OMRON

V460-H
Industrial Handheld DPM Reader

User Manual



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Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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Safety Precautions

Meanings of Signal Words

● Symbols and Meanings of Safety Precautions Described in this Document

In order to use this product safely, this document uses the following indicators to draw your attention to safety precaution statements. Precaution statements with graphical indicators are intended to maintain user safety.

	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.
	Indicates a Class 1 Laser Warning.

Meanings of Alert Symbols

This document uses the following alert symbols.

	**General Prohibition** Indicates general prohibitions, including warnings, for which there is no specific symbol.
	**General Caution** Indicates general cautions, including warnings, for which there is no specific symbol.
	**Electrical Hazard** Indicates the possible danger of electric shock under specific conditions.

Alert Statements in This Document

The following alert statements apply to the products in this document. Each alert statement also appears at the locations needed in this document to attract your attention.

WARNING

This product must be used according to this manual or Instruction sheet. Failure to observe this may result in impairment of functions and performance of the product.



This product is not designed or rated for ensuring human safety. Do not use it for such purposes.



Never connect this product directly to AC power. Connecting to AC power will cause electric shock and fire.



When using equipment that is connected to an AC power source, such as an AC adapter or PoE injector, use it within the rated voltage range. Usage with an incorrect voltage may cause serious personal injury or serious damage to the product.



When using this product in conjunction with other equipment, carefully design the entire system to conform to safety best practices so that the failure or malfunction of any one component does not create a hazard to people or the environment.



Consignes de sécurité

Signification des mots de signalisation

● Symboles et signification des consignes de sécurité décrites dans ce document

Afin d'utiliser ce produit en toute sécurité, ce document utilise les indicateurs suivants pour attirer votre attention sur les consignes de sécurité. Les conseils de sécurité accompagnés d'indicateurs graphiques sont destinés à assurer la sécurité des utilisateurs.

AVERTISSEMENT	Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, entraînera des blessures mineures ou modérées, ou peut entraîner des blessures graves ou la mort. En outre, il peut y avoir des dommages matériels importants.
ATTENTION	Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou modérées ou des dommages matériels.
	Indique un avertissement laser de classe 1.

Signification des symboles d'alerte

Ce document utilise les symboles d'alerte suivants.

	**Interdiction générale** Indique des interdictions générales, y compris des avertissements, pour lesquelles il n'existe pas de symbole précis.
	**Précautions générales** Indique des mises en garde générales, y compris des avertissements, pour lesquelles il n'existe pas de symbole précis.
	**Danger électrique** Indique le risque possible de décharge électrique dans des conditions spécifiques.

Énoncés d’alerte dans ce document

Les énoncés d’alerte suivants s’appliquent aux produits figurant dans ce document. Chaque énoncé d’alerte apparaît également aux endroits nécessaires dans ce document pour attirer votre attention.

AVERTISSEMENT	
Ce produit doit être utilisé conformément à ce manuel ou à cette fiche d’instructions. Le non-respect de cette consigne peut entraîner une altération des fonctions et des performances du produit.	
Ce produit n’est pas conçu ni évalué pour assurer la sécurité des personnes. Ne l’utilisez pas à de telles fins.	
Ne branchez jamais ce produit directement sur une prise de courant alternatif. Le branchement sur le courant alternatif peut provoquer une décharge électrique et un incendie.	
Lorsque vous utilisez un équipement connecté à une source d’alimentation CA, comme un adaptateur CA ou un injecteur PoE utilisez-le dans la plage de tension nominale. L’utilisation d’une tension incorrecte peut entraîner des blessures graves ou endommager sérieusement le produit.	
Lorsque vous utilisez ce produit en conjonction avec d’autres équipements, concevez soigneusement l’ensemble du système pour qu’il soit conforme aux meilleures pratiques en matière de sécurité, afin que la défaillance ou le dysfonctionnement d’un composant ne crée pas de danger pour les personnes ou l’environnement.	

Precautions for Safe Use

Conditions for the Safe Use of This Product

- This product is designed and manufactured as a general-purpose product for use in general industrial applications. This product is NOT intended to be used in the following critical applications, and doing so will void the warranty, unless otherwise specifically agreed upon by the manufacturer.
  - Applications with stringent safety requirements, including but not limited to nuclear power control equipment, combustion equipment, aerospace equipment, railway equipment, elevator/lift equipment, amusement park equipment, medical equipment, safety devices and other applications that could physically harm the operator.
  - Applications that require high reliability, including but not limited to supply systems for gas, water and electricity, etc., 24 hour continuous operating systems, financial settlement systems and other applications that handle rights and property.
  - Applications under severe operating conditions or in a severe environment, including but not limited to outdoor equipment, equipment exposed to chemical contamination, equipment exposed to electromagnetic interference and equipment exposed to vibration and shocks.
  - Applications under operating conditions and environments not described in product specifications.
- This product is not intended for use in vehicles designed for human transport (including two-wheeled vehicles). Do NOT use this product for vehicles designed for human transport. Please contact the our sales staff for information on our automotive line of products.

  Note: The above is part of the Terms and Conditions Agreement. Please carefully read the contents of the guarantee and disclaimers described in our latest version of the catalog, datasheets, and user manuals, and in your sales agreement.
- DO NOT ATTEMPT TO MODIFY OR SERVICE THIS PRODUCT. THIS PRODUCT IS NOT SERVICEABLE.
- If you notice any abnormalities, immediately stop use, turn OFF the power supply, and contact your Omron representative.
- Adjust beeper volume to a level appropriate for the environment. An excessively loud beeper in a quiet environment can cause a startled reaction and lead to injury.
- When disposing of the product, treat it as an industrial waste.
- Be careful not to drop product as personal injury could result.
- Do not look directly into the high-intensity LEDs on the front of this product. The LEDs may cause eye injury or discomfort.
- Use this product only for its intended purpose of code reading. Using it for anything other than its intended purpose may result in personal injury or damage to the equipment.

Précautions à prendre pour une utilisation sûre

Conditions pour une utilisation sûre de ce produit

- Ce produit est conçu et fabriqué comme un produit à usage général destiné à être utilisé dans des applications industrielles générales. Ce produit n'est PAS destiné à être utilisé dans les applications critiques suivantes, sous peine d'annulation de la garantie, sauf accord spécifique du fabricant.
  - Applications présentant des exigences strictes en matière de sécurité, y compris, mais sans s'y limiter, les équipements de contrôle de l'énergie nucléaire, les équipements de combustion, les équipements aérospatiaux, les équipements ferroviaires, les ascenseurs/ascenseurs, les équipements de parcs d'attractions, les équipements médicaux, les dispositifs de sécurité et d'autres applications susceptibles de blesser physiquement l'opérateur.
  - Les applications qui exigent une grande fiabilité, notamment les systèmes d'approvisionnement en gaz, en eau et en électricité, etc., les systèmes de fonctionnement continu sur 24 heures, les systèmes de règlement financier et d'autres applications qui gèrent les droits et la propriété.
  - Applications dans des conditions de fonctionnement sévères ou dans un environnement sévère, y compris, mais sans s'y limiter, les équipements extérieurs, les équipements exposés à une contamination chimique, les équipements exposés à des interférences électromagnétiques et les équipements exposés à des vibrations et des décharges.
  - Applications dans des conditions de fonctionnement et des environnements non décrits dans les spécifications du produit.
- Ce produit n'est pas destiné à être utilisé dans des véhicules conçus pour le transport de personnes (y compris les véhicules à deux roues). N'utilisez PAS ce produit pour les véhicules conçus pour le transport de personnes. Veuillez contacter notre personnel de vente pour obtenir des informations sur notre gamme de produits automobiles.

  Remarque : Ce qui précède fait partie de l'accord sur les conditions générales. Veuillez lire attentivement le contenu de la garantie et des clauses de non-responsabilité décrites dans notre dernière version du catalogue, des fiches techniques et des manuels d'utilisation, ainsi que dans votre contrat de vente.
- NE TENTEZ PAS DE MODIFIER OU D'ESSAYER DE RÉPARER VOUS-MÊME CE PRODUIT. Ce produit ne doit pas être réparé par l'utilisateur.
- Si vous remarquez une quelconque anomalie, cessez immédiatement d'utiliser l'appareil, mettez-le hors tension et contactez votre représentant Omron.
- Réglez le volume du signal sonore à un niveau approprié à l'environnement. Un signal sonore trop fort dans un environnement calme peut provoquer une réaction de sursaut et entraîner des blessures.
- Lors de l'élimination du produit, traitez-le comme un déchet industriel.
- Veillez à ne pas faire tomber le produit, car cela pourrait entraîner des blessures.
- Ne regardez pas directement les DEL à haute intensité situées à l'avant de ce produit. Les DEL peuvent provoquer des lésions ou une gêne oculaires.
- N'utilisez ce produit que pour l'usage auquel il est destiné, à savoir la lecture de codes. L'utiliser à d'autres fins que celles pour lesquelles il a été conçu peut entraîner des blessures ou endommager l'équipement.

Precautions for Correct Use

Conditions for the Correct Use of This Product

- Be careful when handling product. Dropping it may cause injury to you or others or may cause the product to malfunction.
- Install, store and use the product in a location that meets the following conditions:
  - The ambient temperature does not fall below 0°C. (-40°C for storage);
  - The ambient tempertaure does not rise above +40°C (+70°C for storage);
  - Relative humidity of between 25 to 85%;
  - No rapid changes in temperature (dew does not form);
  - There is no presence of corrosive or flammable gases;
  - Is free of dust, salts and iron particles;
  - Is free of vibration and shock;
  - Is out of direct sunlight;
  - Product will not come into contact with water, oils or chemicals that are outside the ratings of the product.;
  - Product will not be affected by strong electro-magnetic waves;
  - Is not near to high-voltage, or high-power equipment.
- Use only cables that are designed for the application. Use of poor quality cables may cause damage to the product or cause it to malfunction.
- Be careful when connecting cables. Pinching or other injury may occur.
- Do not bend cables more than recommended by the cable specifications. The product may malfunction.
- When designing work processes involving this product, be mindful of the cable path. Injury to people or damage to equipment may occur if persons or equipment become entangled in the cable.
- If using this product in an area where airborn oils or water are present, clean the lens and the exterior surface of the product frequently and inspect for deterioration of the plastics. Stop using the product if damage is identified.
- Optical components should be cleaned with a lens-cleaning cloth.
- Do not clean with products containing solvents such as thinner, benzine, alcohol or kerosene.
- Use only with a correctly functioning power supply. Application of a voltage that exceeds the specification may damage the product and cause it to malfunction.
- When designing work processes involving this product, design them to avoid repetitive stress injury.
- Be careful when unpacking and handling product. Avoid sharp edges that may cause injury.

Security Measures

● Anti-Virus Protection

Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up to date.

● Security Measures to Prevent Unauthorized Access

Take the following measures to prevent unauthorized access to our products:

- Install physical controls so that only authorized personnel can access control systems and equipment.
- Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
- Install firewalls to shut down unused communications ports and limit communications hosts and isolate control systems and equipment from the IT network.
- Use a virtual private network (VPN) for remote access to control systems and equipment.
- Adopt multifactor authentication to devices with remote access to control systems and equipment.
- Set strong passwords and change them frequently.
- Scan for viruses to ensure safety of USB drives or other external storage devices before connecting them to control systems and equipment.

● Data Input and Output Protection

Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.

- Check the scope of data.
- Check validity of backups and prepare data for restore in case of falsification or abnormalities.
- Safety design, such as emergency shutdown and fail-soft operation in case of data tampering or abnormalities.

● Data Recovery

Back up and update data periodically to prepare for data loss.

When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering.

You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.

When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment. Take adequate measures, such as restricting physical access to network devices, by such means as locking the installation area.

When using a device equipped with the SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing or unmounting the removable media. Please take sufficient measures, such as restricting physical access to the controller or taking appropriate management measures for removable media, by means of locking the installation area, entrance management, etc.

● Software

To prevent computer viruses, install antivirus software on the computer where you use this software. Make sure to keep the antivirus software updated.

Keep your computer's OS updated to avoid security risks caused by a vulnerability in the OS.

Always use the latest version of this software to add new features, increase operability, and enhance security.

Manage usernames and passwords for this software carefully to protect them from unauthorized uses.

Set up a firewall (e.g., disabling unused communication ports, limiting communication hosts, etc.) on a network for a control system and devices to separate them from other IT networks.

Make sure to connect to the control system inside the firewall.

Use a virtual private network (VPN) for remote access to a control system and devices from this software.

Regulations and Standards

Using Product Outside Japan

This regulation applies to the V460-H Handheld Code Reader and peripheral devices.

If you export (or provide a non-resident with) this product or a part of this product that falls under the category of goods (or technologies) specified by the Foreign Exchange and Foreign Trade Control Law as those which require permission or approval for export, you must obtain permission or approval (or service transaction permission) pursuant to the law.

Conformance to EC/EU Directives

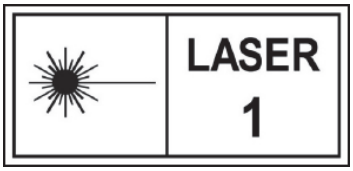
This regulation applies to the V460-H Handheld Code Reader and peripheral devices.

- This product is in compliance with all applicable directives, 2014/30/EU, 2014/35/EU, and 2011/65/EU.
- This product complies with EC/EU Directives. EMC-related performance of the Omron devices that comply with EC/EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the Omron devices are installed.
- The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Conformance to UL Standards

This regulation applies to the V460-H Handheld Code Reader and peripheral devices.

- This product complies with UL Standards.
- UL60950-1 2nd-edition, 2014 (Class III).
- **CLASS 1 LASER PRODUCT**



IEC 60825-1:2014

Caution: Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Korean Radio Regulation (KC)

사용자안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Guide for Users

This equipment has been evaluated for conformity in a commercial environment. When used in a residential environment, it may cause radio interference.

Radio Frequency Interference Requirements: FCC

This equipment has been tested for compliance with FCC (Federal Communications Commission) requirements and has been found to conform to applicable FCC standards. To comply with FCC RF exposure compliance requirements, this device must not be co-located with or operate in conjunction with any other antenna or transmitter. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Class A Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Class B Statement

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

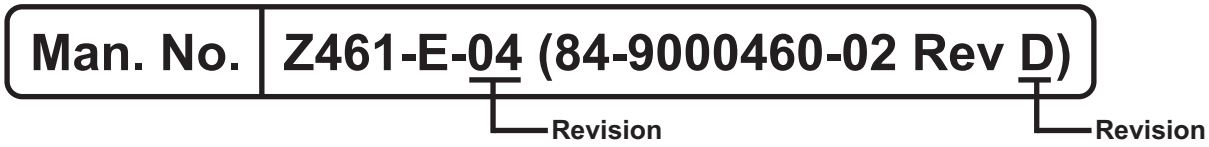
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Radio Frequency Interference Requirements: Canada

This device complies with Industry Canada ICES-003. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Cet appareil est conforme à la norme ICES-003 d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Revision History

The manual's part number and revision letter appear on the first and last pages.



Revision	Date	Revised Content
A	October 2022	First publication.
B	December 2022	General improvements.
C	March 2023	General improvements.
D	May 2023	General improvements.

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1

Product Overview

This section provides a general functionality description of the V460-H Industrial Handheld DPM Reader with Ethernet Connectivity. It also contains field of view (FOV) and code readability tables that can help you achieve optimal reading performance.

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1-1 Features

The V460-H is a wired, handheld industrial direct part mark (DPM) reader with built-in Power over Ethernet (PoE) connectivity.

Industrial Handheld

- IP65-rated.
- DPM reader.
- Built-in PoE (Power over Ethernet) network connectivity for demanding manufacturing applications.

No Software Installation Needed

- Intuitive browser-based setup and runtime monitoring via WebLinkHH.

X-Mode Decoder for DPM Reading

- Industry-leading DPM reading performance with Omron's X-Mode decoding technology.

On-Screen Reading Capability

- Can read codes on PC, tablet, and smartphone screens.

Multi-Color Lighting

- Patented multi-axis lighting technology for challenging direct part marks on a variety of part geometries, materials, and surface preparations.

Extended Read Range

- From contact to 254 mm [10"] with built-in liquid lens autofocus optics.

Simple Point-and-Click Targeting

- Audible, haptic / vibration, and multi-directional visual indicators for real-time operator feedback.

Time-of-Flight (ToF) Technology

- Automatic detection of the presence of codes inside the read range, eliminating the need for continuous or manual triggering. Increased decode speed through improved autofocus capability.

Full PoE (Power over Ethernet)

- Easy connectivity, portability, and industrial protocols over a single cable without requiring a separate power connection. See **Section 2-1 System Configuration** for a hardware connection diagram.

Direct-Wired Fieldbus Connectivity to PLCs via Built-In EtherNet/IP and PROFINET

- Function Blocks Library and Sample Program for Omron Controllers are available for download.
- Please contact your Omron representative for information on Function Blocks and Sample Programs for additional PLCs/Controllers.

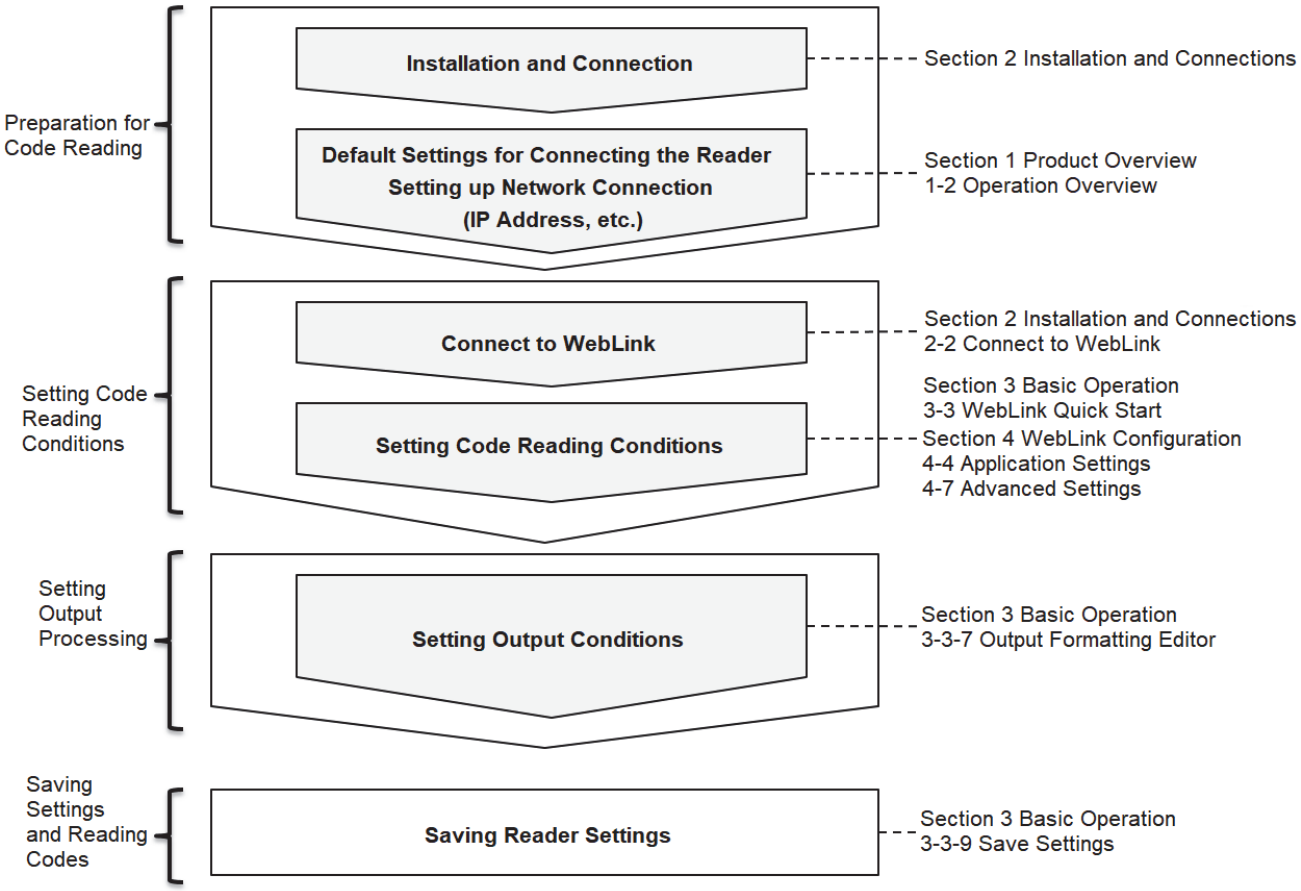
Keyboard Wedge

- Keyboard Wedge capability is also possible through third-party hardware or software options.
- Please contact your Omron representative for additional information.

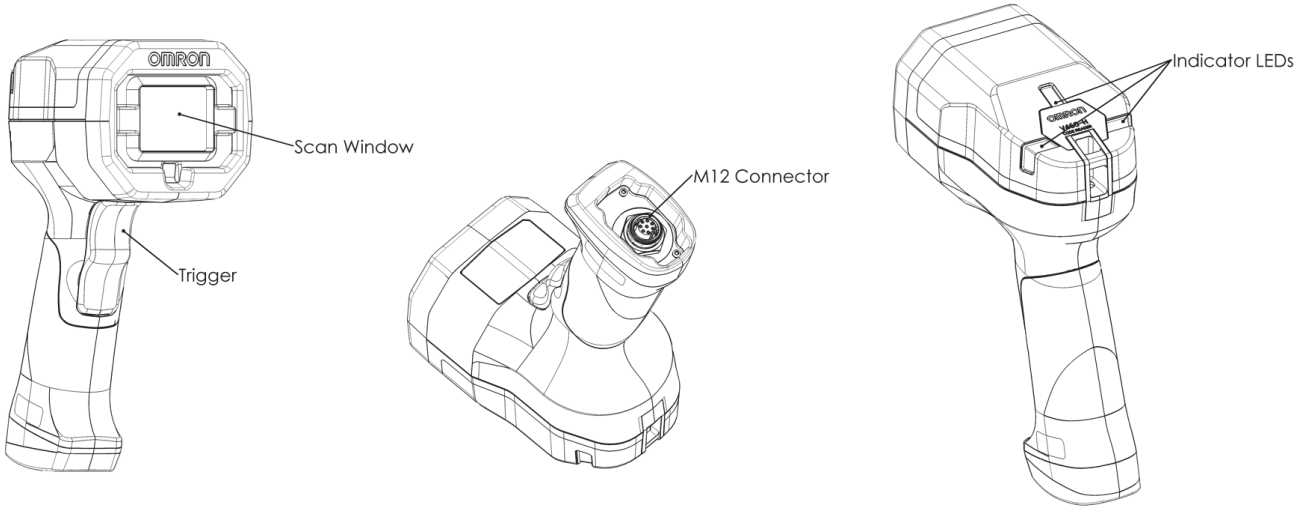
1-2 Operation Overview

1-2-1 Basic Operation Flow

The following is the basic operation flow for setting up and using the V460-H.



1-2-2 Reader Hardware



Step 1 – Connect Hardware

You will need:

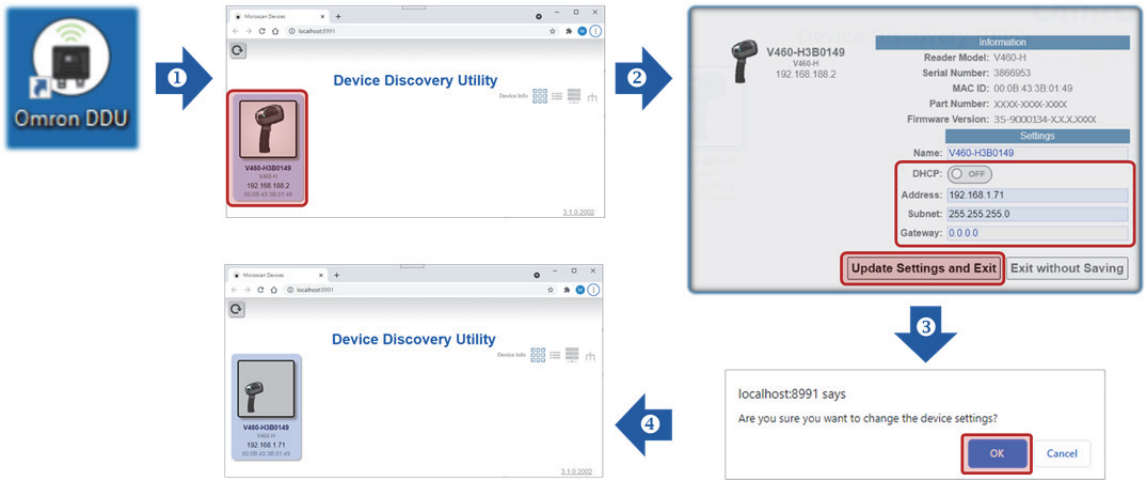
1. Ethernet Cable for V460-H-to-PoE Injector Connection
2. PoE Injector (IEEE 802.3af-compliant)
3. Ethernet Cable for PoE Injector-to-Host Connection
4. Host PC

See **Section 2-1 System Configuration** for a hardware connection diagram.

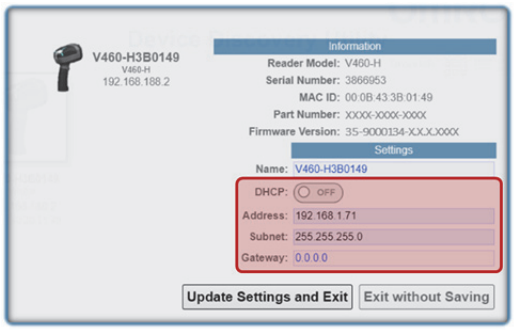
Step 2 – Change IP Address (If Required by Application)

The V460-H's default IP Address is **192.168.188.2** (subnet **255.255.0.0**).

If it is necessary to redefine the reader's parameters to match the current network configuration, use the **Device Discovery Utility (DDU)**. The DDU can be downloaded from **automation.omron.com**.



The **V460-H's IP Address parameters** must match those of the **PC's Ethernet adapter**.



V460-H Configuration



PC Ethernet Adapter Configuration

See **Section 3-3 WebLinkHH Quick Start** for detailed information about how to use the DDU.

Important: IP settings are not modified until they are saved by clicking the **Save to Flash Memory** icon in WebLinkHH. After the Save to Flash Memory icon is clicked, the reader automatically reboots and the new IP address is now accessible by web browser. The IP setting in WebLinkHH also matches. The Save to Flash Memory icon changes from red to blue as shown below.



Save to Flash Memory

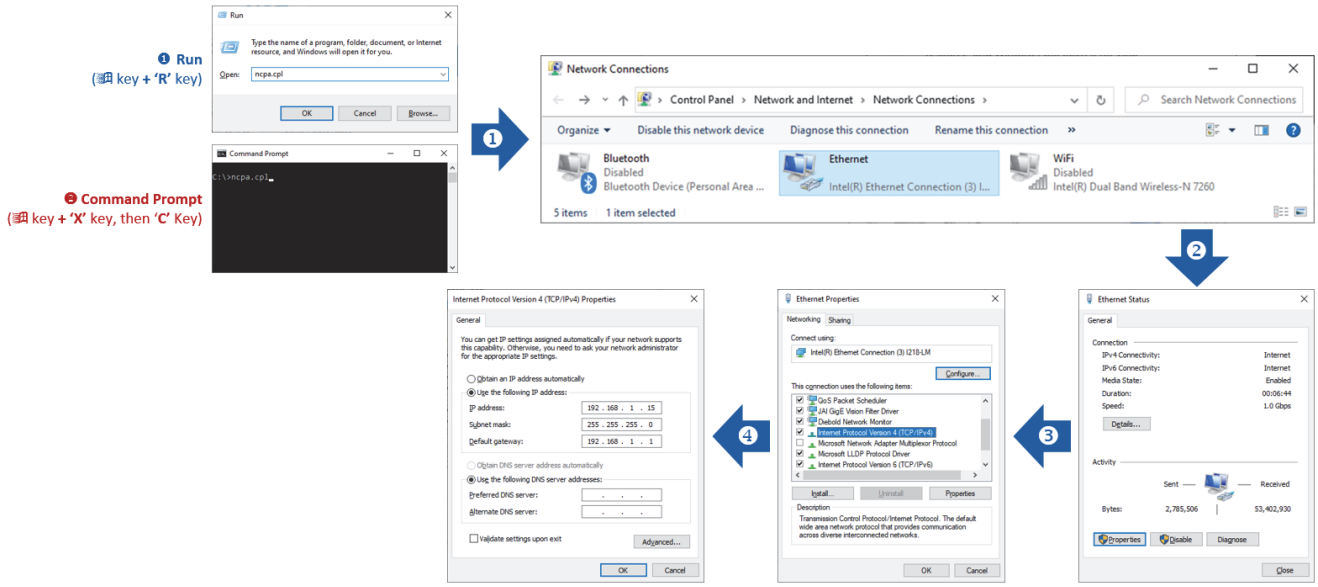


Saved to Flash Memory

If you cycle power to the reader after changing IP settings but before clicking the Save to Flash Memory icon, the changes will not be saved.

● Ethernet Adapter Configuration – Windows, Option 1

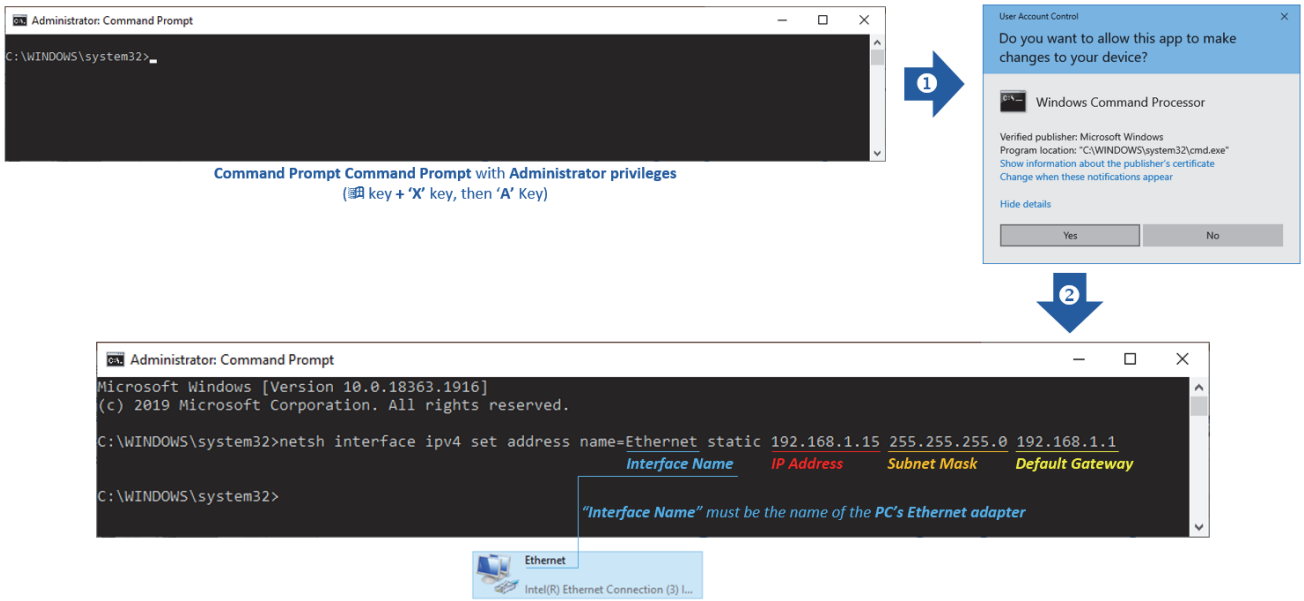
Open **Network Connections** via **1. Run** or **2. Command Prompt** (running the command "**ncpa.cpl**"). Select the desired PC's Ethernet adapter and edit the TCP/IPv4 properties accordingly.



● Ethernet Adapter Configuration – Windows, Option 2

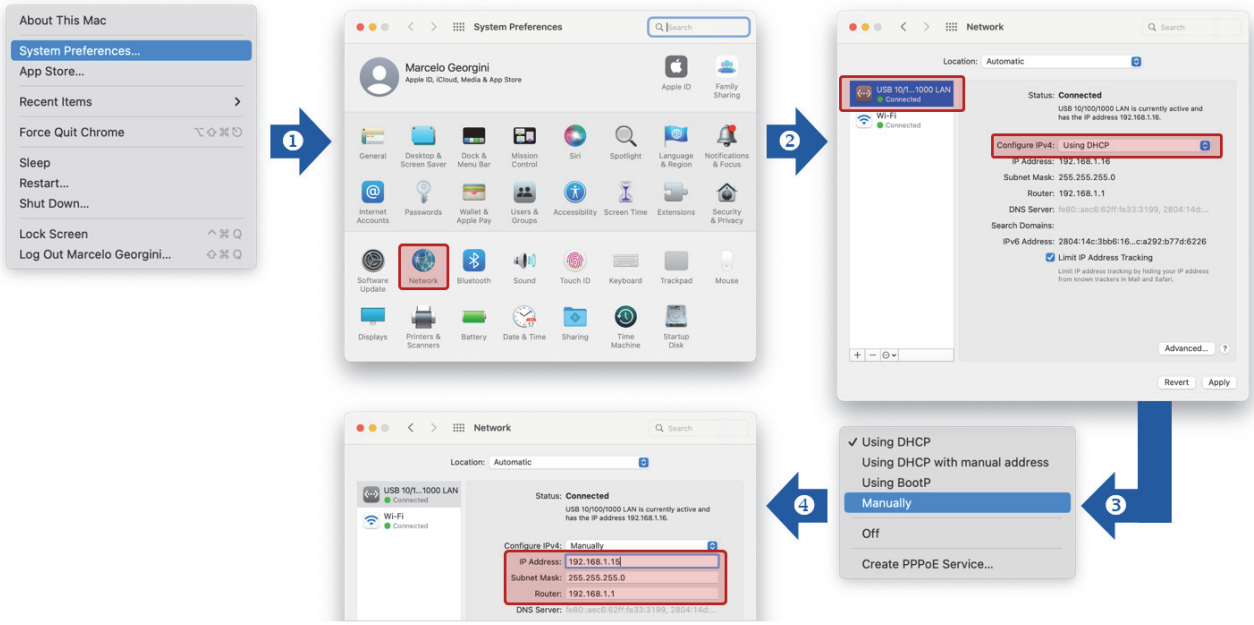
Open the **Command Prompt** with **Administrator** privileges. If requested, accept it (**Yes**) for **User Account Control**. Enter the "**netsh interface ipv4 set address**" command line. For example:

netsh interface ipv4 set address name=Ethernet static 192.168.1.15 255.255.255.0 192.168.1.1.



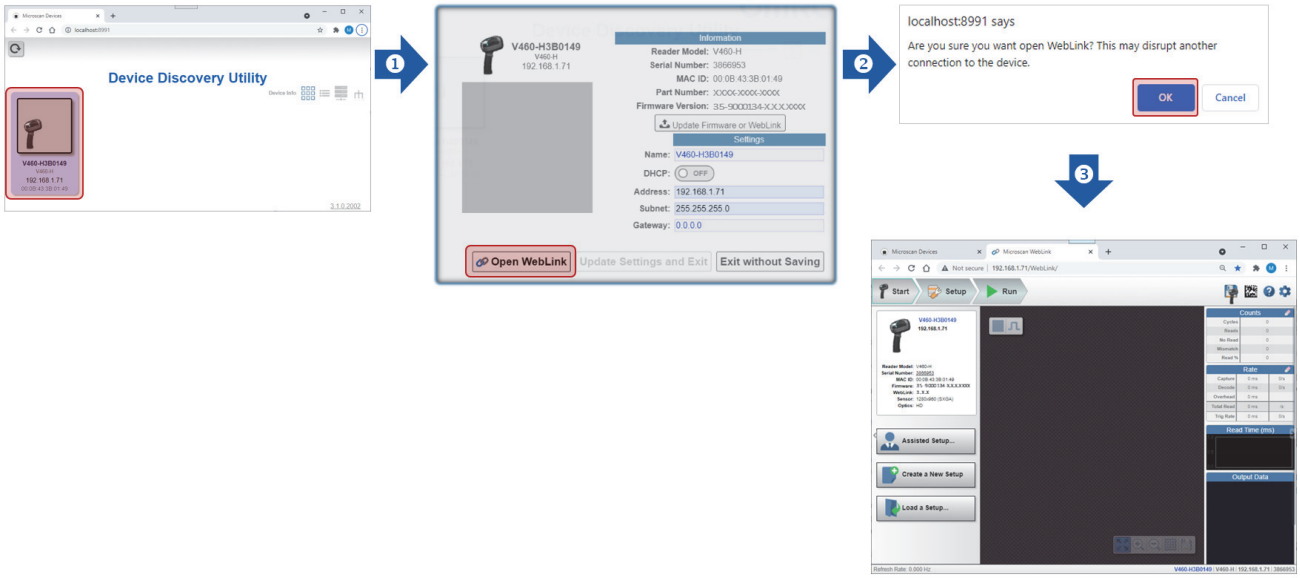
● Ethernet Adapter Configuration – MacOS

From the **Apple** menu (top-left corner of the screen), select **System Preferences…** and then click **Network**. If necessary, select **Configure IPv4** as **Manually** and edit the IPv4 properties accordingly.



Step 3 – Connect to WebLinkHH

Once the V-460-H IP Address has been updated, open WebLinkHH to update other desired parameters.

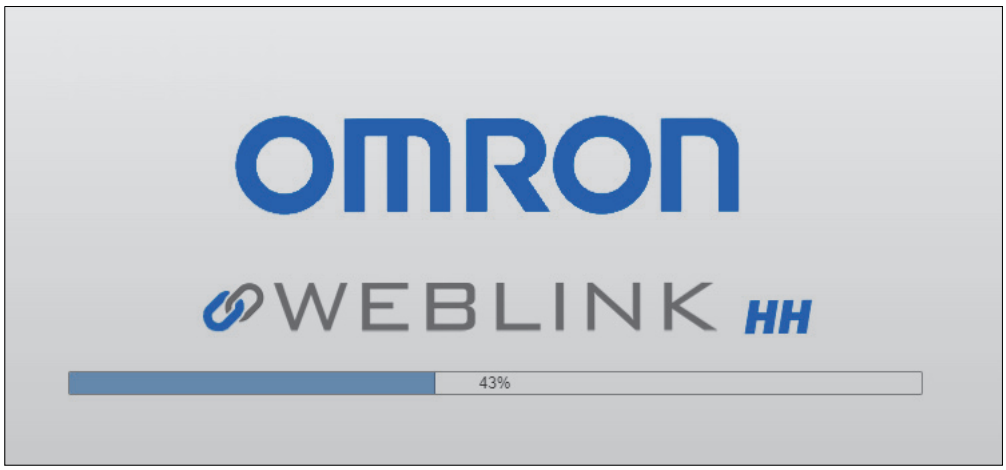


The browser-based **WebLinkHH** interface enables quick and easy configuration and testing of the V460-H without the need to install or access files on a host system.

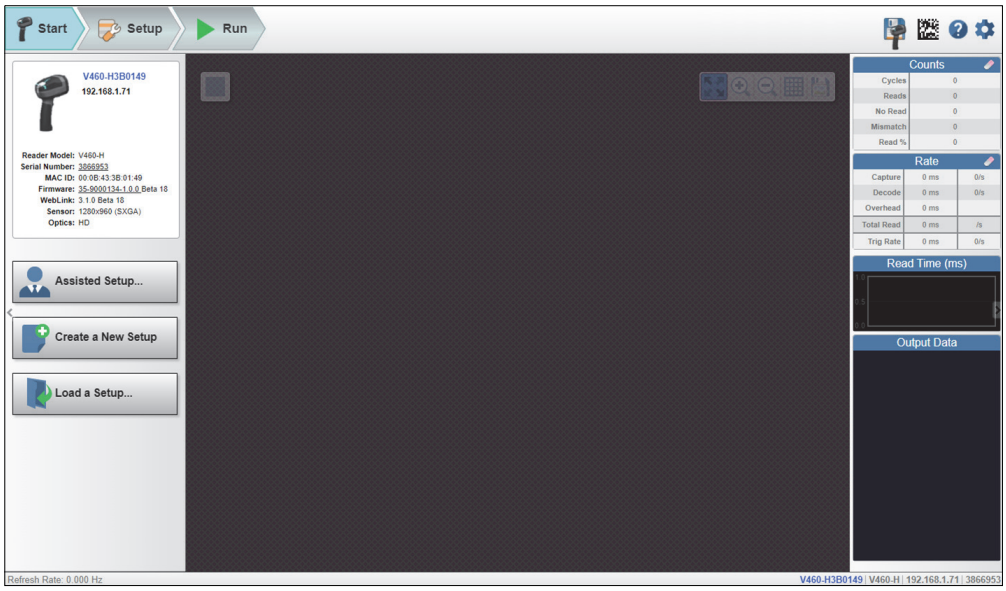
WebLinkHH is reliable, lightweight, and operating-system-independent without compromising the power and depth of its tool set. WebLinkHH offers novice users an intuitive way to connect, configure, monitor, and troubleshoot a **V460-H reader**, and provides the power and flexibility expected by advanced users.

Enter the **V460-H IP address** in the browser of your choice. The default IP Address is **192.168.188.2**. If you have modified it, enter the new IP address.

The first thing you will see is the splash screen shown below. You will also see a progress bar as your WebLinkHH session starts.



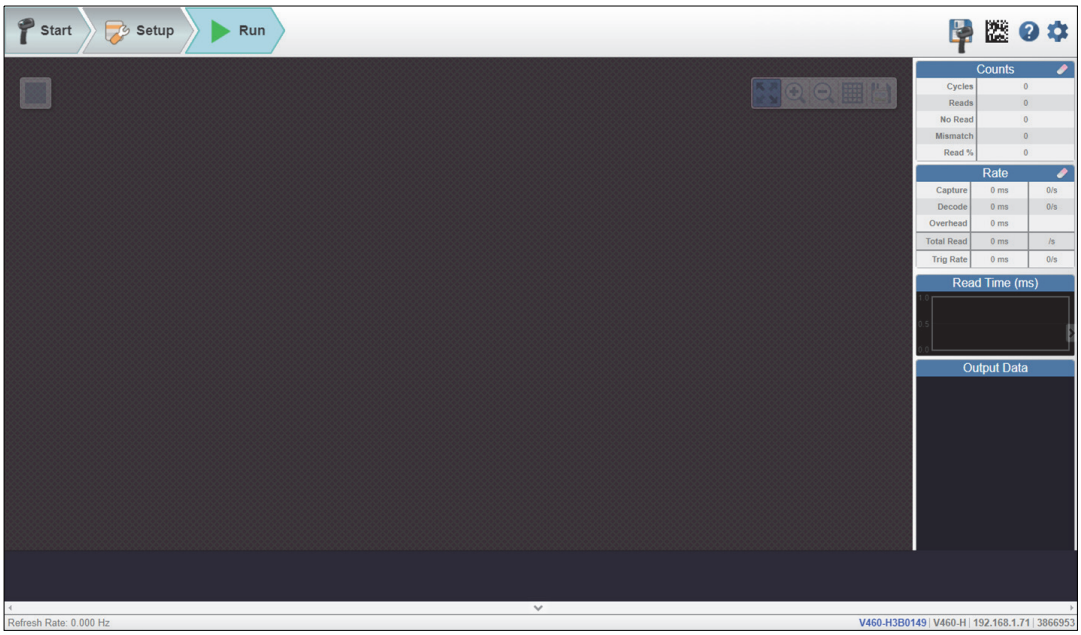
The **Start** view is the initial view you will see when the WebLinkHH session begins.



The V460-H comes with three predefined **Modes of Operation ("Recipes")**: **Auto Lighting**, **Torch Lighting**, and **Close-Up Lighting**. Each mode can be selected via **Assisted Setup**.

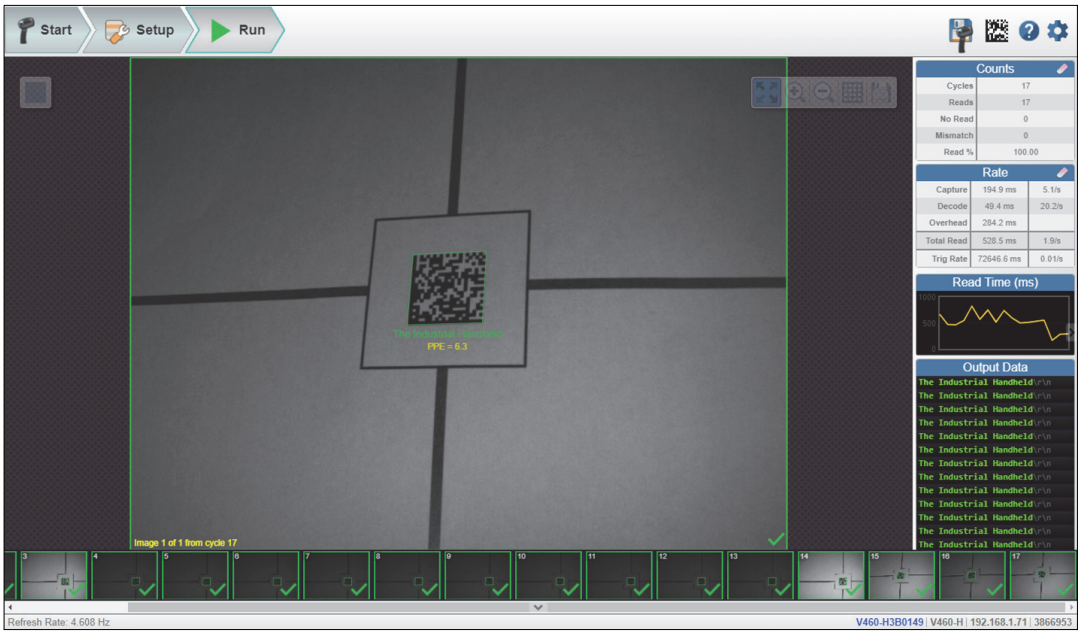
See **Section 3-3 WebLinkHH Quick Start** for detailed information about Modes of Operation.

Note: Auto Lighting mode is selected by default. Navigate directly to the **Run** view if using Auto Lighting.



Step 4 – Start Reading Codes

The most difficult direct part marks and labels can be decoded easily with the V460-H's extended read range: **from contact to 10" (254 mm)**. Just keep the trigger pulled until you read the code.



See **Section 3-2 Targeting Tips and Tricks** for detailed information about decoding direct part marks and labels.

Aiming Guidelines

When scanning, the V460-H projects two LED dots that allow you to position the barcode within the reader's field of view (FOV).

● Aiming Dots

The V460-H activates its aiming LED dots to illuminate the target barcode. To scan a barcode, center it between the two aiming dots. This ensures that the entire symbol is within the reader's field of view. The V460-H can read a barcode that is not precisely centered, but the code should be centered for best results.



The aiming dots are smaller when the V460-H is closer to the symbol and larger when it is farther from the symbol. Scan symbols with smaller bars or elements (mil size) more closely, and those with larger bars or elements (mil size) more distantly.

The examples below show how to use the aiming dots and reader distance to achieve successful decodes.

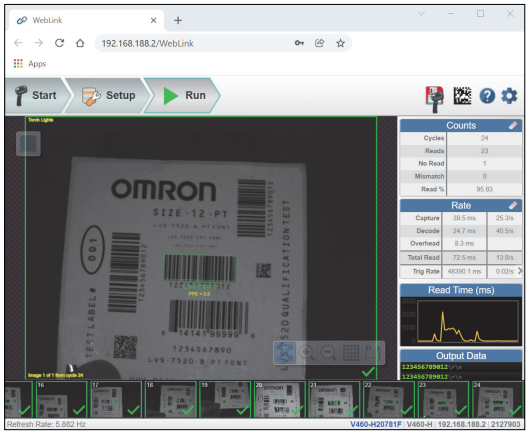
● Correct Aiming

The following examples show the V460-H reading the same code at different distances, and then reading different codes. Each example also shows the corresponding view in the WebLinkHH interface.

The reader can focus at different distances. Simply center the code between the two aiming dots.

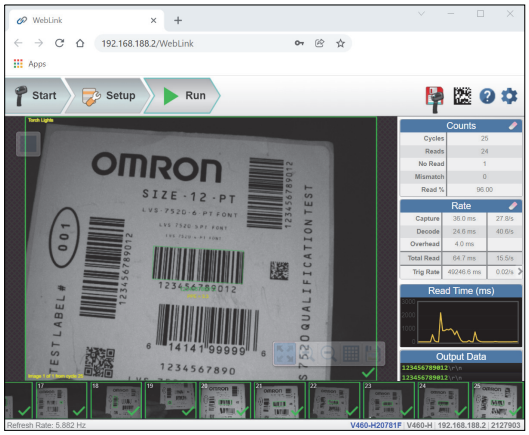
The V460-H can focus and decode at multiple distances. The reader is slightly closer to the code in the example below.





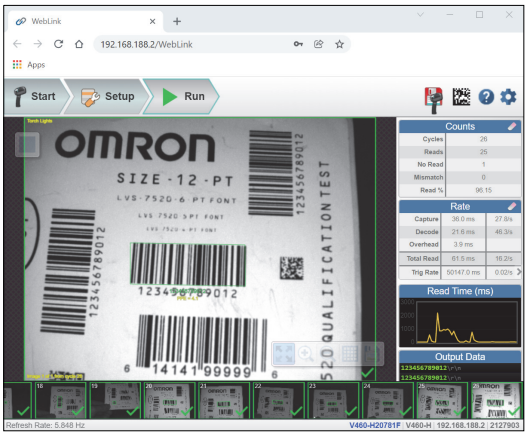
Here, the reader is about 2 inches closer to the code, and still decodes it successfully.





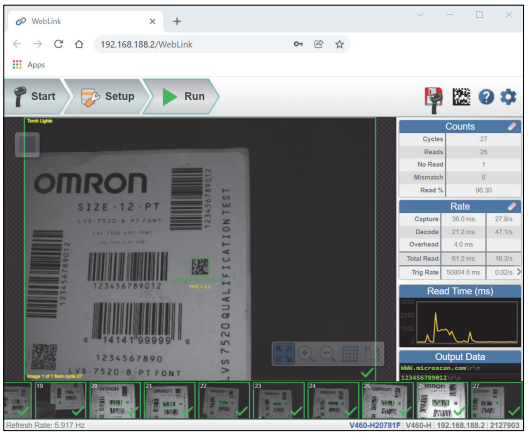
The reader continues to decode the symbol successfully another 2 inches closer.





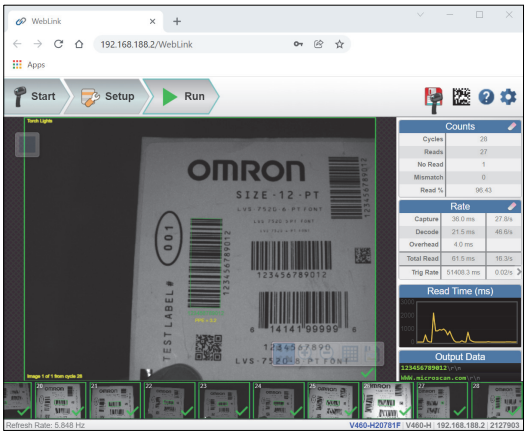
In this example, the V460-H decodes a Data Matrix code to the right of the first code at a distance of about 6 inches.





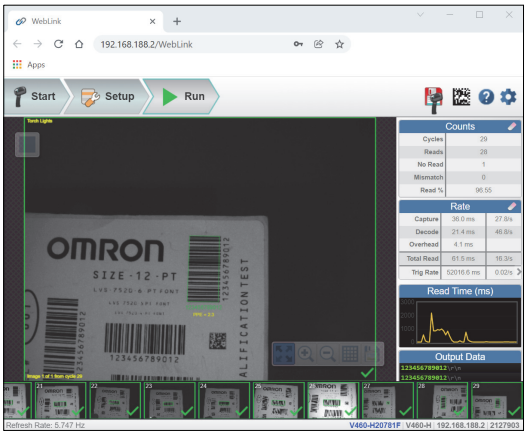
Here, the V460-H decodes a vertically-oriented barcode to the left of the first code at a distance of about 4 inches.



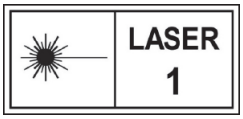


Finally, the V460-H decodes another vertically-oriented barcode at the top right of the test card at a distance of about 6 inches.

