Systems makes a wide variety of optics for reading special barcodes, our UV optics allow a customer to read targets printed with inks that fluoresce (glow) in the presence of various UV lights. Since printing with UV inks has become simpler, there is no loss in speed and it compares to other DPM methods, thus saving time and money in the packaging process. InData Systems 405 nanometer optic is well within the visible spectrum, while the 365 nanometer optic lies just outside the spectrum of visible light. Both optics afford great opportunities for overt and covert applications. Security and authenticity are two leading applications for this product thus allowing for brand authenticity without adding undesirable marks to some packaging. Different dyes fluoresce at different wavelengths so using the correct dye at the wavelength for which it is intended is the key to success. This is a new illumination technology, and InData Systems is on the cutting edge.

InData Systems UV Safety and Product Use – This safety information is applicable only to UV Optics.

Attention: Please read this document in its entirety before using any of InData Systems Ultra Violet products.

InData Systems Safety Statement

InData Systems UV or Ultra violet products utilize a UV (Ultra Violet) or Near-UV light source. The purpose of this document is to inform the consumer about the effects of using this product, and the potential hazard of misuse. InData Systems does not accept liability for misuse of this product.

The Center for Devices and Radiological Health CDRH which operates under the Food and Drug Administration (FDA) states that they do not have any regulations that govern LED based devices such as this product. This product has not yet been evaluated thoroughly for its compliance with International Standard IEC 60825-1:1993/A2: 2001.

This product uses LED's which are inherently Class 1, which is one of the safer forms of high intensity illumination. InData Systems is actively working to further define classification of this product relating to the above standard.



Product Information and Recommendations

The purpose of this device is for data/bar code illumination **only**.

Attention: InData Systems UV and near UV products are not toys, and should never be used as such. Keep InData Systems UV and near UV products out of the hands of children.

InData Systems UV and near UV products:

- should **never** be used in any type of game setting or for entertainment purposes
- are for industrial and professional use only
- must be used responsibly

Do not remove warning labels or operate InData Systems UV or near UV products with warning labels removed.

There are no serviceable parts in this device and the user could lose authority to operate this device if unauthorized change or modification is made. Do not remove the protective UV shroud. It is in place to protect the user and others in the immediate area from potentially harmful UV radiation. Unplugging the whole UV optic from its socket on the scanner or terminal is a safe action, which enables the user to scan larger, standard bar codes.

While the light from this device does not appear to be bright, and therefore may appear harmless, it should be noted that this is a near-UV light source and much of its intensity is in an area that appears invisible to the human eye, but is still potentially harmful to the eye when viewed directly and for prolonged periods of time.

Do not put any optical components (such as a lens or mirror) in front of the aperture for any purpose, or under any circumstance for the purpose of collimating, focusing or reflecting the light source.

Accidental UV overexposure can injure unaware victims due to the fact that UV is **invisible** and does not produce an immediate reaction. While an emission indicator is not required on UV products as it is on laser products, reported UV accident scenarios often involve work near UV sources with protective coverings removed, cracked or fallen off. Therefore, do not operate this device if the protective shroud is cracked, damaged in any way or removed.

Never look directly into the light when in operation - Never point this device at another person or animal and operate.

HEALTH WARNING

Improper use of a device emitting any UV radiation can cause temporary blindness. Avoid contact with eyes. Deep UV radiation has been known to cause skin irritation in laboratory animals, avoid prolonged contact with skin.

Instructions for Proper Use of InData Systems Ultraviolet Product

1. Point the aperture of the device at the bar code or target to be read
2. Depress the trigger. The code or target will illuminate
3. Release the trigger after the bar code has been read and the read sound has sounded

Never look directly into the light when in operation - Never point this device at another person or animal and operate.

In summary, UV radiation has numerous useful applications, but increased awareness and control of UV hazards are needed to prevent accidental overexposures.

UV Questions and Answers

Q. What is UV or ultraviolet light?

A. Ultraviolet light is part of the spectrum of electromagnetic energy generated by many sources such as the sun. The full spectrum includes, in order of increasing energy, radio waves, infrared, visible light, ultraviolet, x-rays, gamma rays and cosmic rays. Since UV is not visible, it is technically not "light", but use of the term "ultraviolet light" is so widespread, it will be used here. Most sources of light generate some UV. For air disinfection, deep UV (250nm) is generated by electric lamps that resemble ordinary fluorescent tubes.

Q. What are the Symptoms and Signs of UV Overexposure?

A. The eye is most sensitive to UV overexposure, which causes an inflammatory condition known as photokeratitis. For 6 to 12 hours after an accidental overexposure the individual may feel nothing unusual, followed by the abrupt sensation of a foreign body or "sand" in the eyes, redness of the skin around the eyes, some light sensitivity, tearing, and eye pain, which can be severe.

The acute symptoms last 6 to 24 hours and resolve completely in 48 hours without long-term effects. Overexposure to skin resembles sunburn, but does not result in tanning.

Q. Why do you use UV light if it is unsafe?

A. The wavelength of the new UV used by InData scanners is classified as 9000 times safer than the wavelength of 270nm that health officials refer to regarding other widely used products.

Read this manual and the safety precautions and safeguards before operating this device. It is recommended by the manufacturer that all persons operating this device be trained in the safe operation and handling of it.

Q. What is the UV wavelength of the LED's in the illumination module?

A. The most common InData UV optic operates at a center wavelength of 405 ±5nm (26 nm Half-Width), which is technically in the blue visible light range rather than being in the true ultraviolet area which is generally considered that below 400nm.

Q. What is the Exposure Rating of the combined 8 LED's in terms of milli-watts per centimeter squared?

A. The total output of all 8 LED's on the interchangeable optics at 405nm, measured at 1" from the LED array shroud is .0009 milli-Watts/cm squared. At a distance of 6 inches from the shroud, which is a typical operating mode, the combined LED output is only .0002 milli-Watts/cm squared.

Q. What is the pulse duration?

A. The LED's are not pulsed and remain illuminated as long as the trigger is held, or the scanner times out.

References:

The standards we are familiar with that address UV exposure are the Threshold Limit Values-Time Weighted Average (TLV-TWA) which are exposure limits recommended by a committee of the American Conference of Governmental Industrial Hygienists (ACGIH). Based on the TLV standards, at a 6 inch distance, an average person could safely be exposed to 4 continuous hours of scanner illumination per day. LED's are turned on only for a few seconds per each read, and the illumination is normally directed toward the target and away from the face and skin of an operator. At 1 inch from eyes or skin, the TLV standards will allow up to one hour per day of direct LED exposure.

Operator safety may be further enhanced by wearing UV protective eyewear such as normal clear polycarbonate safety glasses and any work gloves. InData Systems also recommends UV safety training for employees who will be operating the scanners. Operators should be warned about direct eye exposure to UV or any intense illumination sources. Contact us at InData Systems to let us know if we can be of further assistance in assuring the safety of anyone operating this equipment.

InData Systems Interchangeable Scanning Options

InData Systems offers several different methods of reading direct marked bar codes depending on the surface finish, curvature and type of mark.



LDS 4600 with V2 Optic



LDS 4600 with M3 Optic



LDS 4600 with UV Optic

The InData Systems **LDS-V2** Optic (InData Systems U.S. patent number 6,352,204) is used when surfaces are smooth and the etched area is recessed or roughened. The concept is much like the effect of holding a flashlight parallel to the floor, showing every crumb and surface scratch as a shadow. With this scheme, the actual mark usually appears as a white mark on a black background. In some cases the etched mark only needs to affect the surface as a different finish to use this type of optic.

InData Systems **LDS-M3** optic (Patent # 6,854,650) was designed initially, to address a shiny CURVED surface that had been etched with a bar code. In many of these cases, the surface is not of a consistent enough background, due to the curvature, to be read effectively with the low angle illumination of our V2 optic design. Our LDS-M3 has a broad "glowing" surface which shines down onto the surface of the bar coded area illuminating the object that is marked. When held at a precise angle relative to the "glowing surface", the optics read to the imager. This set of angles causes the shiny background to appear lighter (rather than darker) than the marks by means of a broad illumination area. This works especially well on curved or shiny surfaces.

There are certain cases where an etched barcode target can be read with either the M3 or V2 optic due to specific properties of the etched material. Both styles of optics could also use customized guides to assure the correct positioning of the scanner relative to the object, making it easier to use.

InData Systems Family of interchangeable Shrouded Optics (U.S. patent # 6,824,061) uses UV, near UV and Infrared illumination, to see invisible UV and infrared bar code marks which are made with special fluorescing dyes. The marks are not noticeable except when illuminated by a corresponding wavelength light. Considering this, covert markings are a good application for a variety of security purposes. Passports issued by most countries now contain UV sensitive inks and security threads. Drivers' licenses and credit cards may also include a UV watermark that can only be seen when viewed under a UV emitting light. Passports issued by the United States have UV sensitive threads on the last page of the passport along with the barcode.