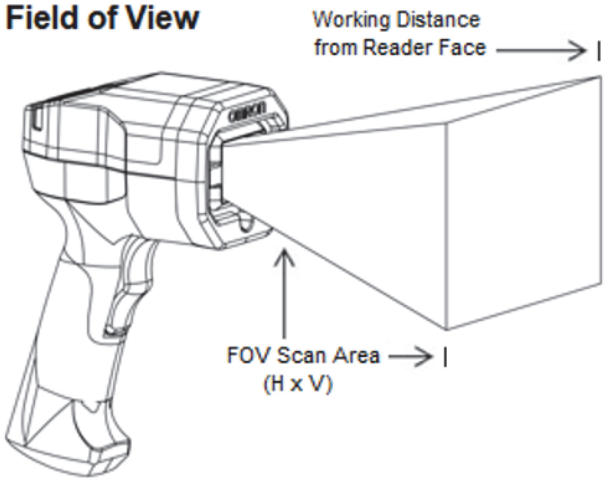


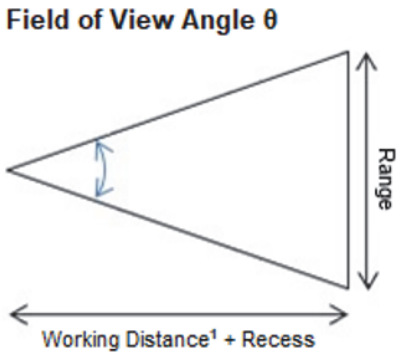


1-3 Technical Specifications

V460-H		
Item		**Description**
Physical Characteristics		
Dimensions		7.32” (H) x 3.03” (W) x 5.20" (D) / 186 mm (H) x 77 mm (W) x 132 mm (D)
Weight		14.82 oz. / 420 g
Input Voltage Range		IEEE 802.3af PoE-compliant 44 to 57VDC, Class 0
Maximum Current of PoE		0.20A
Source: PoE		44 to 57 VDC
Communication	**Connectivity**	Ethernet TCP/IP, EtherNet/IP, PROFINET I/O
	Ethernet Specifications	100BASE-T
Color		Black
User Indicators		Good Decode top and side LEDs, green flash front LEDs, Beeper, Haptic / Vibration
Performance Characteristics		
Focus		Liquid Lens Autofocus, 7.7 mm
Image Sensor		1280 x 960 pixels (SXGA), Monochrome CMOS, Global Shutter
Targeting Pattern		Two dots indicating center of FOV. Center the code between the two dots.
Illumination		Multi-axis illumination: Diffuse reflective Dome (red, green and blue), low-angle Dark Field (red), and long-range Torch lighting (white)
Imager Field of View Angles		34.6° H x 26.3° V nominal
Environmental		
Operating Temperature		-32° F to 104° F / 0° C to 40° C
Storage Temperature		-40° F to 158° F / -40° C to 70° C
Humidity		25% to 85% Non-Condensing
Drop Test		50 drops to concrete from 6.6 feet / 2 meters
Tumble Test		3,000 tumbles from a height of 3.3 feet / 1 meter; exceeds IEC 60068-2-31
Degree of Protection		IP65
Approved Cleaners		Preferred Disinfectant: Ethanol (95%) and Hypochlorous Acid Water (concentration: 95%). Alternate Disinfectant: Sodium Hypochlorite Aqueous Solution (concentration: 90 ppm).
Industrial Fluid Resistance		Motor / Engine Oil, Automatic Transmission Fluid (ATF), Continuously Variable Transmission Fluid (CVT), Industrial De-Greaser (Engine Brite Heavy Duty), Brake Fluid (DOT4) per ISO 16750-5
Electrostatic Discharge (ESD)		EN 55024 (IEC 61000-4-2)
Ambient Light Immunity		0 to 91,000 lux (direct sunlight) except for reflective codes in direct sunlight.
Symbol Decode Capability		
Symbologies	**1D Symbologies**	Code 39, Code 128, BC412, Interleaved 2 of 5, UPC/EAN, Codabar, Code 93, Pharmacode, U.S. Postal, Australia Post, Japan Post, Royal Mail, KIX, UPU, PLANET, POSTNET, USPS4CB
	2D Symbologies	Data Matrix (ECC 0-200 and DMRE), QR Code, Micro QR Code, Aztec Code, DotCode
	Stacked Symbologies	PDF417, MicroPDF417, GS1 Databar (Composite and Stacked)
Minimum Element Resolution		1D Codes – 2.0 mil
		2D Codes – 3.3 mil
Decode Ranges (Typical; Printing Density / Quality, Contrast, and Ambient Light-Dependent)		
Symbology / Print Density		**Near / Far**
Code 128: 2 mil		0.0” / 0 mm to 0.5” / 12 mm
Code 128: 3.3 mil		0.0” / 0 mm to 2.3” / 60 mm
Code 128: 5 mil		0.0” / 0 mm to 4” / 102 mm
Code 128: 10 mil		0.0” / 0 mm to 10” / 254 mm
Data Matrix: 3.3 mil		0.0” / 0 mm to 1” / 25 mm
Data Matrix: 5 mil		0.0” / 0 mm to 2.3” / 60 mm
Data Matrix: 10 mil		0.0” / 0 mm to 6.0” / 152 mm
Data Matrix: 15 mil		0.0” / 0 mm to 10.0” / 254 mm
Utilities and Device Management		
WebLinkHH		Used to configure reader parameters, return barcode data, and perform image-based troubleshooting.
Regulatory Compliance		
Lighting Safety Standard		IEC 62471-2, Risk Class Group 1; IEC 60825-1, Laser Class 1 CLASS 1 LASER PRODUCT  **IEC 60825-1:2014**
Certifications at Product Introduction		CE (EU), UL (U.S./Canada), FCC (U.S.), AU, NZ, UK, KC (Korea)

1-3-1 Imager Field of View Calculation





Note: The recess value of 49.85 mm is a calculated distance from the reader's front face to the theoretical center of the imager engine optics inside the reader. The working distance to a part being imaged from the front of the reader and the recess value are added together for the FOV area calculation.

FOV Formula:
Range = 2 * (WD+ Recess) * tan (θ/2)

[1] - The working distance is measured from the front face of the reader to the part being imaged.

Image Field of View in Degrees = 34.6 (Horizontal) x 26.3 (Vertical)

Field of View (mm)

Distance	Width	Height	FOV
0.0	31	23	31 mm x 23 mm
5.0	34	26	34 mm x 26 mm
25.0	47	35	47 mm x 35 mm
50.0	62	47	62 mm x 47 mm
75.0	78	58	78 mm x 58 mm
102.0	95	71	95 mm x 71 mm
152.0	126	94	126 mm x 94 mm
180.0	143	107	143 mm x 107 mm
200.0	156	117	156 mm x 117 mm
254.0	189	142	189 mm x 142 mm

Field of View (in.)

Distance	Width	Height	FOV
0.0	1.2	0.9	1.2" x 0.9"
0.2	1.3	1.0	1.3" x 1.0"
1.0	1.8	1.4	1.8" x 1.4"
2.0	2.5	1.8	2.5" x 1.8"
3.0	3.1	2.3	3.1" x 2.3"
4.0	3.7	2.8	3.7" x 2.8"
6.0	5.0	3.7	5.0" x 3.7"
7.1	5.6	4.2	5.6" x 4.2"
7.9	6.1	4.6	6.1" x 4.6"
10.0	7.5	5.6	7.5" x 5.6"

Minimum Code Size (X-Dimension)

1D Label	1D DPM	Distance	2D Label	2D DPM
2.00 mils	2.40 mils	0.0 mm [0.0”]	2.70 mils	3.20 mils
2.20 mils	2.70 mils	5.0 mm [0.2”]	2.90 mils	3.50 mils
2.90 mils	3.60 mils	25.0 mm [1.0”]	4.00 mils	4.70 mils
3.90 mils	4.80 mils	50.0 mm [2.0”]	5.30 mils	6.30 mils
4.80 mils	6.00 mils	75.0 mm [3.0”]	6.60 mils	7.80 mils
5.90 mils	7.30 mils	102.0 mm [4.0”]	8.10 mils	9.50 mils
7.80 mils	9.70 mils	152.0 mm [6.0”]	10.70 mils	12.60 mils
8.90 mils	11.10 mils	180.0 mm [7.1”]	12.20 mils	14.40 mils
9.60 mils	12.00 mils	200.0 mm [7.9”]	13.20 mils	15.60 mils
11.70 mils	14.60 mils	254.0 mm [10.0”]	16.10 mils	19.00 mils

1-3-2 Code Readability Tables

The readability tables below are designed to help you choose the best distance to read their particular code size and code type successfully. The tables show the calculated PPE (Pixels Per Element) for a range of typical code sizes at certain focus distances.

PPE is defined as the following for 1D and 2D codes:

- PPE for 1D codes is the number of pixels across the thinnest bar in the barcode.
- PPE for 2D codes is the number of pixels across a single code cell.

The tables show a color code for readability based on labels and Direct Part Marks (DPM) where red means not likely to read, and green means that it should read. The tables also show a range of colors between red and green, while showing the zone where read rates may be acceptable for high-contrast, well-printed labels and can be considered.

1D Code Readability Guidelines

- **High-Contrast Labels**
  - 1.5 pixels per thin bar is suggested minimum;
  - 2 pixels or more per thin bar is preferred.
- **Direct Part Marks**
  - 2 pixels per thin bar is suggested minimum;
  - 2.5 pixels or more per thin bar is preferred.

2D Code Readability Guidelines

- **High-Contrast Labels**
  - 2.5 – 2.75 pixels per 2D cell is suggested minimum;
  - 3.5 – 5 pixels per 2D cell is preferred.
- **Direct Part Marks**
  - 3.25 pixels per 2D cell is suggested minimum;
  - 4 – 6 pixels per 2D cell is preferred.

1D Label Readability Table

Minimum Element Size (X-Dimension)	Readability of 1D LABEL Code at Distance (1.50 → 2.00)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.00 mils	2.20 mils	2.90 mils	3.90 mils	4.80 mils	5.90 mils	7.80 mils	8.90 mils	9.60 mils	11.70 mils

Additional readability tables on next page.

1D DPM Readability Table

Minimum Element Size (X-Dimension)	Readability of 1D DPM Code at Distance (2.00 – 2.50)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.40 mils	2.70 mils	3.60 mils	4.80 mils	6.00 mils	7.30 mils	9.70 mils	11.10 mils	12.00 mils	14.60 mils

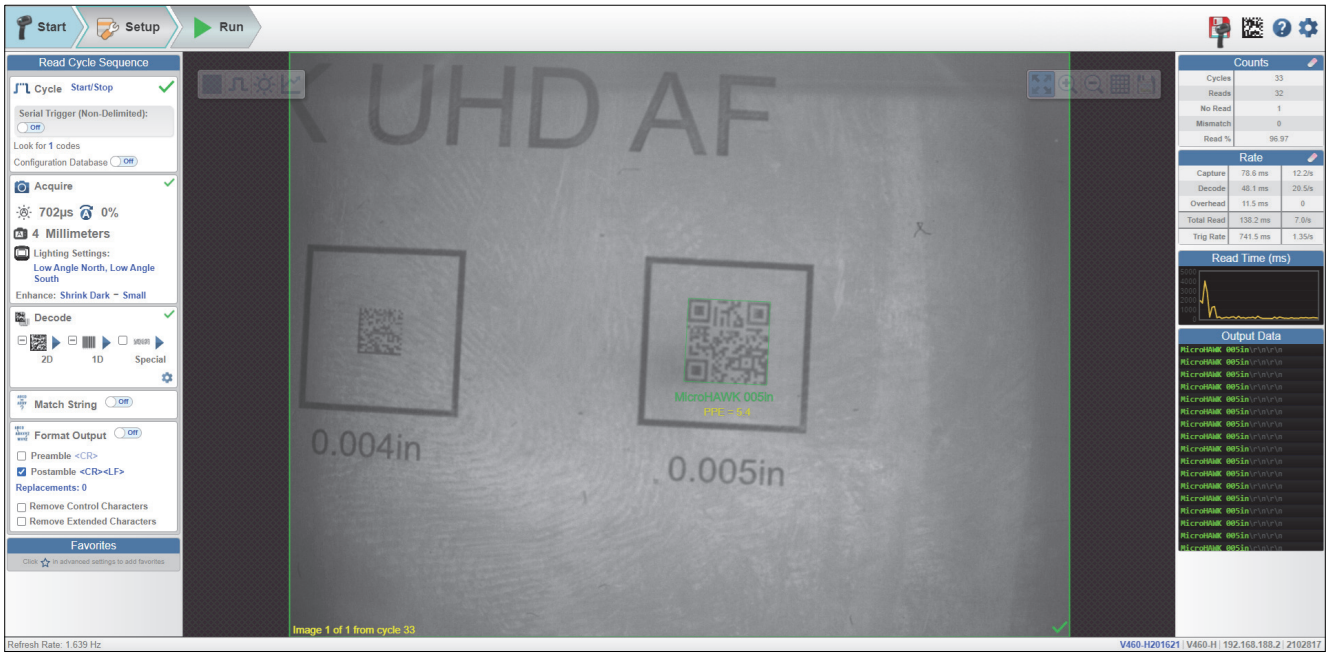
2D Label Readability Table

Minimum Element Size (X-Dimension)	Readability of 2D LABEL Code at Distance (2.50 – 3.50)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.70 mils	2.90 mils	4.00 mils	5.30 mils	6.60 mils	8.10 mils	10.70 mils	12.20 mils	13.20 mils	16.10 mils

2D DPM Readability Table

Minimum Element Size (X-Dimension)	Readability of 2D DPM Code at Distance (3.00 – 4.00)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	3.20 mils	3.50 mils	4.70 mils	6.30 mils	7.80 mils	9.50 mils	12.60 mils	14.40 mils	15.60 mils	19.00 mils

1-3-3 WebLinkHH



WebLinkHH Setup View

In WebLinkHH's Setup view, the V460-H can be configured to meet any application's requirements.

Intuitive browser-based setup and runtime monitoring via Omron's WebLinkHH user interface.

- No software to download or install.
- Support for HTML5-compliant browsers: Chrome, Safari, Firefox, Edge.
- Fast, responsive user interface.
- Live high-resolution image viewing.
- Direct configuration of reader parameters.
- Immediate updates when user changes settings.
- One-click symbol optimization.
- Configuration Database for automatic cycling through multiple focus, lighting, and parameter settings.
- Automatic image storage to external server.
- Multi-level user password protection.
- Enhanced Match String and Output Format string scripting.
- Advanced X-Mode decoder options for challenging codes.
- ISO/IEC 16022 Data Matrix quality checking.

2

Installation and Connections

This section describes the basic hardware configuration necessary to get the V460-H reading codes right out of the box.

2-1 System Configuration **2-2**
2-2 Connect to WebLinkHH **2-5**

2-1 System Configuration

2-1-1 Basic PC Host Connection

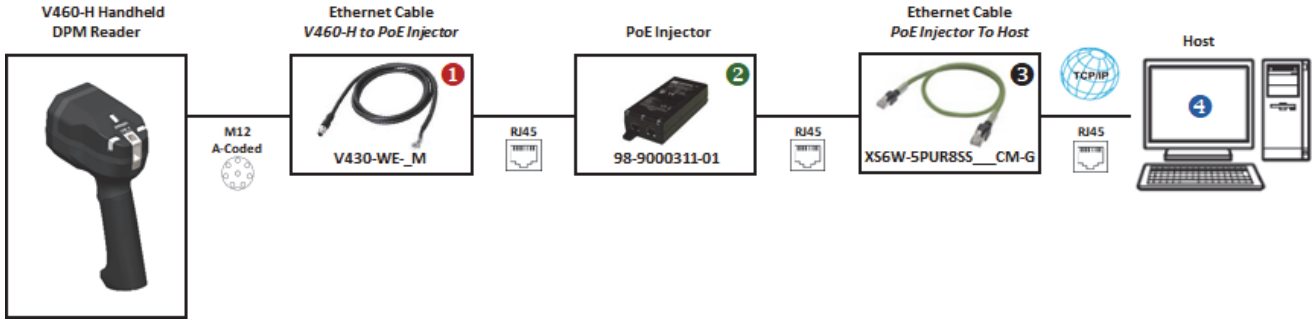
V460-H Industrial DPM Reader

1.) Ethernet Cable for V460-H to PoE Injector Connection

2.) PoE Injector (IEEE 802.3af compliant)

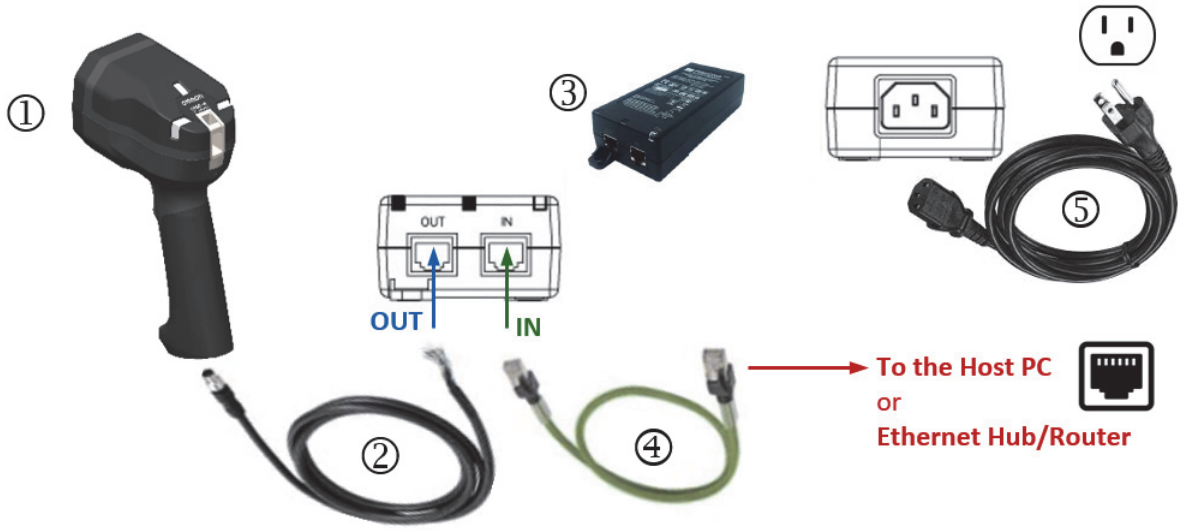
3.) Ethernet Cable for PoE Injector to Host

4.) Host PC



Note: If you connect the reader and then disconnect the Ethernet cable from the PC or PLC, the reader will beep four times every few seconds to signal that the Ethernet cable is disconnected.

Component Names and Functions



Part	Description	Part Number
1	V460-H Industrial DPM Reader	**V460-H0PX**
2	Ethernet Communication Cable *Straight Connector M12 Plug to RJ45 Connector*	**V430-WE-*M**
3	Single Port PoE Injector, 30W, IEEE802.3at Compliant, 2 x RJ45 Connector, 90 to 264VAC* (suggested for standalone PC use) *ATTENTION: Power cord NOT included (C13 connector required)	**98-9000311-01**
4	Standard Ethernet Cables, In-Cabinet Use *Standard RJ45 Connectors on Both Ends*	**XS6W-5PUR8SS**CM-G**
5	Power Cord Cable (NOT INCLUDED with 98-9000311-01)	

* 1, 3, or 5 meters

** 1 (**100**), 3 (**300**), 5 (**500**), 10 (**1000**), or 15 (**1500**) meters

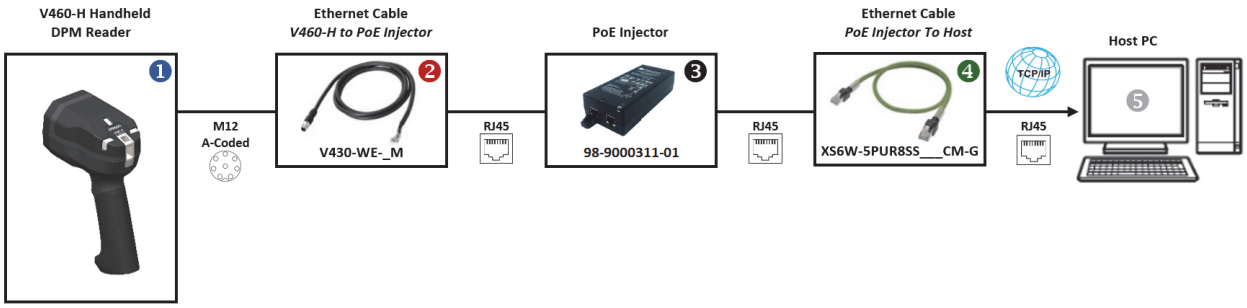
Reader Signal Descriptions



The signal descriptions below apply to the connector on the V460-H Industrial Handheld DPM Reader and are for reference only.

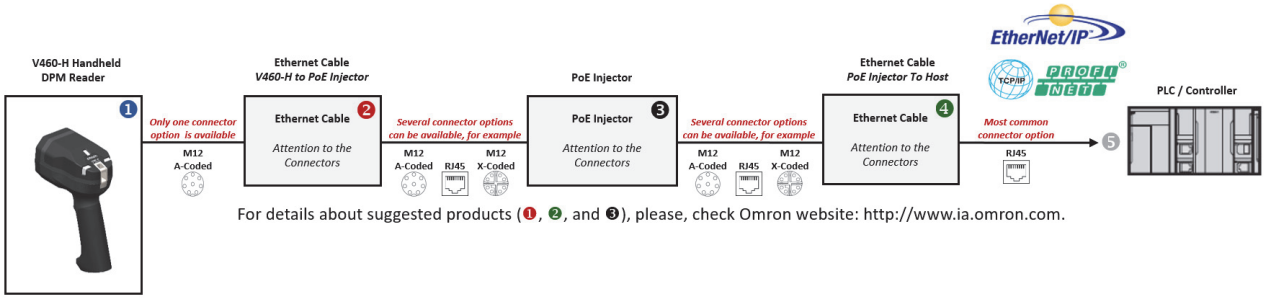
Pin (M12 Connector)	100Mb DC on Spares (Mode B)
1	DC+
2	DC–
3	DC–
4	Tx–
5	Rx+
6	Tx+
7	DC+
8	Rx–

2-1-2 Wiring Example, PC Connection



NOTE: *Once the reader is connected, If the Ethernet cable (❸ PoE injector to PC) will be unplugged (on either side), the reader will start beeping to notify the user.*

2-1-3 Wiring Example, PLC Connection



For details about suggested products (❶, ❷, and ❸), please, check Omron website: http://www.ia.omron.com.

NOTE: *Once the reader is connected, If the Ethernet cable (❸ PoE injector to PLC/Controller) will be unplugged (on either side), the reader will start beeping to notify the user.*

2-2 Connect to WebLinkHH

2-2-1 WebLinkHH System Requirements

Operating System Requirements

- Microsoft Windows 10 (64-Bit) or Microsoft Windows 7 (64-Bit)

  Note: Using an Embedded OS (Windows CE) and / or an underpowered machine (limited RAM or limited disk space) is not recommended.

Minimum Hardware and Performance Requirements

- Intel Core i3 Duo Processor or AMD Equivalent
- 2 GB RAM / 128 MB Video RAM
- 1 GB Hard Drive Space
- 32-Bit Color Display
- 4.0 Windows Experience Index

Browser Requirements

- Google Chrome (Recommended)
- Firefox
- Microsoft Edge
- Opera
- Safari (Mac-Only)

Browser Feature Requirements

WebLinkHH requires certain features to be supported by the hosting browser. Support for these features are checked before WebLinkHH loads, and if they are not available, an error message is displayed.

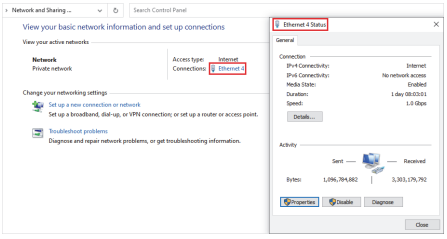
The following features are required by WebLinkHH and are checked at startup:

- Web Sockets
- HTML5 Canvas
- HTML5 Audio

2-2-2 Static Connection

- Navigate to **Control Panel > Network and Sharing Center** on your PC.
- Click **Local Area Connection**. In the **Status** dialog, click **Properties**.
- In the **Local Area Connection Properties** dialog, select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties** again. Set your PC to a **192.168.188.X** IP address (**192.168.188.5**, for example).

  Note: In Windows 10, the Local Area Connection is referred to as **Ethernet**.



- Click **OK**.
- Open a web browser and type the reader's default IP address (**http://192.168.188.2**) in the web browser's address bar.

  The reader will connect to WebLinkHH.

2-2-3 DHCP Network Connection

Important: Do not use DHCP when PROFINET is enabled as the industrial protocol.

- Plug your handheld into the network adapter.
- Change the handheld from **Static** to **DHCP**. The handheld will reboot.
- When the reader is found, note the new IP address that is generated.
- Open a browser and type the new IP address. WebLinkHH will load.

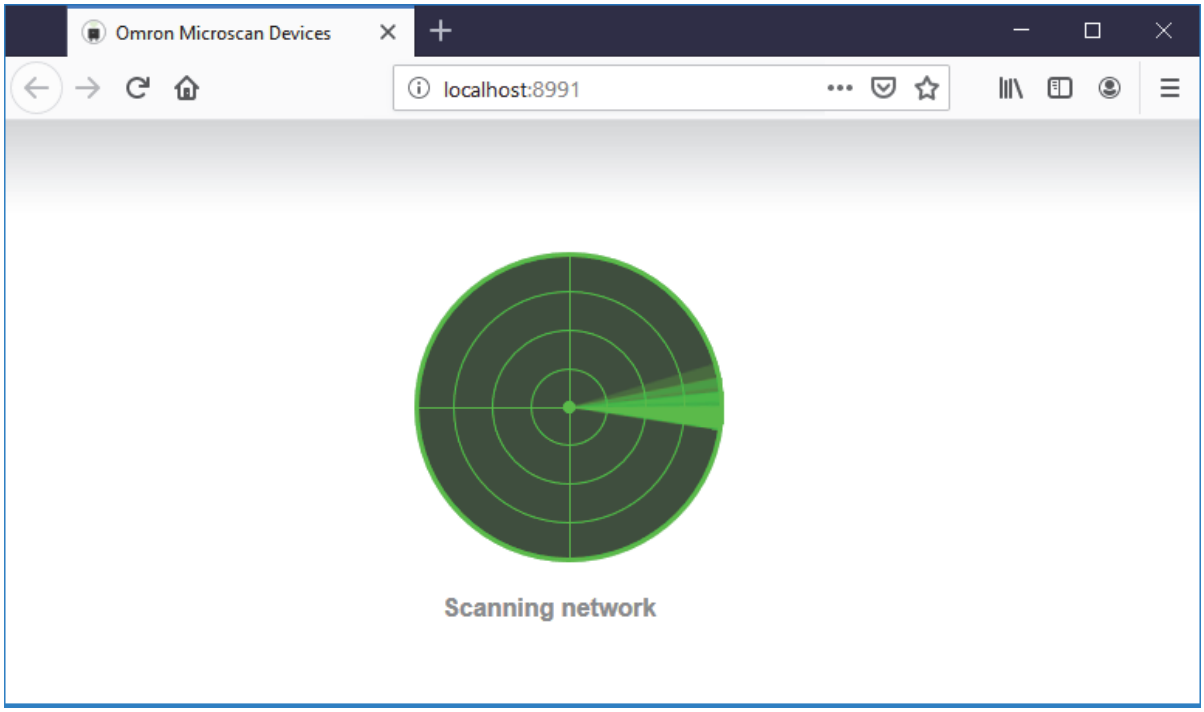
2-2-4 Use the Device Discovery Utility (DDU) to Connect to WebLinkHH

You can also connect to WebLinkHH with Omron Microscan's **Device Discovery Utility**, available at **automation.omron.com**.

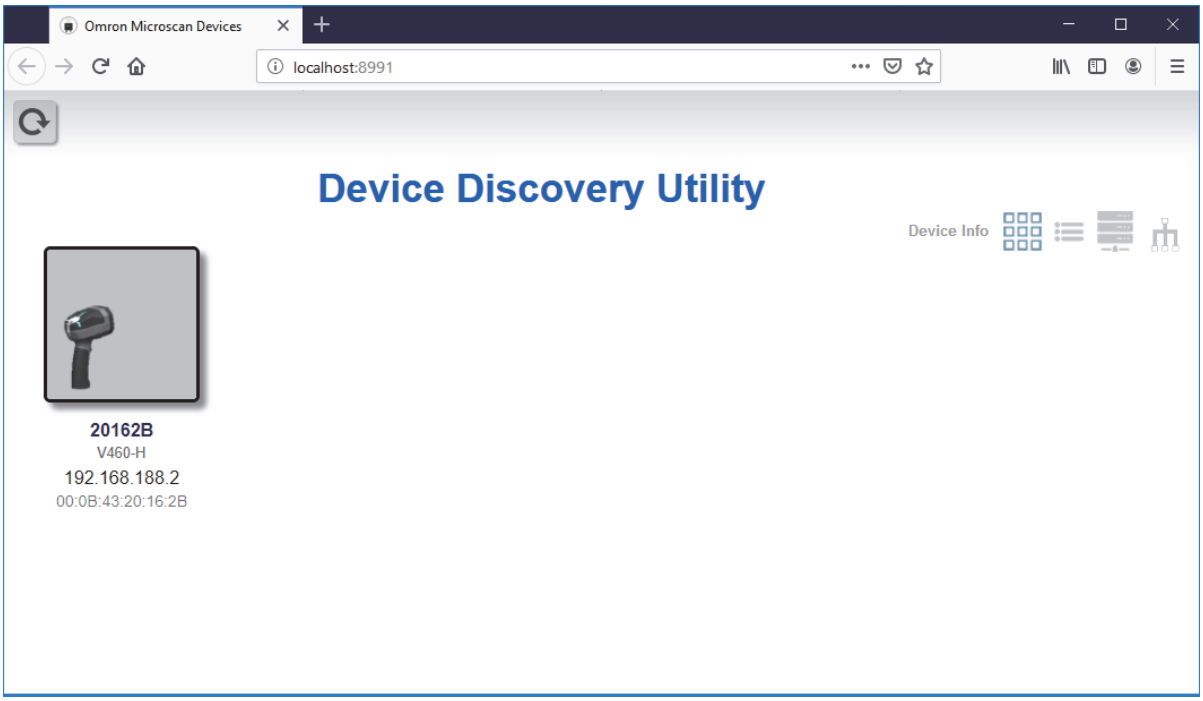
Once you have downloaded the Device Discovery Utility **.exe** file from Omron Microscan's website and installed the utility, select Device Discovery Utility from the **Start** menu.



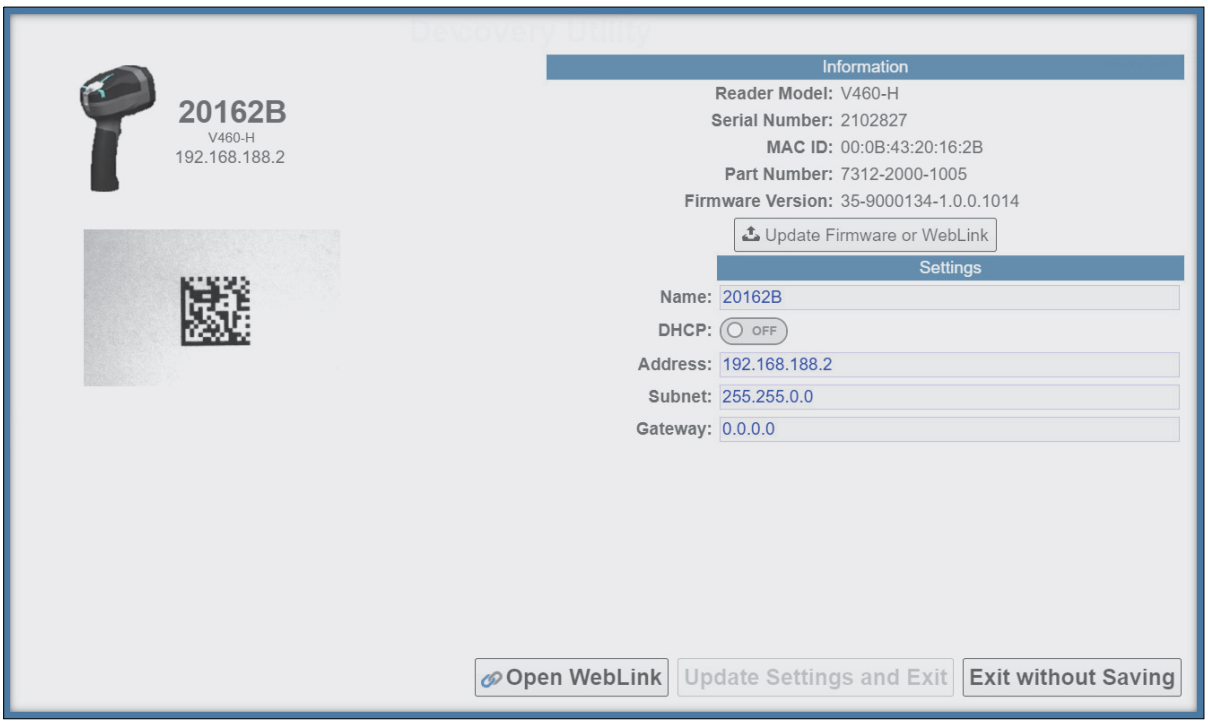
The following screen will appear.



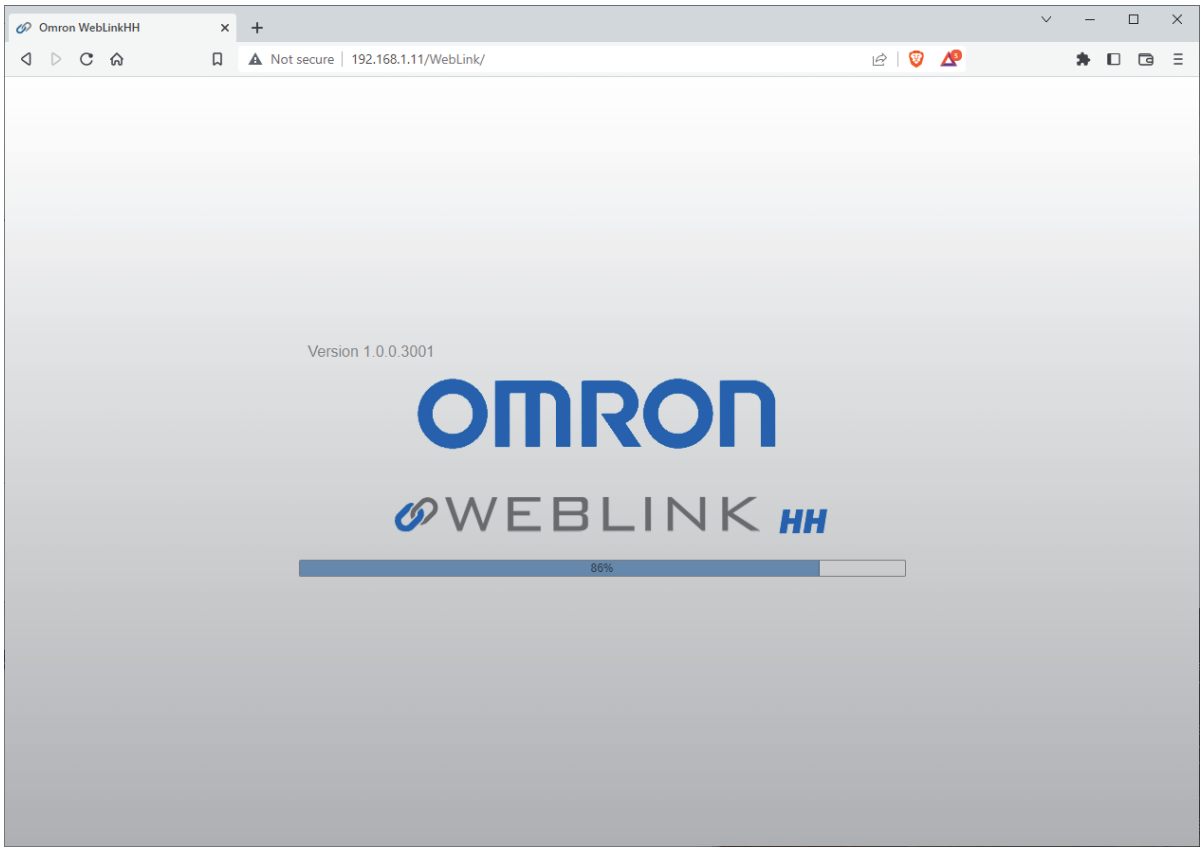
When your reader is located on the network, its identifying information will be shown as in the example below.



Click on your reader to bring up the information and settings view.



Click **Open WebLinkHH**. The WebLinkHH splash screen will appear as the program opens.



3

Basic Operation

This section is designed to get your V460-H up and running quickly using WebLinkHH. Following these guidelines will allow you to get a sense of the reader's capabilities and how it can meet the needs of your application.

3-1 V460-H Scanning 3-2
3-2 Targeting Tips and Tricks 3-6
3-3 WebLinkHH Quick Start 3-21

3-1 V460-H Scanning

3-1-1 Aiming and Decoding

Pick up the V460-H. The aiming dot LEDs turn on automatically by default when a symbol enters the field of view.

1. Ensure that the barcode is centered between the aiming dots.
2. Pull and hold the trigger until the V460-H reads the barcode. The V460-H beeps and vibrates, and the top and front LEDs flash green. The aiming dots turn off during image acquisition.
3. Release the trigger. If the V460-H has read the barcode, the read cycle is finished. Return to Step 1 to decode the next barcode. If the V460-H has not read the barcode, the V460-H beeps and vibrates, and the top LEDs flash red. The aiming dots turn off during image acquisition.

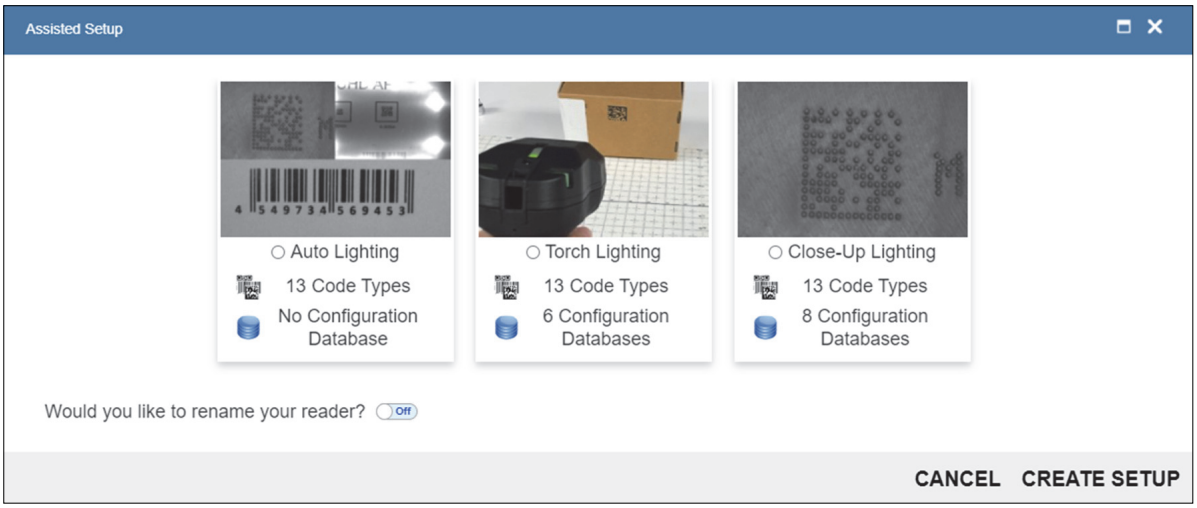
Decoding Guidelines

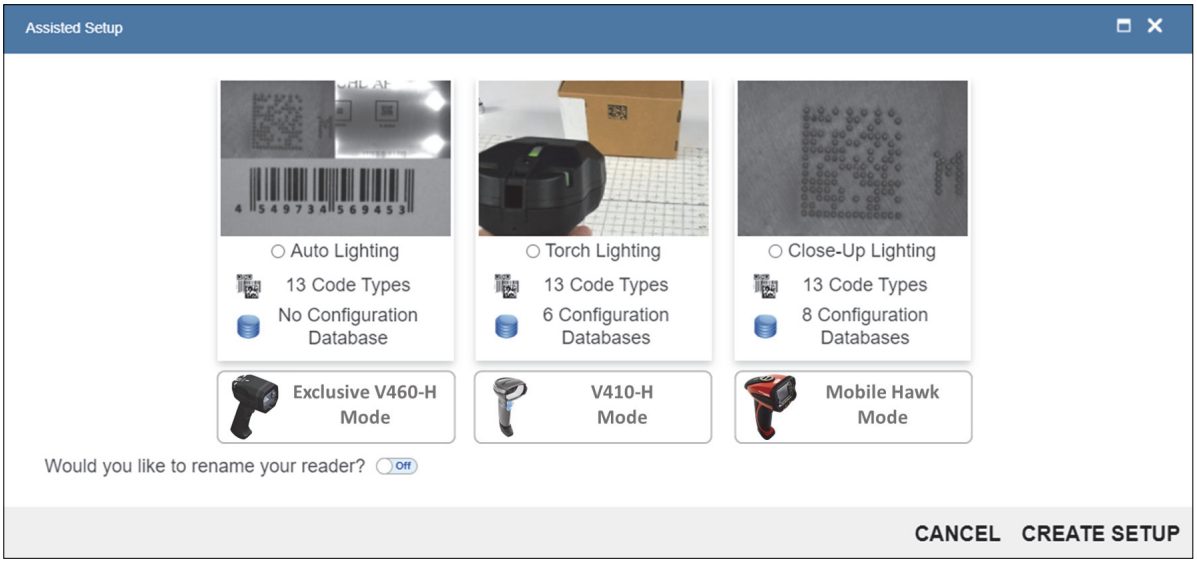
The V460-H makes reading the most difficult direct part marks (DPMs) and labels easy, with extended read range from contact to 10” (254 mm).

The V460-H comes with three predefined modes of operation, or “recipes”: **Auto Lighting** (default), **Torch Lighting**, and **Close-Up Lighting**.

See **Section 3-2 Targeting Tips and Tricks** for basic usage examples of each lighting mode.

Note: The V410-H Code Reader and Mobile Hawk Code Reader are shown to give long-time users a sense of how V460-H modes of operation correlate with those readers. The V410-H and Mobile Hawk are not supported by WebLinkHH.





3-1-2 Multi-Axis Lighting

The V460-H incorporates a **multi-axis illumination** system designed to ensure reliable decoding of the toughest direct part marks (DPM) and labels.

- **Dome Lighting:** Red, green, and blue LEDs (allowing any RGB combination).
- **Low-Angle Lighting:** Red LEDs (north, south and north + south).
- **Torch Lighting:** White LEDs

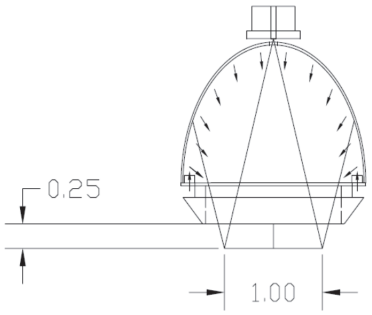
Through an advanced combination of multi-colored dome (bright field), low-angle (dark field), and torch (long-range) illumination techniques, the V460-H provides even illumination of flat, shiny surfaces, enhancing embossed features, or differentiating features on curved surfaces, as well as providing high-powered illumination for reading codes with extended read range from contact to 10” (254 mm).

Dome Illumination

Dome Illumination provides diffused, uniform light. The large, solid angle of illumination supports imaging of shiny, flat surfaces or curved surfaces. This type of illumination is useful on specular (shiny) and non-specular surfaces, and is ideal for de-emphasizing surface texture and elevation (curves). The dome geometry provides the widest area of coverage at close working distances.

It is important to note that for marks that are a large percentage of the diameter of a curved surface, closer distances will provide the best performance.

In addition to illuminating marks on curved surfaces, dome lighting also provides diffuse, even bright field illumination, which provides thorough coverage on a wide variety of direct part marks.

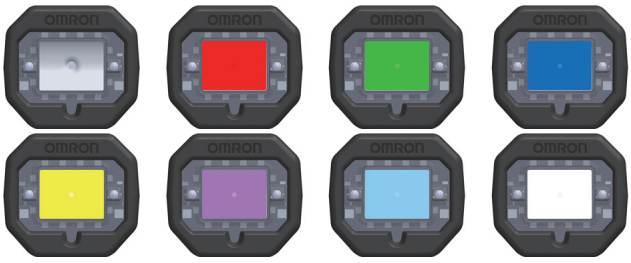


Dome Illumination

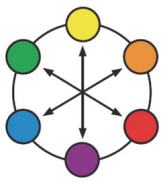
● Dome Illumination Colors

Dome Illumination provides diffused, uniform light in RGB colors that can be combined to achieve additional colors:

- Red
- Green
- Blue
- Yellow (Red + Green)
- Magenta (Red + Blue)
- Cyan (Green + Blue)
- White (Red + Green + Blue)



Dome Illumination adds another dimension of decode optimization for direct part marks. Using the opposite light spectrum as a part’s surface color will make the part feature appear darker. Using the same light spectrum will make the part feature appear lighter.

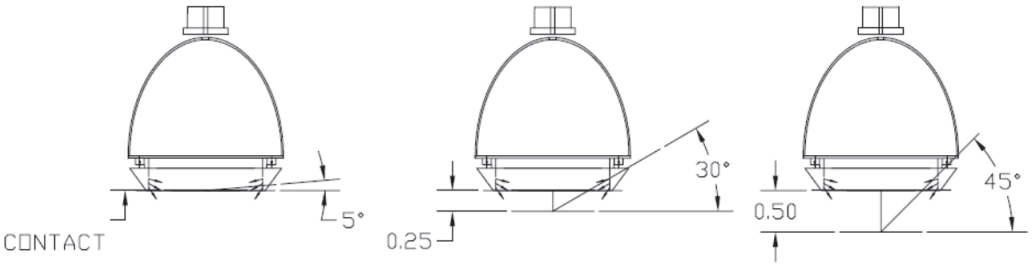


Low Angle (Dark Field) Illumination

Low Angle Illumination provides what is called “dark field” illumination, ideal for very low-contrast marks such as laser-embossed or engraved marks. This type of illumination is useful on both specular (shiny) and non-specular surfaces, and emphasizes surface texture.

The optimum lighting angle for most marks is **30 degrees**, which occurs when the V460-H is approximately **0.25 inches** away from the target mark.

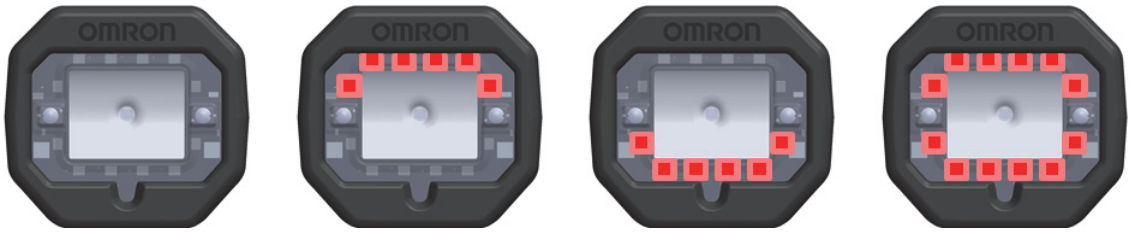
Low Angle Illumination directs light inward at an angle that varies with the working distance and provides an optimal illumination source from contact **(5 degrees) to about 0.5 inches (45 degrees)**. Beyond this working distance, the illumination zone converts to a general-purpose illuminator as a portion of the illumination passes straight through the prism. This can be useful in providing “bright field” illumination.



Low Angle Illumination

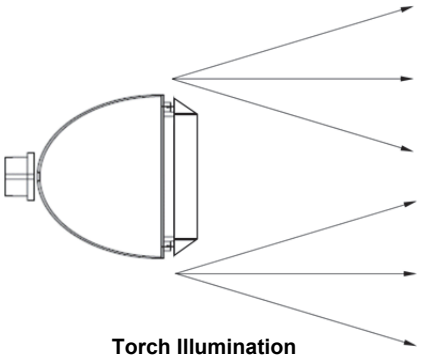
Low Angle Illumination can be selected independently (north or south) or in combination (north + south). It can also be used simultaneously with any combination of Dome Illumination.

Low Angle Illumination uses red LEDs only.

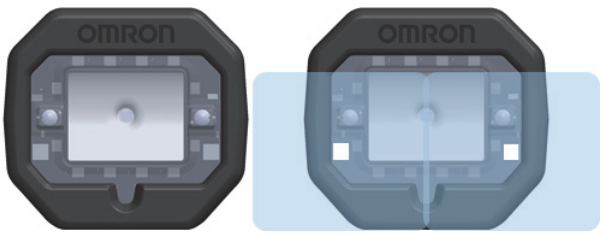


Torch Illumination

Torch Illumination provides high-powered bright field illumination. This type of illumination is designed for reading 1D and 2D codes that cannot be read easily at contact or near-contact. It is useful for reading flat direct part marks (DPMs) at a greater distance with some tilt (+/– 15 degrees).



Torch Illumination



Torch Illumination cannot be used in combination with Dome Illumination or Low Angle Illumination.

Torch Illumination uses high-intensity white LEDs only.

3-2 Targeting Tips and Tricks

Follow these guidelines for optimal performance.

1. Keep the trigger pulled until you read the barcode. Keep changing the reader's position while holding the trigger down. If any of the predefined **modes of operation** or a custom **database configuration** is used, the V460-H will run through its sequences while the trigger is activated. The V460-H continues to cycle and adapt its lighting and imaging parameters with every image acquired while the trigger is held down. The V460-H acquires several images with each illumination option, evaluating the optimal settings. If reading the same part or same part type, the V460-H always uses the most recent good read settings as a starting point so that subsequent reads will be faster.
2. For labels and flat DPM parts, start at approximately 4" (+/- 100 mm) to 6" (+/- 150 mm) and with some tilt (+/- 15 degrees). If the symbols are small, move the reader closer, keeping the trigger pulled until you achieve a successful decode.
3. For shiny, cylindrical, or curved parts, force the close-up mode by moving the part very close – from contact to approximately 0.25" (+/- 6 mm). If the part radius is small and the code covers much of the circumference, make sure that it is in the "sweet spot" of the reader's **Dome Lighting** (available for **Auto Lighting** and **Close-Up Lighting** modes by default). You can also rotate the part while holding the trigger down to accomplish this.
4. The **ToF (Time-of-Flight) sensor** may not estimate the part distance correctly if the part is small and does not cover the sensor. In such a case, you can flip the part, put your hand briefly in front of the sensor, or place the part on a table or other work surface.

3-2-1 Code Density (X-Dimension)

The **X-dimension** is the basic building block of **1D** and **2D codes**, and determines their physical size (density). It is usually expressed in **mils** (**thousandth of an inch, i.e., 0.001"**) or in **mm (millimeters)**, For a **1D barcode**, this is **the width of the narrowest bar of the code**. For a **2D code**, this is **the height or width of a single square**.



3-2-2 Quiet Zone

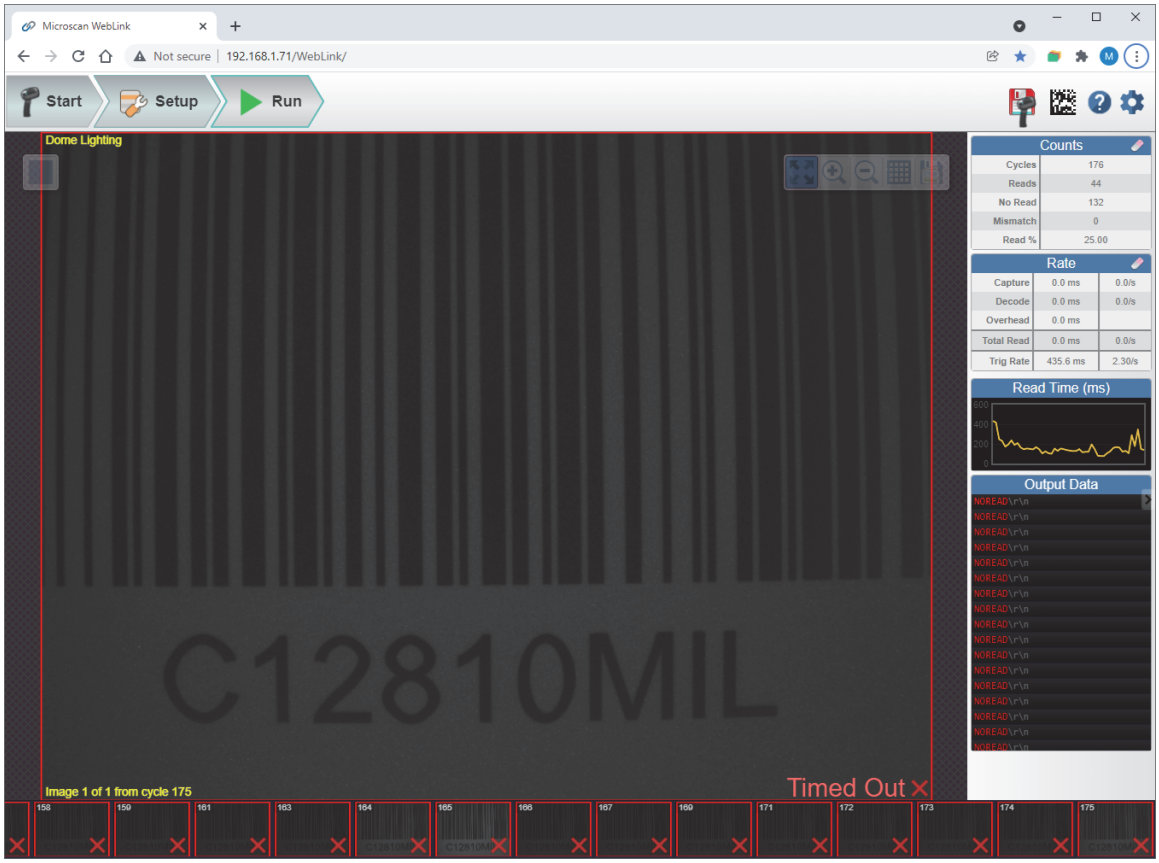
For a **1D barcode**, the **quiet zone** is **a clear space of approximately 10x the X-dimension** on the left and right sides of the barcode. For a **2D code**, the **quiet zone** is **a clear region free of markings or text** surrounding the 2D code (at least **1x the X-dimension**).