LDS Self Contained Covert Barcode Scanner

The InData Systems Self Contained bar code scanner is a scanner with a fixed optic that reads covert bar codes, or invisible to the eye direct part marks on a variety of surfaces. Using different wavelengths for different applications, the non interchangeable option offers a more affordable system, when there is no need to change optics. This model can be built with most of the same wavelengths as the interchangeable shrouded optic.



Self Contained LDS 4600

Technical Considerations

Due to the wide variety of surface finishes, depths of marks, and inconsistencies of the marks (voids and breaks in the “L-pattern” being the most detrimental effect) sometimes the target needs to be defocused. This is usually accomplished by drawing the scanner away from the near contact position. Changing the print weight setting also has the same effect by offsetting the interpretation (threshold) of the imager. Refer to page 28 for print weight setting codes, and a more detailed explanation of how to use print weight settings to enhance scanning capability.

Improving Bar Code Readability

It is fairly easy to observe whether a specific optic assembly enhances the imager’s view of an etched target by using the advanced diagnostic tool, Quick*View software. See Appendix C in this manual for more information about installing and using Quick*View.

We have found that the basis of the specifications incorporated into the ATA SPEC 2000 quality standard are VERY relevant to the decode-ability of an etched (or even a labeled) bar code on a cylindrical object. The spec calls for no greater than 16 percent of wrap on a round or curved object. See page 3 in this manual for an illustration of this explanation. It may be difficult to determine how large a target mark may be (or small the diameter of the object) before it becomes un-decodable. The principal problem is the distortion of the straight L-pattern and timing marks. If the perceived curvature of any side of the bar code mark is greater than one half of an element, in other words, down on both the left and right, and up in the middle (our measurements imply this) then the scanner will probably not be able to read it.

One interesting fact that may be overlooked is that by making the mark SMALLER you can put that mark on a smaller diameter object. Accuracy of the mark, however, is still a critical part of the process.

In Summary, InData Systems has developed, and continues to refine, optics to read low contrast and UV (ultra violet) fluorescing bar code symbols. Our organization welcomes working with resellers, end customers and etched mark producers to improve the ease of reading direct part marks in a variety of environments. InData Systems optics are available on hand held scanners, Bluetooth wireless scanners, fixed mount readers, and portable data terminals for the most dynamic uses in the field. Please contact InData Systems for a reseller in your area who will provide assistance in solving your toughest challenges in direct part mark reading.

About InData Systems

InData Systems is an engineering, manufacturing and sales organization specializing in bar code and wireless based data collection systems. Our staff has extensive experience in varied wireless/data collection (RF/DC) installations and are qualified to consult, recommend and provide both hardware and software solutions concerning your company's unique requirements. By providing total systems solutions, InData Systems has earned a reputation for dependability, high quality, and an unwavering commitment to excellence. With over twenty years of service and expertise, we have developed a broad customer base including companies of all sizes and from many industries including manufacturing and distribution facilities, hospitals, universities, and many others.

Patents

The LDS products in this manual are covered by one or more of the following U.S. patents:

6,352,204 B2, 6,854,650, 6,824,061, 7,357,326, 7,370,801.

Other U.S. and foreign patents are pending.

Warranty Information

All InData Systems Products carry a standard 1 year warranty against defects in manufacturing.

Our Mission

Our goal is to provide customers with industry leading products, fully integrated solutions, and premier technical support at an affordable price. Let InData Systems and our network of resellers be your exclusive wireless and bar code equipment supplier, and let your information and data collection systems do what they were meant to do, save time and money.

Introduction

InData Systems has developed optical systems which will read some of the most difficult direct part markings. Using the power of Adaptus™ Imaging Technologies, developed by Hand Held Products, a leader in imaging readers and portable data terminals, in conjunction with the patented optics and illumination systems developed by InData Systems, our solutions can tackle some of the most challenging direct part markings. The ATA (Air Transport Association) Spec 2000 is setting standards for the industry, but varying materials and finishes demand different solutions for reading some of those marks. The US Government driven UID program, as well as Brand Protection schemes of covert UV Bar Code marks, are just two of the many areas in which InData Systems is solving tough problems.

Our unique optics based scanners and terminals are developed for the rugged industrial challenges of the manufacturing workplace. Reliable, easy to use scanners and portable data terminals with interchangeable optics, provide high value to companies tracking direct part marked materials. Invisible UV barcodes are being used to track registered brand, security based documents and other high sensitivity items. Bar codes provide a quick and error free means for inputting data into an application running on a computer. By using bar codes, the potential for errors from manual data input is eliminated. This application of inputting data without having to type not only lends itself to reduced error, but to productivity as well.

The InData Systems LDS (Light Delivery System) 4600, 4620, 4800, and FM (Fixed Mount) 500 and 600 bar code scanners are capable of reading otherwise hard to read low contrast data matrix codes. Available with interchangeable optics, the LDS product family offers superior performance and response to the user.

SCANNING PRODUCTS

The LDS 4600, 4800, 4620, 9500 and FM500 and FM600 scanning products can be ordered with or without InData Systems powered sockets, which provide power for the enhanced illuminated optics.

LDS 4600

The LDS 4600 is a hand held input device, designed by InData Systems for reading and decoding small-scale etched or embossed two dimensional (2D) Matrix symbologies. Designed to optimally read and decode exceptionally small Data matrix bar codes (the code selected as the ATA Spec 2000 and EIA standard for small parts marking), the LDS 4600 is the scanner of choice for a wide range of applications. Because it is both difficult and costly to place a label on small electrical, medical instruments or aircraft components, the small Data Matrix codes are applied multiple times directly to the surface of the part itself by laser etching, chemical etching or use of the ink jet applied paints multiple times. This multiple application leads to low contrast ratios and bar codes on irregular surfaces. Both of these factors lead to bar codes that are not easily decoded. The LDS 4600 optimizes the readability by concentrating the lighting on the target bar code at a proper angle and magnifying the codes. The angle at which the light hits the object usually minimizes the “wash out” effect caused by irregular and shiny surfaces.



Lightweight, balanced and easy to use, the LDS 4600 can be used in repetitive, high volume hand scanning operations in even the most demanding environments. The LDS 4600 is configurable for keyboard wedge, USB Serial, USB Keyboard wedge emulation, TTL RS-232, or True RS-232, depending on the interchangeable cable. The LDS 4600 connects to all popular PCs and portable data terminals. The LDS 4600 can be integrated with all types of customer systems.

Designed for today's demanding industrial as well as, commercial environments, the LDS 4600 offers superior image quality, speed, durability, and the ability to read all major bar code symbologies. The LDS 4600 is comfortable to hold, easy to use, rugged, and excellent for industrial applications, as well as for all general scanning and imaging applications.

The LDS 4600 area imager from InData Systems combines the versatility of area imaging with the speed and cost of linear scanning for a wide range of applications. Powered by Adaptus™ imaging, the LDS 4600 is full featured, fast, and cost effective. Current and future industrial and commercial applications will involve much more than linear bar codes. The omni-directional reading capability of the LDS 4600 allows fast and easy reading of EAN-UCC composite codes, PDF417, Matrix codes and Postal codes. Simply point and shoot. There is no need to align a scan line or wait for a raster beam to open up. InData Systems has a reputation for products that are tough as nails and the LDS 4600 is no exception, and will provide years of service at a low cost. Built to last, durable and with no moving parts to wear out, InData Systems backs this product with a 1-year warranty. The LDS 4600 provides reliable performance year after year with no downtime. The LDS 4600 leading image quality and image transfer speed provide crisp images in less than one-second, and omni-directional reading of 1D, and OCR Fonts for fast and easy data collection. The LDS 4600 delivers aggressive read rates and depths of field on 1D, stacked linear, and matrix codes.

LDS 4620

The LDS 4620 is a cordless hand held input device, designed by InData Systems for reading and decoding small-scale etched or embossed two dimensional (2D) Matrix symbologies. Designed to optimally read and decode exceptionally small Data matrix bar codes (the code selected as the ATA Spec 2000 and EIA standard for small parts marking), the LDS 4620 is the scanner of choice for a wide range of applications. Because it is both difficult and costly to place a label on small electrical, medical instruments or aircraft components, the small Data matrix codes are applied multiple times directly to the surface of the part itself by laser etching, chemical etching or use of the ink jet applied paints. These multiple applications lead to low contrast ratios and bar codes on irregular surfaces. Both of these factors lead to bar codes that are not easily decoded. The LDS 4620 optimizes the readability by concentrating the lighting on the target bar code at a sharp angle and magnifying the codes. The angle at which the light hits the object minimizes the “wash out” effect caused by irregular and shiny surfaces. Lightweight, balanced and easy to use, the LDS 4620 can be used in repetitive, high volume hand scanning operations in even the most demanding environments.