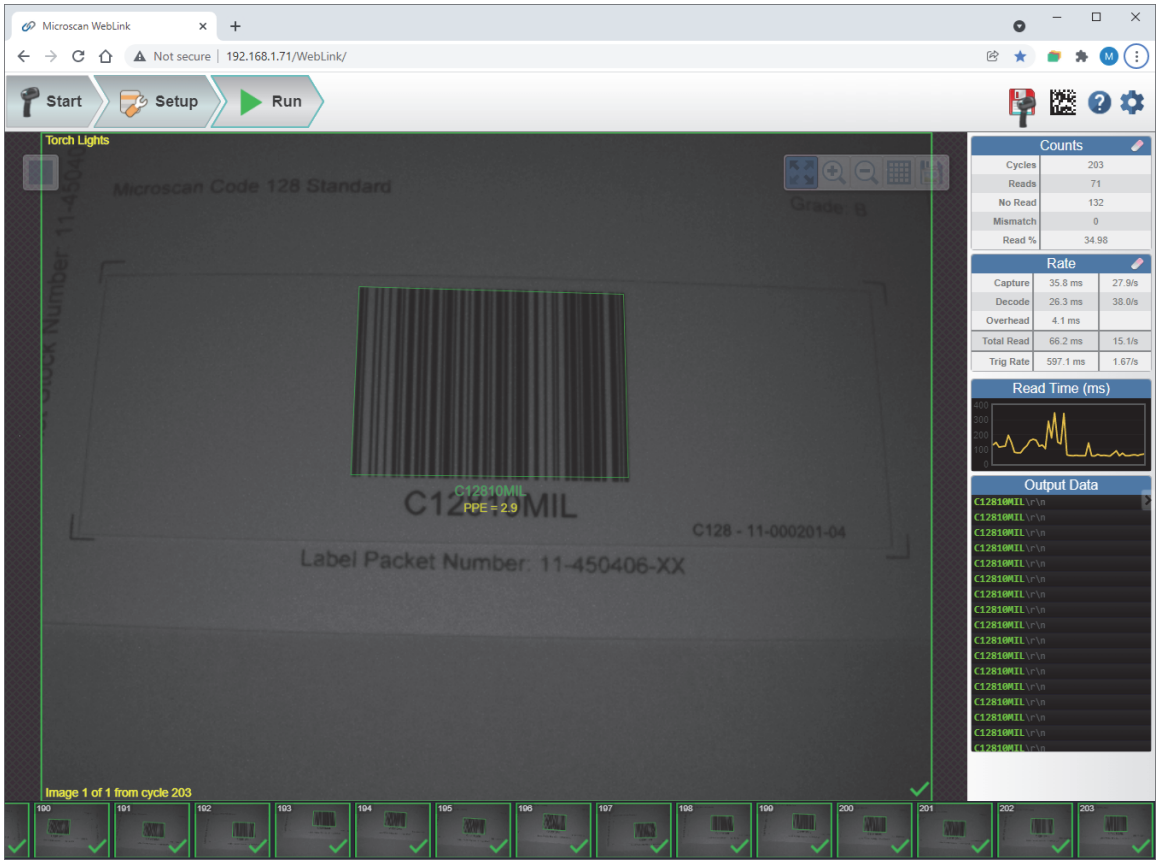




3-2-3 Code Size x Field of View

To be decoded, any code – including its quiet zone – must be completely “seen” by the reader.





3-2-4 1D and 2D Codes on Labels

1



1D / 2D Labels

2



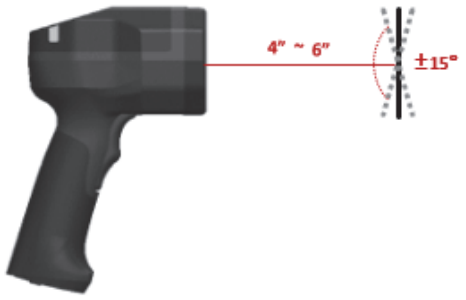
Select Auto Lighting Mode.

3



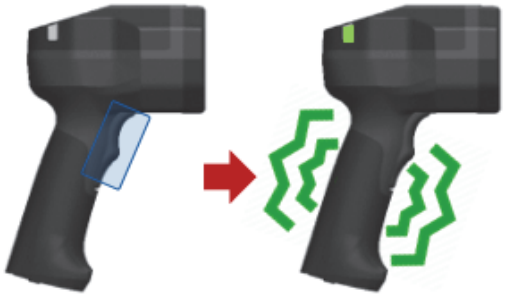
Use the two LED dots to positioning the code.

4



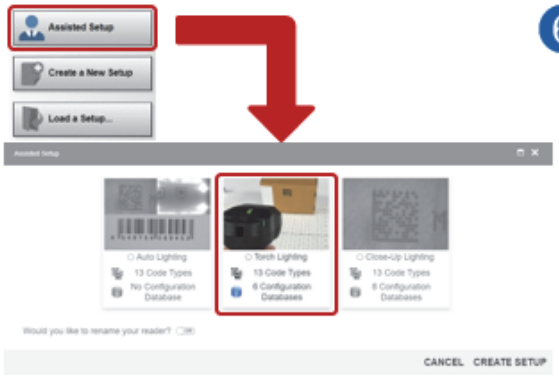
Start at approximately 4" ~ 6" (± 100mm ~ 150mm) and, if necessary, tilt the label (±15 °).

5



Keep the trigger pulled until you read the code.

6



If not successful, select Torch Lighting Mode and repeat steps 3~5.

Tips and Tricks – 1D and 2D Codes on Labels

- If the code is shiny and difficult to read, try the suggestions in **3-2-5 Small 1D and 2D Codes (Less than 5 mil), Shiny Codes**.
- While keeping the trigger pulled, move closer if the codes are small.
- If the code is difficult to read, change the reader position while holding the trigger.
- If reading a code at greater than **4" (±100 mm)**, position the reader at **15°** for improved decoding.
- If needed, check the **readability table** to confirm that the code density can be read at the current working distance.
- Check that the reader can "see" the entire code, i.e., **code size < FOV (field of view)**.
- Check that the correct code type is currently enabled.
  Important: Aztec Code, **Pharmacode**, and **DotCode** aren't enabled by default.
- Check that the symbology features are properly enabled.
  Important: DMRE (Data Matrix Rectangular Extension) is not enabled by default.
- For **Data Matrix** codes, only **ECC 200** is enabled by default. If necessary, **legacy ECC 000 - ECC 130** can be enabled.

Readability Tables – 1D and 2D Codes on Labels

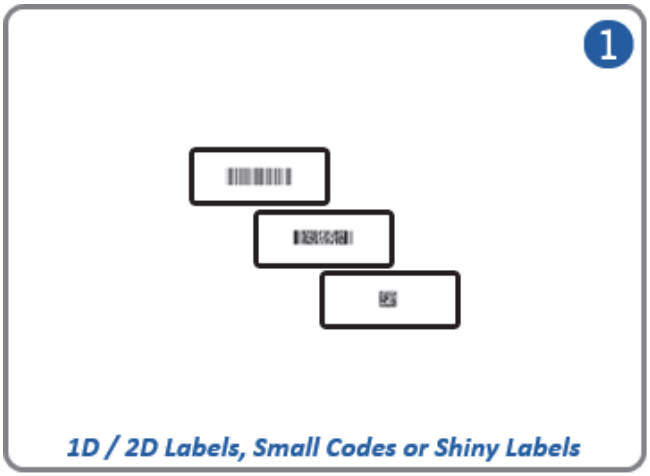
The readability tables below show the **calculated PPE (pixels per element)** for a range of **typical code sizes (X-dimensions)** at certain working distances. For a **1D barcode (high-contrast label): 1.5 PPE** is suggested as a **minimum**. **2.0 PPE** or more is **preferred**. For a **2D code (high-contrast label): 2.5 PPE** is suggested as a **minimum**. **3.5 PPE** or more is **preferred**.

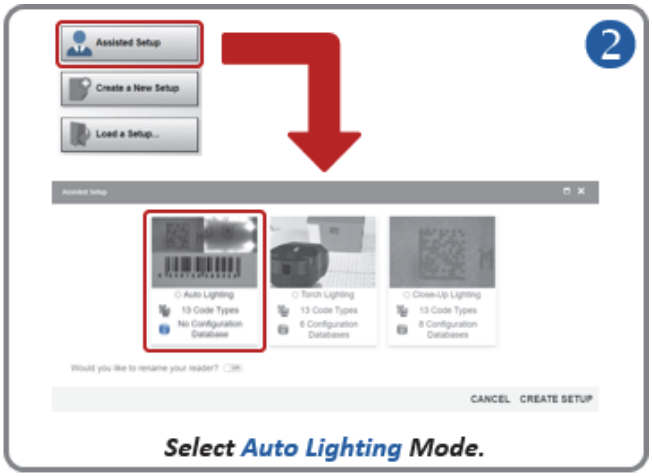
Minimum Element Size (X-Dimension)	Readability of 1D LABEL Code at Distance (1.50 → 2.00)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.00 mils	2.20 mils	2.90 mils	3.90 mils	4.80 mils	5.90 mils	7.80 mils	8.90 mils	9.60 mils	11.70 mils

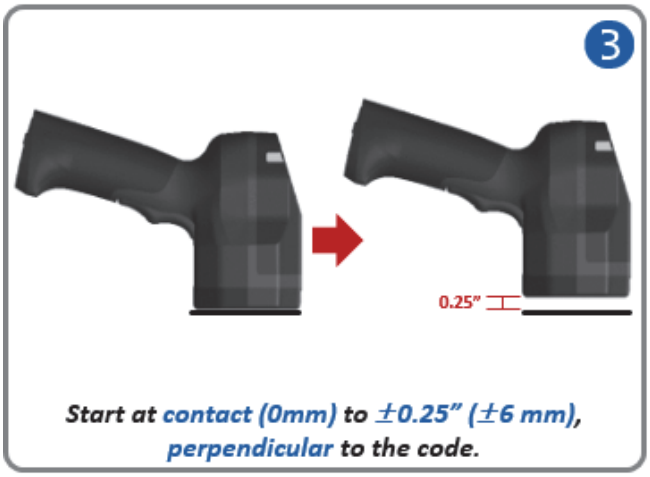
Minimum Element Size (X-Dimension)	Readability of 2D LABEL Code at Distance (2.50 → 3.50)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.70 mils	2.90 mils	4.00 mils	5.30 mils	6.60 mils	8.10 mils	10.70 mils	12.20 mils	13.20 mils	16.10 mils

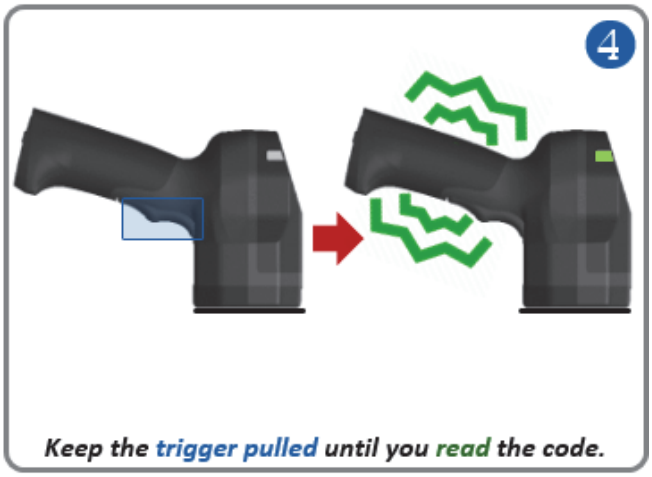
A **10.0 mil 1D barcode** should be read up to a distance of **200 mm** (or even a little further, as the PPE at **200 mm** is **2.09**.) A **10.0 mil 2D code** should be read at a distance **≈ 100 mm**.

3-2-5 Small 1D and 2D Codes (Less than 5 mil), Shiny Codes







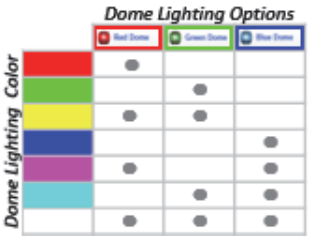




Tips and Tricks – Small 1D and 2D Codes, Shiny Codes

- If the code is difficult to read, change the reader position while holding the trigger.
- If needed, check the **readability table** to confirm that the code density can be read at the current working distance.
- Check that the reader can "see" the entire code, i.e., **code size < FOV (field of view)**.
- Check that the correct code type is currently enabled.
  Important: Aztec Code, **Pharmacode**, and **DotCode** aren't enabled by default.
- Check that the symbology features are properly enabled.
  Important: DMRE (Data Matrix Rectangular Extension) is not enabled by default.
- For **Data Matrix** codes, only **ECC 200** is enabled by default. If necessary, **legacy ECC 000 - ECC 130** can be enabled.
- For codes printed in color, select the proper lighting color to create contrast when using **Dome Lighting** (RGB available).





- Using the opposite light spectrum will make the target appear darker.
- Using the same light spectrum will make the target appear lighter.
- The target can be the code's foreground or background color.

Readability Tables – Small 1D and 2D Codes, Shiny Codes

The readability tables below show the **calculated PPE (pixels per element)** for a range of **typical code sizes (X-dimensions)** at certain working distances. For a **1D barcode (high-contrast label): 1.5 PPE** is suggested as a **minimum**. **2.0 PPE** or more is **preferred**. For a **2D code (high-contrast label): 2.5 PPE** is suggested as a **minimum**. **3.5 PPE** or more is **preferred**.

Minimum Element Size (X-Dimension)	Readability of 1D LABEL Code at Distance (1.50 … 2.00)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.00 mils	2.20 mils	2.90 mils	3.90 mils	4.80 mils	5.90 mils	7.80 mils	8.90 mils	9.60 mils	11.70 mils

Minimum Element Size (X-Dimension)	Readability of 2D LABEL Code at Distance (2.50 … 3.50)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.70 mils	2.90 mils	4.00 mils	5.30 mils	6.60 mils	8.10 mils	10.70 mils	12.20 mils	13.20 mils	16.10 mils

A **5.0 mil 1D barcode** should be read at a distance **≥ 75 mm**. A **5.0 mil 2D code** should be read at a distance **≈ 25 mm**.

3-2-6 DPM, Flat Parts (Large to Medium Diameter)

1



DPM, Flat Parts

2



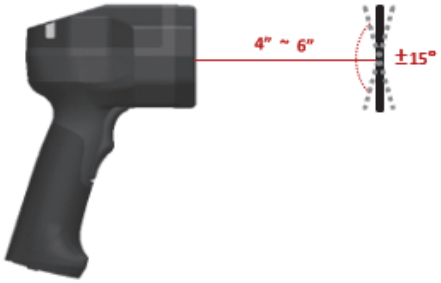
Select Auto Lighting Mode.

3



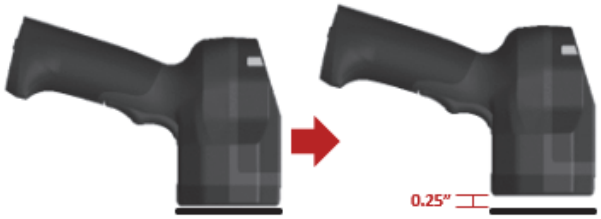
Use the two LED dots to positioning the code.

4



Start at approximately 4" ~ 6" (± 100mm ~ 150mm) and, if necessary, tilt the part (±15 °).

5



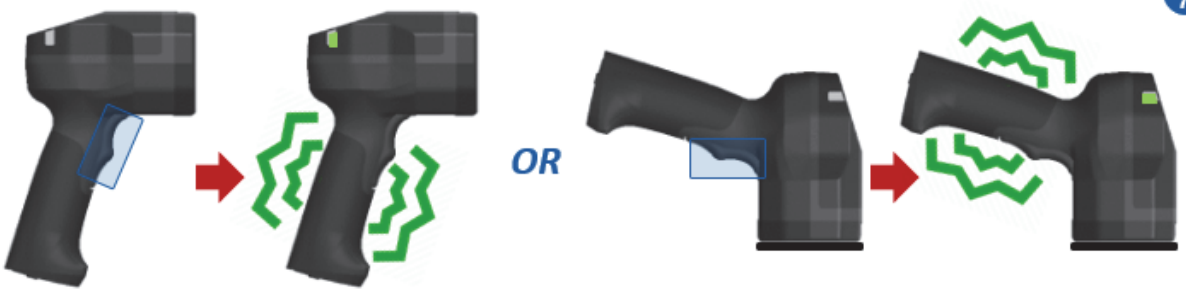
If needed, for shiny parts, force the close-up mode by moving the reader very close: at contact (0mm) to ±0.25" (±6 mm), perpendicular to the code.

6



In close-up mode, if the part is small and does not cover the ToF sensor, you may flip the part or put a hand in front of the sensor or place the part on a table.

7



Keep the trigger pulled until you read the code.

Tips and Tricks – DPM, Flat Parts

- If the mark is small, move the reader closer while holding the trigger.
- If the mark is difficult to read, change the reader position while holding the trigger.
- If needed, check the **readability table** to confirm that the code density can be read at the current working distance.
- If reading a part at greater than **4" (±100 mm)**, position the reader at **15°** for improved decoding.
- Check that the reader can "see" the entire code, i.e., **code size < FOV (field of view)**.
- Check that the code type is currently enabled.
  Important: Aztec Code and **DotCode** aren't enabled by default.
- Check that the symbology features are enabled properly.
  Important: DMRE (Data Matrix Rectangular Extension) is not enabled by default.
- For **Data Matrix** codes, only **ECC 200** is enabled by default. If necessary, **legacy ECC 000 - ECC 130** can be enabled by the user.
- For parts in color, select the proper lighting color to create contrast when using **Dome Lighting** (RGB available).





- Using the opposite light spectrum will make the target appear darker.
- Using the same light spectrum will make the target appear lighter.
- The target can be the code's foreground or background color.

Readability Tables – DPM, Flat or Cylindrical / Curved Parts

The readability tables below show the **calculated PPE (pixels per element)** for a range of **typical code sizes (X-dimensions)** at certain working distances. For a **1D barcode (high-contrast DPM): 2.0 PPE** is suggested as a **minimum**. **2.5 PPE** or more is **preferred**. For a **2D code (high-contrast DPM): 3.0 PPE** is suggested as a **minimum**. **4.0 PPE** or more is **preferred**.

Minimum Element Size (X-Dimension)	Readability of 1D DPM Code at Distance (2.00 – 2.50)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.40 mils	2.70 mils	3.60 mils	4.80 mils	6.00 mils	7.30 mils	9.70 mils	11.10 mils	12.00 mils	14.60 mils

Minimum Element Size (X-Dimension)	Readability of 2D DPM Code at Distance (3.00 – 4.00)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	3.20 mils	3.50 mils	4.70 mils	6.30 mils	7.80 mils	9.50 mils	12.60 mils	14.40 mils	15.60 mils	19.00 mils

A **10.0 mil 1D barcode** should be read at a distance **≥ 150 mm**. A **10.0 mil 2D code** should be read at a distance **≈ 75 mm**.

3-2-7 DPM, Shiny Cylindrical / Curved Parts (Large to Medium Diameter)

1



DPM, Cylindrical or Curved Parts

2



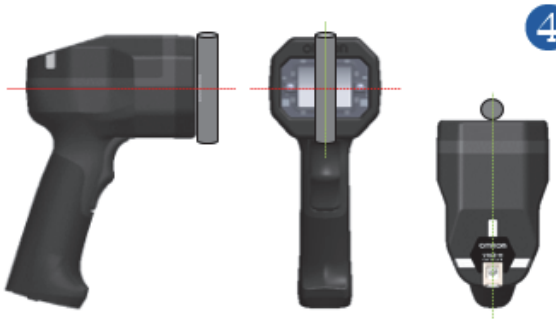
Select Auto Lighting Mode.

3



Force the close-up mode by moving the part very close: at contact (0mm) to ±0.25" (±6 mm).

4



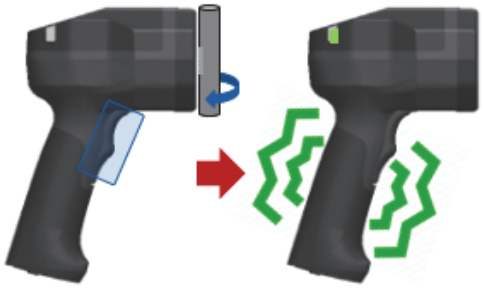
If the code covers much of the circumference, make sure that it is in the center of the reader.

5



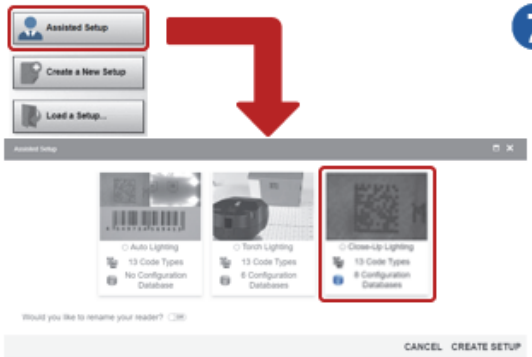
If the part is small and does not cover the ToF sensor, you may flip the part and put a hand in front of the sensor or place the part on a table.

6



Keep the trigger pulled until you read the code. If needed, rotate the part while pressing the trigger.

7

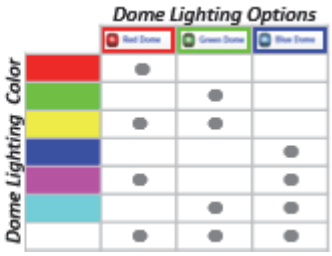


If not successful, select Close-Up Lighting Mode and repeat steps 3~7.

Tips and Tricks – DPM, Shiny Cylindrical / Curved Parts

- If the mark is difficult to read, change the reader position while holding the trigger.
- If needed, check the **readability table** to confirm that the code density can be read at the current working distance.
- Check that the reader can “see” the entire code, i.e., **code size < FOV (field of view)**.
- Check that the correct code type is currently enabled.
  Important: Aztec Code and **DotCode** aren’t enabled by default.
- If needed, enable **Advanced Features: Curved 2D, 2D Damaged Mode, Attempt Morphology Manipulation, etc. (disabled by default)**.
- Check that the symbology features are enabled properly.
  Important: DMRE (Data Matrix Rectangular Extension) is not enabled by default.
- For **Data Matrix** codes, only **ECC 200** is enabled by default. If necessary, **legacy ECC 000 - ECC 130** can be enabled.
- For parts in color, select the proper lighting color to create contrast when using **Dome Lighting** (RGB available).





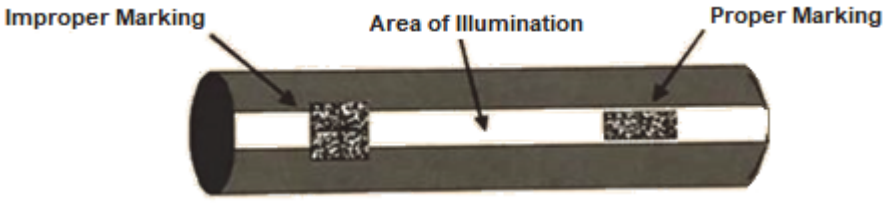
- Using the opposite light spectrum will make the target appear darker.
- Using the same light spectrum will make the target appear lighter.
- The target can be the code’s foreground or background color.

Guidelines for Direct Part Marking on Curved Surfaces

It is important to be familiar with the standards and guidelines for marking on curved surfaces.

The **AIAG B-17 Standard (2D Direct Parts Marking Guideline)** states the following:

“For marking and reading, flat surfaces are preferred over curved surfaces because the curvature of an item may prohibit proper marking and proper illumination for reading and can distort the code. If the mark is made on a round/curved surface, the symbol height should be less than 16% of the part’s diameter. For Data Matrix codes, a rectangular symbol may be considered to provide greater readability on smaller circumference parts. QR Code is not available in a rectangular form.”



From the 2D Direct Parts Marking Guideline (B-17) 7th Edition, 2009. Reprinted with permission of AIAG (Automotive Industry Action Group). AIAG makes no representation or warranty as to the accuracy or usefulness of its materials when presented in contexts, with other materials, or for uses, other than as originally published by AIAG. For additional information, or to purchase the referenced AIAG publication, contact AIAG at 248.358.3003 or www.aiag.org.

The **Department of the Navy (DON) IUID Marking Guide (Item Unique Identification (IUID) Marking Guide: Applying Data Matrix Identification Symbols To Legacy Parts)** states the following:

"Flat surfaces are preferred over curved surfaces for marking when a choice is available. A rectangular symbol, rather than a square symbol, is better for application to polished concave or convex cylindrical parts. The rectangle is sized to fit either within the reflective band of light that emanates from the spine of the curve or on 5% of the circumference. Under normal room light, this band of light typically occupies 16% of the diameter of the curve but can increase in size under bright light conditions. To apply larger symbols, the surface should be textured to reduce glare or matte-finished, laser-markable paints should be used to mark the part."



Readability Tables – DPM, Shiny Cylindrical / Curved Parts

The readability tables below show the **calculated PPE (pixels per element)** for a range of **typical code sizes (X-dimension)** at certain working distances. For a **1D barcode (high-contrast DPM): 2.0 PPE** is suggested as a **minimum**. **2.5 PPE** or more is **preferred**. For a **2D code (high-contrast DPM): 3.0 PPE** is suggested as a **minimum**. **4.0 PPE** or more is **preferred**.

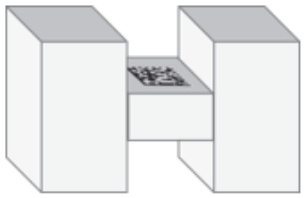
Minimum Element Size (X-Dimension)	Readability of 1D DPM Code at Distance									
	2.00									2.50
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.40 mils	2.70 mils	3.60 mils	4.80 mils	6.00 mils	7.30 mils	9.70 mils	11.10 mils	12.00 mils	14.60 mils

Minimum Element Size (X-Dimension)	Readability of 2D DPM Code at Distance									
	3.00									4.00
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	3.20 mils	3.50 mils	4.70 mils	6.30 mils	7.80 mils	9.50 mils	12.60 mils	14.40 mils	15.60 mils	19.00 mils

A **5.0 mil 1D barcode** should be read at a distance **≥ 50 mm**. A **5.0 mil 2D code** should be read at a distance **< 25 mm**.

3-2-8 DPM, Hard-to-Reach Marks

1



DPM, Parts With Access Constraints

2



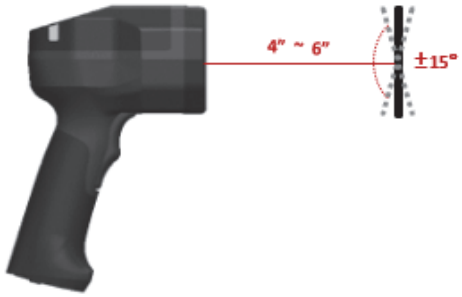
Select Auto Lighting Mode.

3



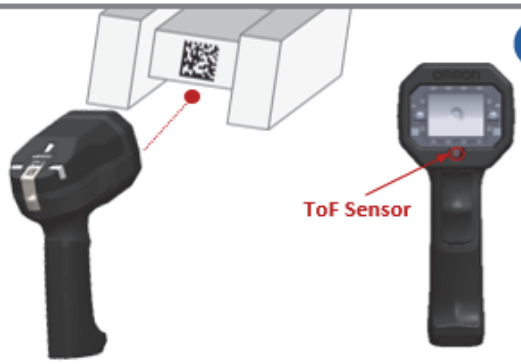
Use the two LED dots to positioning the code.

4



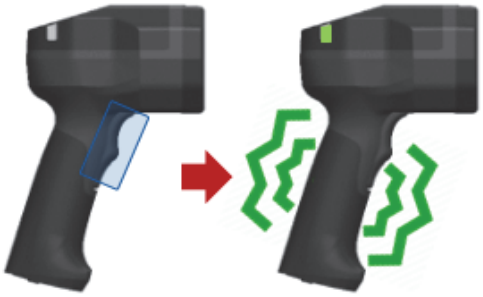
Start at approximately 4" ~ 6" (± 100mm ~ 150mm) and, if necessary, tilt the part (±15 °).

5



Pay attention on the ToF sensor path. If needed, use some object at the same level of the code surface.

6

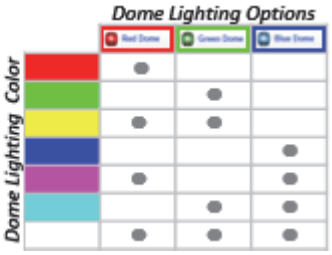


Keep the trigger pulled until you read the code.

Tips and Tricks – DPM, Hard-to-Reach Marks

- If the mark is small, move the reader closer while holding the trigger.
- If the code is difficult to read, change the reader position while holding the trigger.
- If needed, check the **readability table** to confirm that the code density can be read at the current working distance.
- If reading a part at greater than **4" (±100 mm)**, position the reader at **15°** for improved decoding.
- Check that the reader can "see" the entire code, i.e., **code size < FOV (field of view)**.
- Check that the correct code type is currently enabled.
  Important: Aztec Code and **DotCode** aren't enabled by default.
- If needed, enable **Advanced Features: 2D Damaged Mode, Attempt Morphology Manipulation**, etc. (disabled by default).
- Check that the symbology features are enabled properly.
  Important: DMRE (Data Matrix Rectangular Extension) is not enabled by default.
- For **Data Matrix** codes, only **ECC 200** is enabled by default. If necessary, **legacy ECC 000 - ECC 130** can be enabled by the user.
- If the code is difficult to reach due to access constraints caused by the physical form of the part, disable the **Time of Flight** sensor and perform a **localized quick focus** on the image.
- For parts in color, select the proper lighting color to create contrast when using **Dome Lighting** (RGB available).





- Using the opposite light spectrum will make the target appear darker.
- Using the same light spectrum will make the target appear lighter.
- The target can be the code's foreground or background color.

Readability Tables – DPM, Hard-to-Reach Marks

The readability tables below show the **calculated PPE (pixels per element)** for a range of **typical code sizes (X-dimension)** at certain working distances. For a **1D barcode (high-contrast DPM): 2.0 PPE** is suggested as a **minimum**. **2.5 PPE** or more is **preferred**. For a **2D code (high-contrast DPM): 3.0 PPE** is suggested as a **minimum**. **4.0 PPE** or more is **preferred**.

Minimum Element Size (X-Dimension)	Readability of 1D DPM Code at Distance (2.00 → 2.50)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	2.40 mils	2.70 mils	3.60 mils	4.80 mils	6.00 mils	7.30 mils	9.70 mils	11.10 mils	12.00 mils	14.60 mils

Minimum Element Size (X-Dimension)	Readability of 2D DPM Code at Distance (3.00 → 4.00)									
	0mm [0.00"]	5mm [0.20"]	25mm [0.98"]	50mm [1.97"]	75mm [2.95"]	102mm [4.02"]	152mm [5.98"]	180mm [7.09"]	200mm [7.87"]	254mm [10.00"]
2.0 mils	2.09	1.90	1.39	1.04	0.84	0.69	0.52	0.45	0.42	0.34
2.5 mils	2.62	2.38	1.74	1.31	1.04	0.86	0.65	0.57	0.52	0.43
3.3 mils	3.45	3.14	2.30	1.72	1.38	1.13	0.85	0.75	0.69	0.57
5.0 mils	5.23	4.75	3.48	2.61	2.09	1.72	1.29	1.13	1.04	0.86
7.5 mils	7.85	7.13	5.23	3.92	3.13	2.58	1.94	1.70	1.57	1.29
10 mils	10.46	9.51	6.97	5.22	4.18	3.43	2.58	2.27	2.09	1.72
15 mils	15.69	14.26	10.45	7.83	6.27	5.15	3.88	3.40	3.13	2.57
20 mils	20.92	19.02	13.94	10.45	8.35	6.87	5.17	4.54	4.17	3.43
30 mils	31.39	28.53	20.90	15.67	12.53	10.30	7.75	6.81	6.26	5.15
40 mils	41.85	38.03	27.87	20.89	16.71	13.74	10.34	9.08	8.35	6.87
FOV (mm)	31mm x 23mm	34mm x 26mm	47mm x 35mm	62mm x 47mm	78mm x 58mm	95mm x 71mm	126mm x 94mm	143mm x 107mm	156mm x 117mm	189mm x 142mm
FOV (in)	1.2" x 0.9"	1.3" x 1.0"	1.8" x 1.4"	2.5" x 1.8"	3.1" x 2.3"	3.7" x 2.8"	5.0" x 3.7"	5.6" x 4.2"	6.1" x 4.6"	7.5" x 5.6"
X-Dimension (MIN)	3.20 mils	3.50 mils	4.70 mils	6.30 mils	7.80 mils	9.50 mils	12.60 mils	14.40 mils	15.60 mils	19.00 mils

A **5.0 mil 1D barcode** should be read at a distance **≥ 50 mm**. A **5.0 mil 2D code** should be read at a distance **< 25 mm**.

3-3 WebLinkHH Quick Start

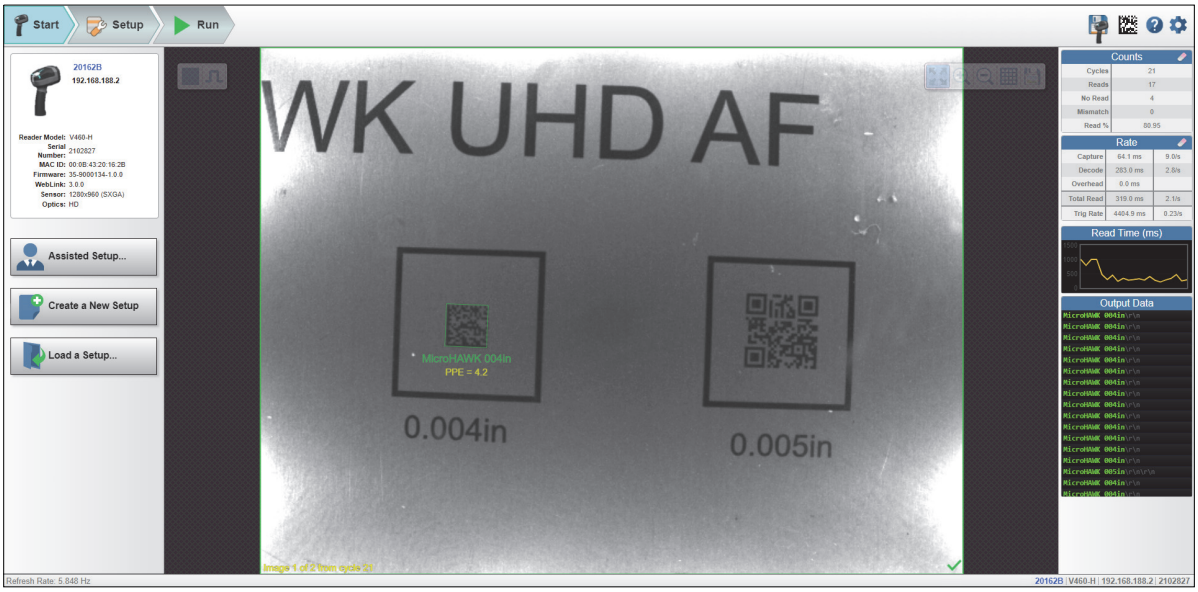
See **Section 2-2 Connect to WebLinkHH** for WebLinkHH system requirements and connection instructions.

3-3-1 Explore the Start View

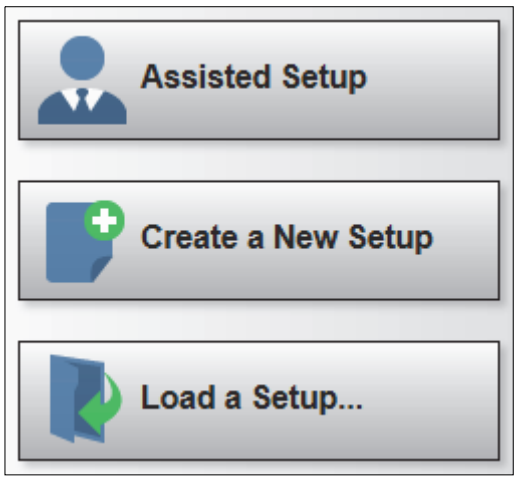
The **Start** view is the initial view you will see when the WebLinkHH session begins. The connected handheld is shown, along with its **user-defined name**, **IP address**, **Reader Model**, **Serial Number**, **MAC ID**, **Firmware version**, **WebLinkHH version**, **Sensor**, and **Optics**.

Note: The user-defined name must be **19 characters** or fewer.

This view allows you to choose **Assisted Setup**, to **Create a New Setup**, or to **Load a Setup**.

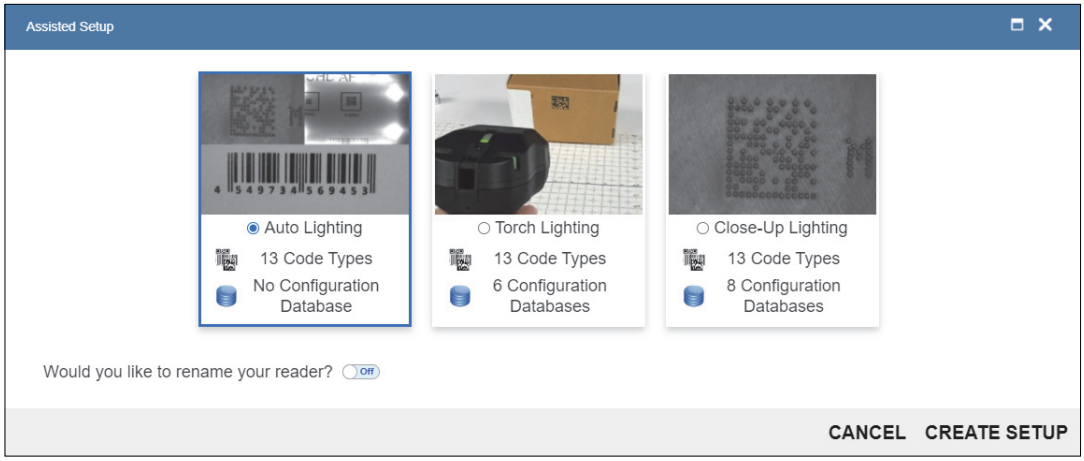


3-3-2 Create a New Setup or Load an Existing Setup



Assisted Setup

When you click the **Assisted Setup** button in the **Start** view, a dialog with three lighting configurations will appear. WebLinkHH generates your initial setup automatically. Once the setup is created, you can fine-tune its parameters in the **Setup** view.



There are three pre-defined system configurations in Assisted Setup: **Auto Lighting**, **Torch Lighting**, and **Close-Up Lighting**.

- **Auto Lighting** is the default “auto-everything” configuration that automatically selects the best lighting and imaging parameters for the application and allows the reader to decode a wide variety of codes, from high-contrast codes on labels at a distance to challenging direct part marks (DPMs) on shiny cylindrical surfaces that can only be read at contact. This configuration should work very well for most applications and is the go-to configuration for most users.

  The other two predefined configurations limit the selected lighting options to either **Torch Lighting** or **Close-Up Lighting** (**Dome** and **Low-Angle**). They are also ideal starting points for expert users who choose to customize reader setup using the options in the **Setup** tab such as the **Configuration Database**.
- **Torch Lighting** only enables the built-in high-intensity long-range lighting and automatically selects the best **Focus**, **Exposure** and **Gain** parameters for codes to be read at a distance. These codes can either be high-contrast labels or direct part marks.
- **Close-Up Lighting** only enables the built-in **Dome** and **Low-Angle** lighting and cycles through illumination settings optimized to decode challenging direct part marks and/or codes on highly-reflective cylindrical surfaces. Such codes are often difficult to read from a distance, but can be decoded more easily at contact or near contact.

  For additional information, refer to **Targeting Tips and Tricks**.

Create a New Setup

The **Start** view also allows you to **Create a New Setup** without using Assisted Setup. When you click the Create a New Setup button, you will see the **Setup** view.

Load a Setup

Select **Load a Setup** to load an existing **.wls** WebLinkHH setup file. The .wls file contains all current reader settings.

3-3-3 Explore the Setup View

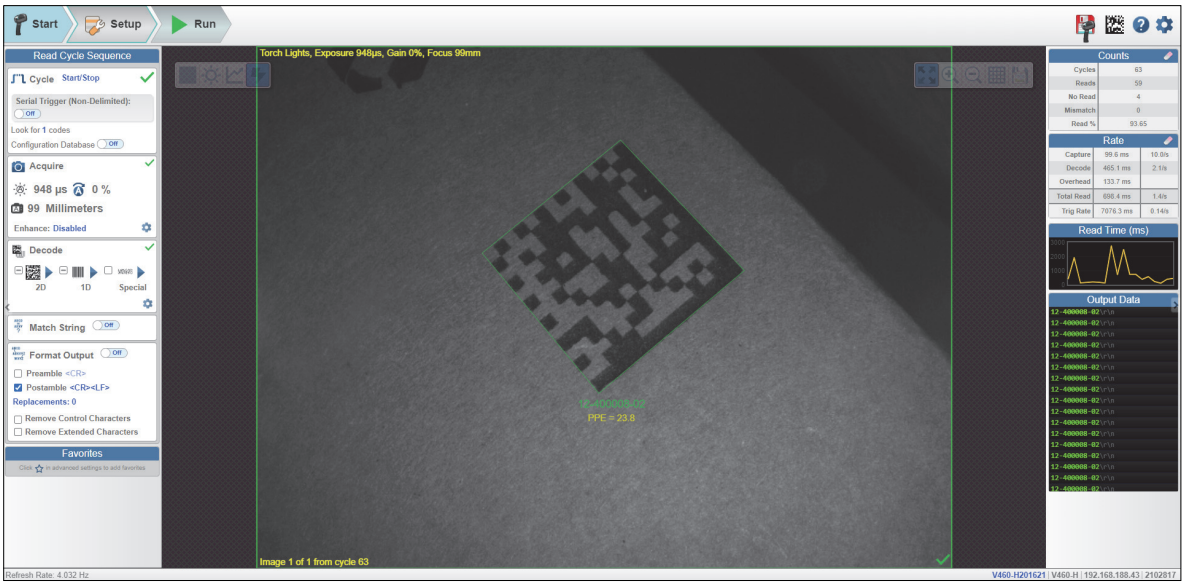
The **Setup** view allows you to configure all aspects of a setup. Multiple discrete sections of the interface give you the ability to set **Cycle**, **Acquire**, **Decode**, **Match String**, **Format Output**, and **Favorites**.

Clicking the **Save** icon at the upper right saves current settings to the handheld's flash memory so the settings will be available when the handheld is rebooted.

The **Data Matrix** icon at the upper right opens **Barcode Programming**.

The **question mark icon** at the upper right opens **WebLinkHH Help**.

The **gear icon** at the upper right opens the **Application Settings** menu.



3-3-4 Configure Read Cycle Settings

Introduction

The handheld can operate in a number of modes from a presentation scanner to a triggered handheld. The **Read Cycle** defines how it will operate. Setting up the read cycle type and parameters involves a series of decisions based on your particular application:

1. Select the **Cycle** type: **Presentation**, **Triggered**, or **Start/Stop**. Select the **number of codes** to be read in a single cycle. The handheld can satisfy this condition by reading one or more codes in a single image frame or across multiple image frames. The handheld will indicate a pass if it finds all codes, and indicate a fail if it does not. Note that the handheld will not read and count a code if it is the same code type, and if it contains the same data as a previous code.

   Note: The pre-configured “recipes” in **Assisted Setup** all default to **Start/Stop** mode.

2. Decide how the read cycle will start by choosing the cycle type. If you choose **Presentation**, the handheld will start automatically. If you choose **Start/Stop**, you will need to pull the trigger to start the cycle. If you choose **Triggered**, you can either pull the trigger or send a serial trigger via WebLinkHH. You can send a trigger via WebLinkHH in Start/Stop by turning on **Serial Trigger (Non-Delimited)**.

   Note: The reader can be triggered by a PLC via Power over Ethernet (PoE).

Common Settings for all Read Cycle Modes

The following settings are common for all read cycle modes:

- **Look for # of Codes –** This is the number of codes that the handheld should find in each decode cycle. If the handheld finds all codes, the decode cycle will pass. If it does not find all codes, the cycle will fail, and only the codes it finds will be output. The remaining codes will be output as **No Read**. The maximum number of codes is **100**.
- **Configuration Database –** Enable or disable the Configuration Database as part of the read cycle. The Configuration Database is described in detail in **Setup > Configuration Database**.

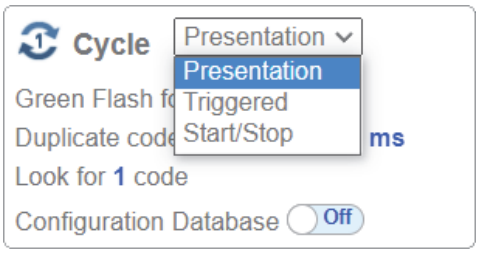
The different read cycle types are listed below.

Presentation

In **Presentation** mode, by default the reader is in a **Continuous-One** free-running state.

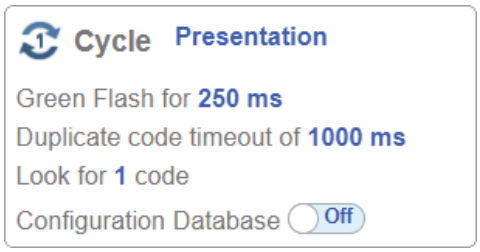
Parts can be presented to the reader at will, and the number of codes to look for will equal **1**. During the cycle, the reader will continuously acquire and process images until all symbols are found, or until the **Timeout** is reached. If the timeout is reached, Nothing was output will be displayed in the output data. A **Green Flash** at the end of a cycle indicates a successful read.

The cycle time includes the **Capture**, **Decode**, **Overhead Time**, and **Green Flash Duration**.



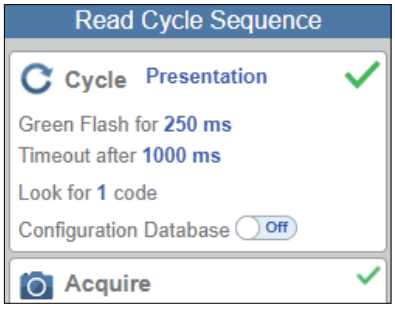
- **Green Flash –** The reader flashes green at the end of a successful read cycle. The green LEDs remain on for the set time. (**0 msec** to **655350 msec**. The default is **250 msec**).

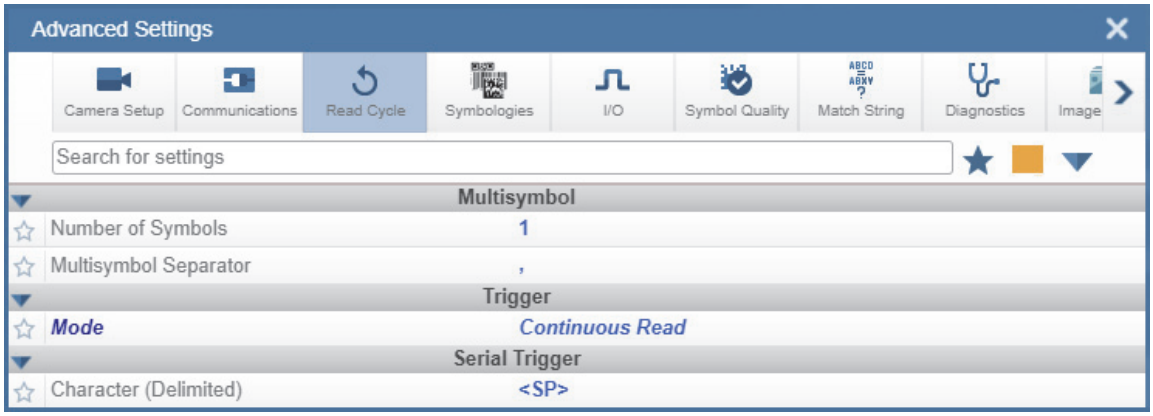
- **Duplicate Code Timeout –** The reader will only read the same code after a certain timeout has passed. (Note that this is only shown when in **Continuous Read 1 Output**, which can be changed in **Advanced > Read Cycle > Trigger > Mode**) (**20 msec** to **655350 msec**).





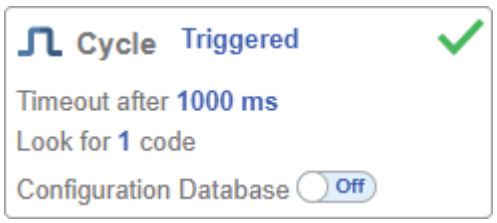
- **Timeout After –** This is the amount of time the reader is allowed to spend for the entire read cycle, acquiring and processing images until all codes are read. Set this value long enough to be able to decode in all circumstances, but short enough to prevent the camera from taking longer than the allowed cycle time of the production line. (**20 msec** to **655350 msec**). (Note that this is only shown when in **Continuous Read**, which can be changed in **Advanced > Read Cycle > Trigger > Mode**).





Note: When the reader is in **Presentation** mode and **Time of Flight** is set to **Enabled** in (its default setting) in **Camera Setup**, there is no **Timeout**. The reader will begin to acquire and process images as soon as an object is placed in front of the reader, and it will continue to do so until the object is removed. Once a symbol is found in the field of view, the reader will report the symbol a single time. **Acquisition** and image processing will continue for as long as the object is positioned in front of the reader. When the object is removed, acquisition and image processing will stop. The symbol that was decoded will not be reported again until the object is removed and placed in front of the reader a second time, or until a different symbol is read during the same cycle. **Time of Flight** can be changed in **Advanced Settings > Camera Setup**.

Triggered Modes

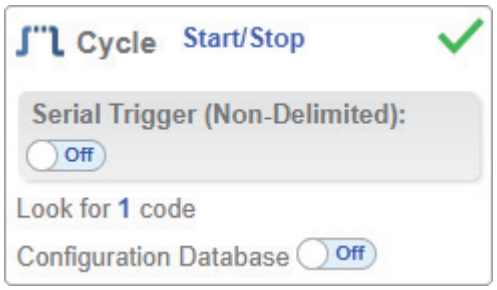


In **Triggered** mode, the handheld starts with a trigger, and the cycle ends when the handheld finds the expected number of codes, or when the read cycle times out.

The cycle time includes the capture and decode times.

- **Timeout After** is the amount of time the handheld is allowed to spend for the entire read cycle, acquiring and processing images until all codes are read. You should set this value long enough to be able to decode in all circumstances, but short enough to prevent the handheld from taking longer than the allowed cycle time of the production line. (**20 msec** to **655 seconds**. The default is **1 second**. **1,000 milliseconds** = **1 second**.)

Start / Stop

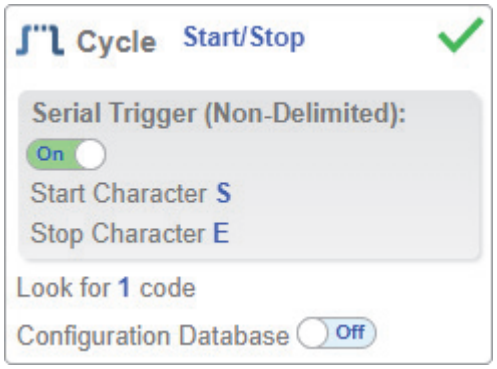


In **Start/Stop** mode, the handheld goes into **Continuous Read** mode when you press the trigger, and exits Continuous Read mode when you release the trigger.