The LDS 4620 is configurable for keyboard wedge, USB keyboard wedge emulation, TTL RS-232, or True RS-232. The LDS 4620 connects to all popular PCs and portable data terminals. The LDS 4620 can be integrated with all types of customer systems. The LDS 4620 delivers all the benefits of the LDS 4600, plus the freedom of cordless operation. In a single mobile product solution, you will be able to perform world-class reading and decoding of small-scale etched or embossed two dimensional (2D) Matrix symbologies.

InData Systems LDS 4620 cordless hand held imager features Bluetooth® Class II v1.2 technology providing 10 meters (33 feet) of read range and utilizes adaptive frequency hopping for improved performance in existing wireless environments. Its power is provided by a lithium ion battery capable of delivering up to 25,000 reads between charges. Powered by Adaptus™ Imaging Technology, the LDS 4620 also comes fully equipped with digital imaging capabilities allowing you to take pictures and capture signatures for the ultimate in data management versatility. Moreover, with no internal moving parts, the LDS 4620 will provide years of reliable service even in the most demanding environments. InData Systems LDS 4620 is ideal for government, healthcare, industrial, and commercial applications.

The imager and base are not linked together when shipped as new product. Therefore, the imager must be linked to the base before first time use. The software automatically links the imager to the base once the imager is placed into the base. If the imager and base were previously linked when the imager is placed into the base, there will be no response. If imager and base were not previously linked, when the imager is placed into the base, both devices emit a brief chirping sound as the radios link together.

LDS 4800

The LDS 4800 hand held industrial area imager is the first industrial class area imager powered by Adaptus™ Imaging Technology which decodes faster, farther, and future-proofs your investment. This means your workers spend less time trying to capture data, and more time using the data to make your business more cost efficient. The LDS 4800 has a similar ergonomic design as the LDS 4600, but has a more rugged housing, and is built to withstand the toughest industrial applications.



Whether your application is reading conventional linear bar codes or tomorrow's 2D matrix symbologies, the LDS 4800 can capture them all today. If your application requires signature capture, OCR, or digital photography, the LDS 4800 can do it. Its advanced imaging optics software quickly and easily determines the image content and transfers it to your host system. In fact, full image transfer is accomplished in less than one second through its onboard full speed USB interface.

The LDS 4800 can be used in a wide range of applications from circuit board manufacture to package delivery tracking. In addition, bar codes, images, and signature capture can provide positive proof of delivery. If discrepant material needs to be viewed by a production supplier, images can be captured and quickly transferred for immediate review and resolution, saving time and money. Because these applications often contain challenges for many image capture devices, the LDS 4800 is extra tough. Full shock-absorbing rubber protects the imager from drops to concrete of up to 6.5 feet (2 meters). As many environments exhibit airborne dust and rain, the LDS 4800's sealed design protects the inside of the scanner so that these tenacious elements will not degrade performance. In addition to an IP54 enclosure specification, the LDS 4800 is backed by an industry leading warranty. For applications that demand superior aiming, the LDS 4800 is the best choice. Integrated LED and laser aiming ensure the best visibility for exceptional point and shoot performance, ensuring that your operator will find and capture the correct image every time.

LDS 4600 Self Contained Scanner

InData Systems has teamed the 4600 scanner with a fixed shroud to introduce a rugged scanning solution for decoding fluorescing covert marks. The result is an affordable scanner to meet your scanning needs. Though the patented optic is not detachable, the custom design still performs at the same high quality as the interchangeable optics. Permanently attached to the scanner, the fixed optic provides all of the benefits and features of the interchangeable optic, in a simpler more rugged package. If your requirements are for many locations, and you need quantities, this is your solution.

Like the interchangeable shrouded optic, various wavelengths are available to meet your scanning requirements.



LDS 9500 (Dolphin)

Please see the LDS 9500 manual for information on the Dolphin Portable Data Terminal.



The LDS 9500 is a self contained mobile unit which utilizes Bluetooth technology and has optional Wireless (WiFi) interfaces running Windows Mobile. The unit contains a display and a keyboard, and supports all of InData Systems optics enhancements. For more information on this portable data terminal, please visit our website at indatasys.com, or contact a reseller in your area.

FM 500

For large or small Industrial scanning, InData Systems' Fixed Mount FM500 does it all. With a rugged exterior the FM500 utilizes the image engines from Hand Held Products, a leader in imaging technologies. Whether reading 1D, 2D, direct part marks, or covert marks, such as UV or IR, the FM500 is capable of doing it all. The flexible mounting, from the bottom or either (or both) sides allows for a variety of Industrial applications. It also facilitates the powering of a variety of external illumination for special applications.

The FM500 was originally designed to use the InData Systems LDS Series of direct part mark optics to optimally read and decode exceptionally small Data Matrix bar codes (the code selected as the ATA Spec2000² and EIA standard for small parts marking). The FM500 is the scanner of choice for a wide range of applications in fixed mounted applications where the bar code is manually or automatically presented in front of the scanner. Even without the addition of the LDS optics, it is a very robust scanner capable of reading 1D, 2D and DPM, or OCR placed in front of the imager.

Because it is both difficult and costly to place a label on small electrical, medical instruments or aircraft components, the small Data Matrix codes are applied directly to the surface of the part itself by laser etching, chemical etching or use of the ink jet applied paints. The process, however, sometimes leads to low contrast ratios, and bar codes on irregular surfaces. Both of these factors lead to bar codes that are not easily decoded. The FM500 optimizes the readability by concentrating the lighting on the target bar code at a sharp angle and magnifying the codes. The angle at which the light hits the object minimizes the "wash out" effect caused by irregular and shiny surfaces.

Compact and easy to use, the FM500 can be used in repetitive, high volume automatic and manual scanning operations in even the most demanding environments. The FM500 can be configured for keyboard wedge, USB Serial or USB Keyboard wedge emulation, TTL RS-232, or True RS-232. The FM500 connects to all popular PCs and portable data terminals. The FM500 can be integrated with all types of customer systems.

International Standard IEC 60529 classifies the level of protection that electrical appliances provide against the intrusion of solid objects, dust, accidental contact, and water. The resulting Ingress Protection Rating is identified by a code that consists of the letters IP followed by two digits and an optional letter. The digits indicate conformity with conditions summarized in a table provided by the IEC. The InData Systems FM500 fixed mount scanner has the capability, with optional seals, of meeting the IP rating of a unit that can be immersed. The FM500 Fixed Mount Scanner is in a sealed metal enclosure that withstands industrial oils, dust and liquids.

INDATA SYSTEMS OPTICS

All InData Systems models of optics are interchangeable with the corded 4600, 4800, cordless 4620, and the self contained portable terminals (Dolphin 9500 series). For more information about the Dolphin 9500 series see the Dolphin Users Guide.

LDS – V2

Our patented (#6,352,204 B2) LDS-V2 (Light Delivery System) Optic is typically used when surfaces are smooth and the etched area is recessed or roughened. The concept is much like the effect caused by a flashlight held parallel to the floor, showing every crumb and surface scratch as a shadow. With this scheme, the actual mark usually appears as a white mark on a black background. There are cases where the etched mark only needs to be evident on the surface as a different finish to use this method.



LDS-V2 Optic

The InData Systems Patented LDS-V2 focuses the light from the scanner to the precise point at which the light is needed, and at an angle at which specular reflection is reduced considerably. This provides an optimal contrast ratio on etched and embossed symbologies, and relates to achieving quicker, more successful bar code decoding.

The patented LDS-V2 optic comes with two different fields of view. The V2-80 has the larger field of view, and the V2-40 has the smaller field of view to read exceptionally small code. Refer to the Field of View Chart on page 6 in this manual for exact reading capabilities of each model.

The LDS V2 optic is available in an ESD version to inhibit or eliminate electro-static discharge. As with all optics, the V2 optic can be mounted on all models of scanners.

The LDS V2 optic is not available in the illuminated version. It is used with non-powered socketed scanners, however, it will work with powered sockets.

LDS – M3

Our LDS-M3 patented (#6,854,650) Optic was designed initially to address a bar code etched onto a shiny curved surface. This kind of surface does not have a consistent enough background, due to the curvature, for the low angle illumination of the V2 optic.



LDS-M3 Optic

InData Systems M3 optic has a broad "glowing surface" that shines onto the surface of the bar coded area at a controlled angle relative to the glowing surface. This set of angles causes the shiny background to appear lighter (rather than darker as in the V2 above) than the marks by means of a broad illumination area. This works especially well on curved surfaces.

The Patented LDS M3 optic is designed to take etched marks on shiny surfaces and use the shininess to make a virtual white background with a black bar code.

The LDS M3 optic is available in three different fields of view. The M3-30 provides the smallest field of view, while the M3-40 is the standard size, and the M3-80 offers the largest field of view. Refer to the Field of View Chart on page 6 in this manual for exact reading capabilities of each model.

The LDS M3 optic is available in the illuminated and non-illuminated version.