Symbol data is output as soon as possible. The output condition can be configured in **Advanced Parameters** (**I/O** > **Symbol Data Output**).

Serial Trigger Non-Delimited Off – When **Serial Trigger** is set to **Off**, the handheld will respond to the I/O trigger **External Level**. **High** will start the read cycle and **low** will end it.

Serial Trigger Non-Delimited On – When **Serial Trigger** is set to On, the handheld will respond to **Serial Triggers**. It will also respond to the I/O trigger **External Level**. By default, the start and stop characters are set to **S** and **E**.



- **Serial Tigger Delimited –** Sets whether **I/O** or **Serial Trigger and I/O** mode are used.
- **Start/Stop Characters –** Characters used for **Serial Trigger**. The maximum number of start characters is **2**. The maximum number of stop characters is **2**. The character range is **0x00 - 0x7F**.

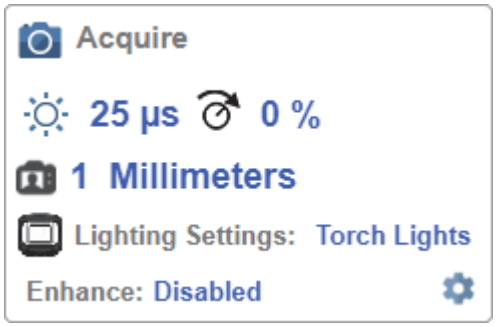
3-3-5 Configure Acquire Settings

Acquire settings allow you to set **Exposure** (signified by the sun icon), **Gain** (signified by the dial and right-pointing arrow icon), and **Focus** (signified by the camera icon) in real time. Clicking any of these settings will cause a control to appear, allowing you to modify that setting. Settings take effect immediately.

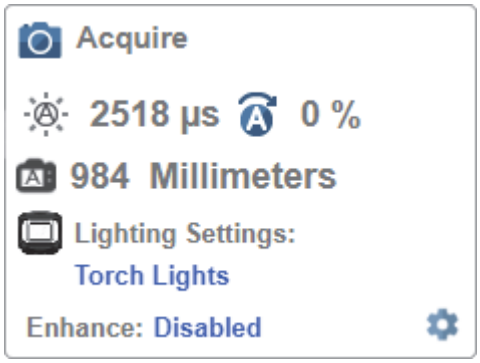
The valid **Exposure** range is **25 µs** to **100,000 µs**. The valid **Gain** range is **0% to 100%**. The valid **Focus** range is **0 mm to 250 mm**.

Important: There are 4 levels of **Gain** in the handheld. Each level corresponds to **25 percentage points**, or one quarter turn of the Gain dial.

- Level **1** = 0% to 24%
- Level **2** = 25% to 49%
- Level **3** = 50% to 74%
- Level **4** = 75% to 100%



When **Time of Flight** (found in **Advanced Settings > I/O** or **Advanced Acquire Settings**) is enabled or **Calculate Exposure and Gain** (found in **Advanced Settings > Read Cycle** or **Advanced Acquire Settings**) is enabled, the **A** shown on the **sun icon** and **dial icon** signifies that **Exposure** and **Gain** will be updated automatically based on Time of Flight or Calculate Exposure and Gain.

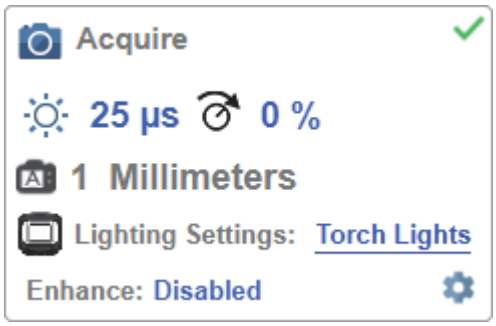


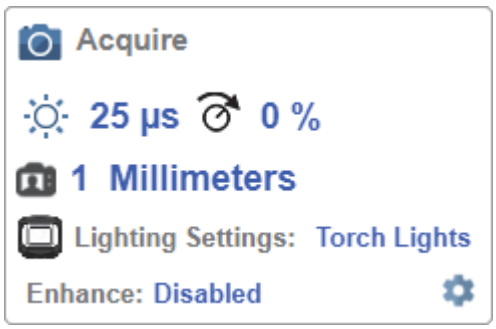
Autofocus

Autofocus can be enabled and disabled in the **Image Area** using the **Focus Button** in the **Device Control Toolbar**, and can be configured in the **Acquire** section of the **Setup** view.

While in **Continuous** mode and **Time of Flight** is disabled, the handheld can enable or disable Autofocus functionality, allowing it to refocus after a number of no reads. The Focus Button shows an **A** when Autofocus is enabled. The focus distance is updated on-the-fly based on the latest refocus settings.

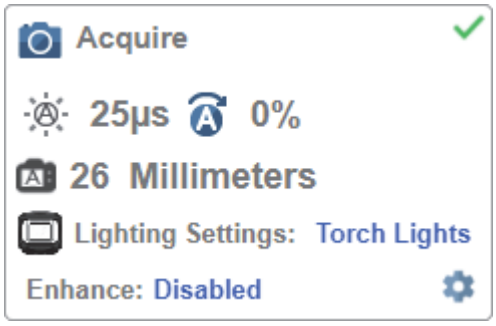






● Time of Flight

Time of Flight is a distance sensor that helps with Autofocus. You can enabled and disable Time of Flight via **Advanced Settings > I/O** or **Advanced Acquire Settings**.



When **Time of Flight** is enabled, **Focus** is read-only. When **Time of Flight** or **Calculate Exposure and Gain** is enabled, **Exposure** and **Gain** are read-only.

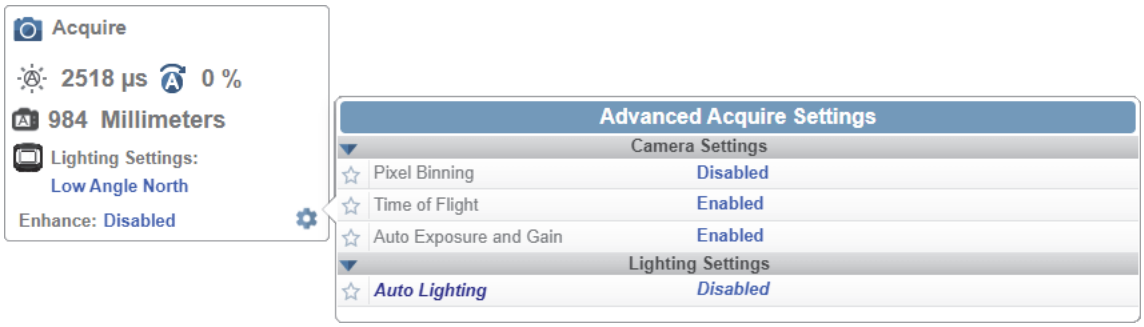
The table below shows the **Time of Flight** and **Calculate Exposure and Gain** parameter setting combinations.

Time of Flight	Calculate Exposure and Gain	Focus	Exposure and Gain
Enabled	Enabled	Read-Only	Read-Only
Enabled	Disabled	Read-Only	Read-Only
Disabled	Enabled	Editable	Read-Only
Disabled	Disabled	Editable	Editable

Note: The **Focus** button in the **Image Area** is hidden when **Time of Flight** is enabled.

Advanced Acquire Settings

Advanced Acquire Settings can be opened via the **gear icon** at the bottom right of the **Acquire** widget.



Spot Focus

If **Time of Flight** is disabled, you can perform a localized **Quick Focus** in the image.

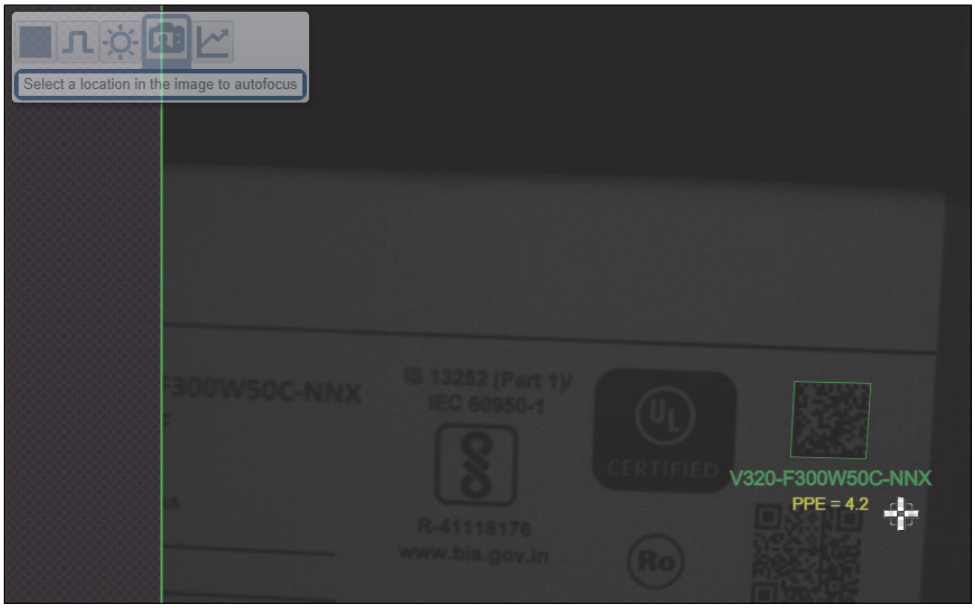
If you click the **Focus Button**, the **Autofocus** and **Spot Focus** icons appear:



When you click the **Spot Focus** icon, the **Select a location in the image to autofocus** message appears.



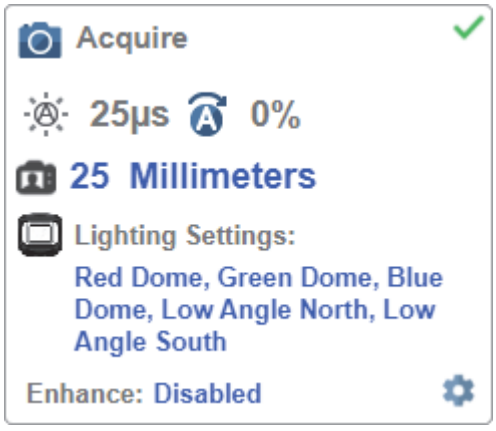
The cursor transforms into crosshairs as shown in the example below. This allows you to select the section of the image in which you want to perform a quick focus.



Note: If you click the **Autofocus** button to the left of the **Spot Focus** button, the handheld will switch from Spot Focus to regular Autofocus functionality. If the handheld is in **Triggered** mode, only the Spot Focus icon will appear.

Lighting Settings

The **Lighting Settings** in **Acquire** allow you to select **Dome Lighting**, **Low Angle**, or **Torch Lighting**, and to configure lighting parameters. This field is hidden when **Auto Lighting** is enabled (**Advanced Settings > Auto Calculate > Auto Lighting**).





● Dome Lighting Options

- Disabled
- Red
- Green
- Red + Green = Yellow
- Blue
- Red + Blue = Magenta
- Green + Blue = Cyan
- Red + Green + Blue = White Dome Lighting

● Low Angle Options

- Disabled
- South
- North
- South + North

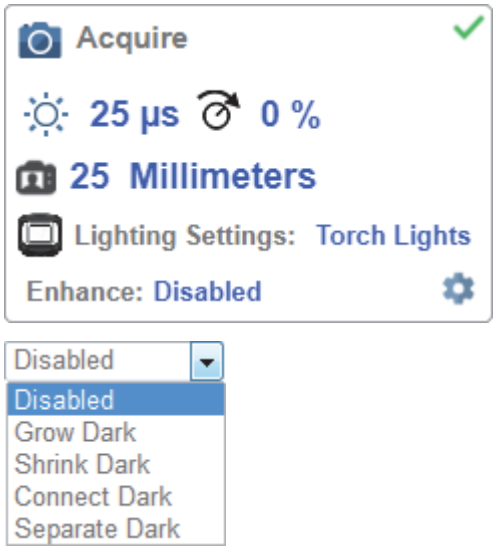
● Torch Lighting Options

- Disabled
- Enabled

Note: If you select **Torch Lighting**, the other options are disabled. The reverse is also true.

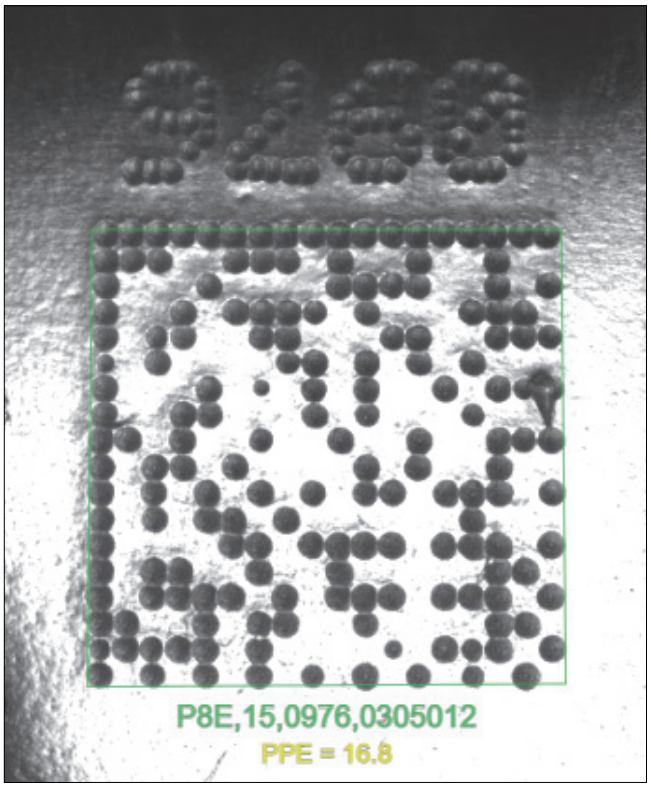
Enhance

The **Enhance** dropdown menu at the bottom of the Acquire editor allows you to select the method for processing captured images to improve reading robustness.



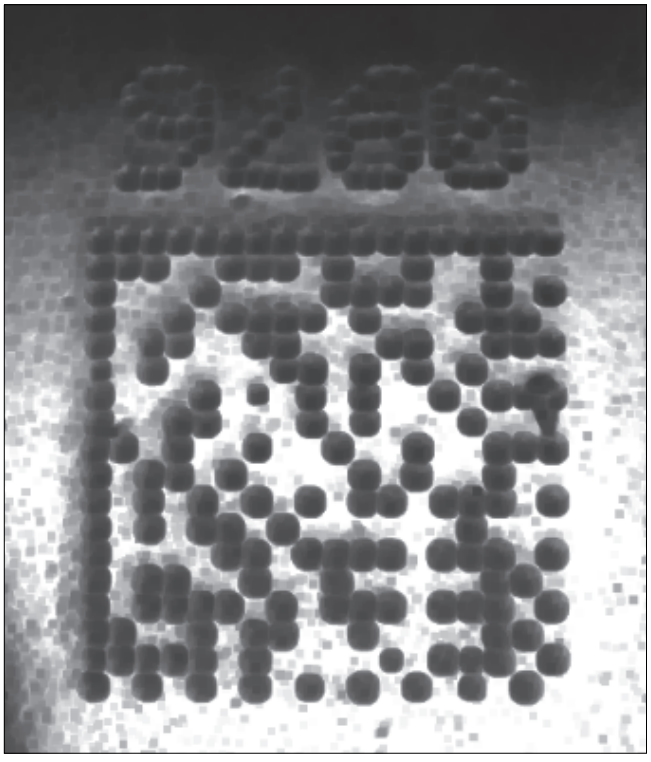
● Disabled

None of the enhanced processing settings are selected. The example below shows a DPM in the handheld's field of view when enhanced processing settings are disabled.



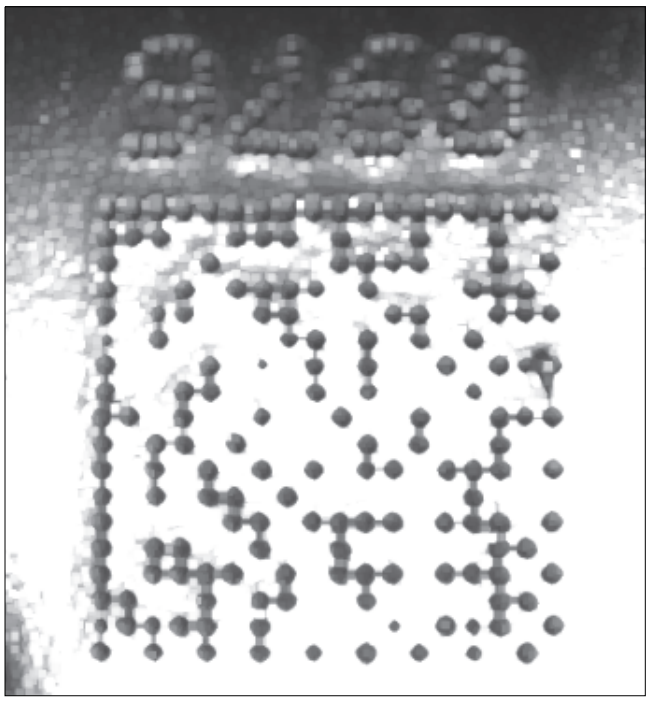
● Grow Dark

Grow Dark increases the dark cell size of a symbol. It is useful for increasing the dark cell size of a dark-on-light Data Matrix symbol. The example below shows a DPM in the handheld's field of view when Grow Dark is enabled.



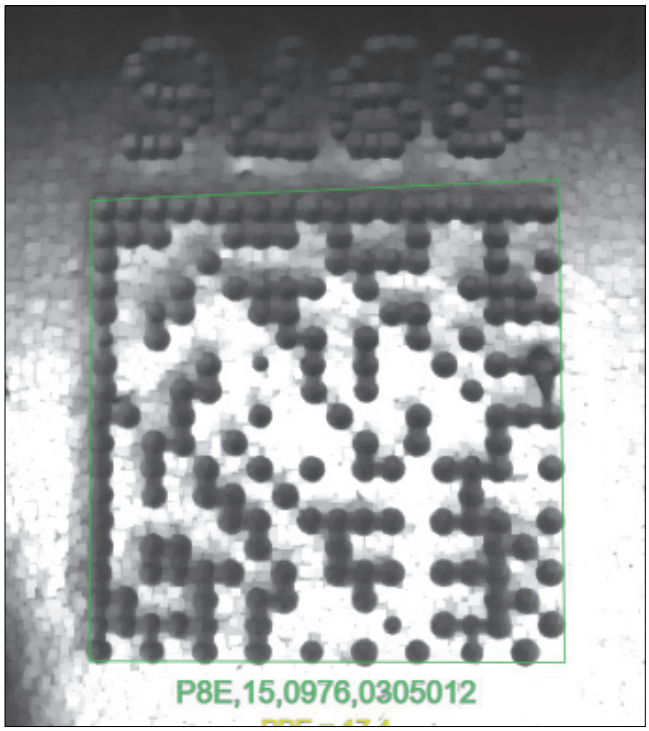
● Shrink Dark

Shrink Dark increases the light cell size of a symbol. It is useful for increasing the light cell size of a light-on-dark Data Matrix symbol. The example below shows a DPM in the handheld's field of view when Shrink Dark is enabled.



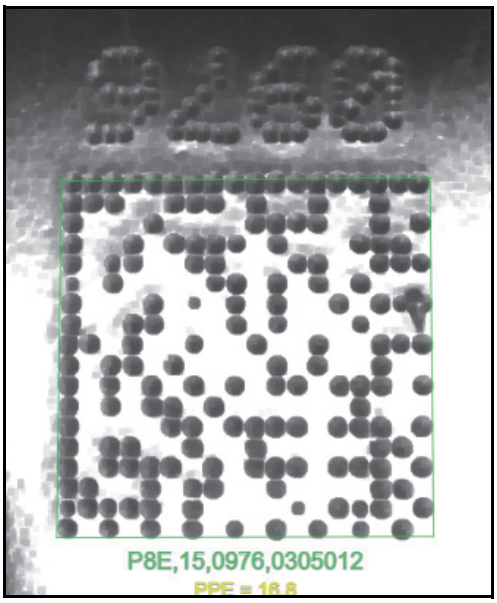
● Connect Dark

Connect Dark removes minor light defects of dark cells. The example below shows a DPM in the handheld's field of view when Connect Dark is enabled.



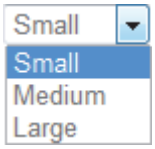
● Separate Dark

Separate Dark removes minor dark defects of light cells. The example below shows a DPM in the handheld's field of view when Separate Dark is enabled.



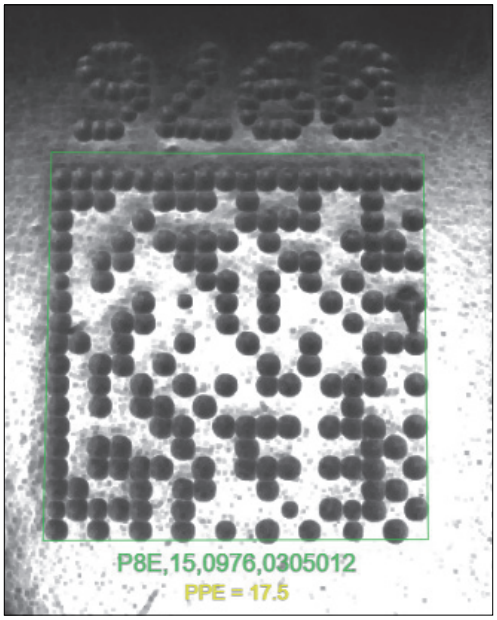
Operator Size

The **Operator Size** dropdown menu determines the size of the area or “pixel neighborhood” in which the enhance operation is being performed.



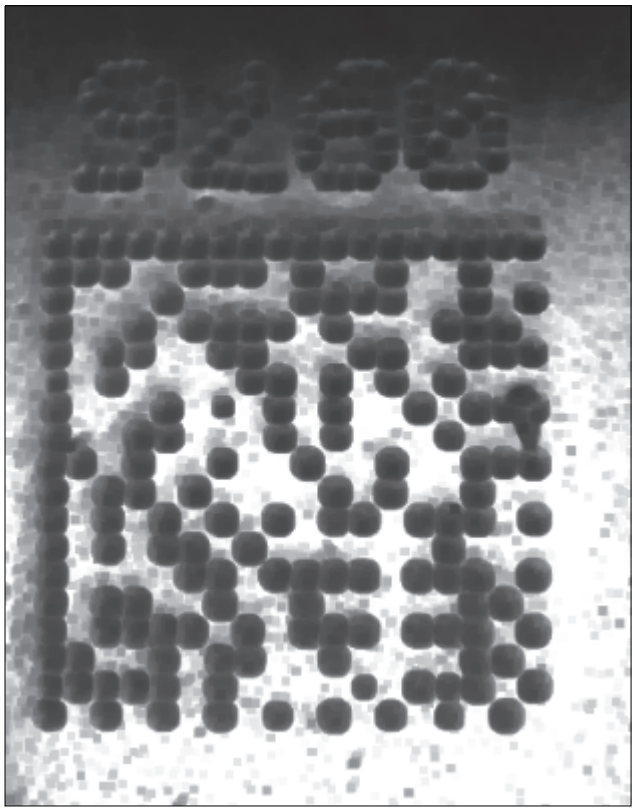
● Small

Small corresponds to an area of **3 pixels by 3 pixels**. The example below shows a DPM in the handheld's field of view when **Grow Dark** is enabled and Operator Size is set to Small.



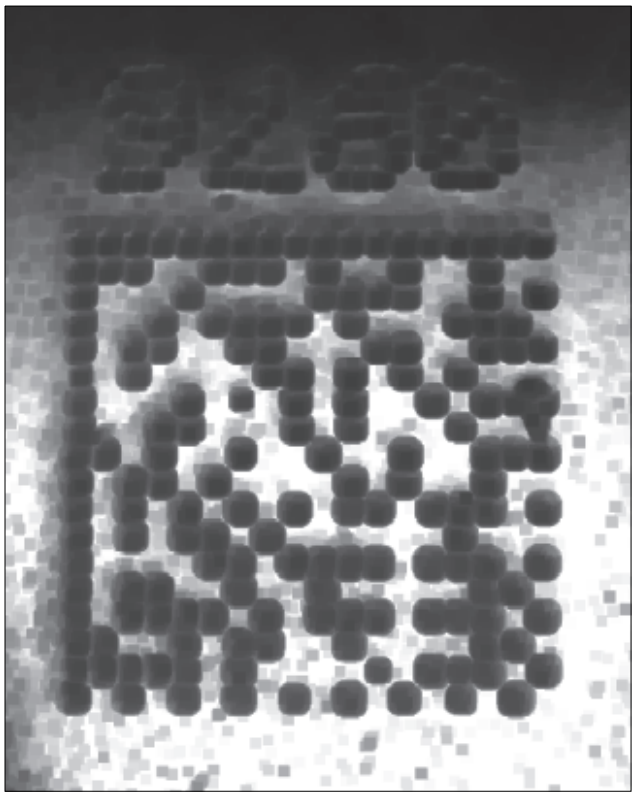
● Medium

Medium corresponds to an area of **5 pixels by 5 pixels**. The example below shows a DPM in the handheld's field of view when **Grow Dark** is enabled and Operator Size is set to Medium.



● Large

Large corresponds to an area of **7 pixels by 7 pixels**. The example below shows a DPM in the handheld's field of view when **Grow Dark** is enabled and Operator Size is set to Large.



3-3-6 Configure Symbology and Decode Settings

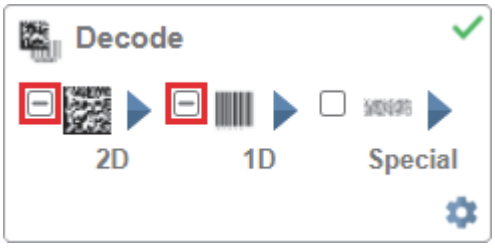
The **Decode** area of the **Setup** view allows you to choose which symbologies (code types) you want to enable, and allows you to configure the parameters for those symbologies.

See **Symbologies** for **Advanced Decoding Parameters**.

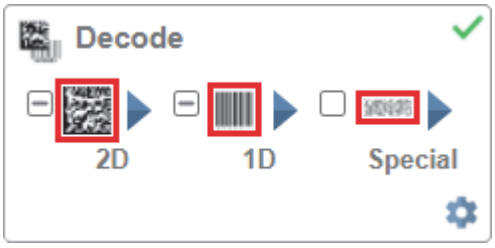
The **Decode** area shown below allows you to select which symbologies the system will search for during the read cycle. Clicking the check boxes (highlighted in the image below) to the left of the **2D**, **1D**, and **Special** symbology categories turns on all symbologies within that category simultaneously.

You can also turn off all symbologies within a category simultaneously by unchecking its corresponding check box. In the image below, for example, the check box for the **Special** category is unchecked, meaning that none of the code types in that category are enabled.

If only some symbologies within a category have been enabled, the check box displays a dash. In the image below, for example, the check boxes for the **2D** and **1D** categories display a dash, meaning that only some of the code types in those categories are enabled.



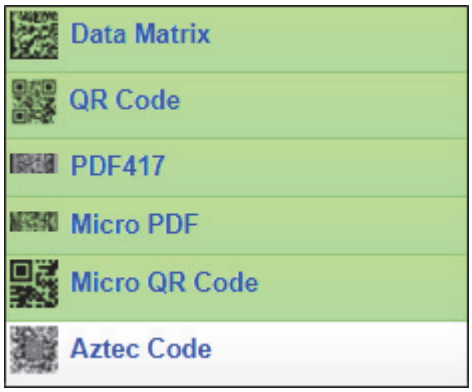
Click the symbols themselves (indicated in the image below) to bring up a list of all the code types available in that symbology category.



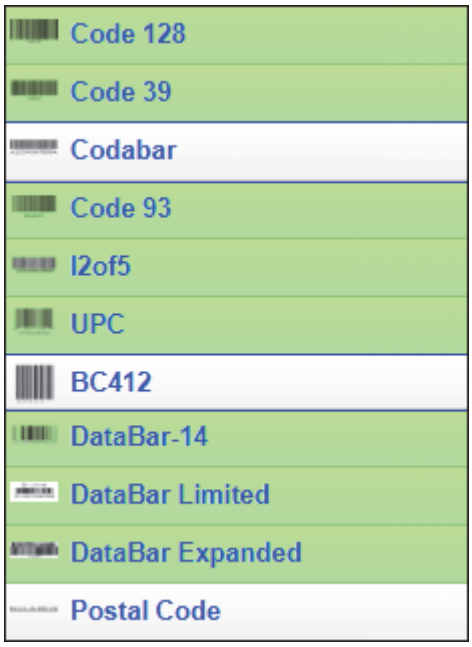
For example, if you click the Data Matrix symbol above **2D** in the **Decode** area, you will see a list of all supported 2D code types. You can enable or disable specific code types from the list by clicking them on or off. In the example below, the green-highlighted code types are enabled and Aztec Code is disabled.

Symbologies

● 2D Symbologies



● 1D Symbologies



● Special Symbologies

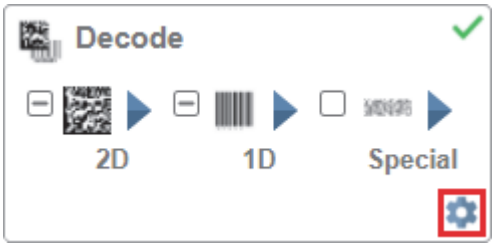


Note: When **DotCode** is enabled, all other symbologies will be disabled.

Note: PharmaCode should only be selected when the application specifically requires the reading of PharmaCode symbols. PharmaCode is used in the pharmaceutical industry, and is designed to be readable despite printing errors. There is a possibility that when PharmaCode is selected but no code is present in the image, random part features may be misrecognized as a code.

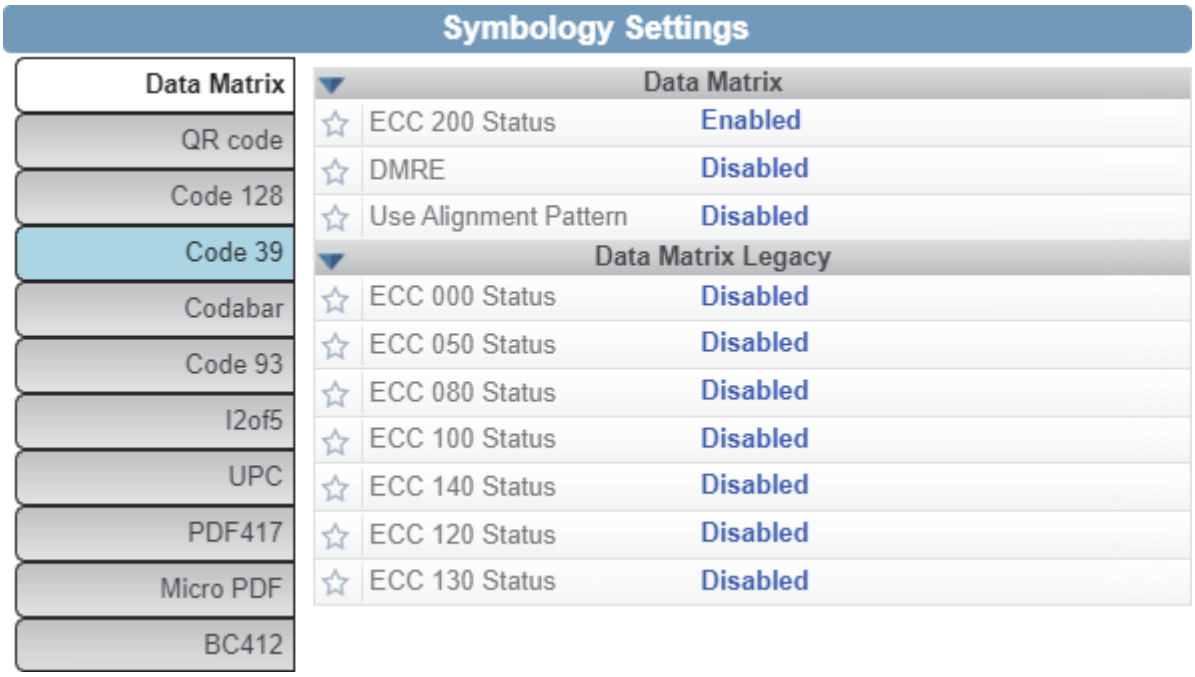
Symbology Settings

Clicking the **gear** icon at the bottom of the **Decode** area brings up **Symbology Settings**.

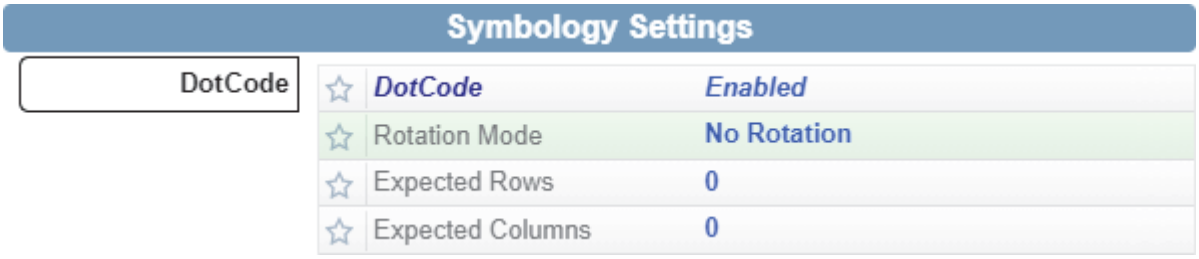


Symbology Settings allows you to configure every parameter of every code type supported by WebLinkHH. All parameter changes take effect immediately.

● Symbology Settings Example 1 – Data Matrix Parameters



● Symbology Settings Example 2 – DotCode Parameters

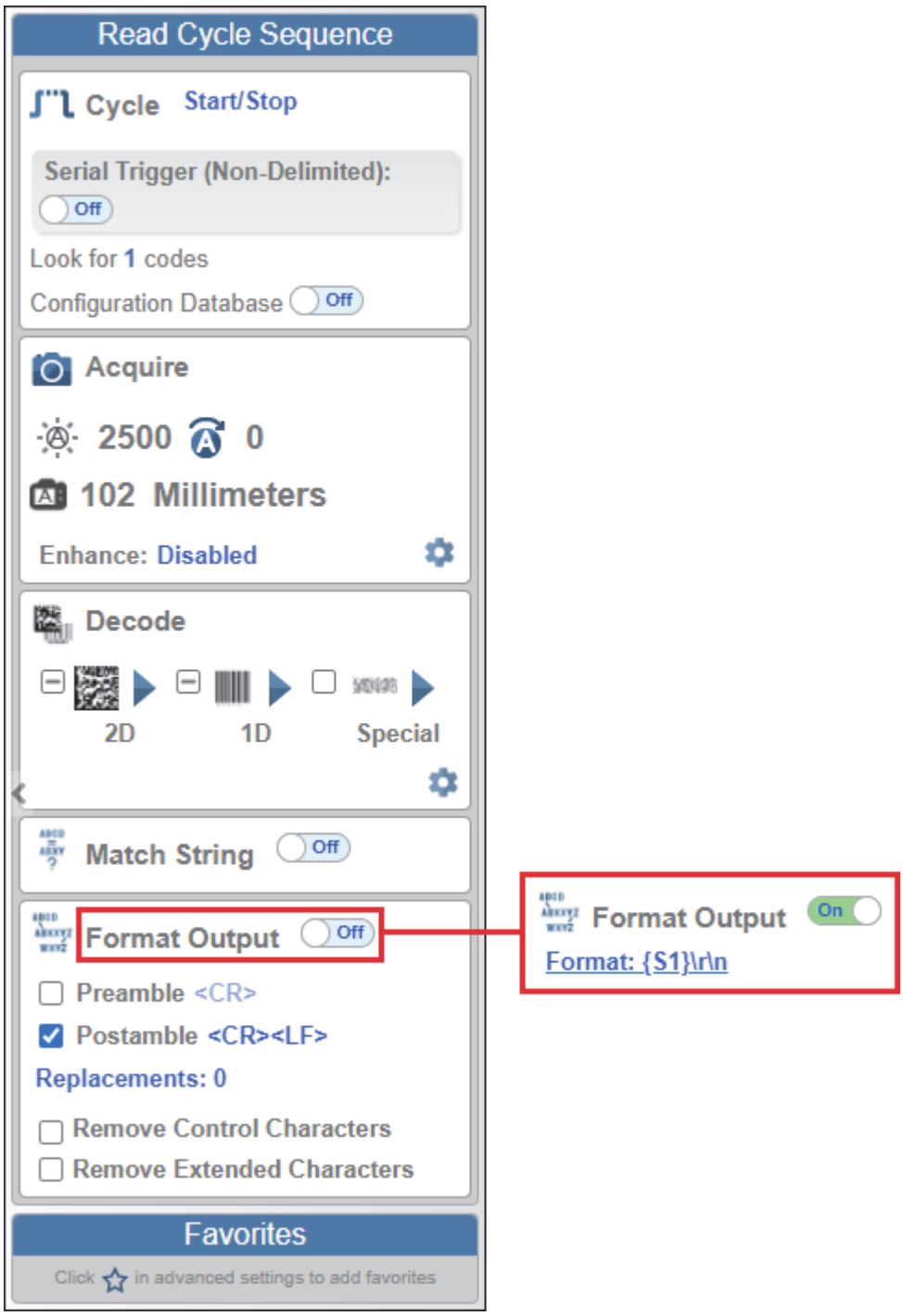


3-3-7 Format Output and Configure Match String

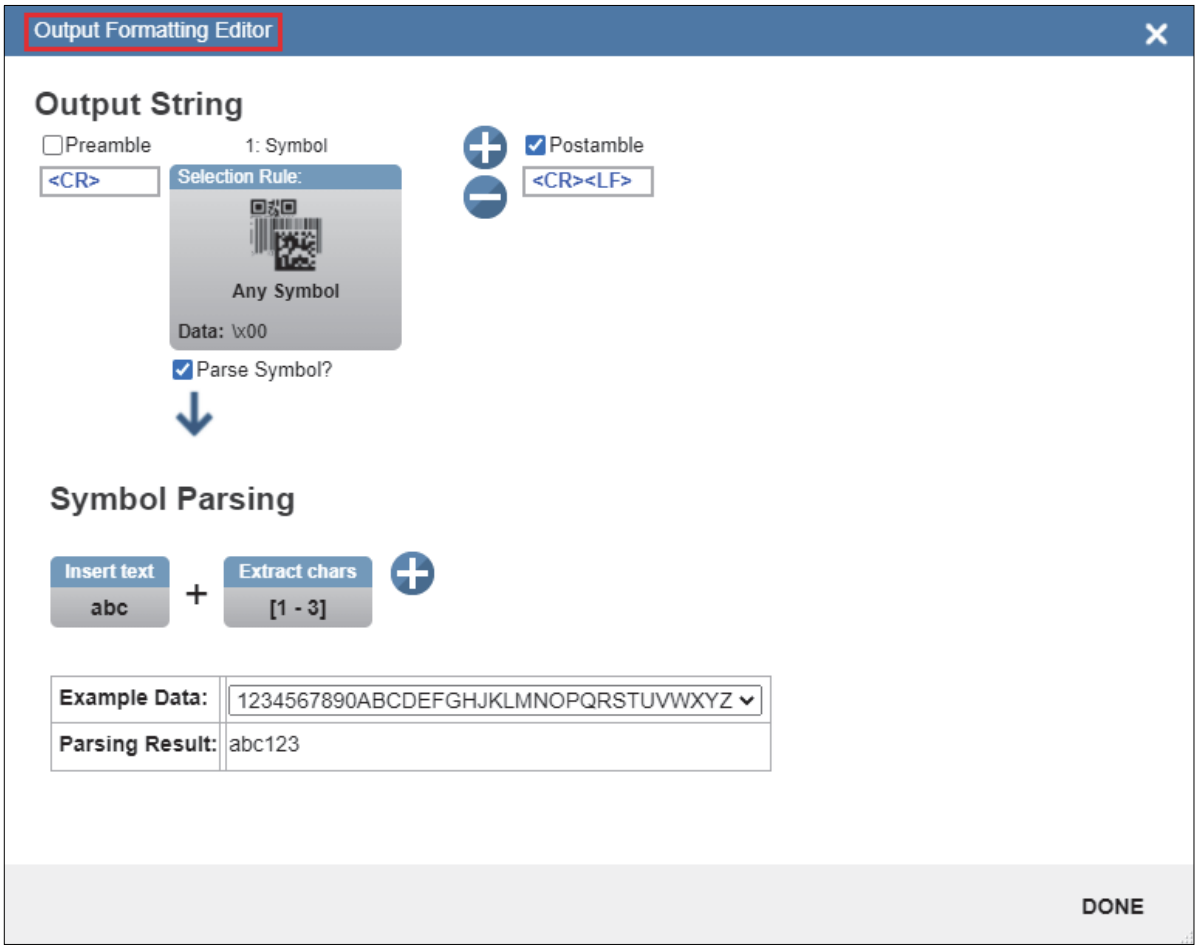
Output Formatting Editor

The **Output Formatting Editor** can be enabled by switching **Format Output** in the **Setup** view's **left panel** to **On**, as shown below, and then clicking the blue **Format:** string. The string in the example below is **Format: {S1}\r\n**.

The Output Formatting Editor provides many ways in which barcode data can be formatted and parsed before it is output as a data string. You can use the Output Formatting Editor to add a **Preamble** and **Postamble** to the beginning and end of the data output string.

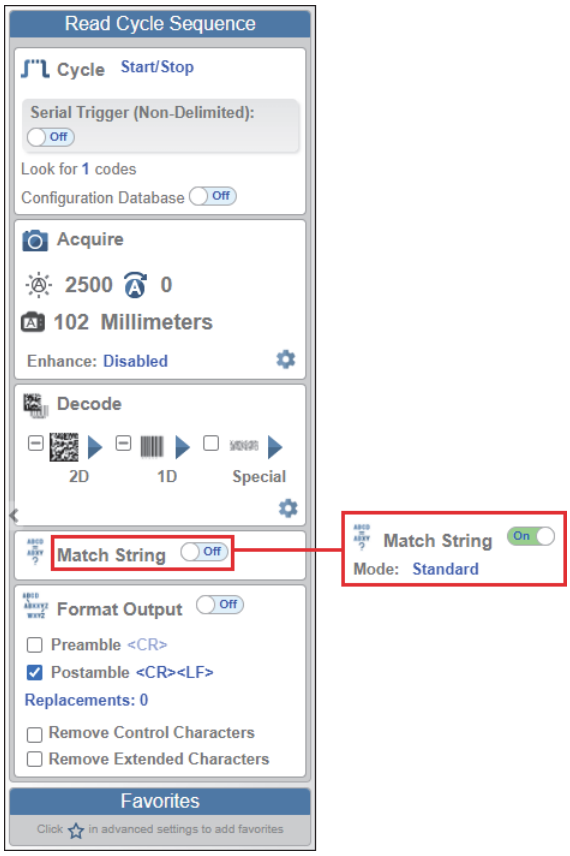


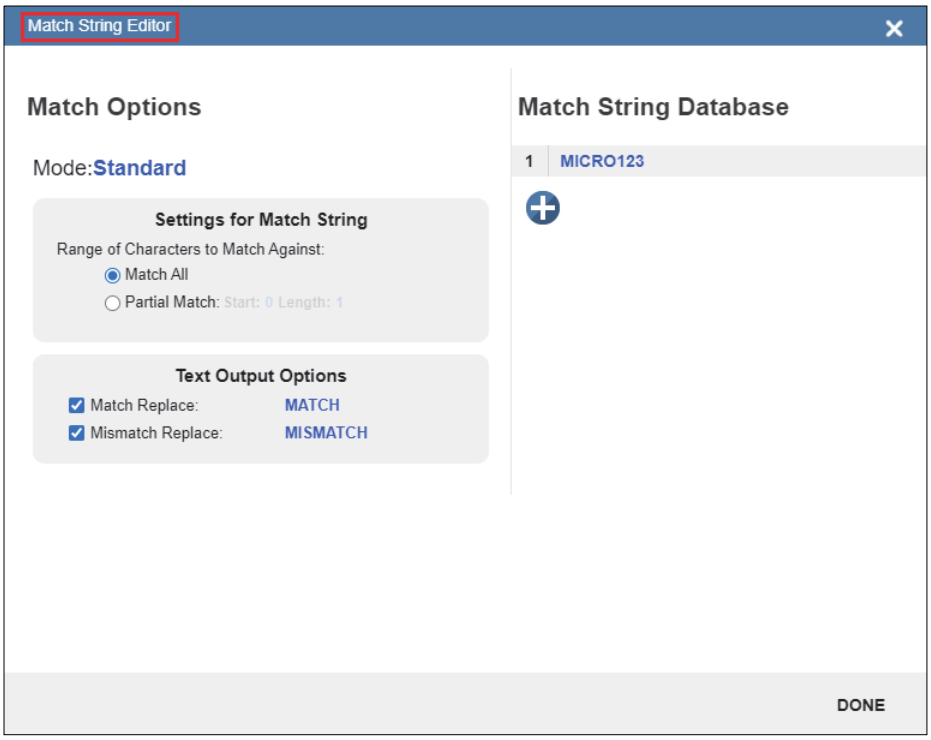
The Output Formatting Editor also allows you to control the order in which data is output by creating an explicit output string.



Match String Editor

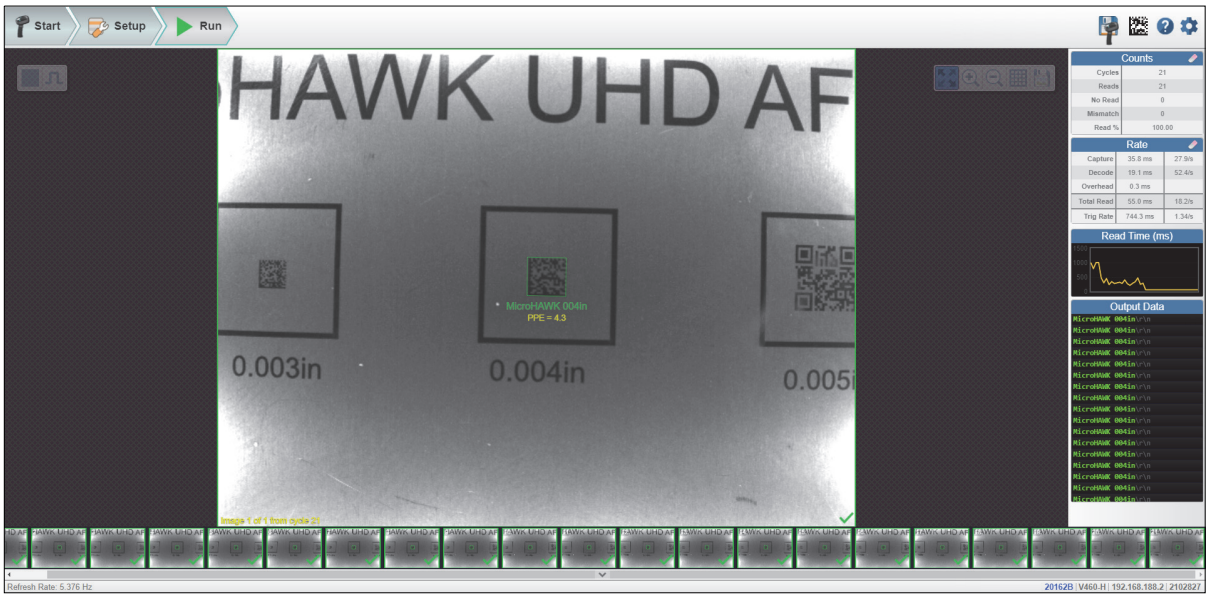
The **Match String Editor**, accessible by switching **Match String** in the **Setup** view's **left panel** to **On** as shown below, allows you to adjust match string settings, select text output options, and set up a match string database.





3-3-8 Run the Application

In the **Run** view, you can observe the progress of the application as it follows the parameters you have defined. The **right panel** of the UI shows **Counts** for **Cycles**, **Reads**, **No Reads**, and **Mismatches**, as well as **Rate** information for **Capture**, **Decode**, **Overhead**, **Total Read**, and **Trigger Rate**, as well as **Output Data**. A **"filmstrip"** below the **Image Area** shows each image capture with a **green check mark** for a good read and a **red x** for a no read.



3-3-9 Save Settings

The **flash icon** at the upper right of the WebLinkHH interface allows you to save current settings to the handheld for reboot. When the current handheld settings match those saved in flash memory, the disk icon changes from **red** to **blue**.

Save to Flash Memory



Saved to Flash Memory



4

WebLinkHH Configuration

This section provides detailed information about the WebLinkHH user interface, which is designed for V460-H configuration, testing, and runtime. Most of this information can also be found in WebLinkHH Help, accessible in the WebLinkHH interface when you are connected to a V460-H reader.

4-1 Overview 4-2
4-2 Start 4-23
4-3 Setup 4-30
4-4 Run 4-78
4-5 Application Settings 4-84
4-6 Terminal 4-128
4-7 Advanced Settings 4-134

Overview

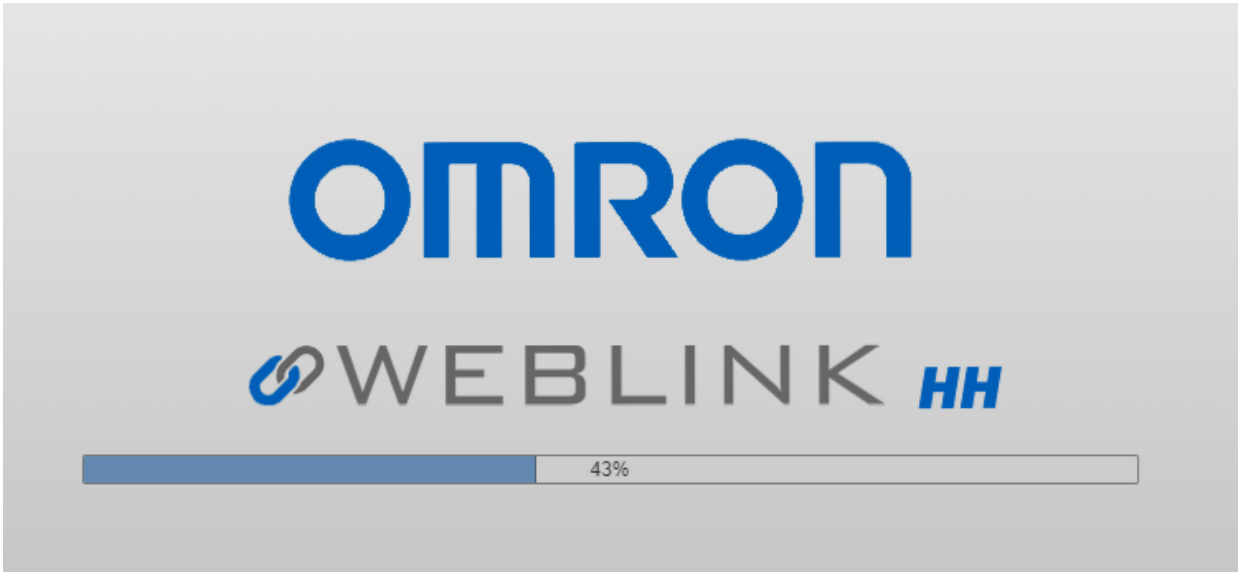
The browser-based **WebLinkHH** interface enables quick and easy configuration and testing of the **V460-H Handheld Code Reader** without the need to install or access files on a host system.

WebLinkHH is reliable, lightweight, and operating-system-independent without compromising the power and depth of its tool set.

WebLinkHH offers novice users an intuitive way to connect, configure, monitor, and troubleshoot a V460-H reader, and provides the power and flexibility expected by advanced users.

Splash Screen

After you open a browser and **enter your reader's IP address**, the first thing you will see is the **splash screen** shown below. You will also see a progress bar as your WebLinkHH session starts.



Navigation Bar

The **navigation bar** at the top of the WebLinkHH interface features buttons for three primary views: **Start**, **Setup**, and **Run**.



Flash Icon

The **flash icon** allows you to save current settings to the reader for reboot. When the current reader settings match those saved in flash memory, the disk icon changes from **red** to **blue**.