Covert Shrouded Optics

The InData Systems scanners with one of the InData Systems patented (#6,824,061) Covert Shrouded Optics are extremely mobile and easy to use. They utilize the Adaptus™ Technology from Hand Held Products, but use UV, near UV and IR illumination, and enhanced optics to see the “invisible” bar code marks printed with various wavelength fluorescing inks. These inks are used to mark items with marks that are not noticeable except when illuminated with UV, near UV and infrared light. The Covert Optic is able to read many types of UV and Infrared inks. The wavelength of the optic must correspond with the wavelength capability of the ink.




Covert Shrouded Optic



Ultra Violet barcode and text viewable with UV optics

InData Systems interchangeable UV optics can be mounted on any of the InData Systems powered socket scanners including the LDS 4600, 4800, 4620, FM 500, and the LDS 9500 and 7600 Dolphins. For specific information on each scanner, consult the associated brochure or user's manual.

Please refer to the InData Systems UV Safety sheet for more information about UV safety and safe product handling.

	<p data-bbox="764 1497 1175 1570">! CAUTION</p> <ul style="list-style-type: none">* This near-UV LED device, during operation, radiates intense Light.* Do not look directly into the near-UV Light during the operation of the device. This can be harmful to the eyes, even for brief periods of time due to the intense light.* If Viewing the near-UV Light is necessary, Please use UV filtered glasses to avoid damage by the near-UV Light.
<p>Avoid direct eye exposure to the light - Keep out of reach of children</p>	

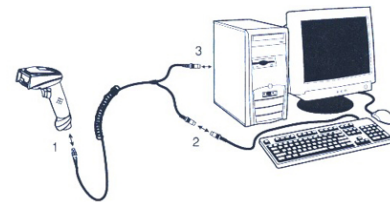
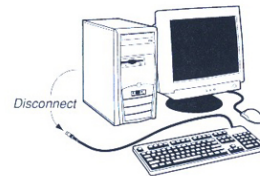
SETUP

Once you receive your InData LDS Reader, remove it from all packaging, and, after checking to make sure all parts are accounted for, connect it to your PC via the cable provided.

Connecting the Imager with Keyboard Wedge

Any of the LDS imagers can be connected between the keyboard and PC as a “keyboard wedge”, plugged into the serial port, or connected to a portable data terminal in wand emulation or non decoded output mode. To connect any of the InData LDS Readers to your PC using a keyboard wedge connection, follow these directions:

1. Turn off power to your computer
2. Disconnect the keyboard cable from the back of your computer
3. Connect the appropriate interface cable to the imager and to the computer
4. Turn the computer power back on. The imager should beep



Connecting to your PC using Keyboard Wedge

5. Scan the Keyboard Wedge code below to configure your scanner for the Keyboard Wedge Interface.
6. Verify the imager operation by scanning the test code below. The scanner will beep once.

Terminal ID = 003



Keyboard Wedge

Test 123456789

Suffix Settings

Scan one of the following suffix codes if you wish to add a carriage return or tab suffix to your bar code symbologies.

To change the suffix value, scan the appropriate code below:

<CR> suffix

<TAB> suffix

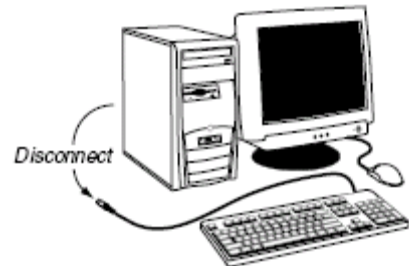
clear all suffix



Connecting the LDS 4620 Base When Powered by Host (Keyboard Wedge)

An LDS 4620 Base can be connected between the keyboard and PC as a “keyboard wedge,” plugged into the serial port, or connected to a portable data terminal in wand emulation or non decoded output mode. The following is an example of a keyboard wedge connection:

1. Turn off power to the terminal/computer.
2. Disconnect the keyboard cable from the back of the terminal or computer.
3. Connect the appropriate interface cable to the base and to the terminal or computer and keyboard.
4. Turn the terminal or computer power back on.
5. Program the base for the keyboard wedge interface using the bar code below.

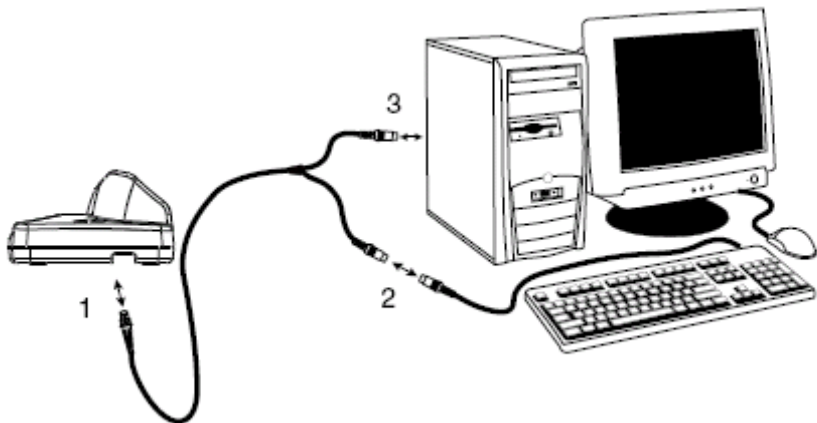


Terminal ID = 003



Keyboard Wedge

6. Verify the base operation by scanning the Test Code below.



Test 123456789

Suffix Settings

Scan one of the following suffix codes if you wish to add a carriage return or tab suffix to your bar code symbologies.

To change the suffix value, scan the appropriate code below:

<CR> suffix



<TAB> suffix



clear all suffix

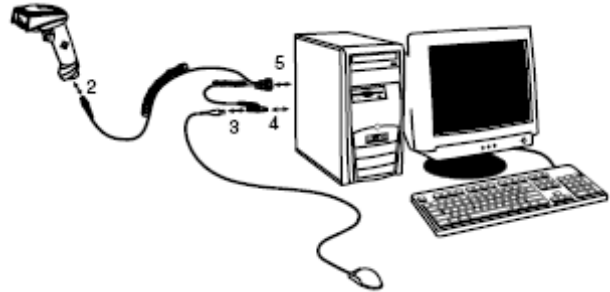


Connecting the Imager with RS-232 Serial Port

Note: These instructions are for use with the RS-232 power stealer cable

To connect the scanner to your PC using a standard RS232 connection, follow these directions.

1. Turn off power to terminal/computer.
2. Connect the appropriate interface cable to the scanner. Make sure you have the correct cable.
3. Unplug the mouse or keyboard from the computer. Plug the mouse or keyboard into the power tap on the imager cable.
4. Plug the power tap into the mouse or keyboard port.



Connecting to your PC using RS-232

5. Plug the serial connector into the serial port on your computer. Tighten the two screws to secure the connector to the port.
6. Once the scanner has been fully connected, power up the computer.
7. Use the Standard RS-232 Interface code to configure your scanner for use with the RS-232 interface cable.
8. The scanner will beep once. Verify the scanner operation by scanning the test bar code below.



Standard RS-232 Interface



Test 123456789

RS-232 Baud Rate

Baud Rate sends the data from the imager to the terminal at the specified rate. The host terminal must be set for the same baud rate as the imager. Default = 38,400



300



600



1200



2400



4800



9600



19,200



38,400



57,600

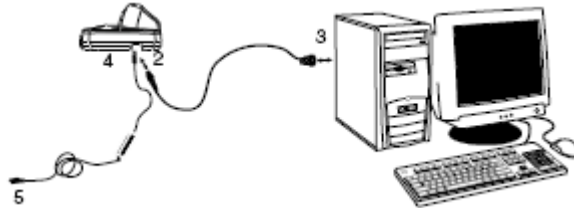


115,200

Connecting the 4620 Base (2020) with RS-232 Serial Port

1. Turn off power to the terminal/computer.
2. Connect the appropriate interface cable to the base.

Note: For the base to work properly, you must have the correct cable for your type of computer.



3. Unplug the mouse or keyboard from the computer. Plug the mouse or keyboard into the power tap on the imager cable.
4. Plug the power tap into the mouse or keyboard port.
5. Plug the serial connector into the serial port on your computer. Tighten the two screws to secure the connector to the port.
7. Once the base has been fully connected, power up the computer.

All communication parameters between the imager and terminal must match for correct data transfer through the serial port using RS-232 protocol. Scanning the RS-232 interface bar code programs the imager for an RS-232 interface at 38,400 baud, parity at none, 8 data bits, 1 stop bit, and adds a suffix of CR LF.