Save to Flash Memory

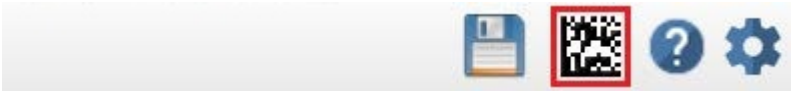


Saved to Flash Memory



Barcode Programming

Barcode Programming allows you to program the reader by decoding Data Matrix symbols encoded with configuration commands. You can open Barcode Programming by clicking the Data Matrix icon between the flash icon and help icon.



Barcode Groups

A **barcode group** is a collection of two or more compound Data Matrix symbols, like those shown below, in the **Barcode Programming** interface.



Differences from Default

The names of barcode groups can be edited.

All Data Matrix symbols in a compound symbol (with the exception of Restore Default) should end with a **<A>** or **<Z>** command in the data. Barcode programming will choose **<A>** when **Save Settings to Flash** is unchecked, meaning the reader will keep its original settings when power is cycled. Barcode programming will choose **<Z>** when **Save Settings to Flash** is checked, meaning the reader will have the settings from the programming code when power is cycled.

Successful Barcode Programming

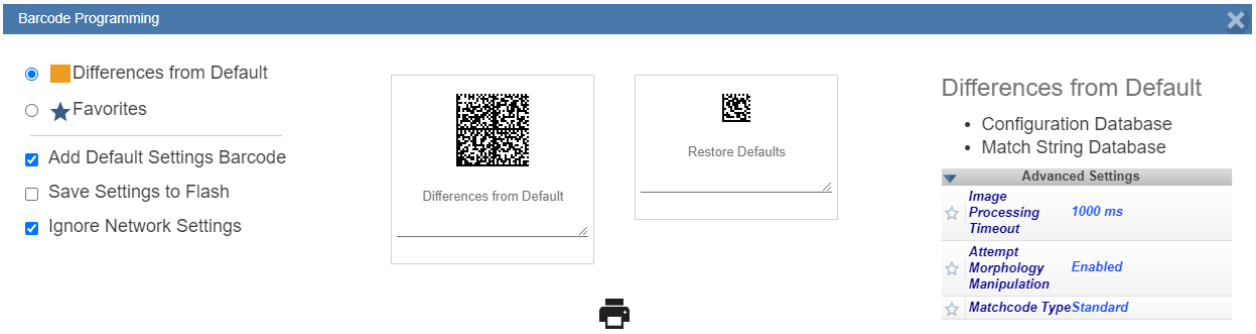
When a **programming barcode** is read successfully, WebLinkHH will show a green **good read** border around the image and around the code. The output data will say **Programming Barcode**, and WebLink's parameters will update to the command setting encoded in the programming barcode (**<Ard> – Reset and Recall Default Parameters Except Communication Settings –** in the example shown below).



Settings Groups

The **settings groups** are **Configuration Database**, **Match String Database**, **Replace Character**, and **Format Output**. Format Output has separate programming codes. The other settings groups can be found with the barcode group captions **Differences from Default** or **Favorites**.

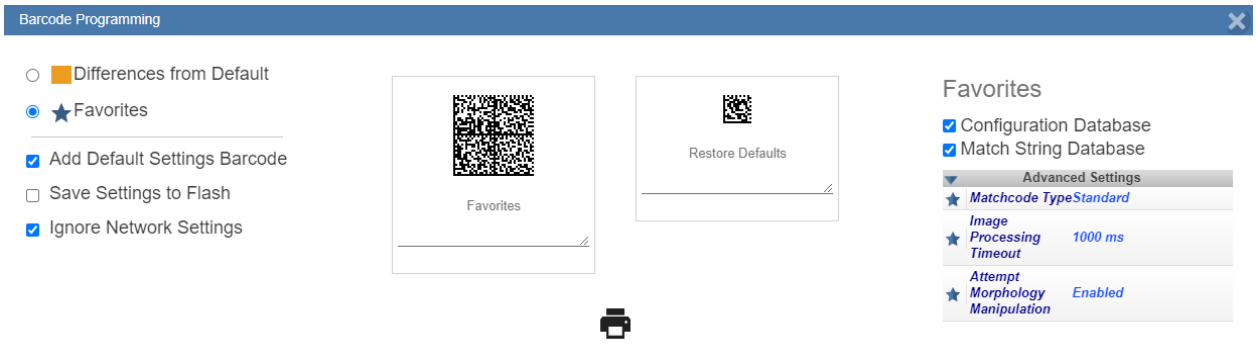
Differences from Default



Differences from Default encodes all the settings necessary to configure the reader after it has been defaulted. Differences from Default provides a list of active settings groups. **Advanced Settings** also provides a list of commands that can be edited. Not all commands found in Advanced Settings can be found in this list. The settings that are excluded are the ones associated with the settings groups **Configuration Database**, **Replace Character**, and **Format Output**. For example, the **Sort Database** command can be found in Advanced Settings, but it doesn't appear in the Advanced Settings list in this window because it's a part of the settings group Configuration Database. When Configuration Database is enabled, you don't see current settings commands like **Exposure**, **Gain**, **Focus**, or **Dome Lighting** in the Advanced Settings list or in the programming code itself because they are already stored in the Configuration Database command. Changing a value in Advanced Settings to a default value will make the field disappear from view, because it's no longer different from default. Encoded data in the

programming code always skips default values, so it's best to start with a **Restore Defaults** code before reading the **Differences from Default** code.

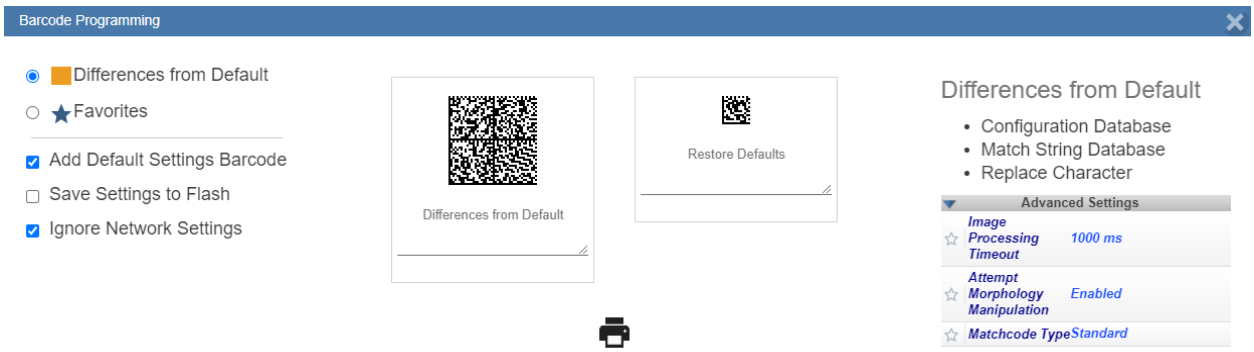
Favorites



Favorites takes all settings that have been marked as favorites in **Advanced Settings,** as well as all active settings groups, and encodes them in the programming code. Commands related to a settings group such as **Sort Database (Configuration Database)** will not appear in Advanced Settings even if marked as favorites. Checkboxes next to the names of the settings groups allow you to control whether or not that settings group is encoded in programming codes. Favorites does not skip commands that are included. Favorites skips commands that are not marked as favorites unless they're in the settings group that is enabled. For example, if Configuration Database is enabled, then all commands associated with Configuration Database (Active Indexes and Sort Database) will be included. If Configuration Database is disabled, then only the commands marked as favorites will be included. If Configuration Database is enabled, current settings commands such as **Exposure**, **Gain**, and **Focus** in Advanced Settings are not shown in the Advanced Settings list or the programming code itself, even when marked as a favorite. This is because they're already stored in the Configuration Database **<K255>** command. If you have un-marked Configuration Database as a favorite, those commands will reappear.

Restore Defaults

Restore Defaults is a single programming code with the **<Ard>** or **<Zrd>** command. This command will make the reader's default the current settings. The code will be programmed with **<Ard>** when **Save Settings to Flash** is unchecked. The code will be programmed with **<Zrd>** when **Save Settings to Flash** is checked. If you read this programming code, it saves the default settings to flash. If you don't want Restore Defaults to be printed when you click the printer icon, you can uncheck **Add Default Settings Barcode** to remove it.



Save Settings to Flash

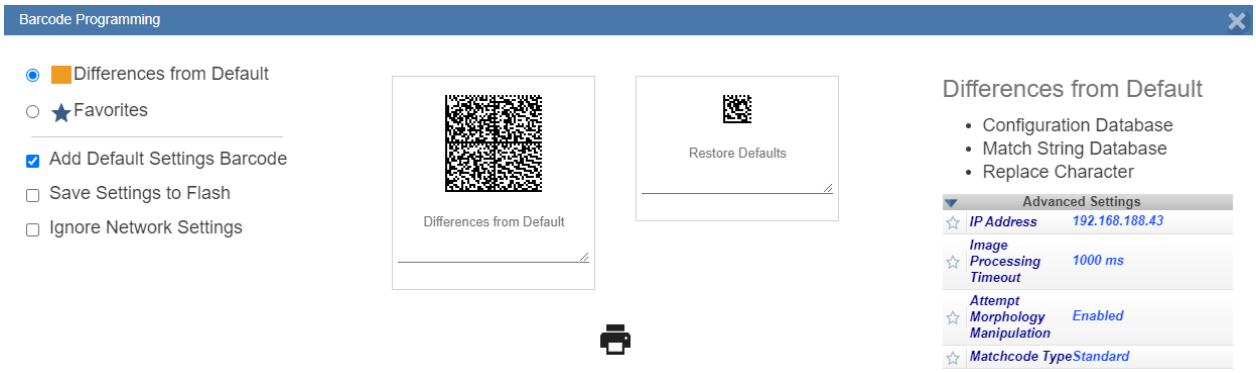
Save Settings to Flash is a checkbox that determines whether an **<A>** or a **<Z>** appears at the end of the encoded data. An **<A>** is encoded when it's unchecked, and a **<Z>** is encoded when it's checked. Save Settings to Flash also determines whether **Restore Defaults** uses **<Ard>** or **<Zrd>**. **<Ard>** is encoded when it's unchecked, and **<Zrd>** is encoded when it's checked.



Ignore Network Settings

Check **Ignore Network Settings** to avoid accidentally changing the reader's IP address or name by reading a programming code containing a different IP address.

Important: If reader settings are not saved, do not change the reader's IP address. The IP address can be changed after reader settings are saved.



Print Button

When you click the **print** button, all the barcode groups are shown together. A window is opened that prompts you to print. The tab closes when you print. **Restore Defaults** and **Differences from Default** appear first, followed by other barcode groups. When there's more than one programming code in a barcode group, arrows are added to the barcode group to indicate the correct decode direction.



Restore Defaults



Differences from Default



Format Output

Help Icon

The **help icon** is located to the right of the flash icon. Click this icon to open **WebLinkHH Help**.

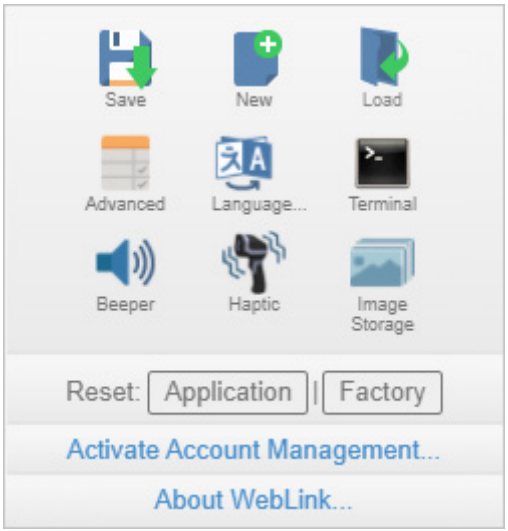


Application Settings Icon

Click the **gear icon** to the right of the help icon to open the **Application Settings** menu.



Application Settings Menu



Left Panel

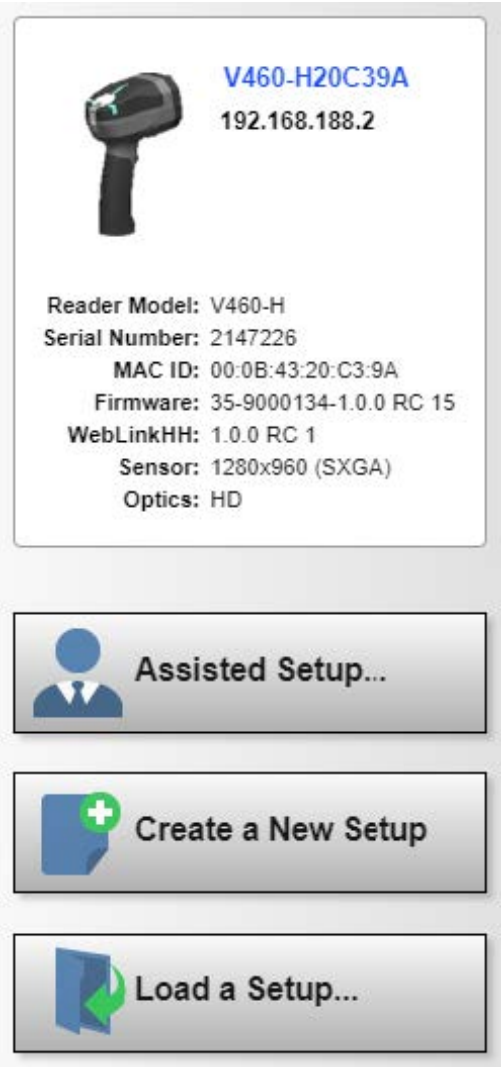
The area to the left of the **Image Area** is different depending on whether you are in the **Start** or **Setup** view. (In the **Run** view, the Image Area expands and the left panel is not present.)

Left Panel in Start View

In the **Start** view, the left panel shows your reader's **user-defined name**, **IP address**, **Reader Model**, **Serial Number**, **MAC ID**, **Firmware version**, **WebLinkHH version**, **Sensor**, and **Optics**.

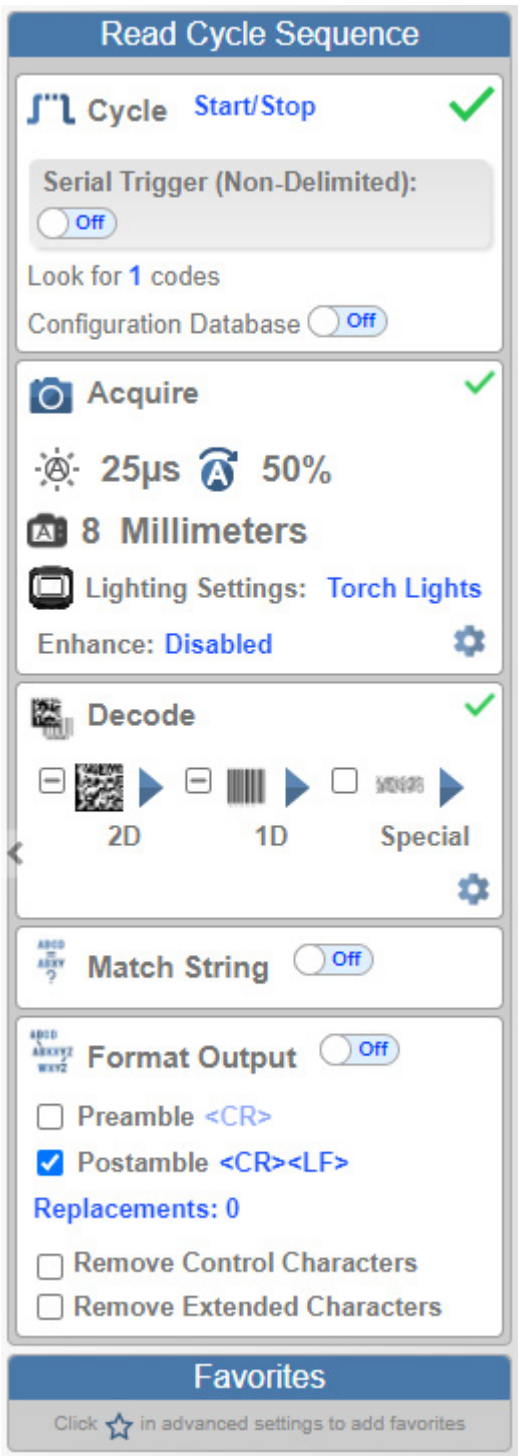
Note: The **user-defined name** must be **19** characters or fewer.

The left panel in the Start view also contains buttons for **Assisted Setup**, **Create a New Setup**, and **Load a Setup**.



Left Panel in Setup View

In the **Setup** view, the left panel contains the majority of WebLink's configuration tools: **Cycle**, which allows you to set the trigger mode; **Acquire**, which allows you to set the reader's exposure and gain; **Decode**, which allows you to select which code types are required in your application; **Match String**, which allows you to set the matchcode mode, wildcard, text output, and match string database; **Format Output**, which allows you to determine the ways in which barcode data can be formatted before it is output as a data string; and **Favorites**, which allows you to define the commands you use most frequently and gives you quick access to their command parameters.


Read Cycle Sequence
Cycle Start/Stop
Serial Trigger (Non-Delimited):
Off
Look for 1 codes
Configuration Database Off
Acquire
25µs 50%
8 Millimeters
Lighting Settings: Torch Lights
Enhance: Disabled
Decode
2D
1D
Special
Match String Off
Format Output Off
Preamble <CR>
Postamble <CR><LF>
Replacements: 0
Remove Control Characters
Remove Extended Characters
Favorites
Click in advanced settings to add favorites

Right Panel

The area to the right of the **Image Area** shows counters for **Cycles**, **Reads**, **No Reads**, **Mismatches** (which only applies if you have defined a match string), and **Read** percentage; statistics for **Capture**, **Decode**, **Overhead**, **Total Read**, and **Trigger Rate**; a line graph representing **Read Time**; and a display area for **Output Data**.

You may find the information displayed on this panel to be most useful in the **Run** view, but it appears in all three of WebLink's primary views.

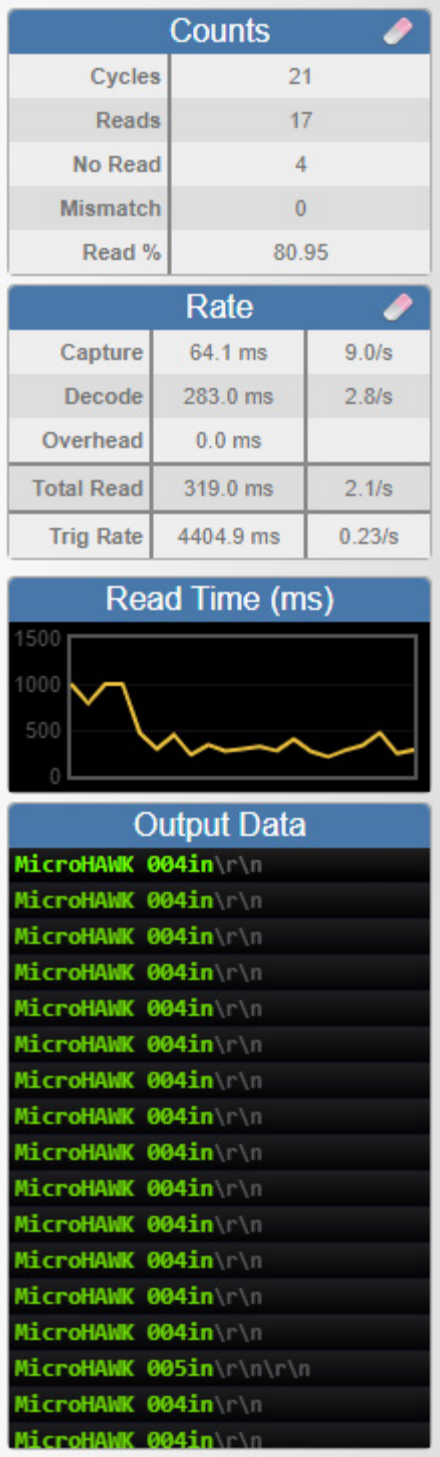
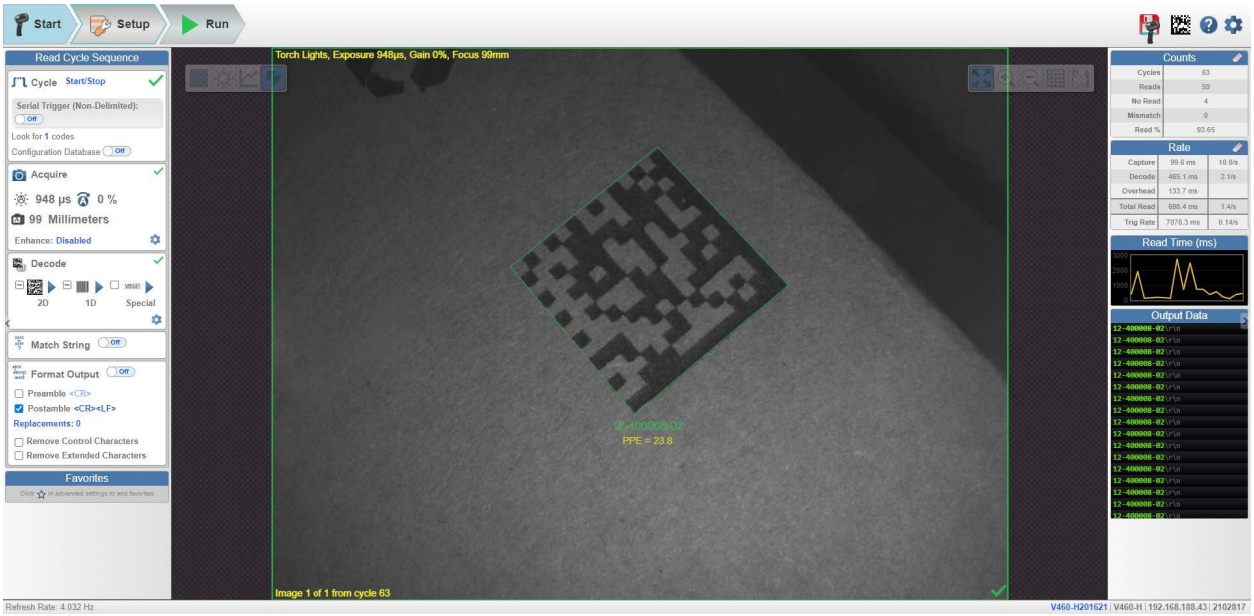

Counts
Cycles 21
Reads 17
No Read 4
Mismatch 0
Read % 80.95
Rate
Capture 64.1 ms 9.0/s
Decode 283.0 ms 2.8/s
Overhead 0.0 ms
Total Read 319.0 ms 2.1/s
Trig Rate 4404.9 ms 0.23/s
Read Time (ms)
1500
1000
500
0
Output Data
MicroHAWK 004in\r\n
MicroHAWK 004in\r\n
MicroHAWK 004in\r\n
MicroHAWK 004in\r\n
MicroHAWK 004in\r\n
MicroHAWK 004in\r\n
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MicroHAWK 004in\r\n

Image Area

The **Image Area** is the main focus of WebLinkHH. This area allows you to see what currently falls within the reader's field of view, and offers several image control tools.



Device Control Toolbar

The **Device Control** buttons are a convenient way to enable and disable multiple triggering methods and image processing settings in the reader directly from the **Image Area**.

Start Read Cycle

Starts the reader's read cycle.



Stop Read Cycle

Stops the reader's read cycle.



Send a Serial Trigger to the Reader

Sends a **Serial Trigger** to the reader.



Quick Photometry

Performs a **Quick Photometry** function that sets the optimal **Exposure** and **Gain** settings for the current image.



Focus Button

The **Focus Button** is hidden when **Time of Flight** is enabled. Clicking the Focus Button causes a dropdown menu to appear, allowing you to select **Autofocus** mode or to perform a **Spot Focus**.



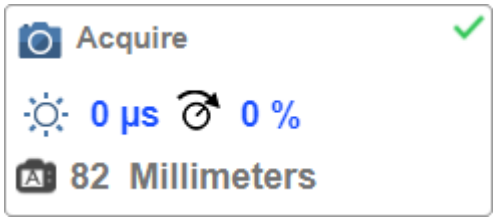
Autofocus On

The **Focus Button** turns blue and shows an **A** in the camera icon when **Autofocus** is **on**.





The  button turns **Autofocus on** or **off**. This button is only available when the reader is in **Continuous Mode (Presentation)**. The reader's focus settings, defined in the **Acquire** section of the **Setup** interface, are applied to the image when Autofocus is on. The focus setting becomes read-only when Autofocus is on.



Autofocus Off

The **Focus Button** shows a person in the camera icon when **Autofocus** is **off**.



Spot Focus

You can perform a **Spot Focus** by clicking the Spot Focus button and then clicking the area in the image where you want to focus.



Optimize

Saves relevant information about the target symbol, allowing the subsequent symbols to be processed more quickly and consistently.

The reader has three optimization states: **un-optimized**, **optimizing**, and **optimized**.

When the reader is in the **un-optimized** state and the Optimize button is clicked, the reader enters the **optimizing** state until a symbol is decoded or until the Optimize button is clicked again to deactivate the optimizing state. When a symbol is decoded during the optimizing state, the reader enters the **optimized** state.



Note: The **Optimize** button is only visible when **Look for # of Codes** in the **Cycle** section is set to **1**.

Auto Button

When the **Auto** button is clicked, the reader will automatically select the best lighting, exposure/gain, and distance.

When Auto is disabled, you can configure the lighting settings in the **Acquire** widget.



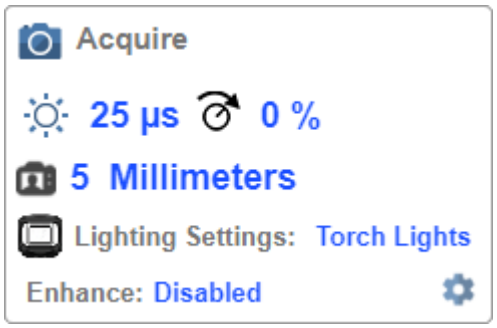


Image Control Toolbar

Fit Image to Window

Fits the captured image to the Image Area window.



Zoom In

Zooms in on the desired area of the captured image.



Zoom Out

Zooms out and decreases the size of the captured image.



Note: You can also zoom in and out by scrolling up or down with your mouse, and you can move the image around by clicking and dragging.

Show All Images Used in Read Cycle

Shows all the images that have been captured during the most recent read cycle.



Save Current Image

Allows you to save the current captured image in PNG format to the location of your choice on your PC.

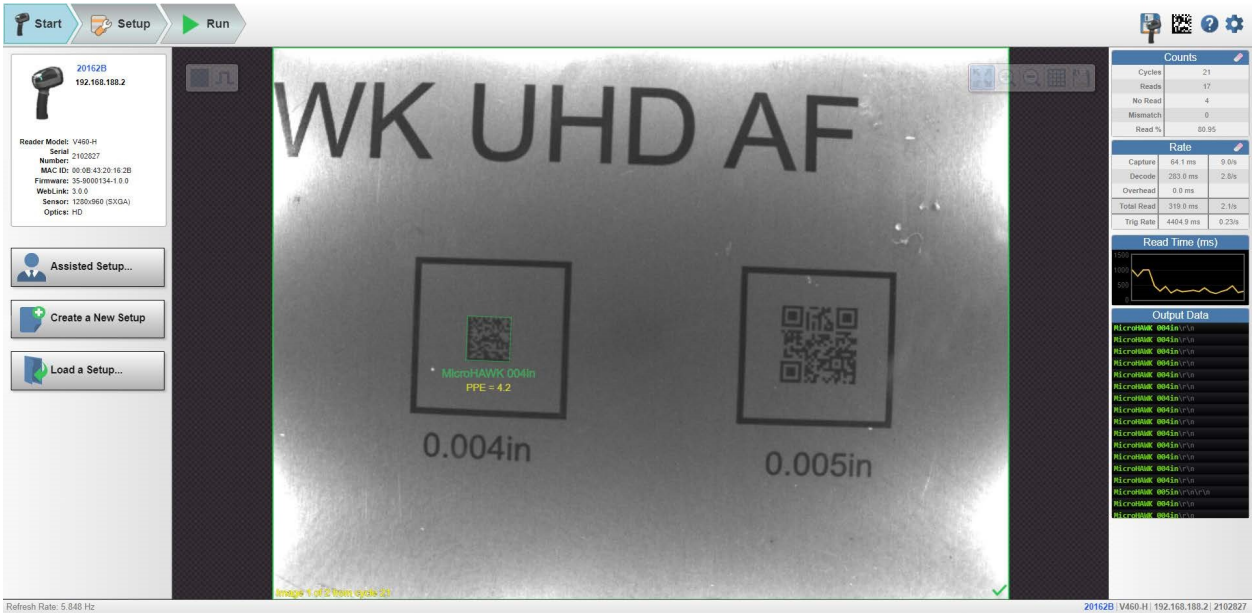


Start

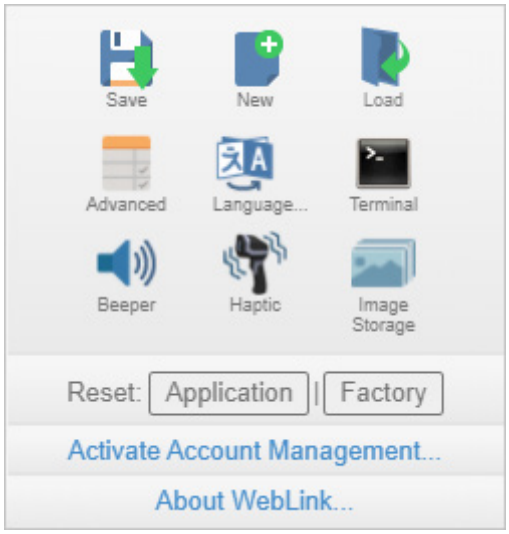
The **Start** view is the initial view you will see when the WebLinkHH session begins. The connected reader is shown, along with its **user-defined name**, **IP address**, **Reader Model**, **Serial Number**, **MAC ID**, **Firmware version**, **WebLinkHH version**, **Sensor**, and **Optics**.

Note: The **user-defined name** must be **19** characters or fewer.

This view allows you to choose **Assisted Setup**, to **Create a New Setup**, or to **Load a Setup**.



Click the gear icon at the upper right to bring up the **Application Settings** menu. This menu includes several functions: **Save**, **New**, **Load**, **Advanced**, **Language**, **Terminal**, **Beeper**, **Haptic**, **Image Storage**, **Reset Application Settings**, **Reset to Factory Settings**, **Activate Account Management**, and **About WebLinkHH**.



Clicking **About WebLinkHH** opens the dialog shown below, which shows the current **WebLinkHH version**, **Reader Model**, **Serial Number**, **Part Number**, **MAC ID**, **Sensor**, **Firmware version**, **Boot version**, **Browser**, **Operating System**, and **Screen Resolution**.

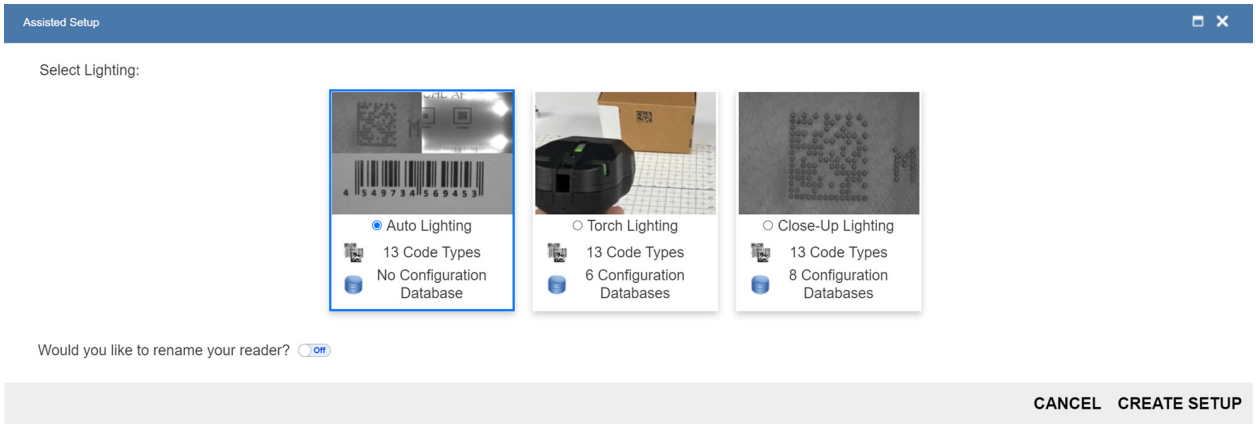
Note: The information in this dialog is selectable so that you can copy it to a clipboard.

Clicking **Contact us...** takes you to the Omron Microscan website.



Assisted Setup

When you click the **Assisted Setup** button in the **Start** view, a dialog with three lighting configurations will appear. WebLinkHH generates your initial setup automatically. Once the setup is created, you can fine-tune its parameters in the **Setup** view.

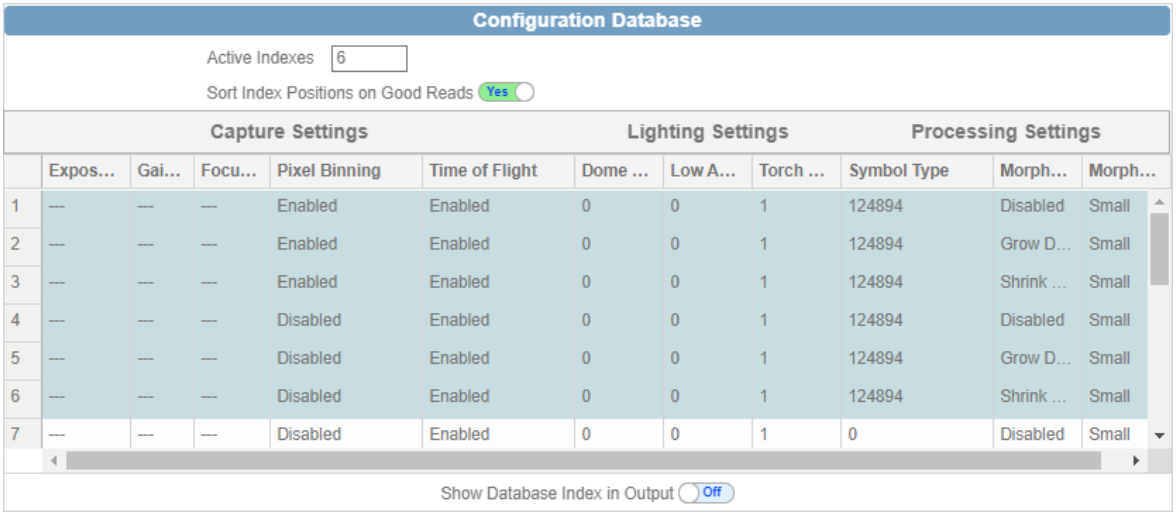


Note: Auto Lighting is always selected when you first open the Assisted Setup dialog.

The Assisted Setup dialog is designed to be logical and intuitive. You are given a choice of three configuration "recipes" based on your application: **Auto Lighting**, **Torch Lighting**, and **Close-Contact Lighting**. Based on your choice of lighting type, WebLinkHH generates your application settings.

- **Auto Lighting** is the default configuration.

- **Torch Lighting** sets up the Configuration Database shown below.



The following **Torch Lighting** parameters are configured in **Advanced Settings**:

Auto Calculate	
Auto Lighting	Disabled
Database Options	
Active Indexes	6

- **Close-Contact Lighting** sets up the Configuration Database shown below.

Configuration Database

Active Indexes 8

Sort Index Positions on Good Reads Yes

	Capture Settings					Lighting Settings			Processing Settings		
	Expos...	Gai...	Focu...	Pixel Binning	Time of Flight	Dome ...	Low A...	Torch ...	Symbol Type	Morph...	Morph...
1	---	---	1	Disabled	Disabled	1	0	0	124894	Disabled	Small
2	---	---	1	Enabled	Disabled	0	3	0	124894	Disabled	Small
3	---	---	1	Enabled	Disabled	0	3	0	124894	Shrink ...	Small
4	---	---	1	Enabled	Disabled	0	3	0	124894	Grow D...	Small
5	---	---	1	Disabled	Disabled	0	3	0	124894	Disabled	Small
6	---	---	1	Disabled	Disabled	0	3	0	124894	Grow D...	Small
7	---	---	1	Disabled	Disabled	0	3	0	124894	Shrink ...	Small

Show Database Index in Output Off

Configuration Database

Active Indexes 8

Sort Index Positions on Good Reads Yes

	Capture Settings					Lighting Settings			Processing Settings		
	Expos...	Gai...	Focu...	Pixel Binning	Time of Flight	Dome ...	Low A...	Torch ...	Symbol Type	Morph...	Morph...
5	---	---	1	Disabled	Disabled	0	3	0	124894	Disabled	Small
6	---	---	1	Disabled	Disabled	0	3	0	124894	Grow D...	Small
7	---	---	1	Disabled	Disabled	0	3	0	124894	Shrink ...	Small
8	---	---	---	Disabled	Enabled	0	3	0	124894	Disabled	Small
9	---	---	---	Disabled	Enabled	0	0	1	0	Disabled	Small
10	---	---	---	Disabled	Enabled	0	0	1	0	Disabled	Small
11	---	---	---	Disabled	Enabled	0	0	1	0	Disabled	Small

Show Database Index in Output Off

The following **Close-Contact Lighting** parameters are configured in **Advanced Settings**:

Auto Calculate	
Auto Lighting	Disabled
Database Options	
Active Indexes	8

- The Assisted Setup dialog also asks if you want to rename the reader. If **Yes**, a text field appears in which you can type the reader's new name. The reader's MAC ID is also shown to the right of the text field.

Note: The user-defined name of the reader cannot be longer than **19** characters.

Click **Create Setup** to configure your WebLinkHH setup automatically based on your answers to the Assisted Setup questions.

Note: Reader settings are defaulted when Assisted Setup settings take effect. Any previous settings must be re-enabled in **Setup**.

Reader Information

The **Reader Information** section of the left panel of the **Start** view shows your reader's **user-defined name**, **IP address**, **Reader Model**, **Serial Number**, **MAC ID**, **Firmware version**, **WebLinkHH version**, **Sensor**, and **Optics**.

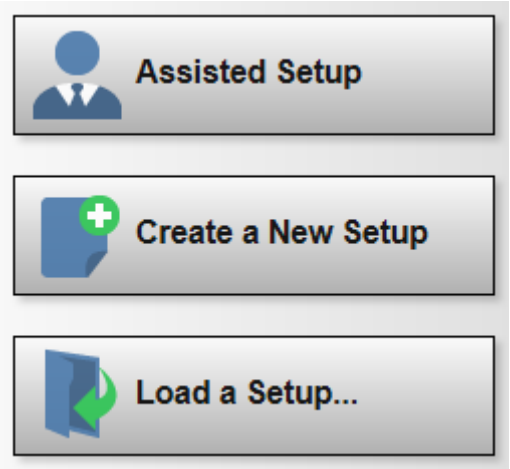


V460-H20C39A

192.168.188.2

Reader Model:	V460-H
Serial Number:	2147226
MAC ID:	00:0B:43:20:C3:9A
Firmware:	35-9000134-1.0.0 RC 15
WebLinkHH:	1.0.0 RC 1
Sensor:	1280x960 (SXGA)
Optics:	HD

Setup Buttons



Assisted Setup

When you click the **Assisted Setup** button in the **Start** view, a dialog with three lighting configurations will appear. WebLinkHH generates your initial setup automatically. Once the setup is created, you can fine-tune its parameters in the **Setup** view.

Create a New Setup

Clicking **Create a New Setup** allows you to create a setup without using Assisted Setup. Create a New Setup performs a software reset and recalls default parameters except Communication settings. The new setup does not save to flash, so you can cycle power to the reader and see the settings that were last saved to flash.

Load a Setup

Select **Load Setup** to load an existing **.wls** WebLinkHH setup file.

Setup

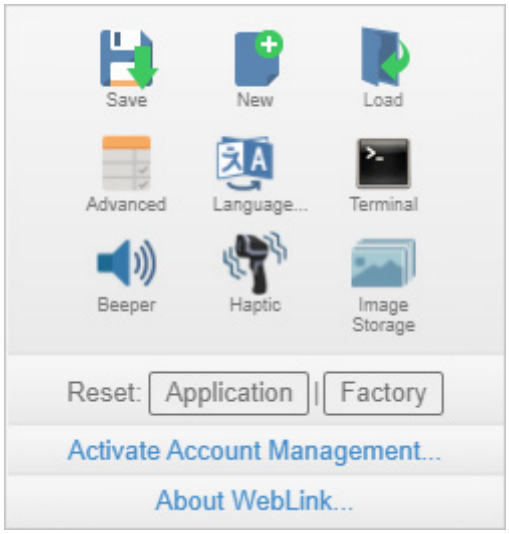
The **Setup** view allows you to configure all aspects of a setup. Multiple discrete sections of the interface give you the ability to set **Cycle**, **Acquire**, **Decode**, **Match String**, **Format Output**, and **Favorites**.

Clicking the **flash icon** at the upper right saves current settings to the reader's flash memory so the settings will be available when the reader is rebooted.

The **question mark icon** at the upper right opens **WebLinkHH Help**.

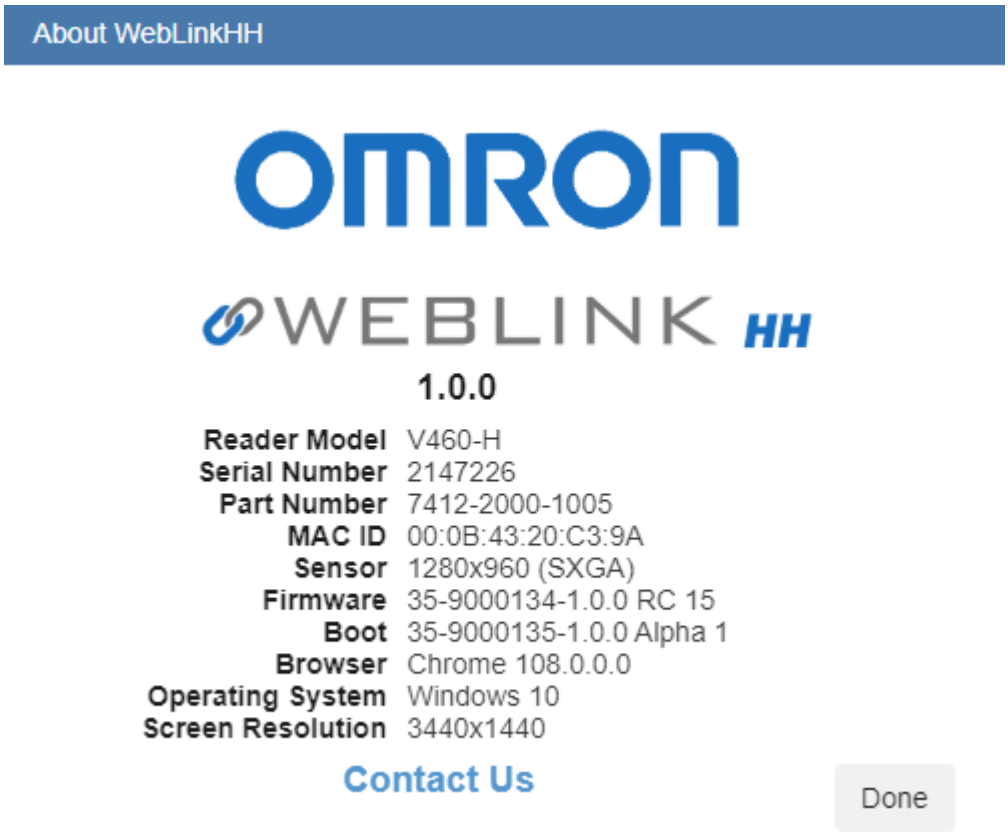


The **gear icon** at the upper right brings up the **Application Settings** menu. This menu includes several functions: **Save**, **New**, **Load**, **Advanced**, **Language**, **Terminal**, **Beeper**, **Haptic**, **Image Storage**, **Reset Application Settings**, **Reset to Factory Settings**, **Activate Account Management**, and **About WebLinkHH**.



Click **About WebLinkHH** to display your current **WebLinkHH version**, **Reader Model**, **Serial Number**, **Part Number**, **MAC ID**, **Sensor**, **Firmware version**, **Boot version**, **Browser**, **Operating System**, and **Screen Resolution**.

Clicking **Contact Us** takes you to **https://info.omron.com/technical-support**.



Cycle

Introduction

The reader can operate in a number of modes from a presentation scanner to a triggered reader. The **Read Cycle** defines how it will operate. Setting up the read cycle type and parameters involves a series of decisions based on your particular application:

1. Select the **Cycle** type: **Presentation**, **Triggered**, or **Start/Stop**. Select the **number of codes** to be read in a single cycle. The reader can satisfy this condition by reading one or more codes in a single image frame or across multiple image frames. The reader will indicate a pass if it finds all codes, and indicate a fail if it does not. Note that the reader will not read and count a code if it is the same code type, and if it contains the same data as a previous code.
2. Decide how the read cycle will start by choosing the cycle type. If you choose **Presentation**, the reader will start automatically. If you choose **Start/Stop**, you will need to pull the trigger to start the cycle. If you choose **Triggered**, you can either pull the trigger or send a serial trigger via WebLinkHH. You can send a trigger via WebLinkHH in Start/Stop by turning on **Serial Trigger (Non-Delimited)**.

Common Settings for all Read Cycle Modes

The following settings are common for all read cycle modes:

- **Look for # of Codes –** This is the number of codes that the reader should find in each decode cycle. If the reader finds all codes, the decode cycle will pass. If it does not find all codes, the cycle will fail, and only the codes it finds will be output. The remaining codes will be output as **No Read**. The maximum number of codes is **100**.

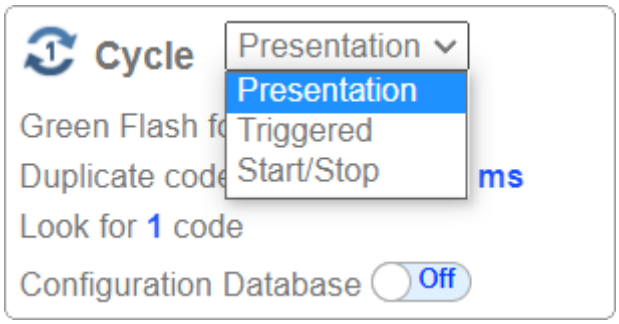
- **Configuration Database –** Enable or disable the Configuration Database as part of the read cycle. The Configuration Database is described in detail in **Setup > Configuration Database**.

The different read cycle types are listed below.

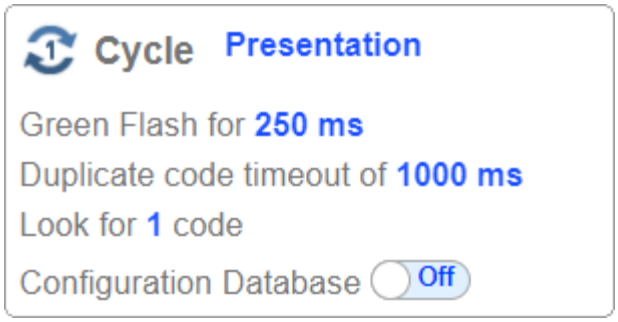
Presentation

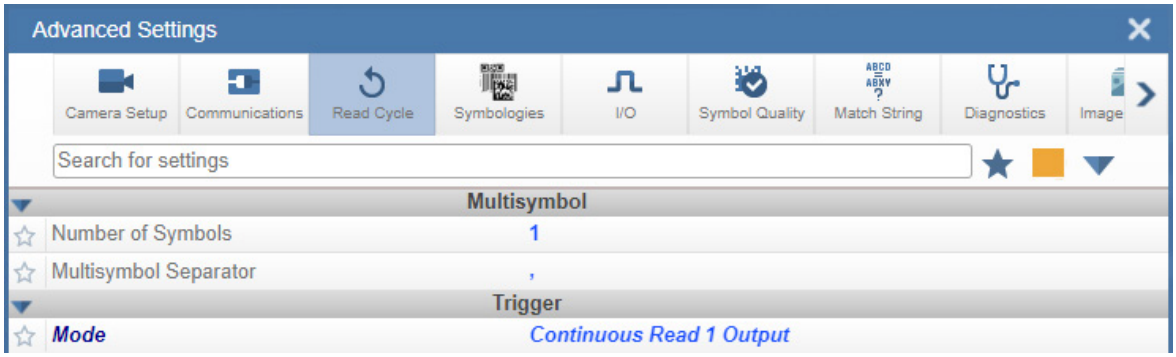
In **Presentation** mode, by default the reader is in a **Continuous-One** free-running state. Parts can be presented to the reader at will, and the number of codes to look for will equal **1**. During the cycle, the reader will continuously acquire and process images until all symbols are found, or until the **Timeout** is reached. If the timeout is reached, **Nothing was output** will be displayed in the output data. A **Green Flash** at the end of a cycle indicates a successful read.

The cycle time includes the **Capture**, **Decode**, **Overhead Time**, and **Green Flash Duration**.

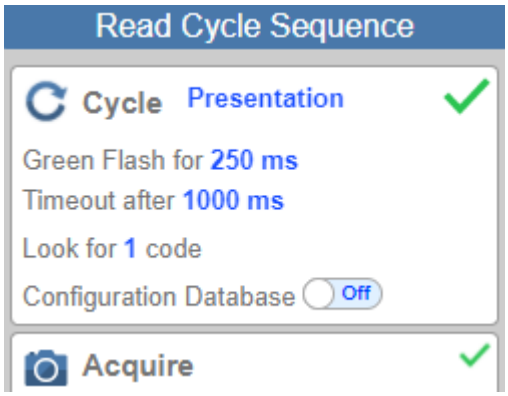


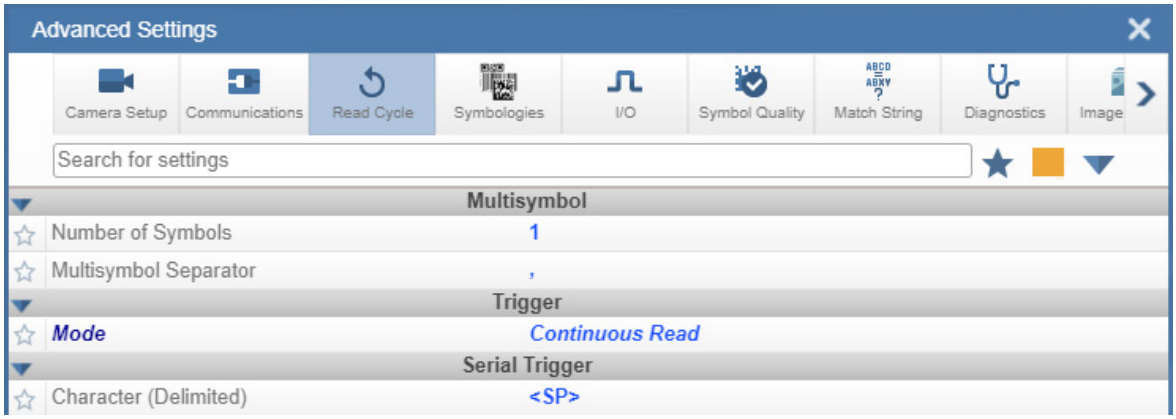
- **Green Flash –** The reader flashes green at the end of a successful read cycle. The green LEDs remain on for the set time. (**0 msec** to **655350**. The default is **250 msec**).
- **Duplicate Code Timeout –** The reader will only read the same code after a certain timeout has passed. (Note that this is only shown when in **Continuous Read 1 Output**, which can be changed in **Advanced > Read Cycle > Trigger > Mode**) (**20 msec** to **655350**).





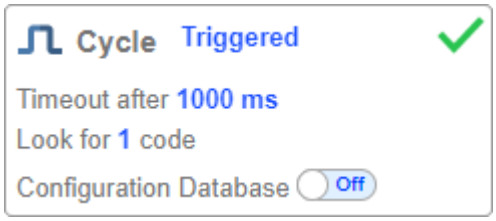
- **Timeout After –** This is the amount of time the reader is allowed to spend for the entire read cycle, acquiring and processing images until all codes are read. Set this value long enough to be able to decode in all circumstances, but short enough to prevent the camera from taking longer than the allowed cycle time of the production line. (**20 msec** to **655350**). (Note that this is only shown when in **Continuous Read**, which can be changed in **Advanced > Read Cycle > Trigger > Mode**).