RS-232 Interface

RS-232 Baud Rate

Baud Rate sends the data from the imager to the terminal at the specified rate. The host terminal must be set for the same baud rate as the imager. Default = 38,400



300



600



1200



2400



4800



9600



19,200



38,400



57,600



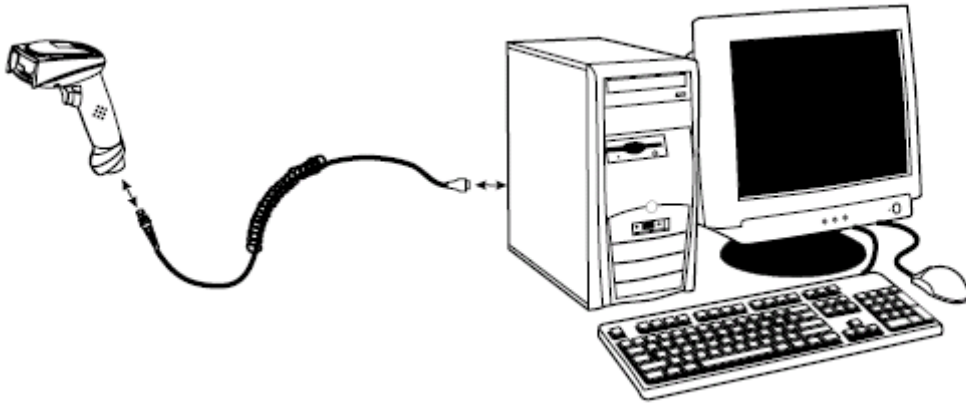
115,200

Connecting the Imager with USB

Note: This interface applies to the LDS 4600 and LDS 4800SR050 models only.

An imager can be connected to the USB port of a computer.

1. Connect the appropriate interface cable to the imager and to the computer.



2. The imager beeps.
3. Verify the imager operation by scanning the test bar code below.

Note: The following USB “Plug and Play” codes are supported on specific LDS 4600 and 4800 models.

For additional USB programming and technical information, refer to Appendix D, USB COM Port and Emulation Instructions.

Use the USB Keyboard code Terminal ID = 124 to configure your scanner to use the USB interface cable.

Terminal ID = 124



USB- Keyboard



Test 123456789

Connecting the 4620 Base with USB

A base can be connected to the USB port of a computer. To do so, use the following directions:

1. Connect the appropriate interface cable to the base and to the computer.
2. Program the base for the USB interface.
3. Verify the base operation by scanning the Test Code below.



Connecting to your PC using USB

Terminal ID = 124



USB- Keyboard

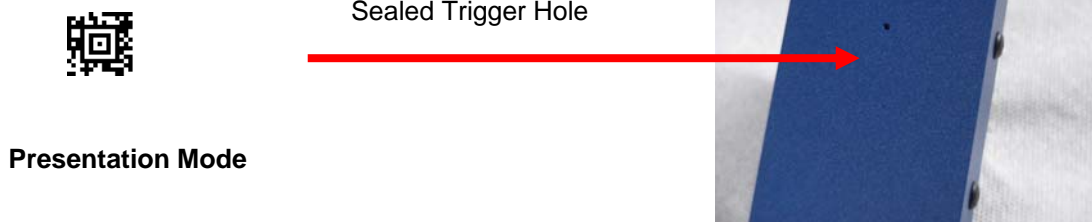


Test 123456789

Presentation Mode

Your FM 500 or FM600 must be configured for presentation mode to operate. Because it is not prompted to scan by the trigger, the decoder must be set to always be on and continually looking for code to scan. Presentation mode ensures that the scanner is always looking for a target or barcode to read.

To put your FM 500 or FM600 into presentation mode, place the point of a paper clip, or an end of the allen wrench that was included in the kit, into the pinhole (indicated by the red arrow on the illustration below) on the top of the scanner while holding it such that it can scan the Presentation Mode code below. The scanner will beep as it scans the code. From that point on, the scanner will be in presentation mode, and, when an illuminated optic is plugged into the scanner, always on, until it does not see movement for a short period of time, at which time it goes to half bright light. When a standard optic or no optic is present, the light will go out.



When your FM 500 or FM600 decoder is in presentation mode, the LED's remain on and continue scanning for a short time after the bar code has been read. If you wish to turn the LED's off immediately after a bar code has been read, scan the **LED's Off** bar code below. LED's On is the default.



LED's Off After Read



LED's ON After Read

Manual/Serial Trigger Mode

This applies to models that are trigger activated only.

You can activate the imager either by pressing the trigger, or using a serial trigger command. When in manual trigger mode, the imager scans until a bar code is read, or until the trigger is released.

When in serial mode, the imager scans until a bar code has been read or until the deactivate command is sent. In serial mode, the imager can also be set to turn itself off after a specified time has elapsed.



Manual/Serial Trigger

Output Settings

NOTE: DO NOT USE the following setups UNLESS the scanner provided does NOT work satisfactorily. Units are usually set to the optimum for the samples provided.

Use of the Quick*View software and the software command IMGSH8F1D is helpful in viewing the effects of making the following adjustments. The print weight controls the black vs. white contrast of the scanner. If you use the IMGSH8F1D command in QuickView you will be able to tell how readable your code is at the current print weight. If your code is too dark use a higher number, if it is too light then use a lower number. If the code in the picture looks good to your eye then it should be readable by the scanners eye.

Print Weight Control Settings

Adjust the print weight for best reading by scanning one of the following to find the best setting. The factory default is 4, but your scanner will be preset to the best print weight based on the samples you provided. If you are reading labels, then 3 or 4 is usually the best, but if you are reading laser etched marks then 6 typically works best.

2



3



4



5



6



Video Reverse

Use **Video Reverse** when you need to have the imager read bar codes that are inverted. The "Off" bar code is an example of this type of bar code. Notice that it looks like a negative image. If additional configuring from a menu bar code is required, Video Reverse must be disabled to read the menu bar codes and then re-enabled after configuration is completed. Off is the default.

Note: You will not be able to read standard black on white linear bar code until you disable Video Reverse if it is enabled.



Video Reverse On



Video Reverse Off

Aimer Mode

You can control concurrent aimer and illuminated LED performance with Aimer Mode during scanning by alternating the aimer and the illuminated LED's.

Scan the **Interlaced** bar code below to have the aimer and the illuminated LED's **not** on at the same time. Interlaced is the default on all new scanners.



Interlaced

Because this limits peak current during scanning, performance may be slower.

Use the **Concurrent** bar code if you wish the LED illumination to not vary based on the perceived illumination of the scanner. With the Concurrent setting, the aimer and the illuminated LED's **do** light at the same time.



Concurrent

If you do not want to use either Aimer Mode use the Off code below.



Off

USING THE LDS 4600 or LDS 4800 SYSTEM

Positioning of the LDS 4800 with whichever etched mark code you are trying to read depends on which optics assembly you are using.

With the V2 optic, hold the code approximately halfway between the two prongs on the optic and in contact to about a quarter (1/4) inch away from the end of the optic. Rotate the code to different angles until you get a successful read.



With the M3 optic, code must be lined up using the built in guide. The M3 Optic Guide is specially designed with a crease, which facilitates proper vertical alignment with every scan.



Adjust the print weight for best reading by scanning one of the print weight setting codes on page 28 to find the best setting. The factory default is 4, but the unit furnished to you will be set to the most precise setting for you if you have provided samples to InData Systems.

If you are having a lot of difficulty reading your codes, you may be using an incorrect optic assembly or your code may be damaged or distorted. Our optics have been specially designed to be forgiving of most misprints in codes, but extreme distortion of etched codes is very difficult to read, even for our optics.

If you continue to have difficulty reading your codes then it may be necessary to send a sample of the code you are trying to read to our testing facility for more thorough analysis.

USING THE LDS 4620 CORDLESS SYSTEM

Base for Cordless System

The cordless base provides the link between the cordless imager and the host system. The base contains an interface assembly and an RF communication module. The RF communication module performs the data exchange between the cordless imager and the interface assembly. The control assembly coordinates the central interface activities including: transmitting or receiving commands and data to and from the host system, performing software activities such as: parameter menuing, visual indicator support, power-on diagnostics, and data translation required for the host system. The base also is the imager's battery charger.

Base Charge Mode

There must be enough voltage for the circuitry to work in order to charge the battery. Three conditions exist during which power can be supplied to the base:

Condition 1: 9VDC power supply connected to the barrel connector

Condition 2: 12VDC host power source only

Condition 3: 5VDC host power source only

Each selection is described by a condition below:

	Condition 1	Condition 2	Condition 3
Automatic	Fast Charge	Slow Charge	No Charge
Full Charge Rate	Fast Charge	Fast Charge	No Charge
Low Charge Rate	Slow Charge	Slow Charge	No Charge
Battery Charge Off	No Charge	No Charge	No Charge

When the battery is mostly discharged, less current is drawn from the input power source when using a slow charge rate. Scan the appropriate bar code for the desired application. The default is Automatic.

Automatic

Full Charge Rate

Low Charge Rate

Battery Charge Off



RF (Radio Frequency) Module Operation

The cordless system uses a state-of-the-art two-way Bluetooth radio to transmit and receive data between the imager and the base. Designed for point-to-point and multipoint-to-single point applications, the radio operates using a license free ISM band, which sends relatively small data packets at a fast data rate over a radio signal with randomly changing frequencies, making the cordless system highly responsive to a wide variety of data collection applications and resistant to noisy RF environments. Bluetooth Class 2 power level provides range of up to 30 feet (10m), depending on the environment.

Cordless Imager

The cordless imager enables fast and accurate bar code scanning using an area imager. The imager is comprised of a decode/control assembly and an RF communication module. The scan engine performs the bar code image illumination and sensing. The decode/control assembly coordinates the central communication activities including: capturing and decoding the bar code image data, performing software activities (parameter menuing, visual indicator support, low battery indication), and data translation required for the host system. The RF communication module performs data exchange between the imager and the base.

Imager Modes

The LDS 4620 is capable of working in single imager mode, multiple imager mode, or with Bluetooth devices, other than the LDS 2020 Charge Base.

Unlinking the Imager

If the base has an imager linked to it, that imager must be unlinked before a new or different imager can be linked. Once the previous imager is unlinked, it will no longer communicate with the base. To unlink an imager from the base, scan the Unlink Imager bar code below.



Unlink Imager

Single Imager Operation

There are two link modes to accommodate different applications: Locked Link Mode and Open Link Mode. Scan the appropriate bar codes included in the Open Link and Locked Link Mode explanations that follow to switch from one mode to another. Default = Locked Link Mode.

Locked Link Mode – Single Imager

If you link an imager to a base using the Locked Link Mode, other imagers are blocked from being linked if they are inadvertently placed into the base. If you do place a different imager into the base, it will charge the imager, but the imager will not be linked.



**Locked Link Mode
(Single Imager)**

To use a different imager, you need to unlink the original imager by scanning the Unlink Imager bar code.



Unlink Imager

Open Link Mode – Single Imager

When newly shipped or defaulted to factory settings, the base and imager are not linked. By placing an imager into the base, they establish a link. Placing a different imager into the base establishes a new link, and the old imager is unlinked. Each time an imager is placed into the base, it becomes the linked imager. The old imager is then unlinked.



**Open Link Mode
(Single Imager)**

Override Locked Imager

If you need to replace a broken or lost imager that is linked to a base, scan the Override Locked Imager bar code below with a new imager, and place that imager in the base. The locked link will be overridden; the broken or lost imager's link with the base will be removed, and the new imager will be linked.



Override Locked Imager

Multiple Imager Operation

Multiple Imager Operation Mode, allows up to 7 imagers to be linked up to one base. You cannot join an eighth imager until you unlink one of the 7 imagers or take an imager out of range. To put the imager in multiple imager mode, scan the bar code below. Once you scan this bar code, the imager is unlinked from the base and must be placed into the base to re-link.



Multiple Imager Operation

Beeper and LED Sequences and Meaning

The LDS 4620 contains LEDs on the top of the unit to indicate its power up, communication, and battery status. Simply stated, red LED = error; green LED = success of any type. The unit's audible indicators have meaning as well: 3 beeps = error; 2 beeps = menu change; 1 beep = all other successes. However, it should be noted that when the base is not powered on, or within range of the imager, a triple beep indicates a successful scan.

The table below lists the indication and cause of the LED illumination and beeps for the IT4620.

LED Indication	Beeper Indication	Cause
Normal Operation		
Red Flash	None	Battery Low
Green Flash	1 beep	Successful Communication or Linking
Red Blinking	3 beeps	Failed Communication
Menu Operation		
Green Flash	2 beeps	Successful Menu Change
Red Blinking	3 beeps	Unsuccessful menu Change

Data Accumulation Mode

Scan the bar codes below to turn data accumulation (batch) mode on and off. If data accumulation mode is on, bar code data is stored when the imager is out of range of the base and transmitted once the imager is back in range.



Data Accumulation Mode On



Data Accumulation Mode Off

About the Battery

Use only the Li-ion battery packs provided by the manufacturer. The use of any battery pack not sold by the original manufacturer will void your warranty and may result in damage to the unit.

Disclaimer

Due to InData Systems continuing product improvement programs, specifications and features herein are subject to change without notice.

Warranty Information

All InData Systems Products carry a standard 1 year warranty against defects in manufacturing.

APPENDIX A – Technical Support

Support by Phone

Please call our customer support department at 315-685-8311. Technical support is available during regular business hours from 8:30am to 5:00pm ET Monday through Friday. A 24 hour message system service is available for calls placed outside of regular business hours. Calls placed to this service will be answered within one business day. Please leave the following information if calling outside of regular business hours:

Name and Company Name

Product make, model, and serial number (if applicable)

Brief description of problem and support needed

Phone number, and best time to be reached.

Telephone support outside of regular business hours may be available if arranged in advance. There is an additional fee for this service. Please contact InData Systems during regular business hours for more information.

Support by FAX

Our printable fax form for technical support may be submitted by FAX 24 /7, at 315-685-8312. Faxed requests for technical support will be responded to within one business day. An on-line printable request form is available from the www.indatasys.com website. To access the online FAXform, click on the Support link on the left side of the Home Page. Under the Technical Support paragraph, click on the click here link. Under the Support by FAX heading, the on-line printable request form can be found under a link here. Print the form, fill in the information, and FAX the form to 315 685-8312. If not using the above form, please be sure the following information is on your request for support:

Name and Company Name

Company Phone/Fax Number

Product Make, Model, and serial number (if applicable)

Brief description of support needed

Support by Internet / Email

To use our online support form, go to indatasys.com, and select the Support link on the left of the page. Click on the click here link under the Technical Support heading, to see the various forms of support available. To access the online support form, click on the click here link under the Support by Internet / Email heading. Requests for technical support may be submitted electronically 24 hours a day, seven days a week. Electronic requests for technical support are responded to within one business day. If you would rather send an E-mail request, contact us at support@indatasys.com. Please be sure the following information is included in the request:

Name and Company Name

Company Phone / Fax / E-mail

Product Make, Model, and serial number (if applicable)

Brief description of support needed

APPENDIX B – Summary of Ordering Guide

Kits containing items for each configuration are available at www.indatastore.com

Hand Held Scanners	
LDS460R2PF0	LDS 4620 commercial grade cordless handheld scanner with powered interchangeable socket
LDS460R5PF0	LDS 4600 commercial grade corded handheld scanner with powered interchangeable socket
LDS480R2PF0	LDS 4820 industrial grade cordless scanner with powered interchangeable socket
LDS480R5PF0	LDS 4800 industrial grade corded scanner with powered interchangeable socket
Fixed Mount Scanners	
LDS500R5200	LDS FM500 (Fixed Mount) fixed mount scanner with powered interchangeable socket
Portable Data Terminals	
LDS950R0PF0-00	Dolphin LDS 9500 batch only, with powered interchangeable socket
LDS950R3PF0-00	Dolphin LDS 9500 802.11b and Bluetooth radios and powered interchangeable socket with wireless networking
Interchangeable Optic Assemblies	
UV Optics	
LDS40G0UL0S	ultra violet illuminated interchangeable optic assembly with 80mm lens at 375 nm wavelength
V2 Versions	
LDS4000060	V2 interchangeable standard resolution optic assembly with 40mm lens
LDS4000010	V2 interchangeable low resolution optic assembly with 80mm lens
M3 Versions	
LDS4000070G	M3 interchangeable high resolution (reads small codes) optic assembly with 30mm lens
LDS4000030G	M3 interchangeable standard resolution optic assembly with 40mm lens
LDS4000090G	M3 interchangeable low resolution optic assembly with 80mm lens
LDS4000170G	M3 interchangeable optics assembly with 30mm lens illuminated
LDS4000190G	M3 interchangeable optics assembly with 80mm lens illuminated

ESD	
LDS40E00600	V2 interchangeable optics assembly with 40mm lens ESD compliant
LDS40E0030G	M3 interchangeable optics assembly with 40mm lens ESD compliant
Power Supplies	
PS-5U-41E	5V power supply for use with RS232 units as indicated above
PS9U-21E	9V Power Supply for 2020-5 base below
4620 Base unit	
HH-2020-5BE	host interface, wireless link and charging for 4620 based solutions requires 9V power supply
HH-2020-CBE	Charge Base alone for 4620 solutions requires 9V powersupply
Holsters/Covers	
9500 CoverE	Dolphin 9500 protective enclosure with clear front and swivel belt clip
9500 Cover/2E	Dolphin 9500 protective enclosure with swivel belt clip
9500 HolsterE	Dolphin 9500 belt holster
Home Base/Cradles	
9500-HB-1E	Dolphin 9500/9550 RS 232 charging and communications cable US kit
9500-HB-2E	Dolphin 9500/9550 RS 232 charging and communications cable Euro kit
Spare Batteries	
20000591-01E	Dolphin 9500 7.4 V 14.8 watt hour Li-ion spare battery
Chargers	
9500-QC-1E	Dolphin Quad Charger™ US Kit Dolphin 9500/9550 four slot battery charging station. Includes US power cord and power supply
9500-QC-2E	Dolphin Quad Charger™ Euro Kit Dolphin 9500/9550 four slot battery charging station. Includes Euro power cord and power supply