Note: When the reader is in **Presentation** mode and **Time of Flight** is set to **Enabled** in (its default setting) in **Camera Setup**, there is no **Timeout**. The reader will begin to acquire and process images as soon as an object is placed in front of the reader, and it will continue to do so until the object is removed. Once a symbol is found in the field of view, the **reader** will report the symbol a single time. Acquisition and image processing will continue for as long as the object is positioned in front of the reader. When the object is removed, acquisition and image processing will stop. The symbol that was decoded will not be reported again until the object is removed and placed in front of the reader a second time, or until a different symbol is read during the same cycle. **Time of Flight** can be changed in **Advanced Settings > Camera Setup**.

Triggered Modes

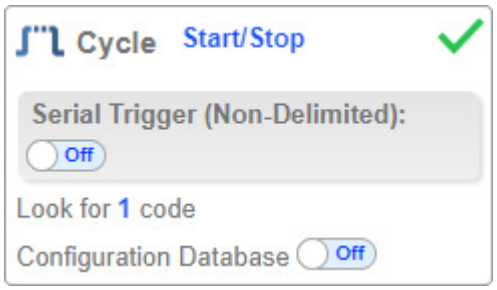


In **Triggered** mode, the reader starts with a trigger, and the cycle ends when the reader finds the expected number of codes, or when the read cycle times out.

The cycle time includes the capture and decode times.

- **Timeout After** is the amount of time the reader is allowed to spend for the entire read cycle, acquiring and processing images until all codes are read. You should set this value long enough to be able to decode in all circumstances, but short enough to prevent the reader from taking longer than the allowed cycle time of the production line. (**20 msec** to **655350**. The default is **1 second**.)

Start / Stop

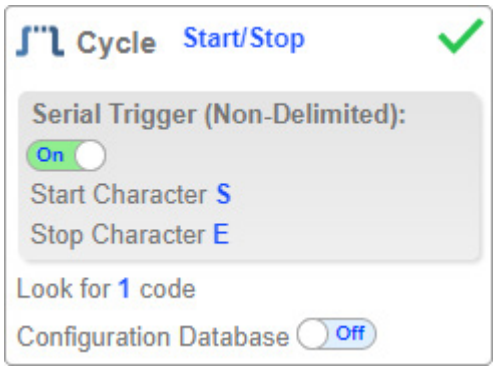


In **Start/Stop** mode, the reader goes into **Continuous Read** mode when you pull the trigger, and exits Continuous Read mode when you release the trigger, or after **1 second** of holding the trigger (by default).

Symbol data is output as soon as possible. The output condition can be configured in **Advanced Parameters** (**I/O > Symbol Data Output**).

Serial Trigger Non-Delimited Off – When **Serial Trigger** is set to **Off**, the reader will respond to the I/O trigger **External Level**. **High** will start the read cycle and **low** will end it.

Serial Trigger Non-Delimited On – When **Serial Trigger** is set to **On**, the reader will respond to **Serial Triggers**. It will also respond to the I/O trigger **External Level**. By default, the start and stop characters are set to **S** and **E**.



- **Serial Tigger Delimited –** Sets whether **I/O** or **Serial Trigger and I/O** mode are used.
- **Start/Stop Characters –** Characters used for **Serial Trigger**. The maximum number of start characters is **2**. The maximum number of stop characters is **2**. The character range is **0x00 - 0x7F**.

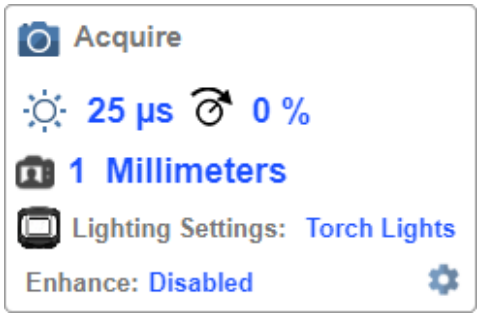
Acquire

Acquire settings allow you to set **Exposure** (signified by the sun icon), **Gain** (signified by the dial and right-pointing arrow icon), and **Focus** (signified by the camera icon) in real time. Clicking any of these settings will cause a control to appear, allowing you to modify that setting. Settings take effect immediately.

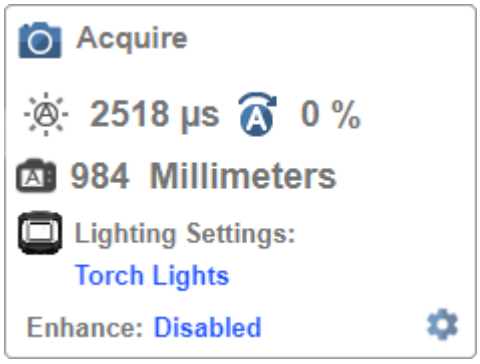
The valid **Exposure** range is **25 µs** to **100,000 µs**. The valid **Gain** range is **0%** to **100%**. The valid **Focus** range is **0 mm** to **250 mm**.

Important: There are 4 levels of **Gain** in the reader. Each level corresponds to 25 percentage points, or one quarter turn of the Gain dial.

- Level **1** = 0% to 24%
- Level **2** = 25% to 49%
- Level **3** = 50% to 74%
- Level **4** = 75% to 100%



When **Time of Flight** (found in Advanced Settings > Camera Setup or **Advanced Acquire Settings**) is enabled or **Auto Exposure and Gain** (found in Advanced Settings > Camera Setup or **Advanced Acquire Settings**) is enabled, the **A** shown on the sun icon and dial icon signifies that **Exposure** and **Gain** will be updated automatically based on Time of Flight or Auto Exposure and Gain.

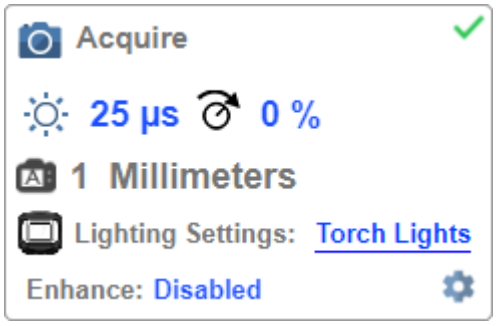


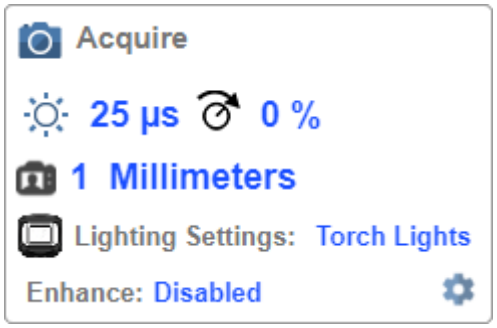
Autofocus

Autofocus can be enabled and disabled in the **Image Area** using the **Focus Button** in the **Device Control Toolbar**, and can be configured in the **Acquire** section of the **Setup** view.

While in **Continuous** mode and **Time of Flight** is disabled, the reader can enable or disable Autofocus functionality, allowing it to refocus after a number of no reads. The Focus Button shows an **A** when Autofocus is enabled. The focus distance is updated on-the-fly based on the latest refocus settings.

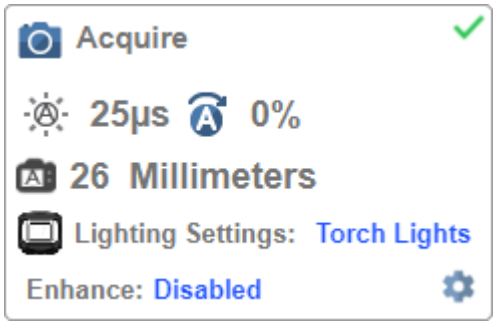






Time of Flight

Time of Flight is a distance sensor that helps with Autofocus. You can enabled and disable Time of Flight via **Advanced Settings > Camera Setup** or **Advanced Acquire Settings**.



When **Time of Flight** is enabled, **Focus** is read-only. When **Time of Flight** or **Auto Exposure and Gain** is enabled, **Exposure** and **Gain** are read-only.

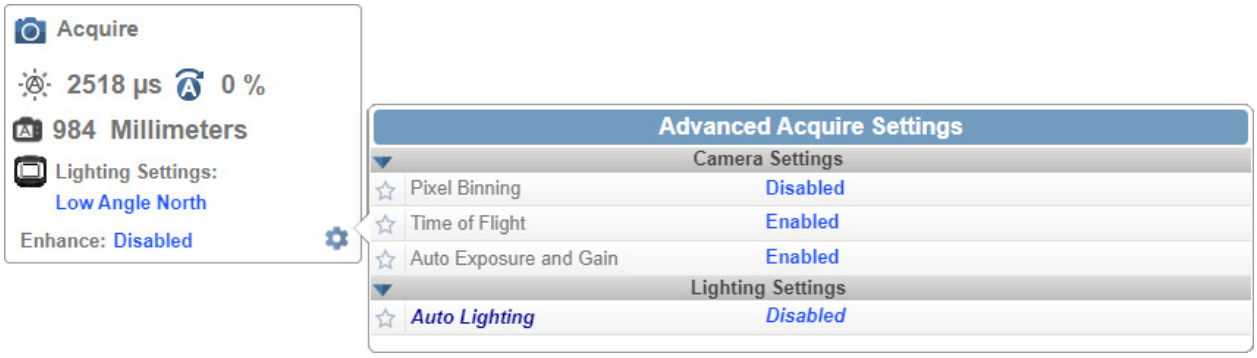
The table below shows the **Time of Flight** and **Auto Exposure and Gain** parameter setting combinations.

Time of Flight	Auto Exposure and Gain	Focus	Exposure and Gain
Enabled	Enabled	Read-Only	Read-Only
Enabled	Disabled	Read-Only	Read-Only
Disabled	Enabled	Editable	Read-Only
Disabled	Disabled	Editable	Editable

Note: The **Focus button** in the Image Area is hidden when **Time of Flight** is enabled.

Advanced Acquire Settings

Advanced Acquire Settings can be opened via the **gear icon** at the bottom right of the **Acquire** widget.



Spot Focus

If **Time of Flight** is disabled, you can perform a localized **Quick Focus** in the image.

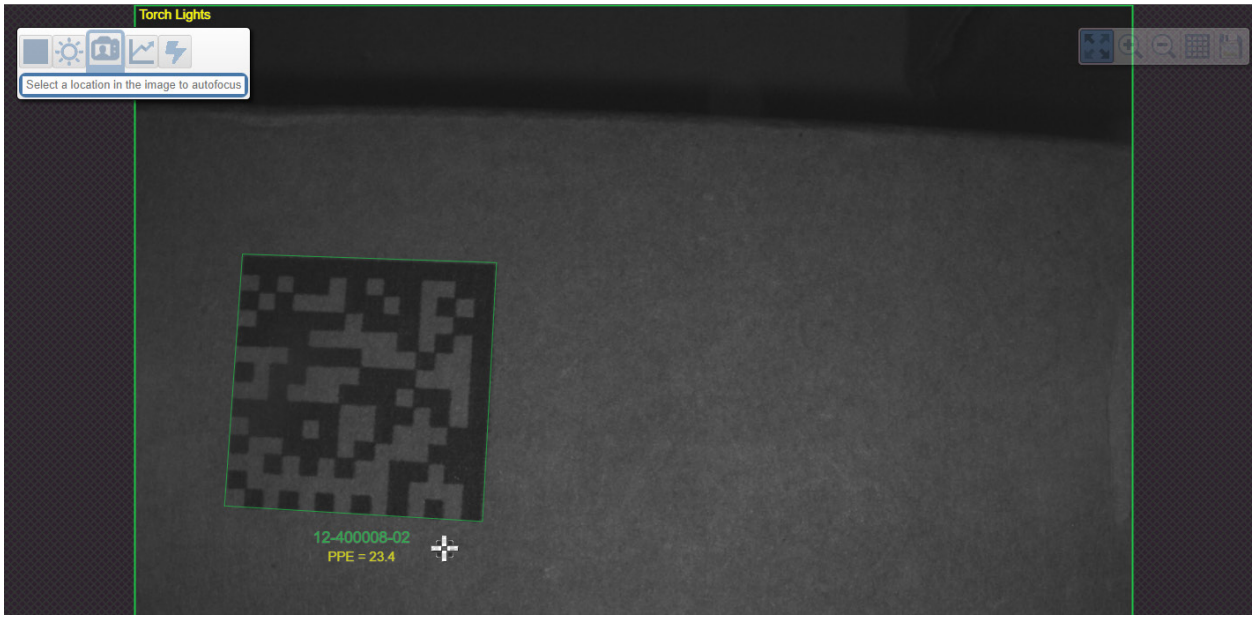
If you click the **Focus Button**, the **Autofocus** and **Spot Focus** icons appear:



When you click the **Spot Focus** icon, the **Select a location in the image to autofocus** message appears.



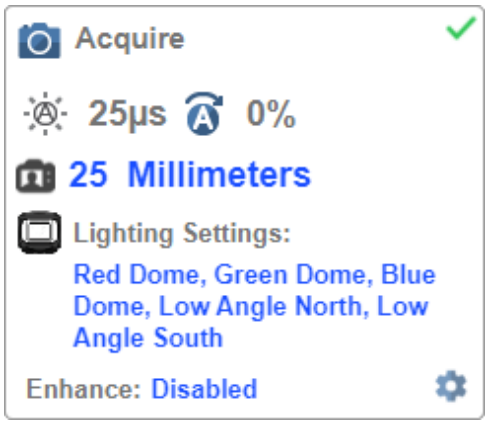
The cursor transforms into crosshairs as shown in the example below. This allows you to select the section of the image in which you want to perform a quick focus.



Note: If you click the **Autofocus** button to the left of the **Spot Focus** button, the reader will switch from Spot Focus to regular Autofocus functionality. If the reader is in **Triggered** mode, only the Spot Focus icon will appear.

Lighting Settings

The **Lighting Settings** in **Acquire** allow you to select **Dome Lighting**, **Low Angle**, or **Torch Lighting**, and to configure lighting parameters. This field is hidden when **Auto Lighting** is enabled (**Advanced Settings > Camera Setup > Lighting Settings**).





Dome Lighting Options

- Disabled
- Red
- Green
- Red + Green
- Blue
- Red + Blue
- Green + Blue
- Red + Green + Blue

Low Angle Options

- Disabled
- South
- North
- South + North

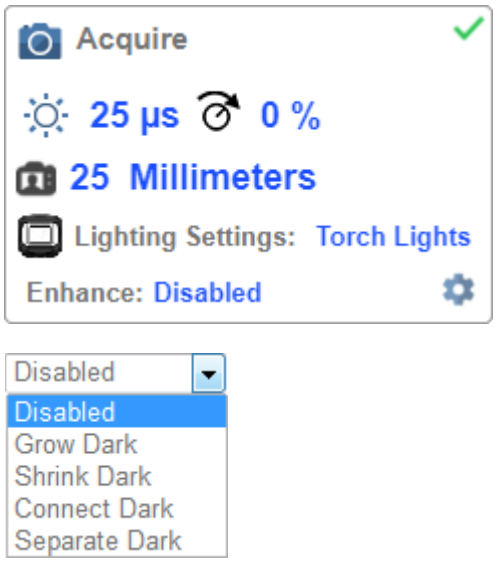
Torch Lighting Options

- Disabled
- Enabled

Note: When **Torch Lighting** is enabled, **Dome Lighting** and **Low Angle** will be disabled automatically.

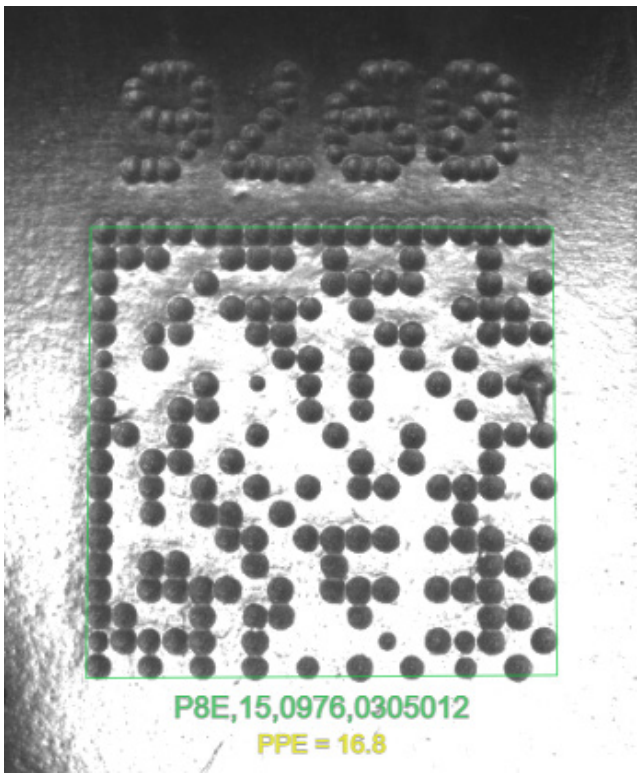
Enhance

The **Enhance** dropdown menu at the bottom of the Acquire editor allows you to select the method for processing captured images.



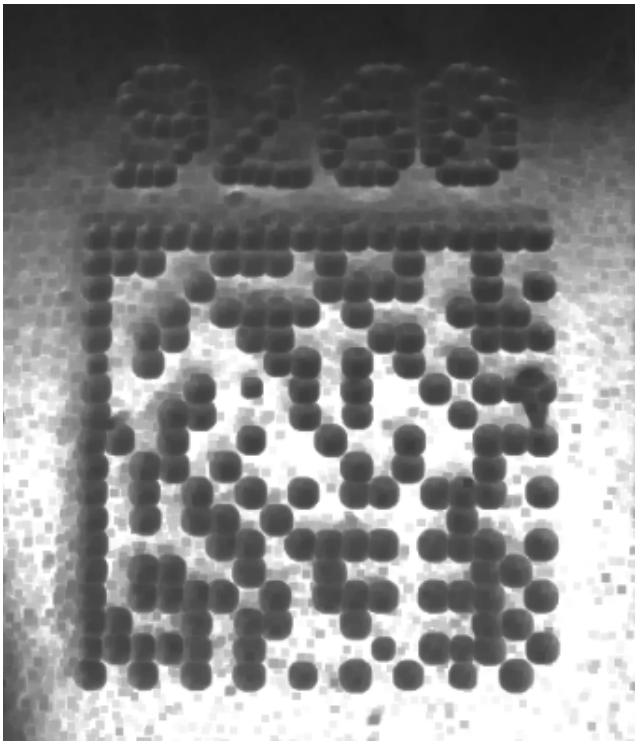
Disabled

None of the enhanced processing settings are selected. The example below shows a DPM in the reader's field of view when enhanced processing settings are disabled.



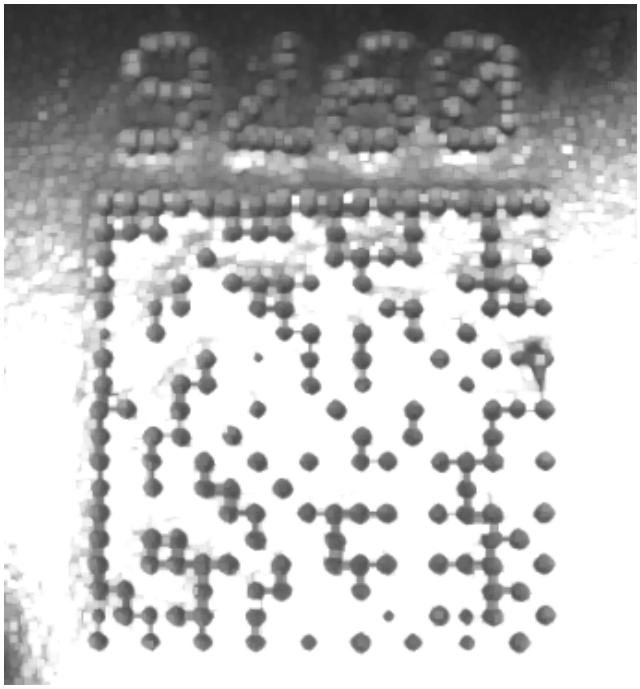
Grow Dark

Grow Dark increases the dark cell size of a symbol. It is useful for increasing the dark cell size of a dark-on-light Data Matrix symbol. The example below shows a DPM in the reader's field of view when Grow Dark is enabled.



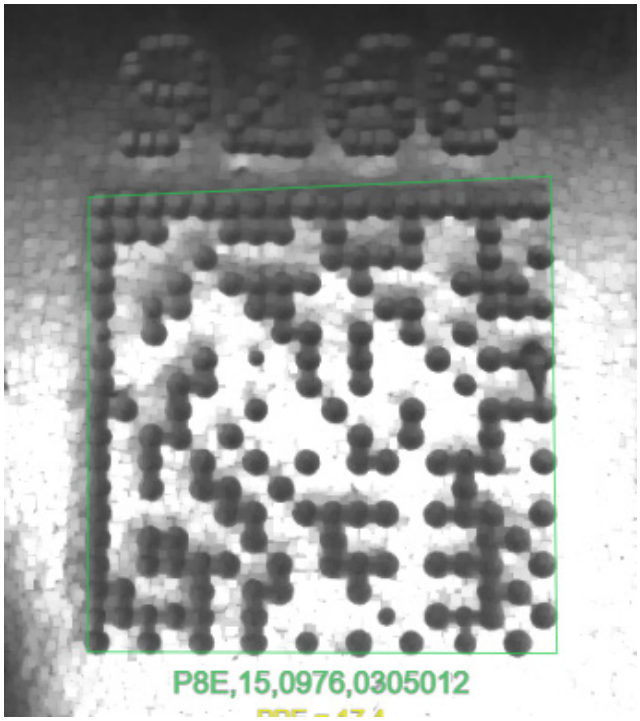
Shrink Dark

Shrink Dark increases the light cell size of a symbol. It is useful for increasing the light cell size of a light-on-dark Data Matrix symbol. The example below shows a DPM in the reader's field of view when Shrink Dark is enabled.



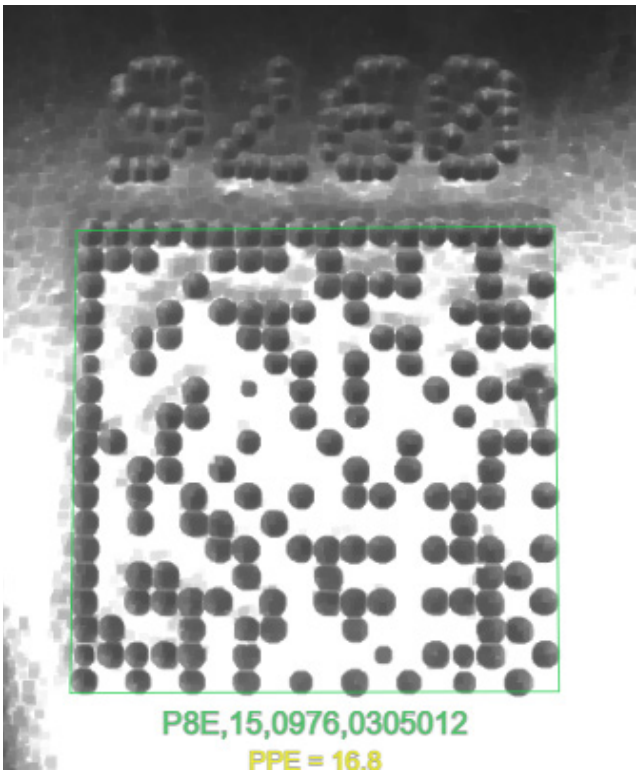
Connect Dark

Connect Dark removes minor light defects of dark cells. The example below shows a DPM in the reader's field of view when Connect Dark is enabled.



Separate Dark

Separate Dark removes minor dark defects of light cells. The example below shows a DPM in the reader's field of view when Separate Dark is enabled.



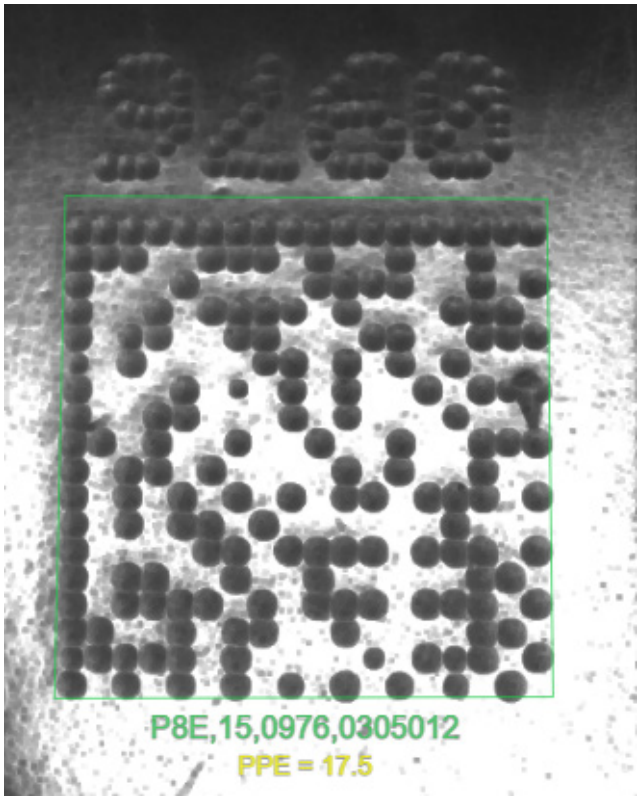
Operator Size

The **Operator Size** dropdown menu determines the size of the area or “pixel neighborhood” in which the enhance operation is being performed.



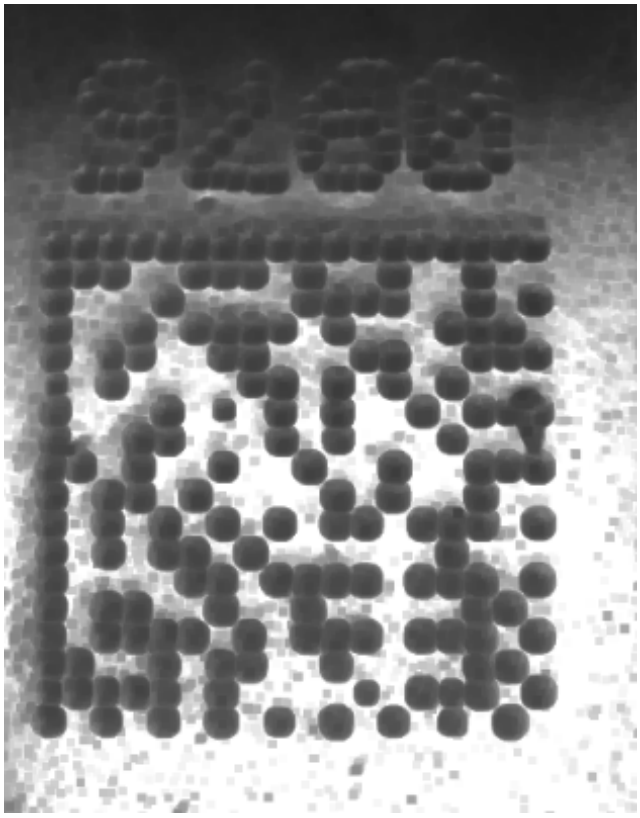
Small

Small corresponds to an area of **3 pixels by 3 pixels**. The example below shows a DPM in the reader's field of view when Operator Size is set to Small.



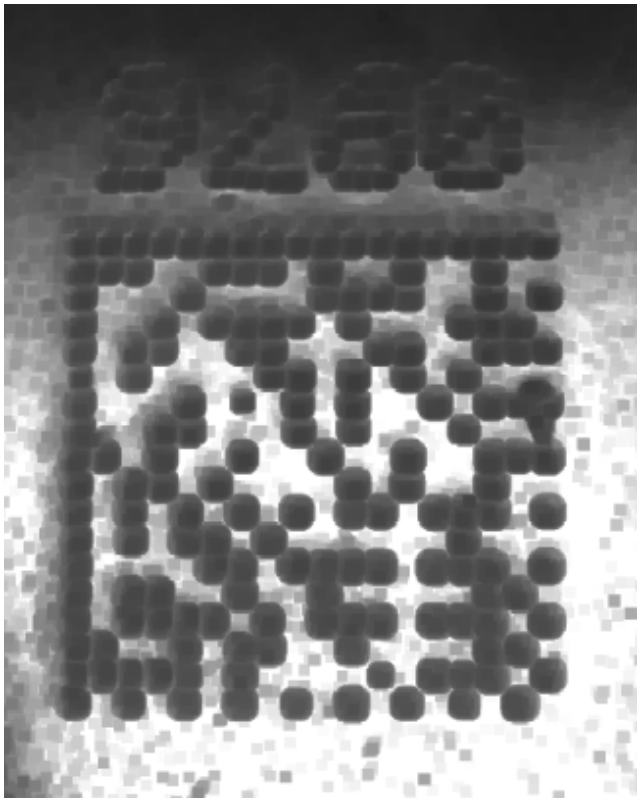
Medium

Medium corresponds to an area of **5 pixels by 5 pixels**. The example below shows a DPM in the reader's field of view when Operator Size is set to Medium.



Large

Large corresponds to an area of **7 pixels by 7 pixels**. The example below shows a DPM in the reader's field of view when Operator Size is set to Large.



Decode

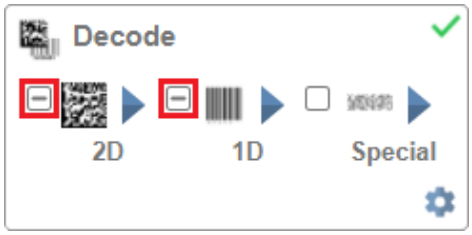
The **Decode** area of the **Setup** view allows you to choose which symbologies (code types) you want to enable, and allows you to configure the parameters for those symbologies.

See **Symbologies** for **Advanced Decoding Parameters**.

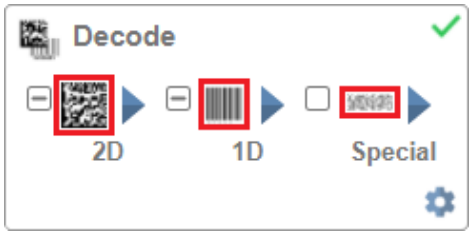
The **Decode** area shown below allows you to select which symbologies the system will search for during the read cycle. Clicking the check boxes (highlighted in the image below) to the left of the **2D**, **1D**, and **Special** symbology categories turns on all symbologies within that category simultaneously.

You can also turn off all symbologies within a category simultaneously by unchecking its corresponding check box. In the image below, for example, the check box for the **Special** category is unchecked, meaning that none of the code types in that category are enabled.

If only some symbologies within a category have been enabled, the check box displays a dash. In the image below, for example, the check boxes for the **2D** and **1D** categories display a dash, meaning that only some of the code types in those categories are enabled.



Click the symbols themselves (indicated in the image below) to bring up a list of all the code types available in that symbology category.



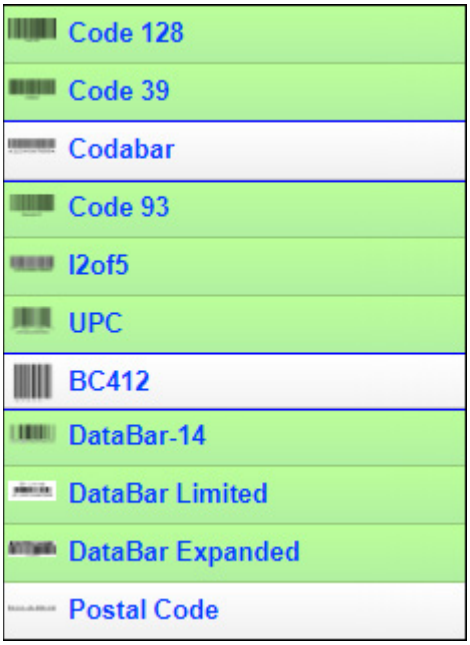
For example, if you click the Data Matrix symbol above **2D** in the **Decode** area, you will see a list of all supported 2D code types. You can enable or disable specific code types from the list by clicking them on or off. In the example below, the green-highlighted code types are enabled and Aztec Code is disabled.

Symbologies

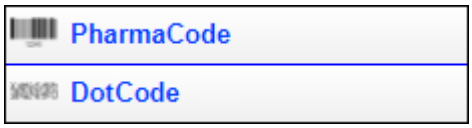
2D Symbologies



1D Symbologies



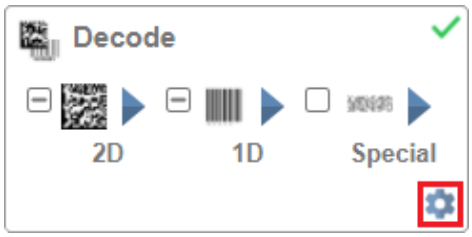
Special Symbologies



Note: When DotCode is enabled, all other symbologies will be disabled.

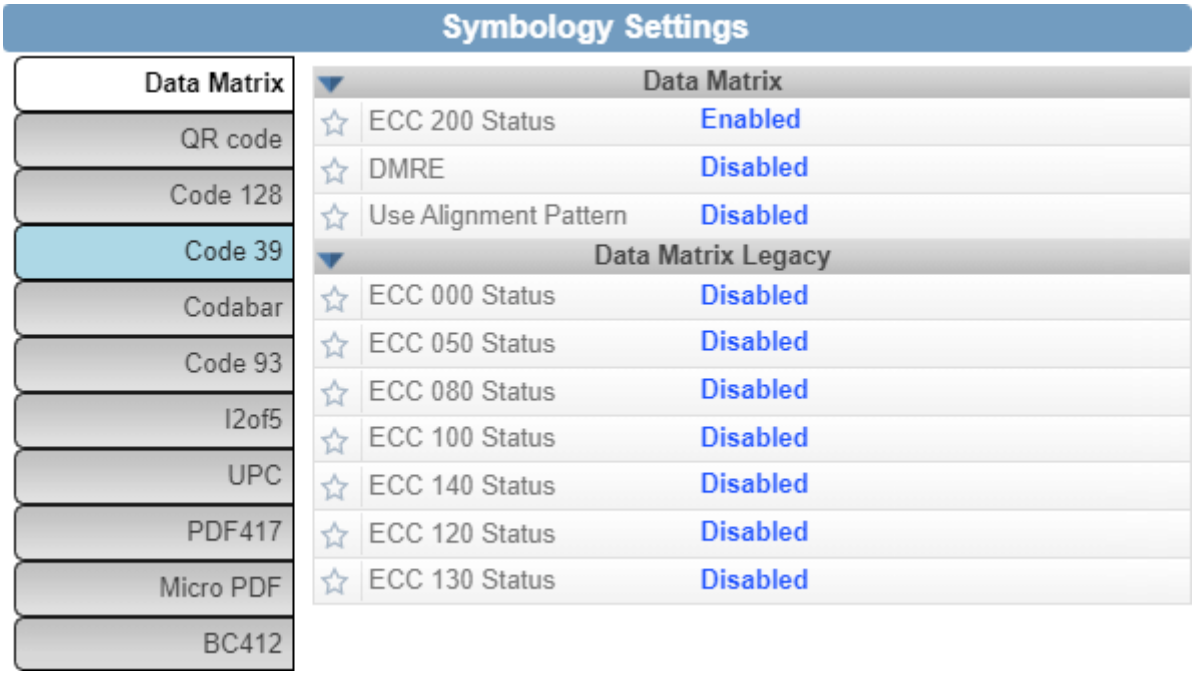
Symbology Settings

Clicking the **gear** icon at the bottom of the **Decode** area brings up **Symbology Settings**.

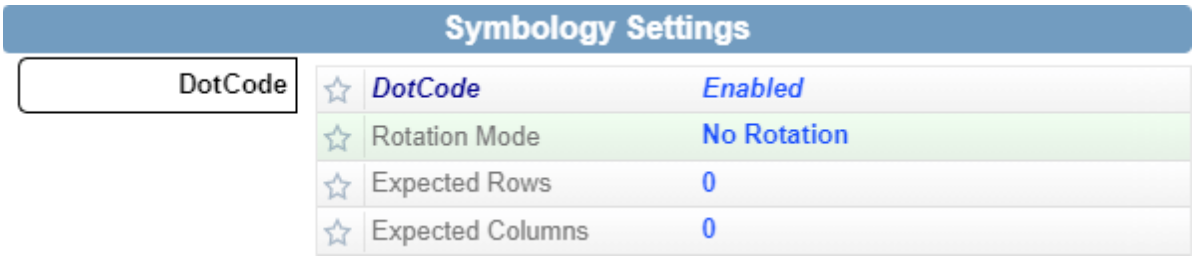


Symbology Settings allows you to configure every parameter of every code type supported by WebLinkHH. All parameter changes take effect immediately.

Symbology Settings Example 1 – Data Matrix Parameters



Symbology Settings Example 2 – DotCode Parameters



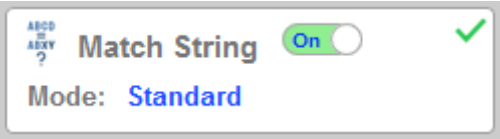
Match String

Match String will attempt to match to the decoded data. (It will not attempt to match to the Formatted Output Data).

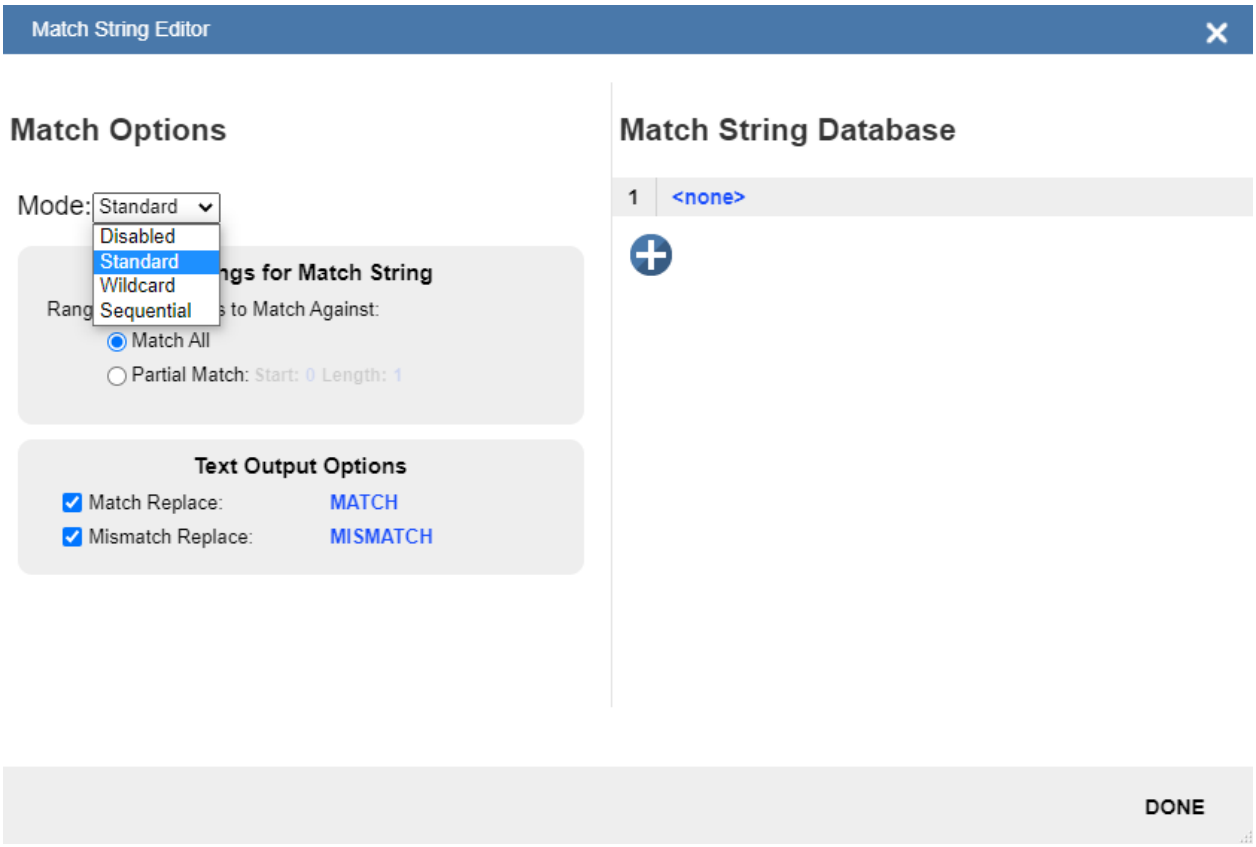
Note: Match String can only be used in **Triggered** and **Start/Stop** modes. It cannot be used in **Presentation** mode.

To open the **Match String Editor**, go to the **Setup** view and turn Match String **ON** as shown below.

Then click on the **Mode** link (shown as **Standard** in the example below) to open the **Match String Editor**.



In the **Match String Editor**, click on the **Mode** link under **Match Options** to select your **Match String Mode – Standard**, **Wildcard**, or **Sequential**.



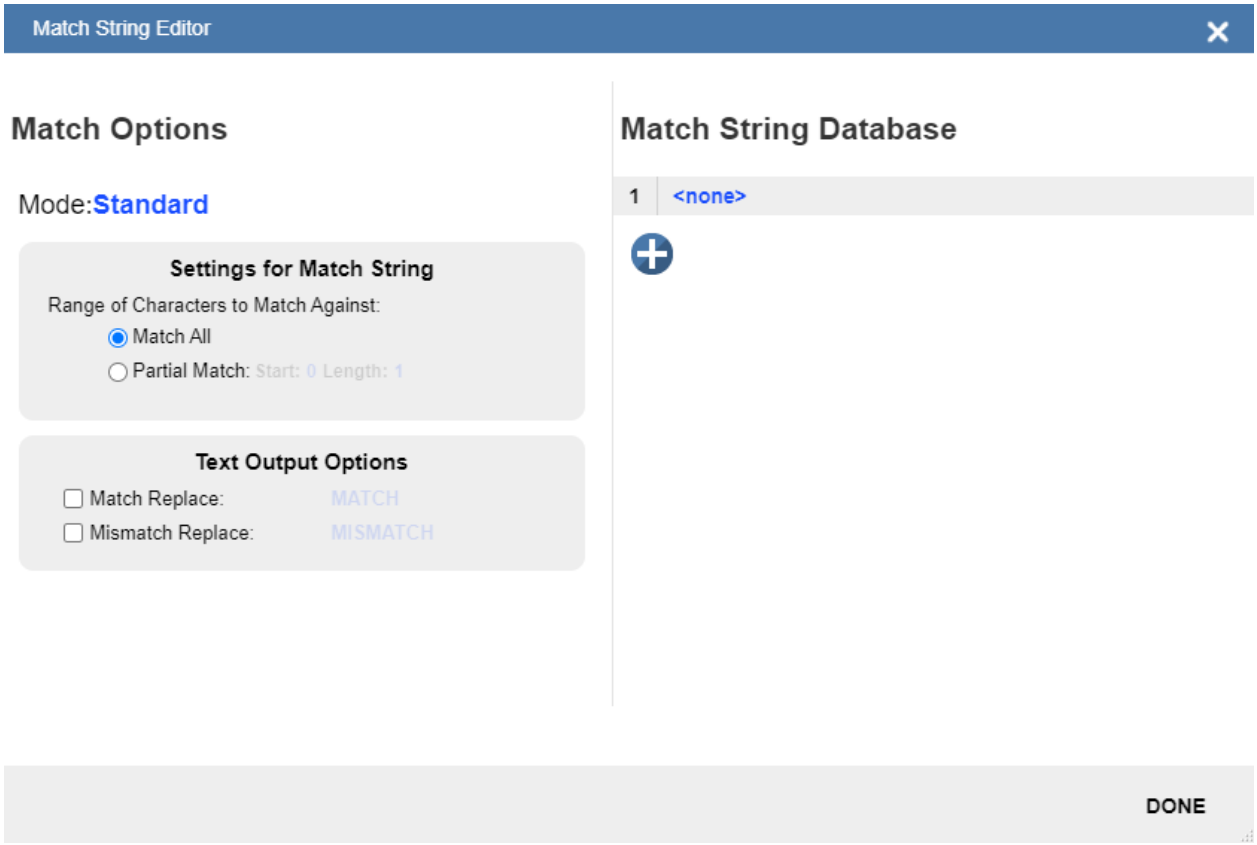
Standard, Wildcard, and Sequential Modes

Standard mode allows you to match total or partial barcodes by defining strings in the **Match String Database**.

Wildcard mode allows you to create custom matches using wildcards and placeholders. A **wildcard** is a single character that can act as **0** or more characters. A **placeholder** is a character that can substitute for exactly one character.

Sequential mode instructs the reader to sequence after each match and to compare symbols or portions of symbols for sequential numbers.

Standard Mode



Select **Match All** under **Settings for Match String**.

Under **Match String Database**, input the exact decoded data as it appears when you scan the barcode. Match All is working correctly if it successfully matches a barcode of the same length and character sequence that you input in the Match String Database.

Now select **Partial Match** under **Settings for Match String**. Choose a start position and length based on the barcode you're scanning.

Partial Match works by using the Start and Length fields and attempting to match the exact portion of text defined in the Match String Database in that location.

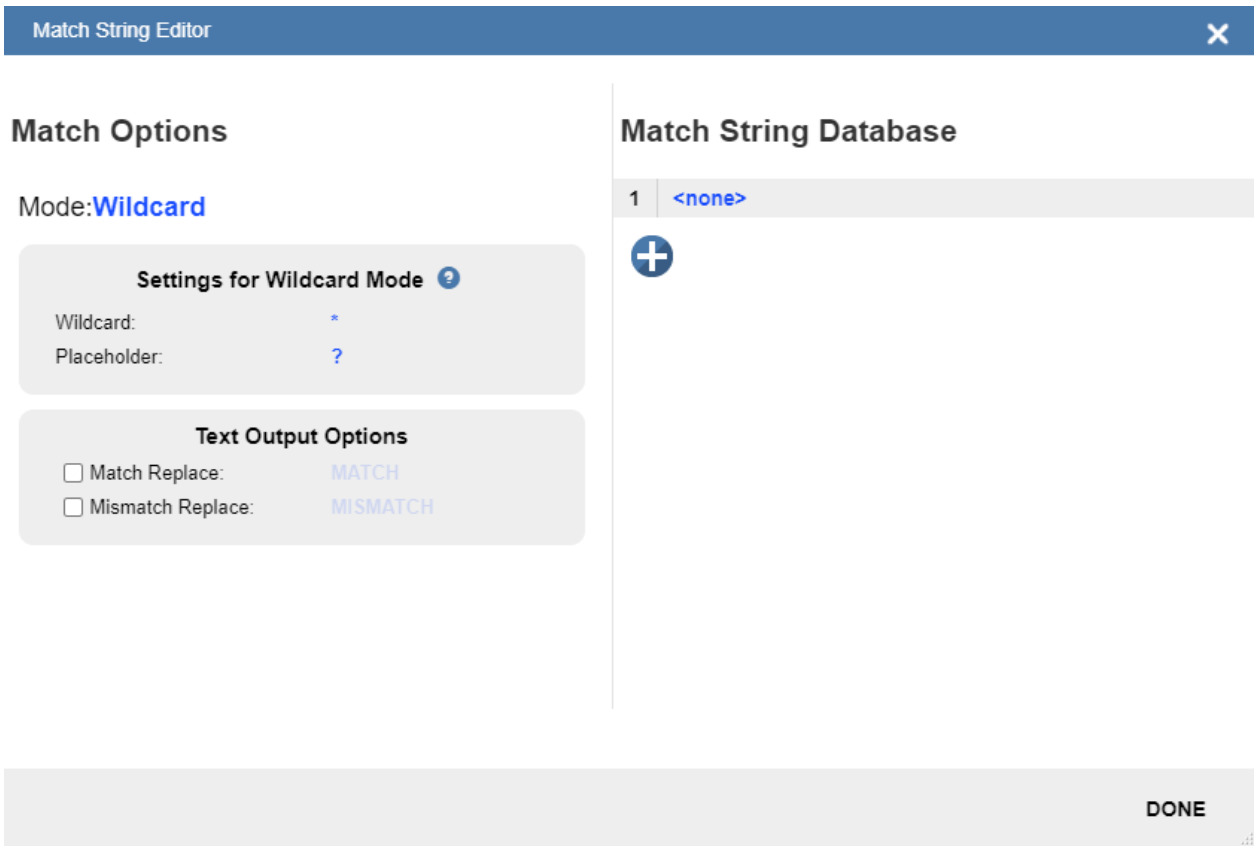
For example, if the decoded symbol data is **1234567**, Start=**1**, Length=**2**, and the input in the Match String Database is **12**, the match would be successful because characters **12** are in the portion of the barcode data defined by the Start and Length fields.

Try achieving several of your own Partial Matches on several portions of your barcode data, changing the Start and Length fields each time.

In both **Match All** and **Partial Match**, you can output custom text upon a successful or unsuccessful match. These fields can be activated and edited by clicking on **Match Replace** and **Mismatch Replace**.

If you enter several inputs into the **Match String Database**, the application will attempt to match all of them. If one match is successful, then the other failures are ignored, and the match is considered successful.

Wildcard Mode



Wildcard mode gives you the ability to use wildcards and placeholders to search for matches. By default the Wildcard is ***** and the Placeholder is **?**

You can use these wildcard and placeholder definitions when they input text into the **Match String Database**.

A **wildcard** represents zero or more characters of any type. For instance, ***TEST*** looks for the text "TEST" in barcode data with any amount of characters before or after it.

***TEST** looks for the text "TEST" in barcode data with any number of characters before it, but "TEST" at the end.

TEST* looks for the text "TEST" at the beginning of the barcode data, with any number of characters after it.

If you had a barcode with data **1234567** and tried to match to the entire data string using **123***, you would have a successful match.

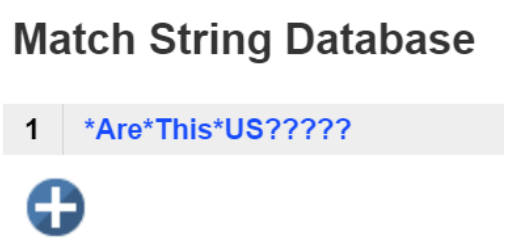
If you tried to match that same barcode data using ***123**, you would be unsuccessful, because **123** appears at the beginning of the barcode and this data string matches with **123** at the end of the barcode. It's important to remember that the wildcard character * always stands for zero or more unknown characters.

Now try to match a portion of the barcode you're scanning by using ***YOURTEXT***. If the text "YOURTEXT" appears somewhere in the middle of the barcode, the match will be successful.

A **placeholder** represents one character of any type. For example, **???TEST** tries to match a barcode that contains three characters of any type followed by the text "TEST". **???TE?T** attempts to match a barcode that contains an unknown character where the 'S' previously appeared.

Placeholders and wildcards can also be used together in the **Match String Database** input fields. The concepts of both are still the same: a wildcard represents zero or more unknown characters, and a placeholder represents exactly one unknown character.

An example of a complex match using wildcards is shown below. Recall that wildcards and placeholders are * and ? by default, but they can be redefined.



The barcode data the example above was attempting to match was **EN-1234_AreYouReadingThis en_US 1234**.

The logic of this match is diagrammed below.