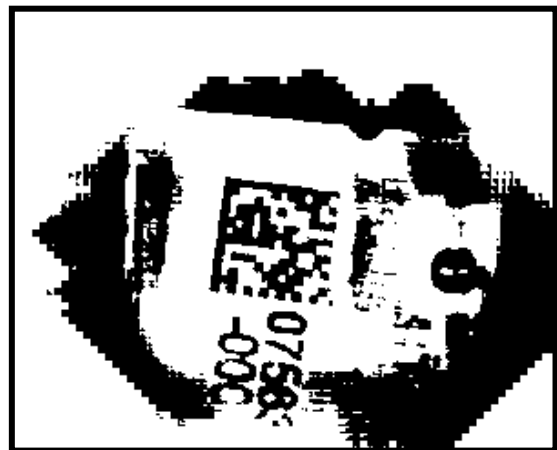
Charging & Communications Cables	
9500 RS232-1	Dolphin 9500/9550 RS-232 charging and communications cable US kit
9500 RS232-2	Dolphin 9500/9550 RS-232 charging and communications cable Euro kit
Stands	
FM500 Flex base	FM500 Flex Base
HFStand5E	Hands free stand for InData LDS products
ESD-HFStand5	Hands free stand for InData LDS products ESD Compliant
Cables	
42206161-01E	USB PC or MAC interface cable
42204253-04E	True RS232 interface cable requires power supply
42203758-04E	TTL RS232 interface cable requires 5V power supply
42206132-02E	Keyboard Wedge Mini DIN interface cable
42203758-03E	Power Link interface cable
Kits	
I6-FM500 Scanner Kit	FM500 scanner, Flex Base with stand, USB interface cable, M3 30mm illuminated optic
I6-9500 Scanner Kit	LDS 9500 802.11 WLAN radio, 56 key alphanumeric keypad, cradle, spare battery, cable and holster
I6-FM450-50ft. Cable	50 ft. cable with RS-422 converter, FM500, cable, and 15 volt power supply
I6-LDS UV 4600 Kit	LDS 4600 scanner, UV optic, USB cable
I6-LDSUV 4620 Kit	LDS 4620 scanner, 2020 charge base, UV optic, power supply, USB interface cable
I6-LDS UV 95 Kit	LDS 9500 with powered interchangeable socket, UV optic, holster, spare battery, terminal emulation client software, charging home base, and USB cable
I6-LDS UV FM500 Kit	FM500, UV optic, flex base, USB cable

APPENDIX C – Using the QUICK*VIEW Utility

Quick*View software is an advanced diagnostics tool that you can use to troubleshoot scanning problems that you might be having with your LDS 4600, 4800 and 4620 scanner. Do not attempt to use Quick*View with a self contained portable such as the InData Systems LDS 9500. Quick*View is available for download from the www.directpartmark.com web site. Click on the Software link on the left side of the Home Page. Select the link [QuickView 4.1.3.exe](#), or what ever the most recent version is. Save the file to a location of your choice. Once the file has been saved, double click on it to install the Quick*View software. Follow the on screen prompts to complete the install. You can connect your scanner when it is in serial communications mode, and receive images downloaded from it into the Quick*View Program for analysis. Grayscale images (black and white but with varying shades of gray) or true black and white (images with NO gray in it – only black OR white) are available as options. The true black and white image has some indication as to what the decoding firmware may be attempting to process. See the example images below.



Gray Scale Image



Black and White Image

Use a serial interface cable. Begin by scanning the Quick*View Setup code found below.

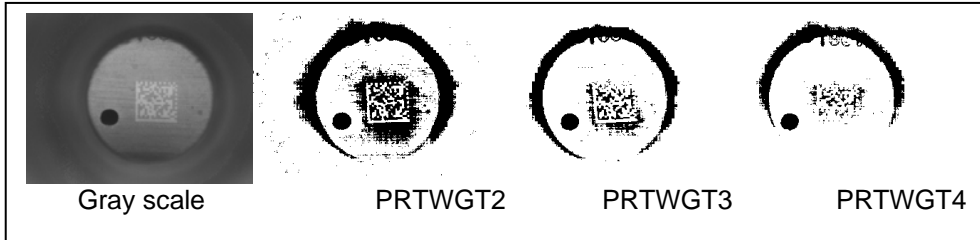


Quick*View Setup Code

A serial interface cable will allow serial communications to the scanner at 38400 baud until power is removed from the scanner, at which time it will revert back to the settings it had before. If using a USB interface cable, see Appendix D in this manual USB COM Port Emulation Instructions. Otherwise, plug the serial cable into the serial port (#1 is preferred) of your PC and launch Quick*View.

Once Quick*View is communicating with the scanner, you can begin to see what the scanner sees. Attempt to read a bar code. If the code reads, the scanner will beep. If it does not read, it will still temporarily keep, in memory, the last image that it saw when you released the trigger. To see the same image in Quick*View, type the following command into the COMMAND box IMGSHF and click on the Send Command button. If all is communicating properly, an image will be downloaded and displayed on your PC. This picture can be saved as a file by clicking the File, Save As menu items. The default format for these files is bmp. It is not necessary to type in the file extension. It is possible to save multiple files with images.

If the picture does not have a distinct clarity without speckles, it may be necessary to change the print weight as described on page 28. After adjusting the print weight, you can scan the target again, and display the picture in Quick*View. If changing the Print Weight does not give enough clarity (and therefore decoding) then a different optics assembly may be required, or the barcode may not be of sufficient quality. Sending the actual sample to InData Systems' analysis lab may speed up your assessment.



Note: If you wish, you can create a shortcut to the Quick*View executable on your desktop. To do so, right click the Quick*View menu item and select Send To, then select Desktop Create Short cut.

APPENDIX D – USB COM Port Emulation Instructions

To program your LDS 4600, LDS 4800, FM500, or LDS4620 to emulate a regular RS-232-based COM port, you will need to scan the following code. Scanning this code changes the terminal ID to 130.



USB COM Port Emulation

Terminal ID = 130

If you are using a Microsoft Windows PC, you will need to download a driver from the site www.directpartmark.com. Click on the Software Menu Item Link on the left side of the main page. Select USB Serial Emulation Driver. Save the file to a desired location on your hard drive or server.

When you plug your scanner in, Windows will ask you for a driver. Navigate to the location of the driver file you just downloaded, and click OK. The driver will use the next available COM Port number.

To determine which serial port is assigned, go to the Windows Device Manager, and click on Ports to expand the list of ports and their assignments.

If you are using an older version of Windows, disconnecting your scanner while the application has the port open may cause your computer to hang or freeze. If this happens, simply restart your PC.

APPENDIX E – Configuration Programming

You will receive your scanner with default settings in place. With these settings you should be able to read some data into the Quick*View Software. Quick*View can also be used to capture images from the scanner and make scanner setting changes. See Appendix C for instructions on installing QuickView.

If your scanner uses a serial interface you may wish to change your baud rate to one of the commonly used baud rates as follows:

1200 BPS



9600 BPS



19200 BPS



38400 BPS



115200 BPS



If you have a keyboard wedge scanner, but have a serial interface cable, set the terminal ID = 000 to allow Quick*View or other software to communicate via RS232 to the scanner. To return the scanner to keyboard wedge mode set the Terminal ID = 003. To set your scanner to PC Keyboard USB mode, set the Terminal ID = 124. For USB Com port emulation, set your Terminal ID = 130. Refer to the scanner appropriate setup section for more detail on how to configure your PC.

**Standard RS-232
Terminal ID = 000**



**Keyboard Wedge
Terminal ID = 003**



**USB Keyboard
Terminal ID = 124**



**USB- Serial
Terminal ID = 130**



To change the suffix value, scan the appropriate code below:

<CR> suffix



<TAB> suffix



Clear all suffix



To change the beeper volume, scan the appropriate code below:

No Beep



Low Beep



Med Beep



High Beep



If you have other interface or setting changes that are not covered in this manual, send an email to support@indatasys.com or refer to Appendix A for Technical Support.

If you are unsure of your configuration, or if you have configured an undesirable setting, scan the Factory Default code to reset your scanner to the factory default settings.

CAUTION: Scanning the Factory Default Code will remove any customized settings that InData my have provided for you.



Factory Default



Test 0123456789

APPENDIX F – General Product Questions – FAQ's

What size 2-D barcodes can I read with the InData Systems M3 optics?

Answer: The InData Systems "M3-30" is able to read 2-D barcodes of a size of up to .25" square (6.2mm), with a Narrow Bar element of .005 inches (0.15mm).

Answer: The InData Systems "M3-40" is able to read 2-D barcodes of a size of up to .35" (9.0mm) square, with a Narrow Bar element of .007" square (0.19mm).

Answer: The InData Systems "M3-80" is able to read 2-D barcodes of a size of up to .6" (15mm) square, with a Narrow Bar element of .010 inches (0.25mm).

What size 2-D barcodes can I read with the InData Systems V2 optics?

Answer: The InData Systems "V2-40" is able to read 2-D barcodes of a size of up to .35" (9.0mm) square, with a Narrow Bar element of .007" square (0.19mm).

Answer: The InData Systems "V2-80" is able to read 2-D barcodes of a size of up to .6" (15mm) square, with a Narrow Bar element of .010 inches (0.25mm).

What size 2-D barcodes can I read with the UV optics?

Answer: The InData Systems "V2-80" is able to read 2-D barcodes of a size of up to .6" (15mm) square, with a Narrow Bar element of .030 inches (0.65mm). Of course, it must be applied with a UV ink, which fluoresces in the correct wavelengths.

What types of marks are available?

Answer: Based on the industry, there are several methods for making marks, and they include, Laser Etching, Printing, and Dot-Peen marking methods.

Can I read linear barcodes with the various InData Optics and Readers?

Answer: Yes, but they must fit within the Field of View of the optics used, or you must remove the InData Systems Optics to allow reading of larger Linear codes.

What size linear barcodes can I read with the M3 optics?

Answer: The InData Systems "M3-30" is able to read linear barcodes of a size of up to .25" long (6.2mm), with a Narrow Bar element of .005 inches (0.15mm).

Answer: The InData Systems "M3-40" is able to read Linear barcodes of a size of up to .35" (9.0mm) long, with a Narrow Bar element of .007" square (0.19mm).

Answer: The InData Systems "M3-80" is able to read Linear barcodes of a size of up to .6" (15mm) long, with a Narrow Bar element of .010 inches (0.25mm).

What size linear barcodes can I read with the V2 optics?

Answer: The InData Systems "V2-40" is able to read Linear barcodes of a size of up to .35" (9.0mm) long, with a Narrow Bar element of .007" long (0.19mm).

Answer: The InData Systems "V2-80" is able to read Linear barcodes of a size of up to .6" (15mm) long, with a Narrow Bar element of .010 inches (0.25mm).

What size linear barcodes can I read with the UV optics?

Answer: The InData Systems UV Optic" is able to read Linear barcodes of a size of up to .6" (15mm) long, with a Narrow Bar element of .030 inches (0.65mm). Of course, it must be applied with a UV ink, which fluoresces in the correct wavelengths.

What types of 2-D barcodes can the LDS Products read?

Answer: All InData Systems scanners are able to read the following 2-D barcodes; PDF417, MicroPDF417, MaxiCode, Data Matrix, QR Code, Aztec, Aztec Mesas, Code 49, and EAN•UCC Composite, as well as the following linear barcodes; Codabar, Code 39, Interleaved 2 of 5, Code 93, Code 128, UPC, EAN, RSS and Codablock.

Can the V2-40 read linear barcodes?

Answer: The InData Systems “V2-40” is able to read Linear barcodes of a size of up to .35” (9.0mm) long, with a Narrow Bar element of .007” long (0.19mm).

Answer: The InData Systems “V2-80” is able to read Linear barcodes of a size of up to .6” (15mm) long, with a Narrow Bar element of .010 inches (0.25mm).

What type of optic do I need for etched codes on Aluminum?

Answer: The InData Systems scanner, equipped with the InData Systems “V2 Optic” is generally used for this type of application; however, some overlap in product selection does occur. If you are unsure, please contact us, and we can assist you with selecting the correct optic to meet your needs.

I have a rolled shaft of stainless steel, which optic will work with it?

Answer: The InData Systems scanner, equipped with the InData Systems “M3 Optic” is generally used for this type of application; however, some overlap in product selection does occur. If you are unsure, please contact us, and we can assist you with selecting the correct optic to meet your needs.

What is DPM?

Answer: D.P.M is standard used to refer to Direct Part Markings, which are used to place a permanent mark (barcode) on an item, to allow the identification of the item through out its life.

Set up Questions

How do I use USB with my unit? (4600/4800/4620/FM500)

Answer: All of the InData Systems scanners and readers come with the built in USB interface, and all you require is the correct USB cable for the various models, and with a single scan of the programming barcode, the units will operate with your USB.

Can I scan the data into Note pad?

Answer: Yes, All of the InData Systems scanners and readers configured as a keyboard interface, can place scanned data into Microsoft applications. The data is merely seen as keyboard-entered data.

Can I use Microsoft Word?

Answer: Yes, All of the InData Systems scanners and readers configured as a keyboard interface, can place scanned data into All Microsoft applications. The data is merely seen as keyboard-entered data.

Can I use Excel, or Access with the unit?

Answer: Yes, All of the InData Systems scanners and readers configured as a keyboard interface, can place scanned data into All Microsoft applications. The data is merely seen as keyboard-entered data.

What types of cables are available for the units?

Answer: All of the InData Systems scanners and Readers are offered in RS232, USB and Keyboard Wedge versions, and we offer cables to allow you to use any, or all of the interfaces within the scanners.

I have a PS/2 keyboard; can I use the unit in USB?

Answer: Yes, you simply require the correct USB cable for the Model you have, with a single scan of the programming barcode, the units will operate with USB.

Ultraviolet Light Questions

What is UV?

Answer: UV stands for Ultra Violet, and represents a frequency of light, at which a barcode fluoresce. InData Systems has patented optics, which are able to “see” and decode the otherwise invisible barcodes printed in UV inks.

What is UV or ultraviolet light?

Answer: Ultraviolet light is part of the spectrum of electromagnetic energy generated by many sources such as the sun. The full spectrum includes, in order of increasing energy, radio waves, infrared, visible light, ultraviolet, x-rays, gamma rays and cosmic rays. Since UV is not visible, it is technically not "light", but use of the term "ultraviolet light" is so widespread, it will be used here. Most sources of light generate some UV. For air disinfection, deep UV (250nm) is generated by electric lamps that resemble ordinary fluorescent tubes.

What are the Symptoms and Signs of UV Overexposure?

Answer: The eye is most sensitive to UV overexposure, which causes an inflammatory condition known as photokeratitis. For 6 to 12 hours after an accidental overexposure the individual may feel nothing unusual, followed by the abrupt sensation of a foreign body or "sand" in the eyes, redness of the skin around the eyes, some light sensitivity, tearing, and eye pain, which can be severe. The acute symptoms last 6 to 24 hours and resolve completely in 48 hours without long-term effects. Overexposure to skin resembles sunburn, but does not result in tanning.

Why do you use UV light if it is unsafe?

Answer: The wavelength of the new UV used by InData scanners is classified as 9000 times safer than the wavelength of 270nm that health officials refer to regarding other widely used products.

What is the UV wavelength of the LED's in the illumination module?

Answer: The InData UV optic operates at a center wavelength of 405 ±5nm (26 nm Half-Width), which is technically in the blue visible light range rather than being in the true ultraviolet area which is generally considered that below 400nm.

What is the Exposure Rating of the combined 8 LED's in terms of milli-watts per centimeter squared?

Answer: The total output of all 8 LED's measured at 1" from the LED array shroud is .0009 milli-Watts/cm squared. At a distance of 6 inches from the shroud, which is a typical operating mode, the combined LED output is only .0002 milli-Watts/cm squared.

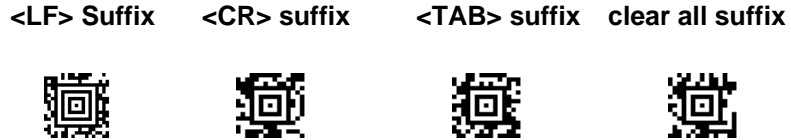
What is the pulse duration?

Answer: The LED's are not pulsed and remain illuminated as long as the trigger is held, or the scanner times out.

APPENDIX G – Often Used Codes

This appendix offers codes that are most often used in the setup and configuration of your scanner.

Suffix Settings



RS-232 Baud Rate

Baud Rate sends the data from the imager to the terminal at the specified rate. The host terminal must be set for the same baud rate as the imager. Default = 38,400



Interfaces

Terminal ID = 124



USB- Keyboard

Terminal ID = 130



USB Com Port Emulation

Terminal ID = 003



Keyboard Wedge

Terminal ID = 000



RS-232 Serial Port Configuration



Quick*View Setup

Print Weight Control Settings

2



3



4



5



6



Aimer Mode



Interlaced



Concurrent



Off



Unlink Imager



Locked Link Mode
(Single Imager)



Open Link Mode
(Single Imager)



Override
Locked Imager



Data Accumulation Mode On



Data Accumulation Mode Off



Standard Product Default Settings



Quick Omni



Full Omni



Video Reverse On



Video Reverse Off



Test 123456789