[ANY AMOUNT OF CHARACTERS][ARE][ANY AMOUNT OF CHARACTERS][THIS][ANY AMOUNT OF CHARACTERS][US][5 CHARACTERS]

* = Any amount of characters (**EN-1234_** in this case)

Are

* = Any amount of characters (**YouReading** in this case)

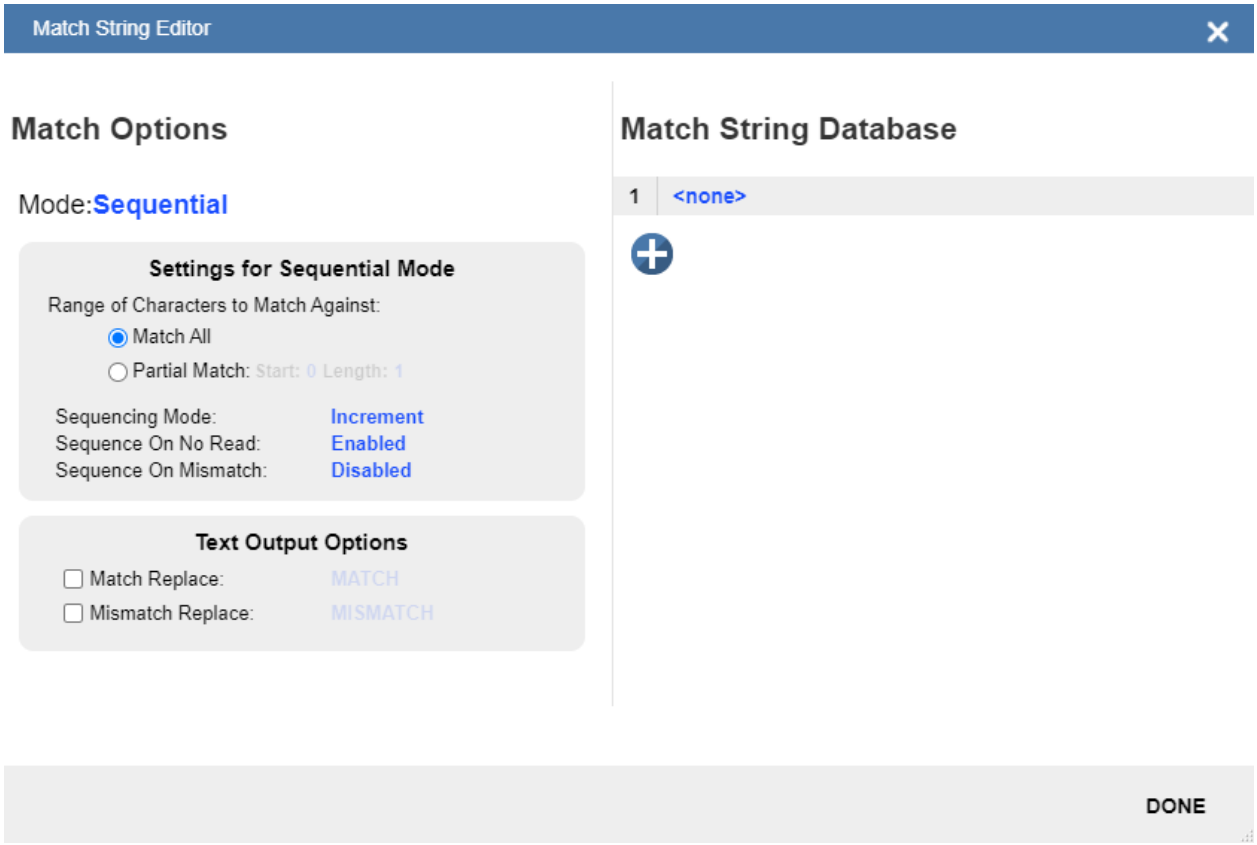
This

* = Any amount of characters (**en_** in this case)

US

????? = 5 Characters (1234 in this case**)**

Sequential Mode



Sequential mode instructs the reader to sequence after each match and to compare symbols or portions of symbols for sequential numbers.

Note: If **Matchcode Type** is set to **Sequential**, the reader will behave as if **Number of Codes** were set to **1**, regardless of the user-defined configuration.

Match String Database

The **Match String Database** can hold up to **30 different strings** and **3,000 characters** in total, meaning **1 string** can be **3,000 characters** long, **2 strings** can each be **1,500 characters** long, and **30 strings** can each be **100 characters** long.

Match String Database

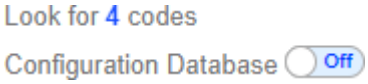
1	YOURTEXT
2	<none>



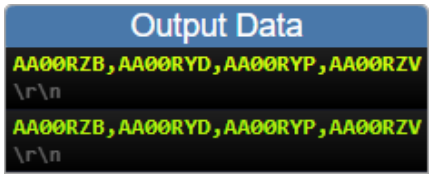
Format Output

By default, the system generates a **standard output string** containing data from all of the decoded symbols.

The number of codes, and whether or not to allow duplicates into the string, is controlled from the **Cycle** dialog.

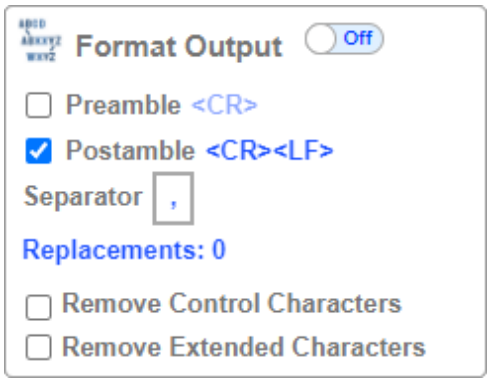


The **default output order** is not controlled. Symbol data is output in the order that the decode algorithm finds each code in the image.



Basic Output String Formatting

The output dialog in the left panel of the user interface allows the user to make formatting changes to the output string. The user may do the following operations:

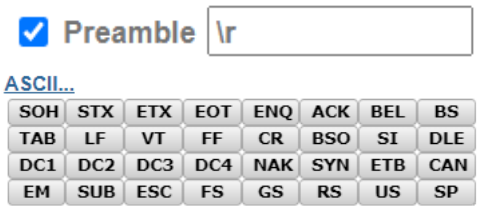


Add Standard or Custom Preamble – Adds standard, or user defined text to the beginning of the output string when the checkbox is selected.

Select Custom Separator – Appends user defined text between the individual symbol data.

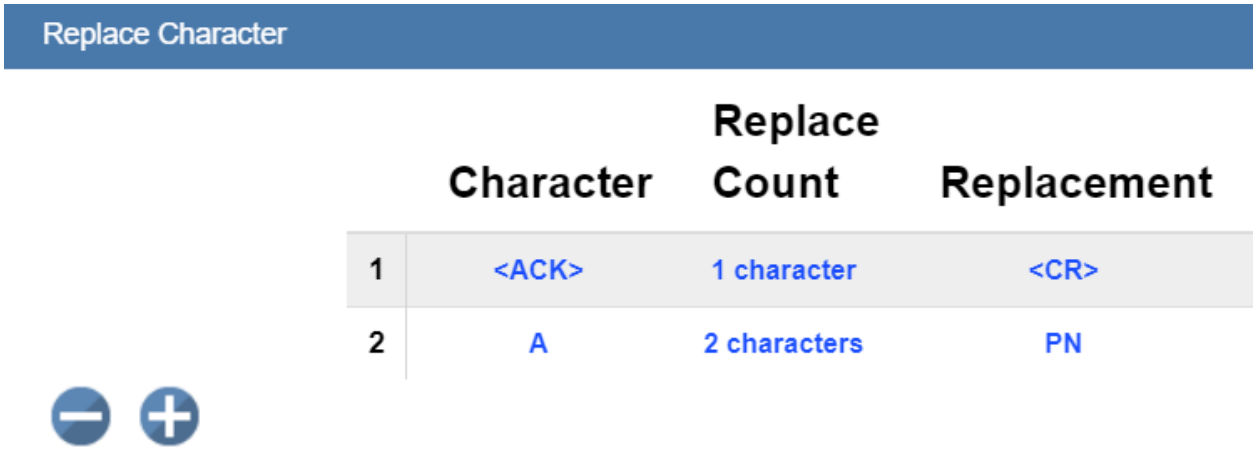
Add Standard or Custom Postamble – Appends standard, or user defined text to the end of the output string if the checkbox is selected.

All three of the above features work in the same way: select the checkbox and then enter characters in the field. You can type standard text and/or insert special ASCII characters using the buttons under "**ASCII...**" as shown below.



Remove Control Characters and Remove Extended Characters – These are used to remove all ASCII control characters and ASCII extended characters from decoded barcode data. A complete ASCII table is available for reference **here**. Control characters are defined as **1-31**, and extended characters are defined as **127-255**.

Define Replacements – Replaces normal or ASCII characters in the string with user defined characters. To use, click on the Replacements in the dialog and it will bring up the following dialog.



Begin by clicking on the + to add a row for each character to be replaced. Complete the table using the following fields.

- **Character:** The standard or ASCII character that you want to replace.
- **Replacement Count:** How many characters to insert in its place. Valid options are 0, 1, and 2.
- **Replacement:** The character, or characters that you want to replace the character with. These can be standard or ASCII.

When you replace a character with one or more different characters, the results will be displayed in the **Output Data** window in the lower right panel of the WebLinkHH user interface.

Up to **25** character replacements can be defined. If duplicates are defined, an error message will appear, and only the first definition will be applied.

You can enter ASCII control characters by selecting the link below the input box. You can also enter extended ASCII characters by entering **\xHexadecimal**. For example: **\xFF**.

The number of replacements that you've defined are displayed in the Format Output editor.

Fully Customizing Output String with Format Output

The **Format Output** dialog allows the user to further customize the output string. It offers three very powerful functions:

- **Filtering –** Select just a subgroup of codes from within a larger group for output.
- **Ordering –** Output the selected codes in user defined order.
- **Parsing / Insertion –** Change content of selected codes based on parsing and insertion rules.

You can access Format Output in the left panel of the Setup view by setting Format Output to **On**, and then by clicking on the blue Format String example.

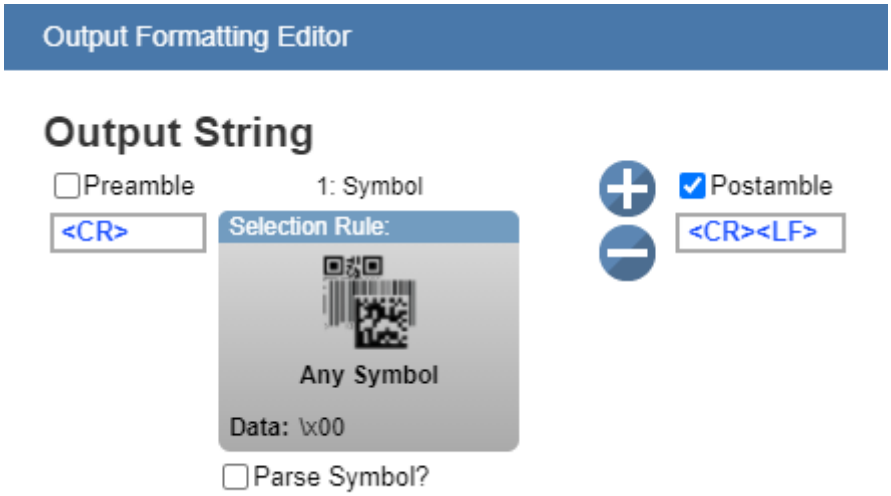


Filtering Using Selection Rules

Inserting Selection Rules

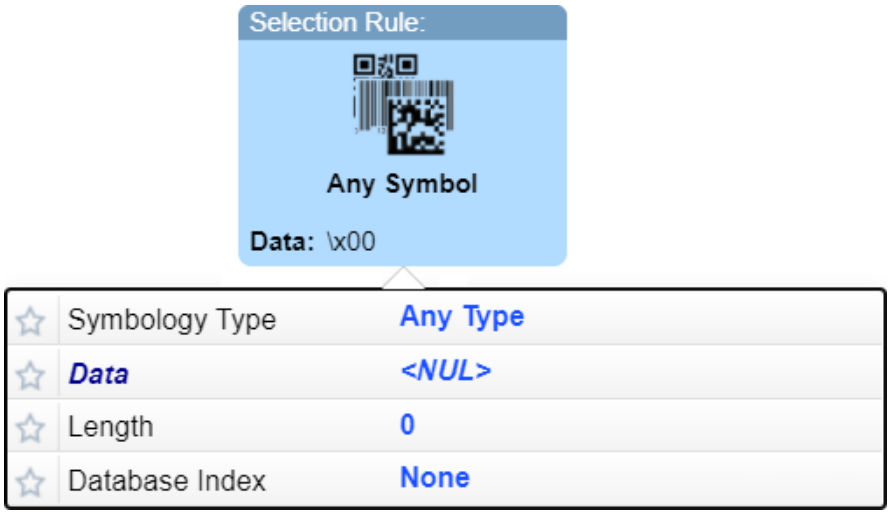
The user begins creating the custom sorted string using **Selection Rules**. This is done by clicking on the **+** sign to insert the first entry. The Selection Rule is used to select a certain code, or set of codes from all of those that have been decoded. This is done based on characteristics of the code, such as code type. Once all matching codes have been identified, they will be inserted into the output string in this position.

Multiple selection rules can be inserted. Again, the position of the Selection Rule determines the position of the selected decodes in the output string.

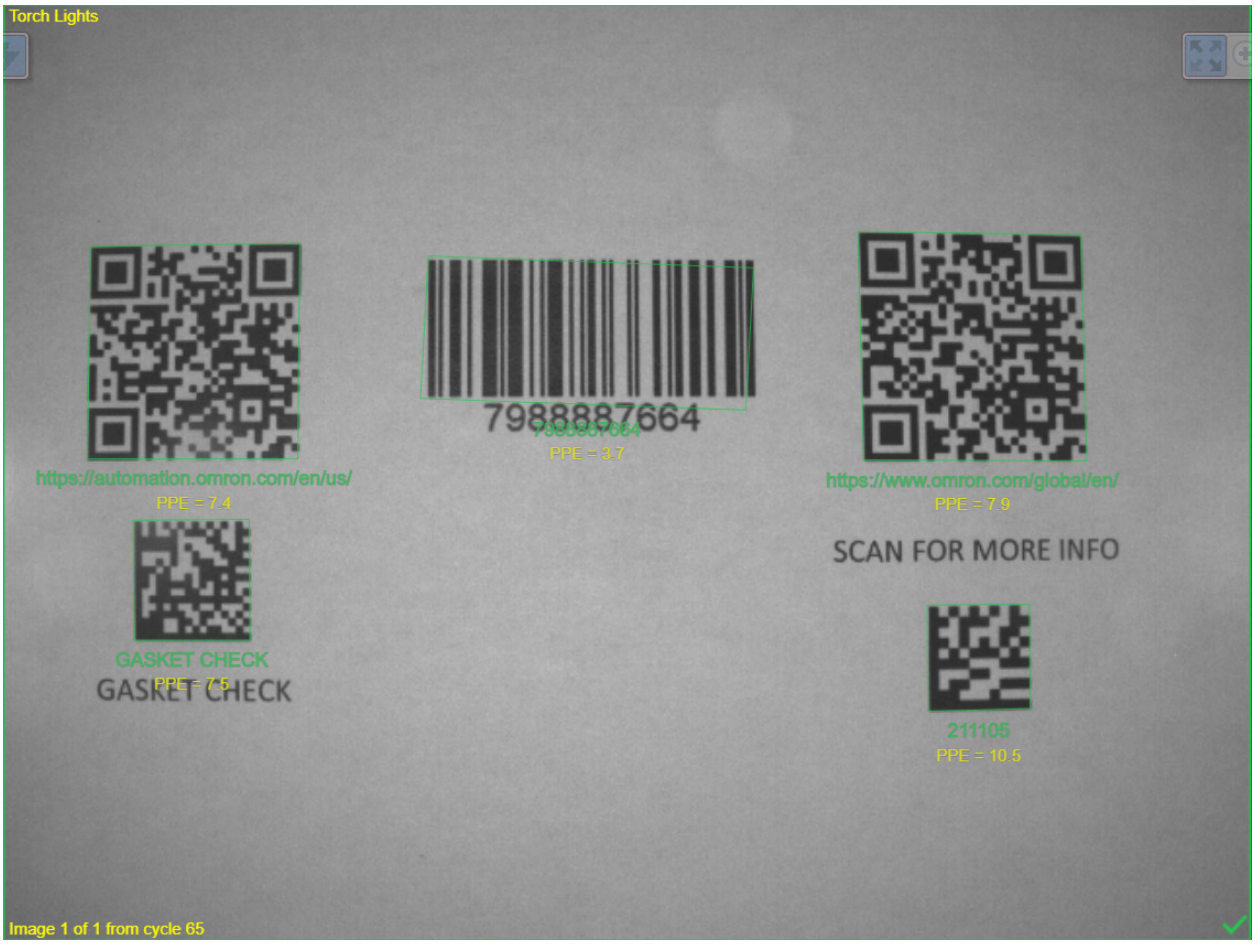


Setting up Selection Criteria

Next, the user should click on the Selection Rule. All of the selection criteria will be displayed. For a symbol, the selection criteria is **Symbology Type**, **Data** content, data **Length**, and **Configuration Database Index**.



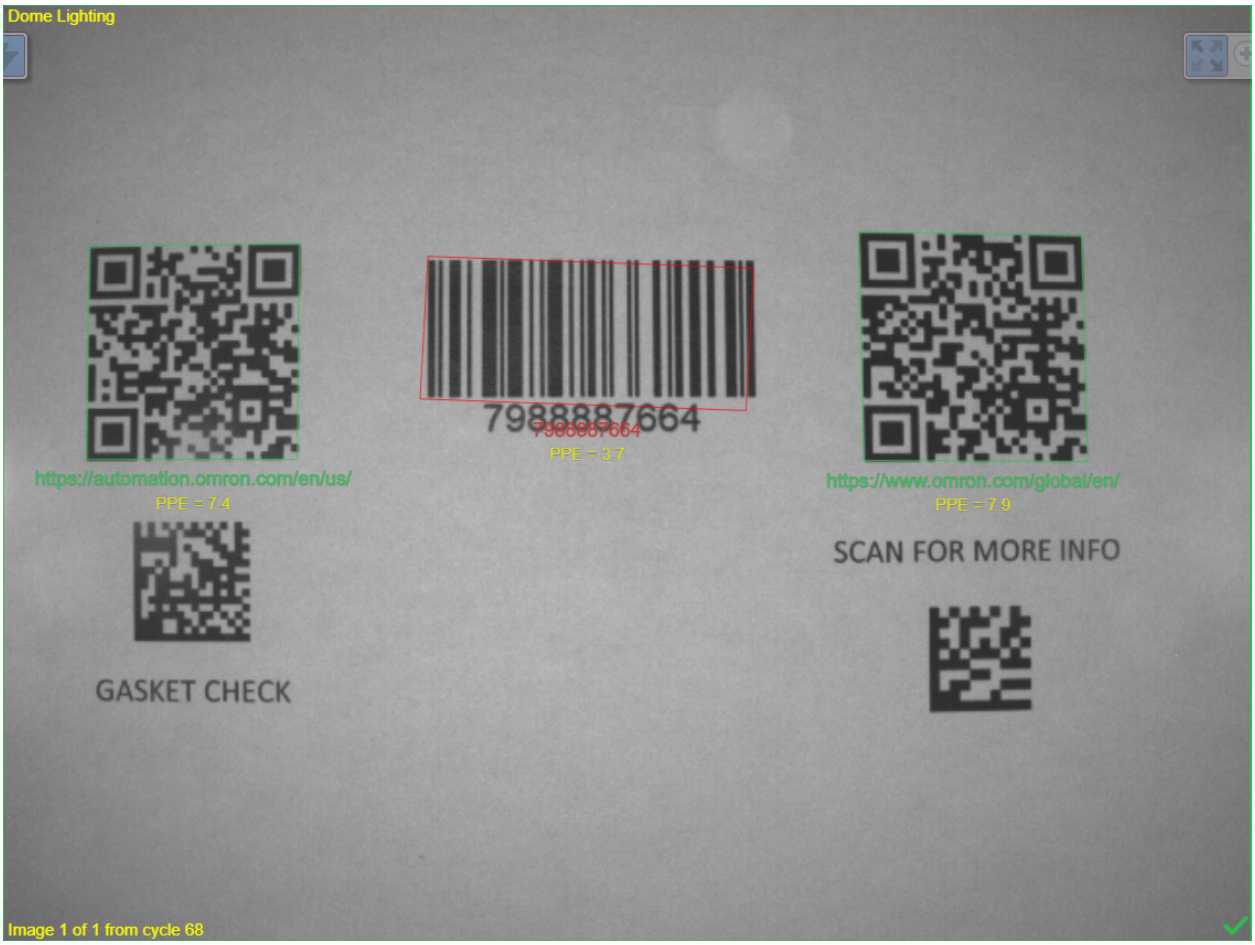
For the image below, without any selection filter and with the number of codes set to five, all codes will be decoded and output.

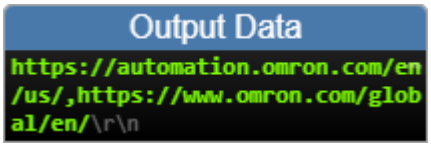


Output Data

```
7988887664,https://automation.o
mron.com/en/us/,https://www.omr
on.com/global/en/,GASKET
CHECK,211105\r\n
```

If you want to select and output just the QR codes, you can set the Symbology type to QR Code and set the number of codes to two. Only the QR Codes will be shown as green in the image, and the string will change from displaying all codes' data to just the QR Codes' data.





Setting up Multiple Criteria with a Single Selection Rule

The user can further refine the selection criteria for which code to choose by setting additional fields. For this example, if we want to differentiate between the two barcode tools, we can select Data to do so. Whichever code contains the set data will be the one selected. Here we set it to find the QR Code containing the substring **"automation"**.

The rules for entering characters in the Data field are similar to those for entering characters in the Match String Database. You simply use a combination of text, wildcards (*****), and placeholders (**?**) to denote the string.

Note: Wildcard (*****) rules. It the string is in the middle of the code, it must be set with wild cards at either end. (***automation****). If the string is at the beginning, or is at the end of the decode data, we need to leave off the leading or trailing *****.

Symbology Type	QR Code
Data	*automation*
Length	0
Database Index	None

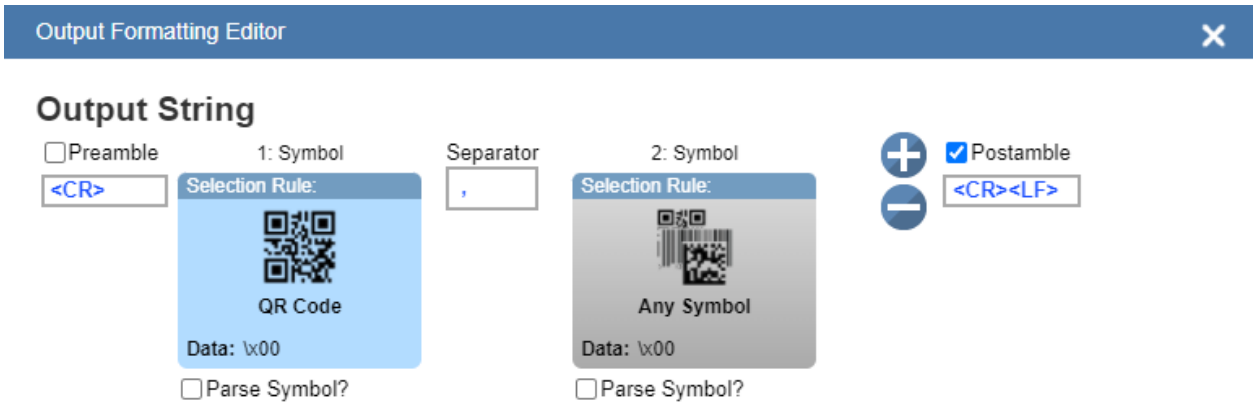


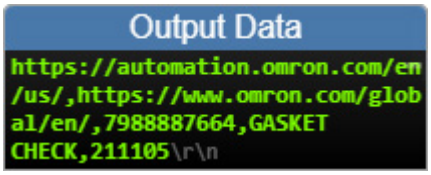
Ordering Using Multiple Selection Rules

The user can insert as many selection rules as there are codes to set the exact order of each and every code if desired. Below we will show two examples for how to output all five codes in a defined order.

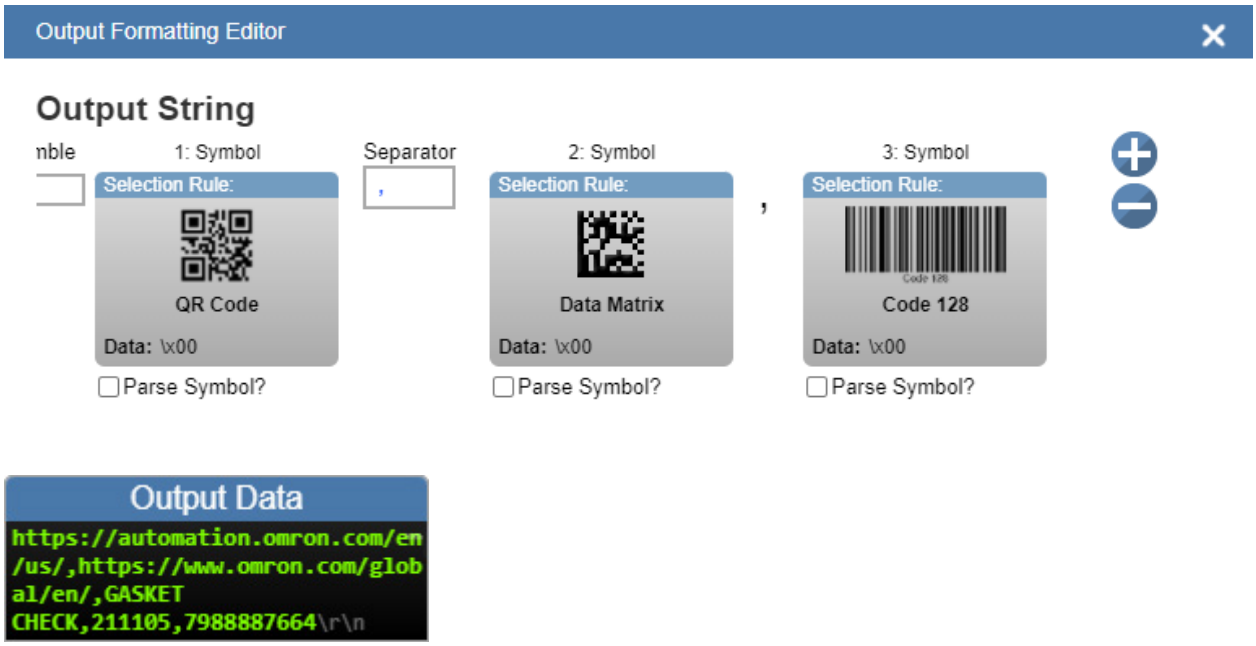
Example 1: For this example, the two QR Codes come out first followed by the other three codes. Here we do not care about the order or the last three.

For this case we simply need to add a second Selection Rule **with no selection criteria** set. This will match to all of the other codes and allow them to be printed out after the two QR Codes.





Example 2: For this example, we want to output two QR Codes followed by two Data Matrix codes and then a Code 128 symbol. Here we simply use three selection rules.



Symbol Parsing and Insertion

Symbol Parsing allows the user to modify the contents of the decode data strings before they are put into the output string. There are two functions or rules that can be applies.

- **Parse –** Extract (parse) multiple substrings from the original symbol data and insert them in the new output string.

- **Insert –** Insert custom text into the output string.

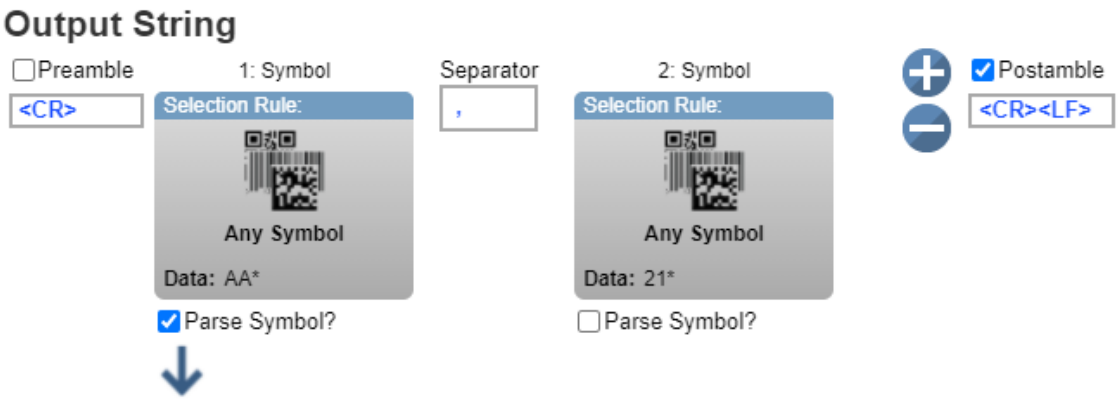
Note: Only one parsing sequence can be set up. It will be applied to all groups where Symbol Parsing is checked on. All codes within a checked group will be affected.

Example: Setting the Format of Output Data

1. Acquire Image and determine output requirements. Here we want to extract the last two characters in the strings beginning with AA.

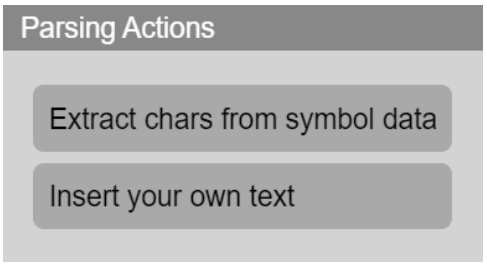


2. Parsing is enabled by clicking on the check box below any or all of the Selection Rules. When checked, all the codes associated with that Selection Rule will be modified by the Symbol Parsing rules.

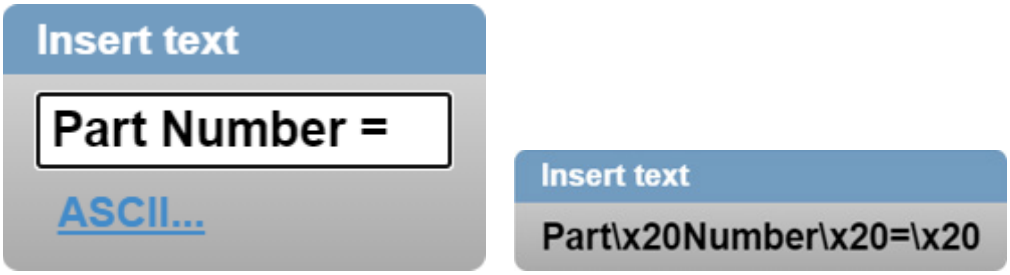


3. Press the **+** to add Parsing Rules. Choose either **Extract chars from symbol data**, or **insert your own text**.





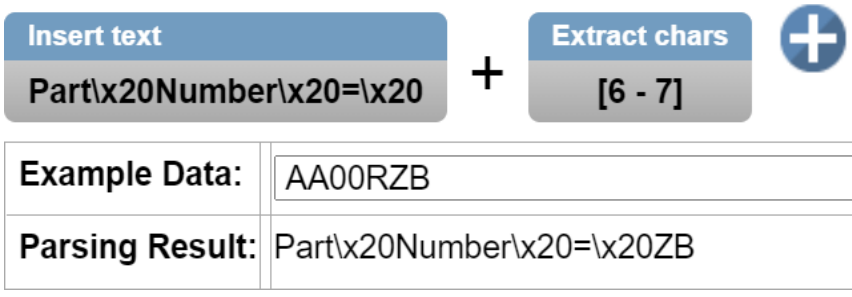
4. To insert text, type the text and hit return inside the text box. You will see the full ASCII characters that will go into the output string.



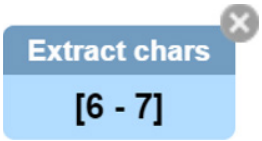
5. Hit **+** again to add the new rule. Choose Extract chars from symbol data. Set first char and last char position. Hit the check for **OK**.



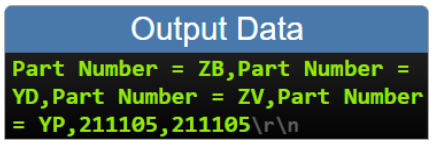
6. Review the sample result that is actively displayed in the **Parsing Result** box as you build the string.



7. Up to **30 rules** can be inserted. Rules can be deleted by hovering over them and typing **X**.



8. When complete, the results can be seen in the Output Data window.



Configuration Database

WebLink's **Configuration Database** is a system that uses two or more unique configurations that are automatically attempted during a read cycle. It allows for multiple reader changes to be made without interaction from the user. WebLinkHH is used to configure the database settings and verify that all the database indexes are working correctly.

The Configuration Database can be used to fine-tune the reader's performance in your application. It can run multiple decode options in a single read cycle. You can enable Configuration Database and define the number of configurations in **Advanced Settings**. Configurations are set up individually and saved individually. Configuration database is set up in the **Setup** tab and tested in the **Run** tab. Virtually all **Acquire** and **Decode** settings can be individualized per database entry. Clicking the gear icon shows a view of all database settings.

The Configuration Database is useful in applications where:

- More than one symbol type is present;
- A symbol may require different photometry settings to decode;
- Symbols are presented at different working distances.

Overview of Setup Process

Use WebLinkHH to:

- Define the number of active database indexes, located in the **Advanced Settings**.
- Configure each of the database indexes by selecting them in the **Setup** view.

Tips

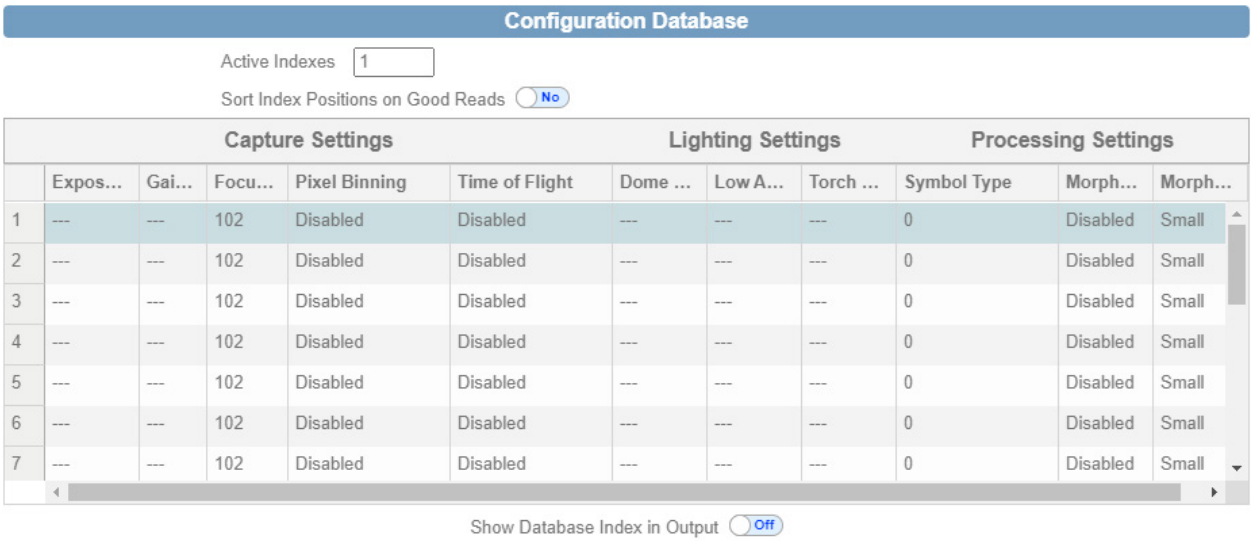
- The indexes are not cycled in Setup mode. Switch to **Run** mode for read cycle testing.
- Set the Number of Codes to match the number of barcodes you need to decode.
- Index number is only output in Run mode if enabled.
- Save settings to the flash memory of the reader when all the indexes in the Configuration Database have been defined for the application.

Limitation

- ECC 200 Data Matrix is the only fully supported symbology in the Configuration Database. If a database entry has Data Matrix disabled, all ECC options will be disabled. If a database entry has Data Matrix enabled, only ECC 200 will be enabled. Other ECC options can be used with the Configuration Database only if all database entries leave Data Matrix enabled.

Read-Only Configuration Database

The read-only **Configuration Database** shows **Capture Settings**, **Lighting Settings**, and **Processing Settings**.



Start and Run Views

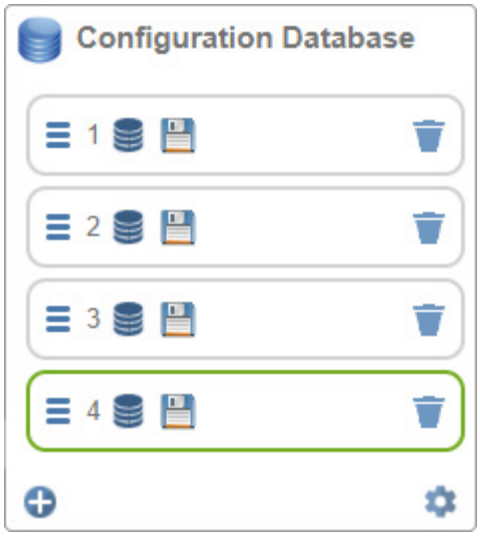
If the **Configuration Database** is enabled, the corresponding global settings are not used. These settings include: **Gain**, **Exposure**, **Focus**, **Pixel Binning**, **Time of Flight**, **Lighting**, enabled **Symbologies**, and **Morphology**. This is true when WebLinkHH isn't running, or when it is in the **Start** or **Run** views. While in the **Setup** view, the Configuration Database is paused, allowing you to configure global settings, which then update the specified Configuration Database index settings on exit.

While in the **Start** and **Run** views, you can see which database decoded the symbol.



Setup View

Configuration Database indexes in WebLink's **Setup** view are drag-and-drop-configurable.

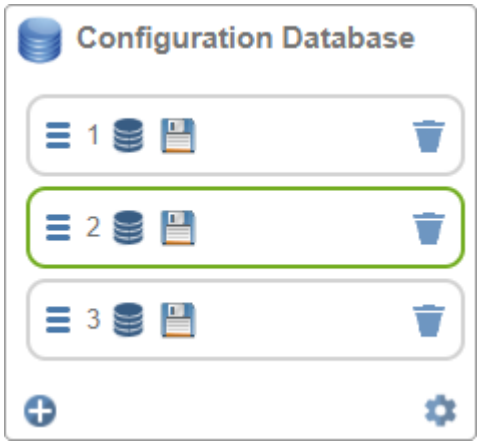


Auto Save

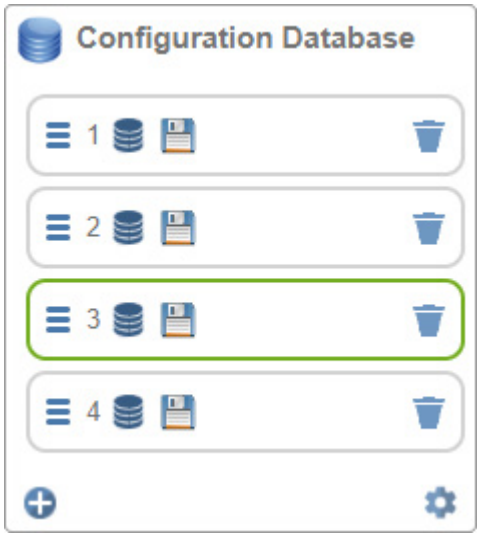
The Configuration Database saves the current index whenever you save to flash, save a .wls file, leave the Setup view, select a database, add a database, remove a database, or move a database. The save icon allows you to copy settings to another database if necessary. Non-current database indexes will turn green when saved. However, the current index's save icon does not turn green.

Adding a Database Index

Adding a database index saves current settings, inserts a new database index after the current database index, and selects the new database index. For example, if database index 2 is the current index...



...clicking **add** will insert a new database index (database index 3) after database index 2, and database index 3 will be selected.



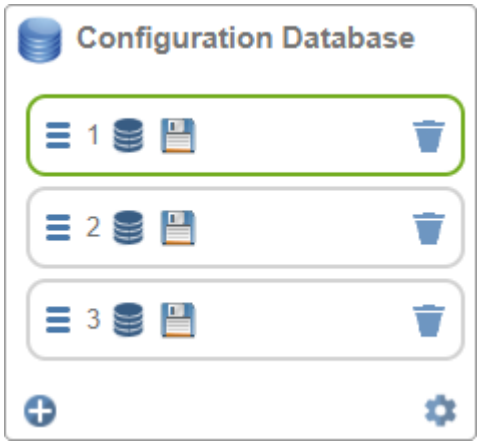
Removing the Current Database Index

You can remove a database index by clicking the **trash** icon.

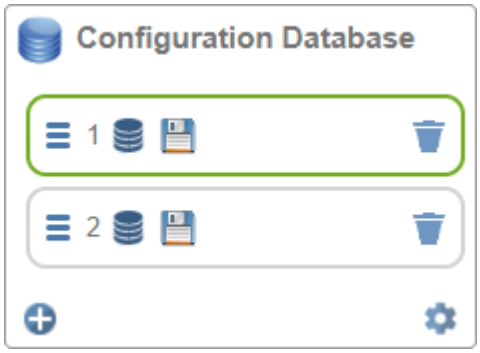


Removing the current database index shifts all database indexes above it down by one and selects the database index before it, unless it's the first database index, in which case it moves the second database index's settings to current and selects it. The second database index will become the first, because it was shifted down.

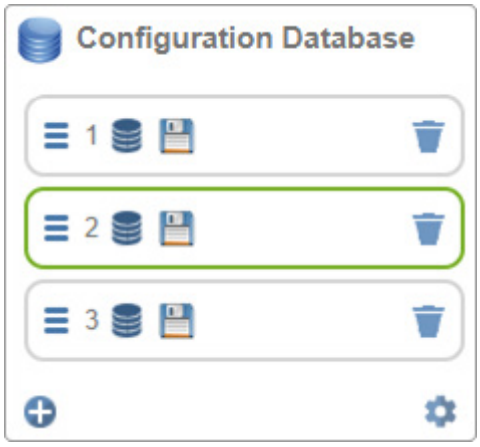
For example, removing the first database index (which is current) in a three-database-index configuration...



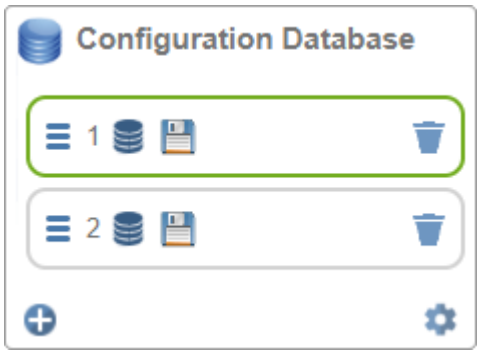
...will remove the first and select the second configuration database index. However, all database indexes above shift down, so the second becomes the first and the third becomes the second.



Another example: Removing the second database index (which is current) in a three-database-index configuration...



...will remove the second and select the first database index. The third database index is shifted down and becomes the second.



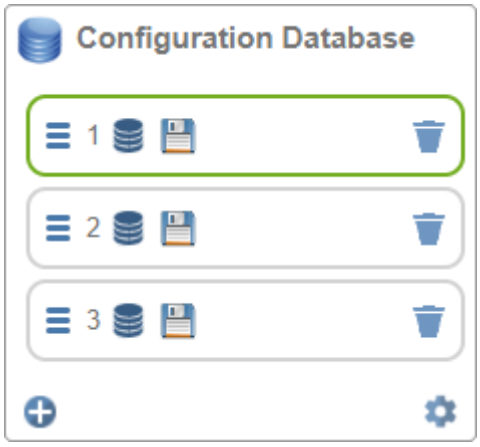
Removing a Non-Current Database Index

You can remove a database index by clicking the **trash** icon.

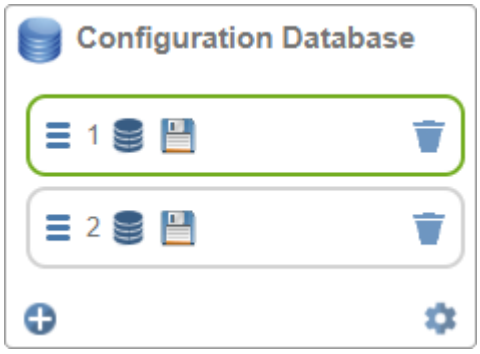


Removing a non-current database index shifts all databases above it down one. If the current database index is above the non-current database index, it will remain selected, but its database index number will be decremented.

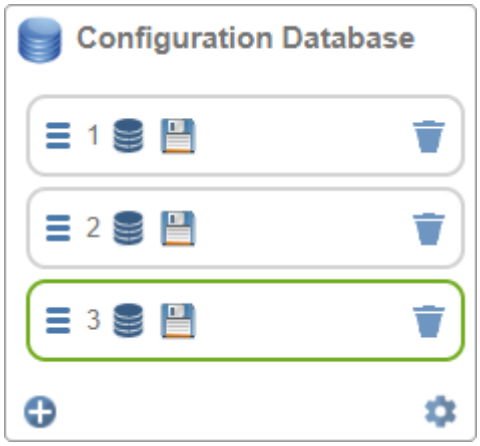
For example, removing the second database index (when the first database index is current) in a three-database-index configuration...



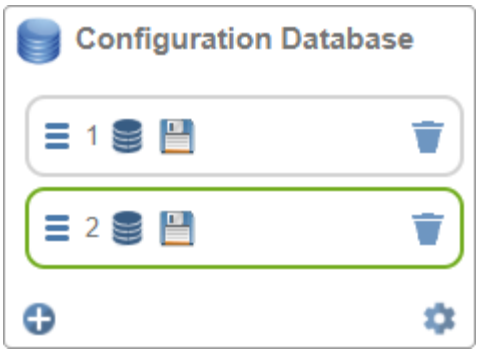
...will keep the first as current, but the third database index is shifted down.



Another example: Removing the second database index (when the third database index is current) in a three-database-index configuration...

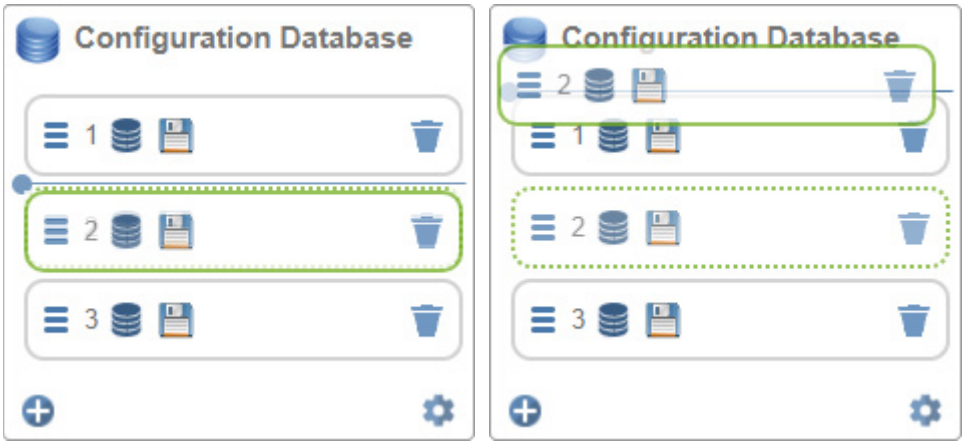


...will keep database index 3 as current, but it's shifted down to 2.



Moving a Database Index

Database indexes can be moved by clicking and dragging.



Rules of Moving a Database Index:

- When moving a database index from 1 to 3, database indexes 2 and 3 shift down by one.

- When moving a database index from 3 to 1, database indexes 1 and 2 shift up by one.

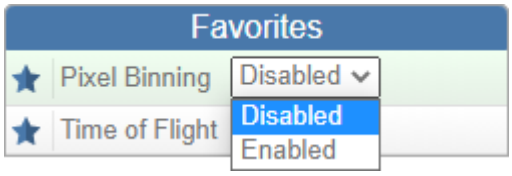
Selecting a Database Index

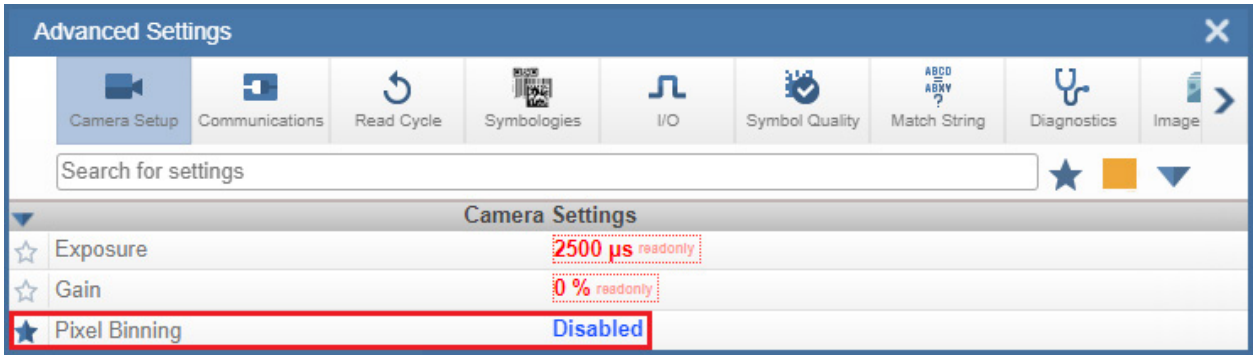
Selecting a database index will auto-save and select the index that was clicked.

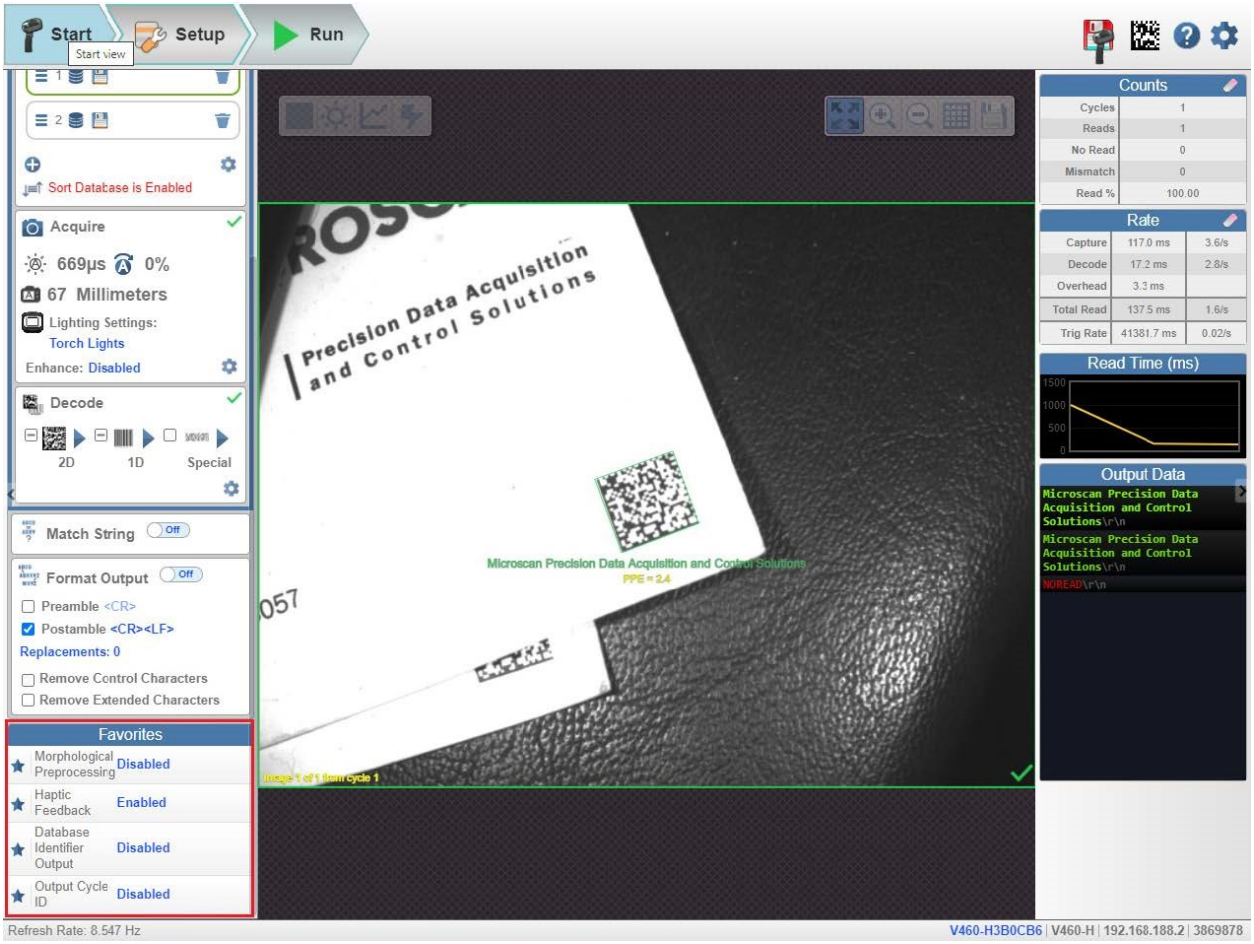
Favorites

The **Favorites** dropdown menu displays commands that you have selected as favorites by clicking the star icons next to command names in the **Advanced Settings** menus. This is useful because it allows you to change the parameters of frequently-used commands without returning to the Advanced Settings menus.

In the example below, notice that the star icon next to the **Pixel Binning** command in the **Camera Setup** menu is selected. This causes that command to appear in the Favorites editor in the **left panel** of WebLink's **Setup** view. Commands that are displayed in Favorites can be configured in the same way as commands in Advanced Settings.

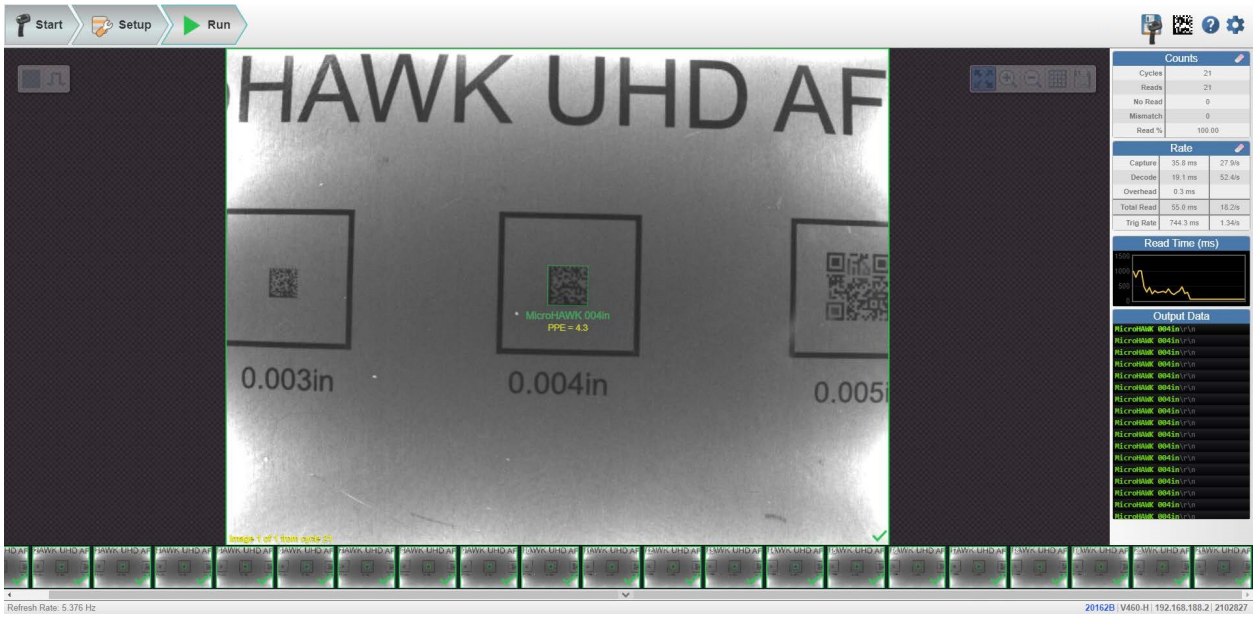





Start
Setup
Run
Start view
Sort Database is Enabled
Acquire
669µs 0%
67 Millimeters
Lighting Settings:
Torch Lights
Enhance: Disabled
Decode
2D
1D
Special
Match String
Off
Format Output
Off
Preamble <CR>
Postamble <CR><LF>
Replacements: 0
Remove Control Characters
Remove Extended Characters
Favorites
Morphological Preprocessing Disabled
Haptic Feedback Enabled
Database Identifier Output Disabled
Output Cycle ID Disabled
Counts
Cycles 1
Reads 1
No Read 0
Mismatch 0
Read % 100.00
Rate
Capture 117.0 ms 3.6/s
Decode 17.2 ms 2.8/s
Overhead 3.3 ms
Total Read 137.5 ms 1.6/s
Trig Rate 41381.7 ms 0.02/s
Read Time (ms)
1500
1000
500
0
Output Data
Microscan Precision Data Acquisition and Control Solutions\r\n
Microscan Precision Data Acquisition and Control Solutions\r\n
NOREAD\r\n
Precision Data Acquisition and Control Solutions
Microscan Precision Data Acquisition and Control Solutions
PPE = 2.4
Refresh Rate: 8.547 Hz
V460-H3B0CB6 | V460-H | 192.168.188.2 | 3869878

Run

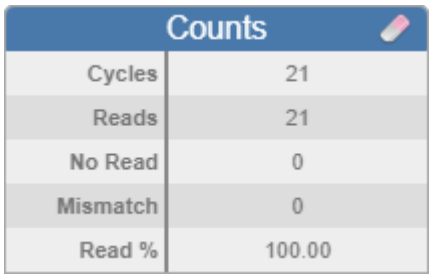
In the **Run** view, you can observe the progress of the application as it follows the parameters you have defined. The **right panel** of the UI shows **Counts** for **Cycles**, **Reads**, **No Reads**, and **Mismatches**, as well as **Rate** information for **Capture**, **Decode**, **Overhead**, **Total Read**, and **Trigger Rate**, as well as **Output Data**. A "**filmstrip**" below the **Image Area** shows each image capture with a **green check mark** for a good read and a **red x** for a no read.



Counts

The **Counts** area of the **right panel** provides five data points:

- **Cycles** shows the total number of captures that have occurred.
- **Reads** shows how many decode attempts have been successful.
- **No Read** shows how many decode attempts have been unsuccessful.
- **Mismatch** shows how many times decoded symbol data has not matched a user-defined character string (if a **Match String** is defined).
- **Read %** shows the percentage of decode attempts that have been successful.



You can reset all counts by clicking the **eraser icon**.

Rate

The **Rate** area of the **right panel** provides five data points:

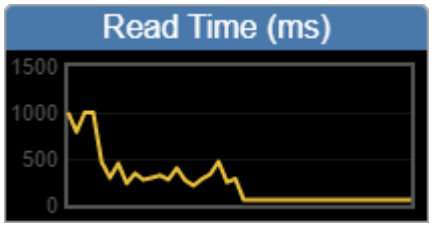
- **Capture** shows the average image capture rate per second.
- **Decode** shows the average decode rate per second.
- **Overhead** shows the average of excess processing time required to achieve captures and decodes.
- **Total Read** shows the total average time required for image capture, decoding, and overhead per second.
- **Trig Rate** shows the average number of triggers per second.

Rate		
Capture	35.8 ms	27.9/s
Decode	19.1 ms	52.4/s
Overhead	0.3 ms	
Total Read	55.0 ms	18.2/s
Trig Rate	744.3 ms	1.34/s

You can reset all rate data by clicking the **eraser** icon.

Read Time

Read Time (ms) is a real-time line graph representation of read time data in the **Rate** area of the **right panel**.



Output Data

The **Output Data** area of the **right panel** shows the data from each symbol decoded in a read cycle. The preamble and postamble are also shown here if enabled and configured.

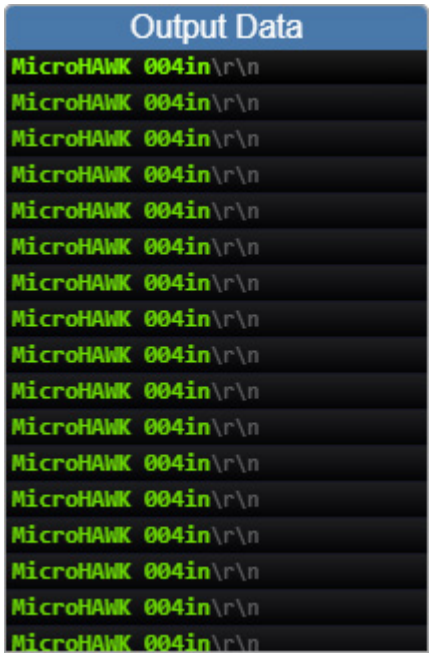


Image History

Image History is a series of thumbnail representations of each image capture. The Image History appears below the **Image Area** in the **Run** view. Each image capture thumbnail shows a **green check mark** for a good read and a **red x** for a no read.



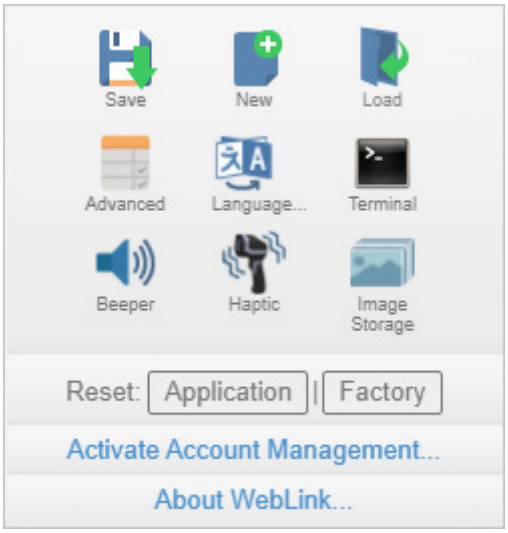
Application Settings

Click the **gear icon** to the right of the **help icon** to open the **Application Settings** menu.



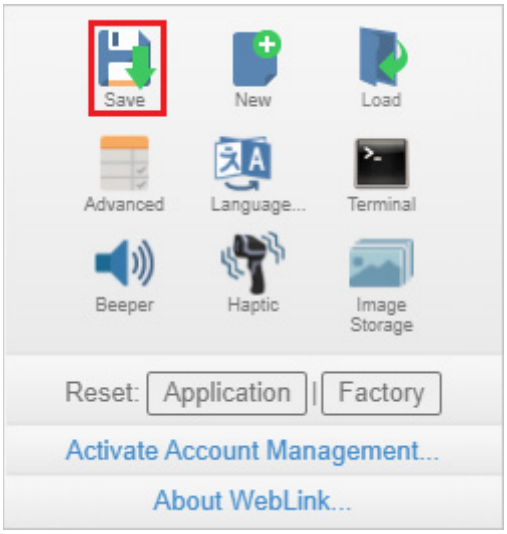
Application Settings Menu

The **Application Settings** menu includes several functions: **Save**, **New**, **Load**, **Advanced**, **Language**, **Terminal**, **Beeper**, **Haptic**, **Image Storage**, **Reset Application Settings**, **Reset to Factory Settings**, **Activate Account Management**, and **About WebLinkHH**.



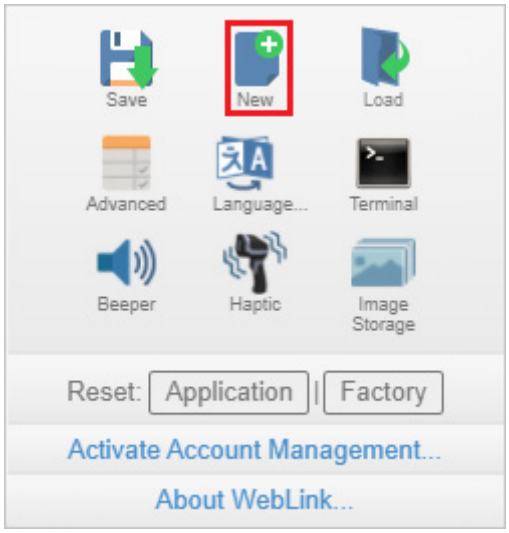
Save

Save saves the current configuration to a **.wls** file that can be loaded onto other readers.



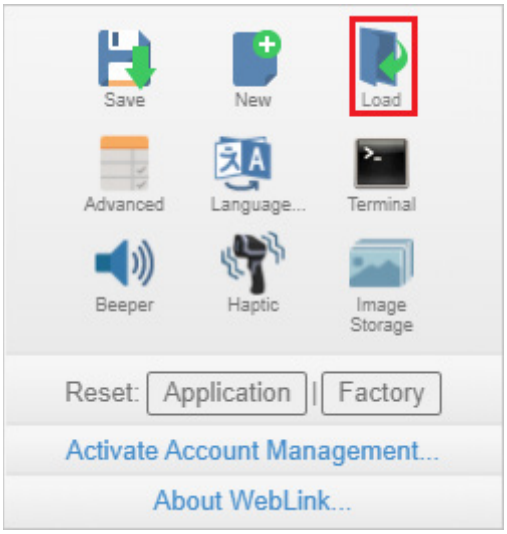
New

New restores default settings and navigates to the Setup view.



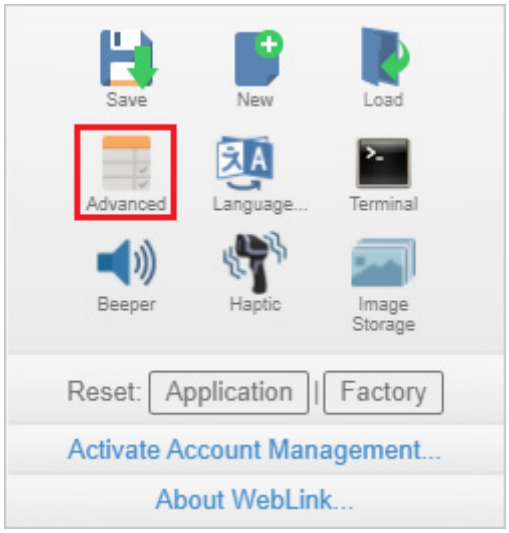
Load

Load allows you to open an existing configuration from a **.wls** file.



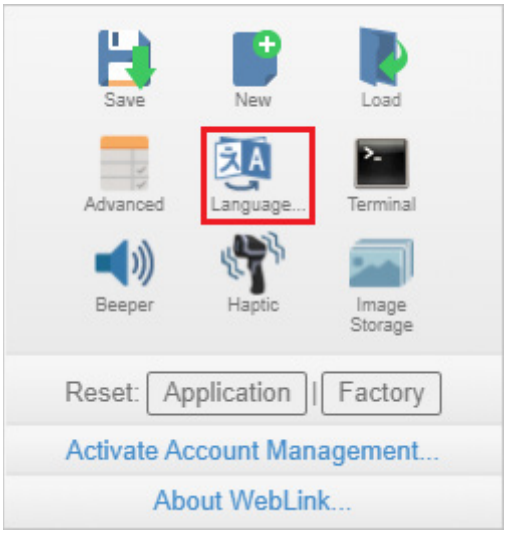
Advanced

Advanced allows you to make precise adjustments to every area of reader functionality: **Camera Setup**, **Communications**, **Read Cycle**, **Symbologies**, **I/O**, **Symbol Quality**, **Match String**, **Diagnostics**, **Image Storage**, **Configuration Database**, and **Differences from Default**.

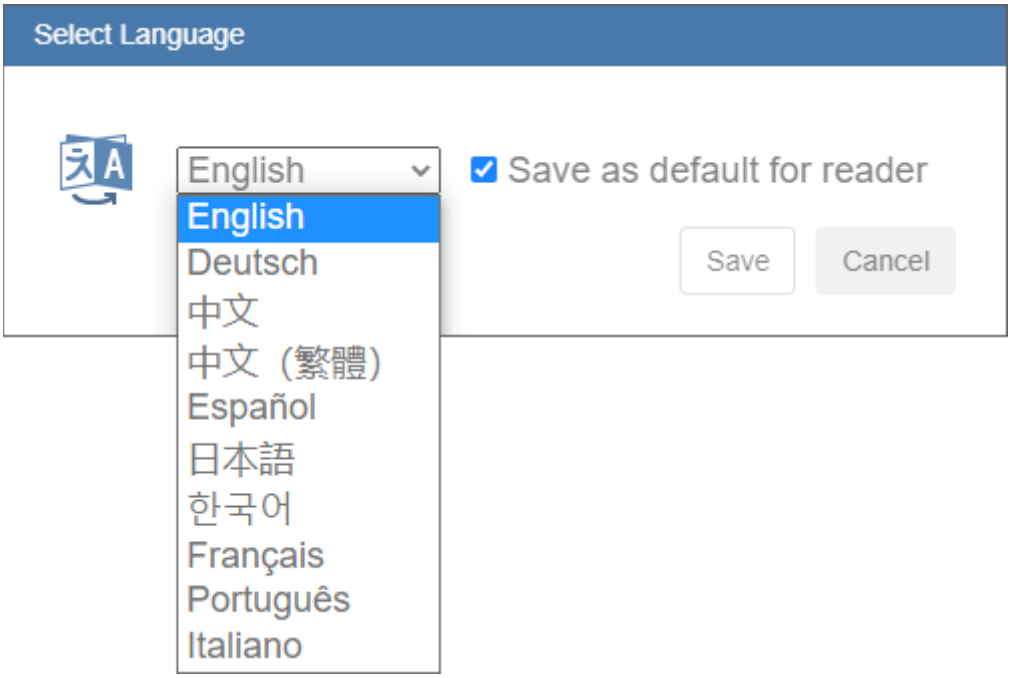


Language

Language allows you to select the language of the WebLinkHH interface.



Important: WebLinkHH will restart when a different language is selected and is saved locally to the browser.



Available languages:

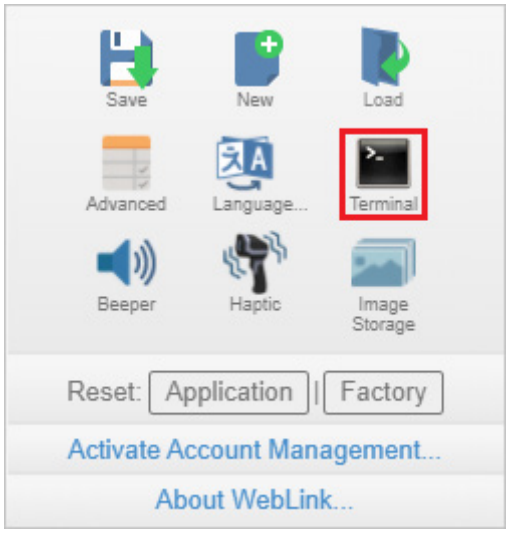
- English
- German
- Chinese (Simplified and Traditional)
- Spanish

- Japanese
- Korean
- French
- Portuguese
- Italian

Terminal

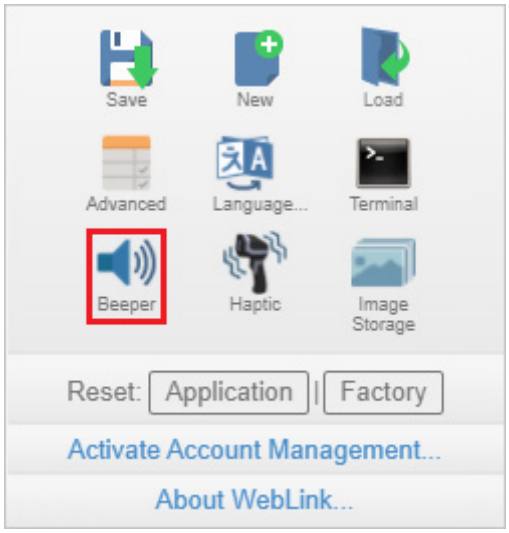
Terminal opens WebLink's **Terminal** interface, where serial commands can be sent, responses from the reader can be shown, and reader output can be displayed.

Important: The Terminal is for advanced users only. It may be possible to send invalid commands to the reader using the Terminal that cause unexpected results in WebLinkHH and/or the reader.



Beeper

Clicking the **Beeper** icon allows you to enable and disable the reader's beeper and to control beeper volume.

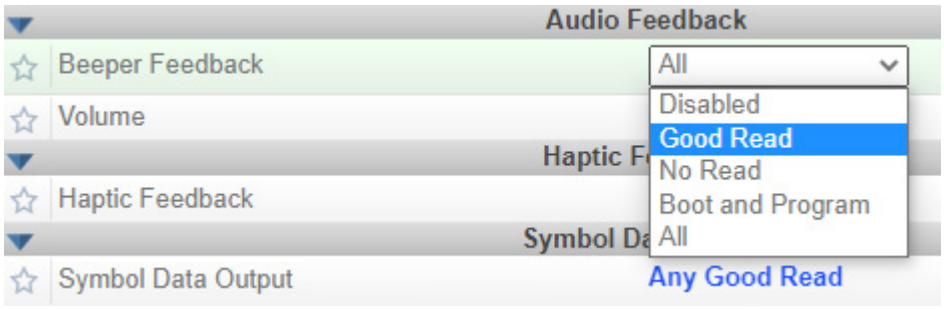


Audio Feedback

The **Audio Feedback** section of the **I/O** menu in **Advanced Settings** allows you to configure the behavior of the reader's beeper.

Beeper Feedback

Determines which condition causes the reader to beep: **Good Read**, **No Read**, **Boot and Program**, or **All**.



- **Disabled:** Will not beep on any event.

- **Good Read:** Will beep upon successful decode.

- **No Read:** Will beep when the read cycle ends without reading all codes.

- **Boot and Program:** Will beep when the reader's firmware or WebLinkHH has been updated, when the reader decodes a programming barcode, and when the reader is booting up.

- **All:** Will beep when any of the above events are met.

Volume

Sets the beeper's volume.

Note: You can also set the volume by clicking the 

icon multiple times to cycle through **High**, **Medium**, **Low**, and **Disabled**. Each click increments the volume setting by one. When the Beeper setting is High, you can click the Beeper icon once more to disable the Beeper. Clicking the Beeper icon one additional time will return Beeper volume to Low, and will return the Beeper to the original **Beeper Feedback** condition. For example, if Beeper Feedback is set to **Boot and Program** and then the Beeper is disabled, Beeper settings will return to Boot and Program and Low volume when the icon is clicked once more.



Haptic Controls

Clicking the **Haptic** icon turns haptic feedback on or off.

When haptic feedback is enabled, the reader's haptic motor will pulse once for 500 ms when a symbol is successfully decoded. When haptic feedback is disabled, no pulse will occur.

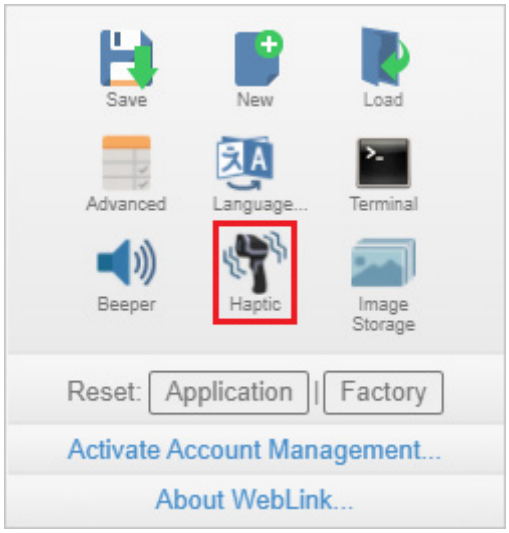
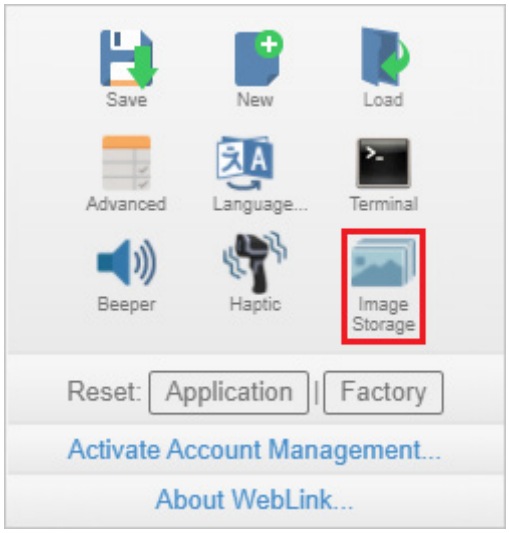
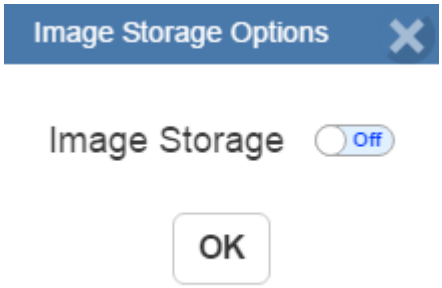


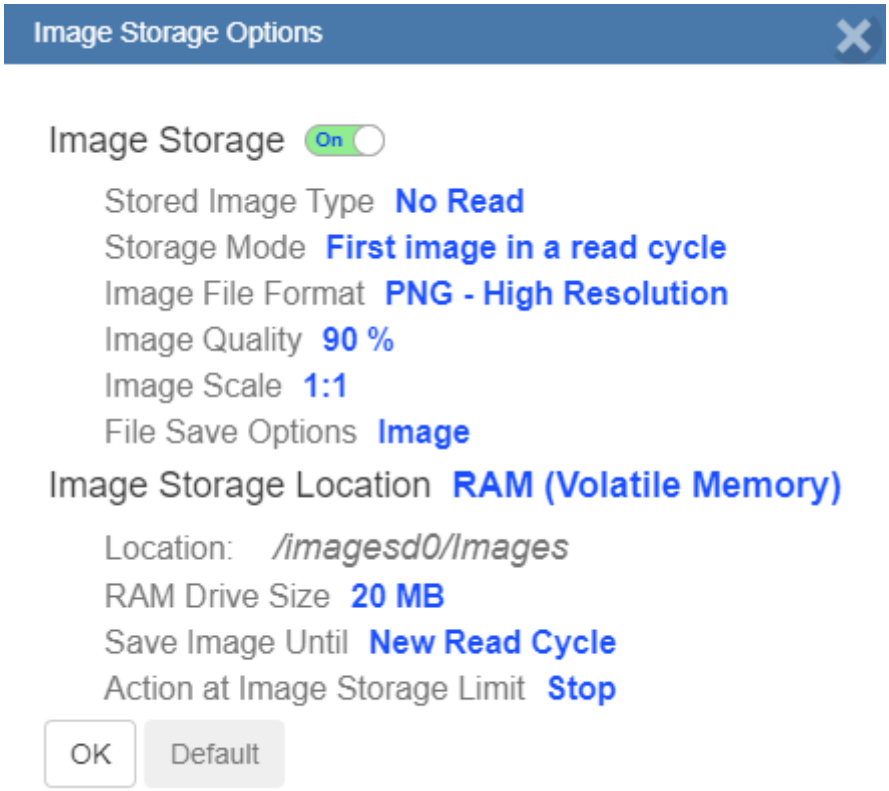
Image Storage



When you click the **Image Storage** icon in the **Application Settings** menu, you will see this dialog:



When you turn Image Storage **on** and click **OK**, the dialog will expand as shown below. The **Image Storage Options** dialog shows commands that allow you to control how, when, and where images captured by the reader are stored.



The **Stored Image Type** field allows the user to configure which images get stored to the destination device. Options are:

- **Good Read:** Saves image(s) where the decoder reports a good read.
- **No Read:** Saves image(s) where the decoder does not report a good read **(default)**.
- **Good Read and No Read:** Save both Good Read and No Read decoder reports.
- **Match:** Save reports satisfying Match criteria.
- **Mismatch:** Save reports satisfying Mismatch criteria.
- **Match and Mismatch:** Save reports satisfying both Match and Mismatch criteria.
- **All:** Save All reports.

The **Storage Mode** field represents which image or images are stored. Options are:

- **First image in a read cycle:** Save first image that qualifies the **Stored Image Type (default)**.
- **All images in a read cycle:** Save all images that qualify the **Stored Image Type**.

Image File Format allows the user to select which file format to apply to the saved image. Options are:

- **PNG – High Resolution:** Save images using PNG format **(default)**.
- **JPG – Low Resolution:** Save images using JPG format.

Image Quality represents a sliding scale between 1% and 100%, where the higher the image quality, the more space is required per saved image. The default setting is 90%.

Image Scale represents the amount of data compression applied to the stored image. Images with a lower compression ratio require more storage space. Options are:

- **1:1 –** No data compression applied to image **(default)**.
- **4:1 –** Image compressed by 75%.
- **8:1 –** Image compressed by 88%.

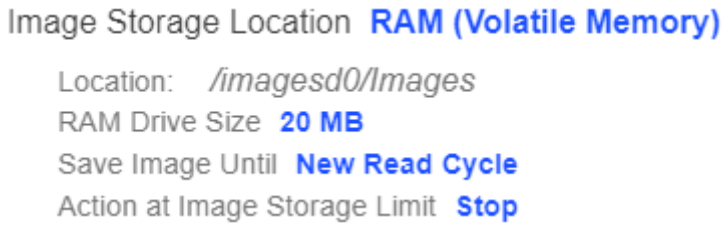
File Save Options allow the user to decide which type of report to save. Options are:

- **Image:** Saves images **(default)**.
- **Read Cycle Report:** Saves cycle reports.
- **Image and Read Cycle Report:** Saves images and cycle reports.

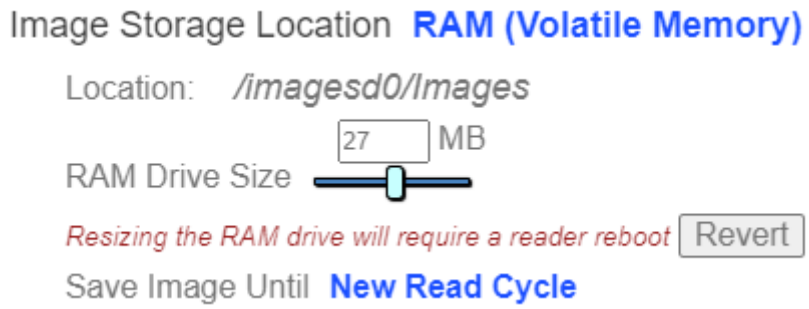
Image Storage Location is where images and reports are to be stored. Options are:

- **RAM (Volatile Memory):** Images and read cycle reports are saved to internal RAM drive **(default)**.
- **Remote (FTP):** Images and cycle reports are saved to a remote FTP-connected device.

When the **Image Storage Location** setting is configured as **RAM**, all information is saved to a RAM drive onboard the camera. This drive is volatile and all data is lost when the unit resets. The location of the drive is **/imagesd0/Images**.



The **RAM Drive Size** parameter allows the user to create a RAM drive between 1 MB and 50 MB. Default is 20 MB. Resizing the RAM drive requires a reboot of the camera, resulting in loss of any data currently on the drive. If the **RAM Drive Size** parameter changes, the message shown below will appear in the **Image Storage Location** dialog. If you click **Revert**, the RAM drive size returns to its previous size.



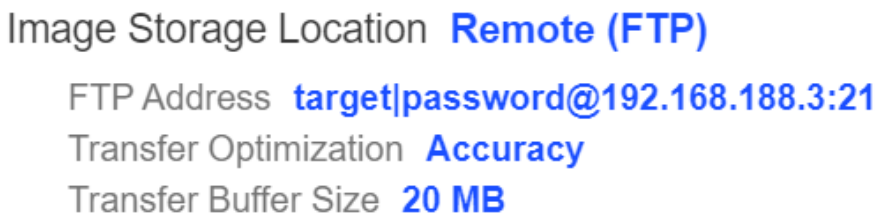
The **Save Image Until** field determines for how long stored data is to be saved. Options are:

- **New Read Cycle:** Saves a cycle of data until the next read cycle **(default)**.
- **System Reset:** Saves data until the system is reset – when maximum storage capacity is reached, the Action at Image Storage Limit parameter determines whether or not data is overwritten.

The **Action at Image Storage Limit** setting allows the user to decide what action is taken once the storage limit is reached. Options are:

- **Stop:** Stop saving images and cycle reports when maximum storage reached **(default)**.
- **Erase Oldest:** Overwrite oldest image and cycle report when maximum storage reached.

If **Image Storage Location** is set to **Remote FTP**, the **FTP Address** will appear, allowing you to input the user ID, password, and address of the applicable FTP server.



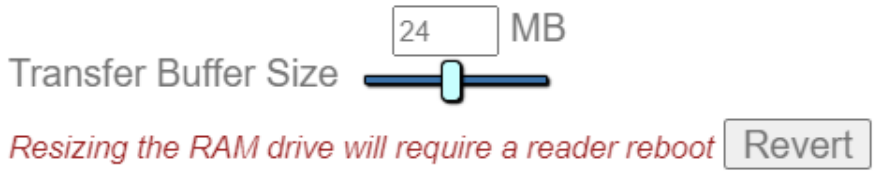
The **FTP Address** represents the FTP host settings on the device to where images and reports are saved. This device must be running an FTP server.

- **userid:** User ID configured on the FTP host server.
- **pass:** Password associated with the user ID of the FTP host server.
- **xxx.xxx.xxx.xxx:** IP address of the FTP host device.
- **port:** Which host port to use – default is **21**.

The **Transfer Optimization** parameter configures how images and reports are sent to the FTP host. Options are:

- **Speed:** Images and reports are sent via a lossy mechanism – this method focuses on maintaining trigger integrity, which could possibly result in some images or reports being dropped **(default)**.
- **Accuracy:** Images and reports are sent via a lossless mechanism – this method transmits all images and reports which could possibly result in triggers being delayed or read cycles being prematurely terminated.

The **Transfer Buffer Size** parameter defines the maximum buffer size used per cycle. If the **Transfer Buffer Size** parameter changes, the message shown below will appear in the **Image Storage Location** dialog. If you click Revert, the RAM drive size returns to its previous size. The default size is 20 MB.



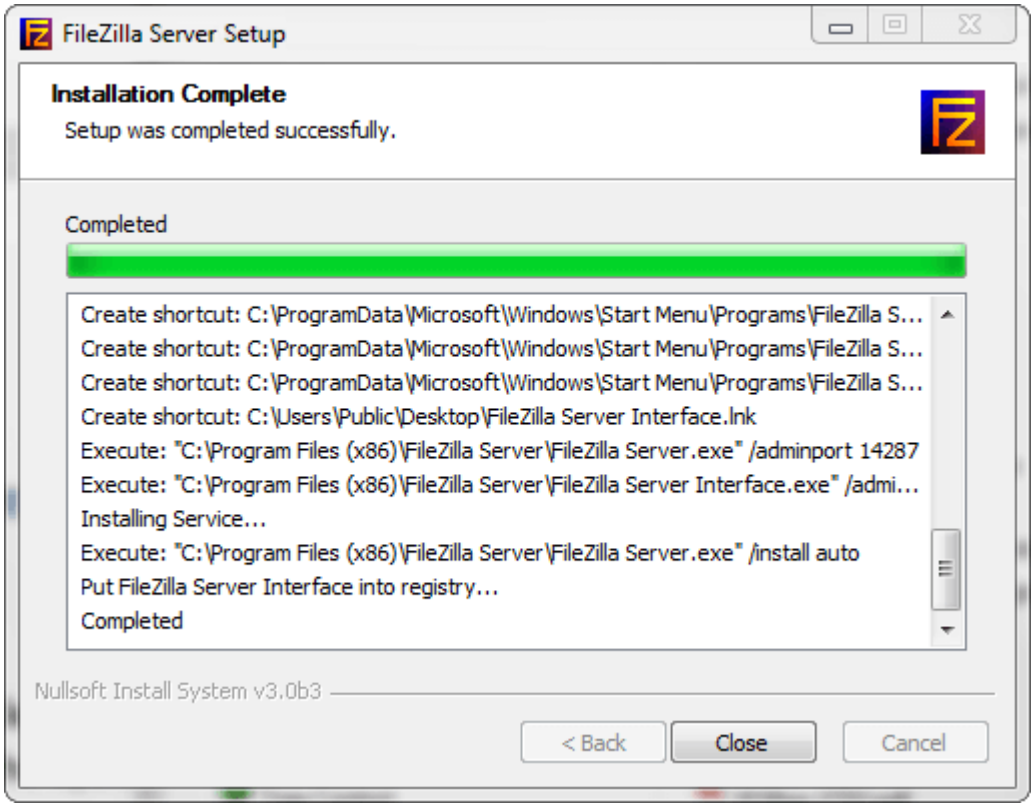
All **Image Storage** settings can also be configured in **Advanced Settings**.

Image Storage by External FTP Server

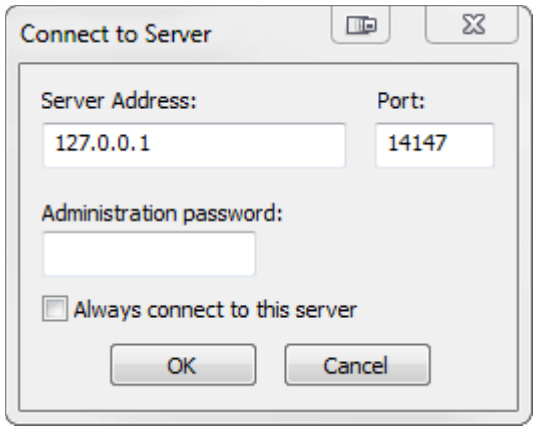
An external FTP server can be used to store images captured by the reader. The reader can connect to an FTP server and can send images and read cycle reports to that server for storage. The following procedure describes how to set up an external FTP server.

The example procedure shown here uses **FileZilla Server**, which can be downloaded at **https://filezilla-project.org/**. Note that FileZilla is a Windows-only utility.

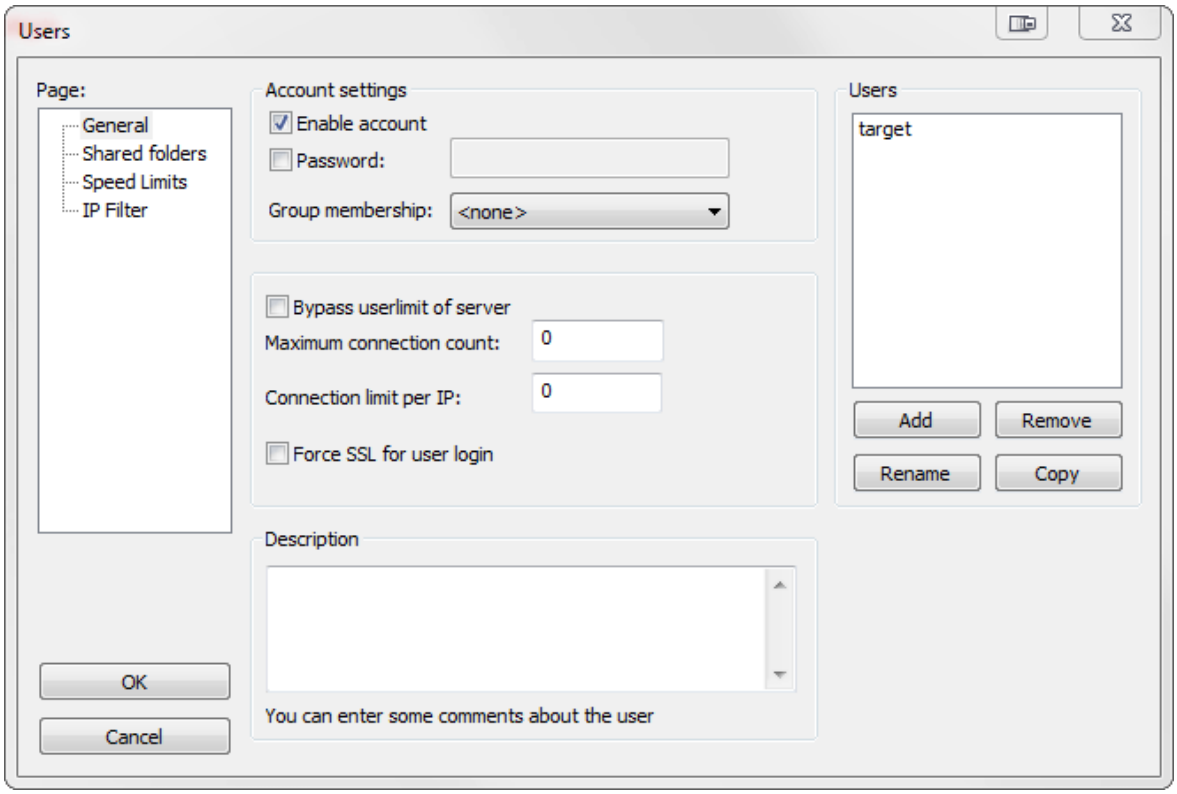
- Download and install FileZilla Server.



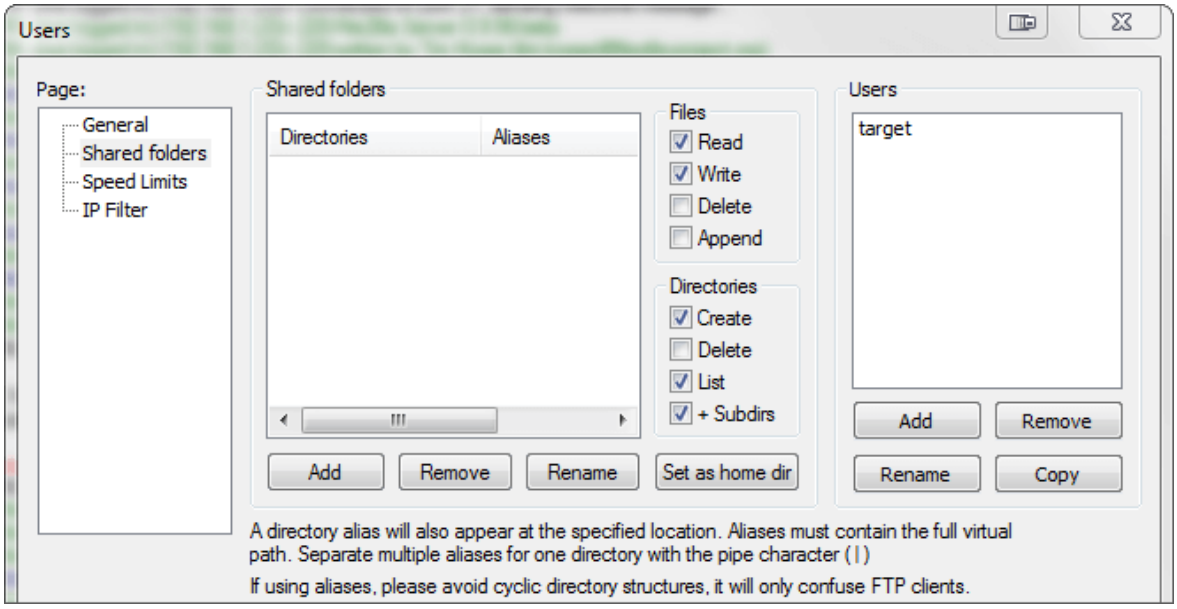
- Connect to the server. Use the **127.0.0.1** server address if you are setting up the server on your PC. Note the port that you use – **14147** in the example shown here – as the port number will be required when you log back into the server.



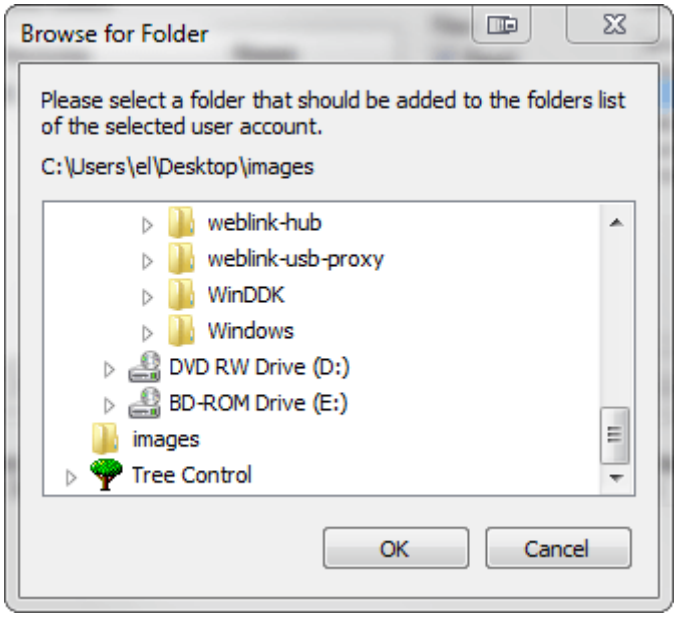
- Configure the settings on the **General** page of the **Users** dialog.



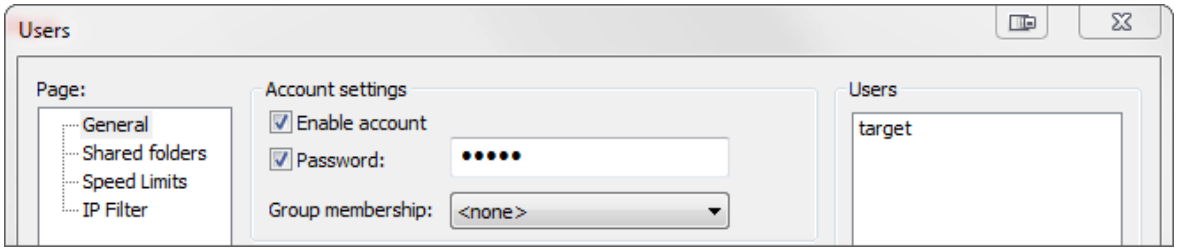
- Navigate to **Shared folders** under **Page:** in the left panel. Be sure that **Write** (under **Files**) is checked and that **Create** (under **Directories**) is checked. Add a new user group.



- Browse for the folder on your PC where you want to store images. In this example, the folder is called **C:\Users\el\Desktop\images**.

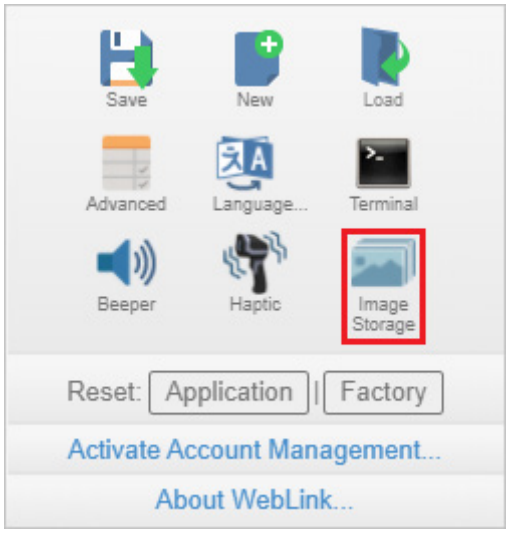


- Return to the **General** page and set a password.



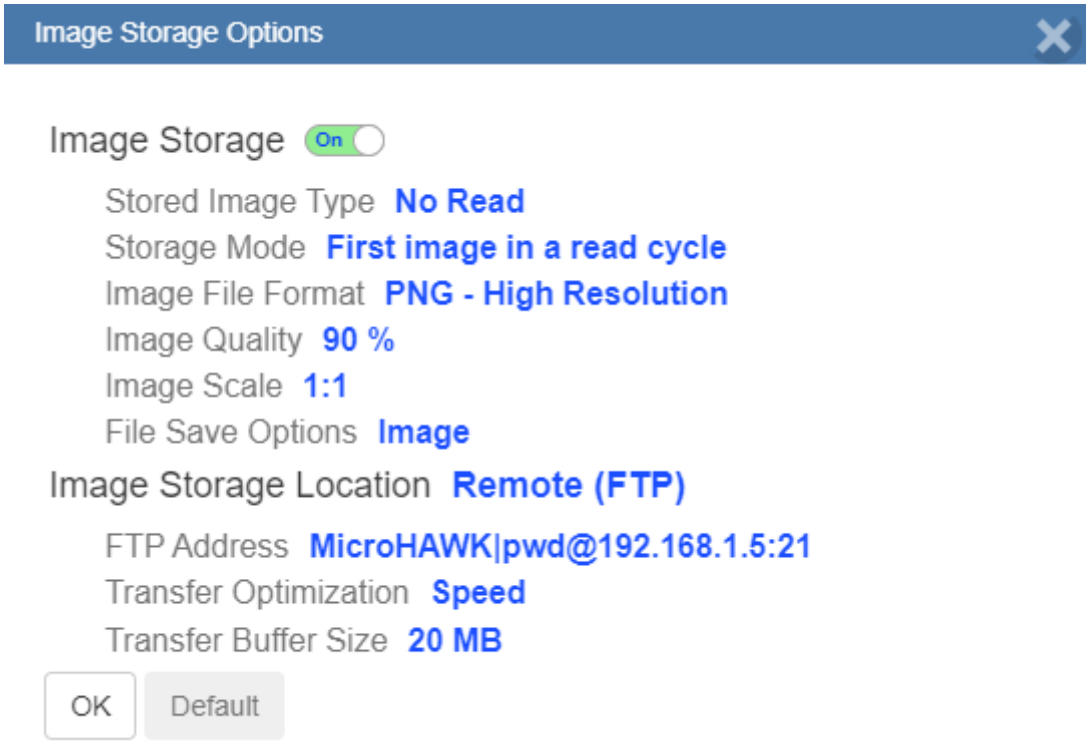
- Click **OK** and connect to your reader.

- Open **Application Settings** and click the **Image Storage** icon.



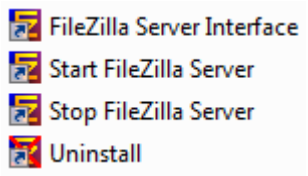
- Update your **Image Storage Options**, including your **FTP Address**.

Note: pwd represents the password you set on the **General** page of the FileZilla Server interface.



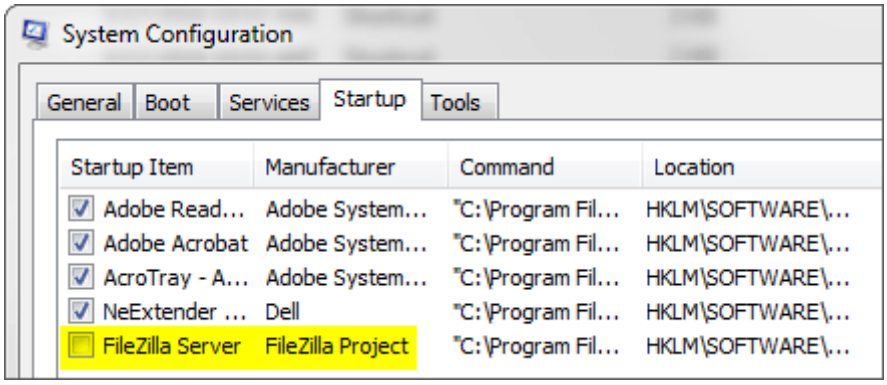
Starting and Stopping FileZilla Server

During FileZilla installation, you can configure FileZilla Server to auto-start each time the reader is powered on. You can also start and stop the server manually via the **Start FileZilla Server** and **Stop FileZilla Server** shortcuts shown here.



To disable FileZilla Server's auto-start feature:

- Type the **Windows button + the 'R' key** to bring up the **Run** dialog.
- In the Run dialog's **Open:** field, type **msconfig** and then **Enter**.
- Click the **Startup** tab as shown below.
- Uncheck **FileZilla Server** so it won't launch on startup.



- Click **OK**.
- When prompted, **restart** your computer.

Saving and Downloading Images with V460-H RAM Drive

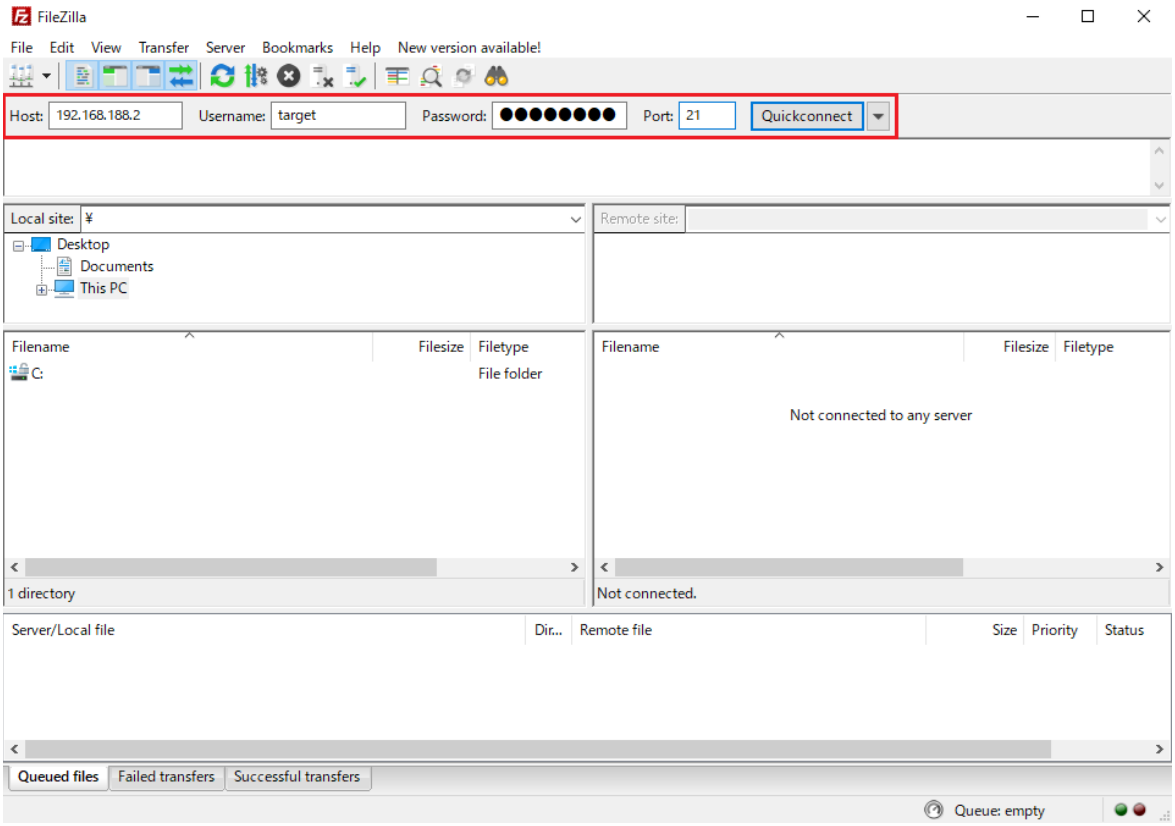
You can save captured images and read cycle reports to the V460-H's **RAM drive** and then download them to a PC or other local device.

The following example shows the RAM drive procedure using **FileZilla** (https://filezilla-project.org/).

Note: FileZilla is a Windows-only utility.

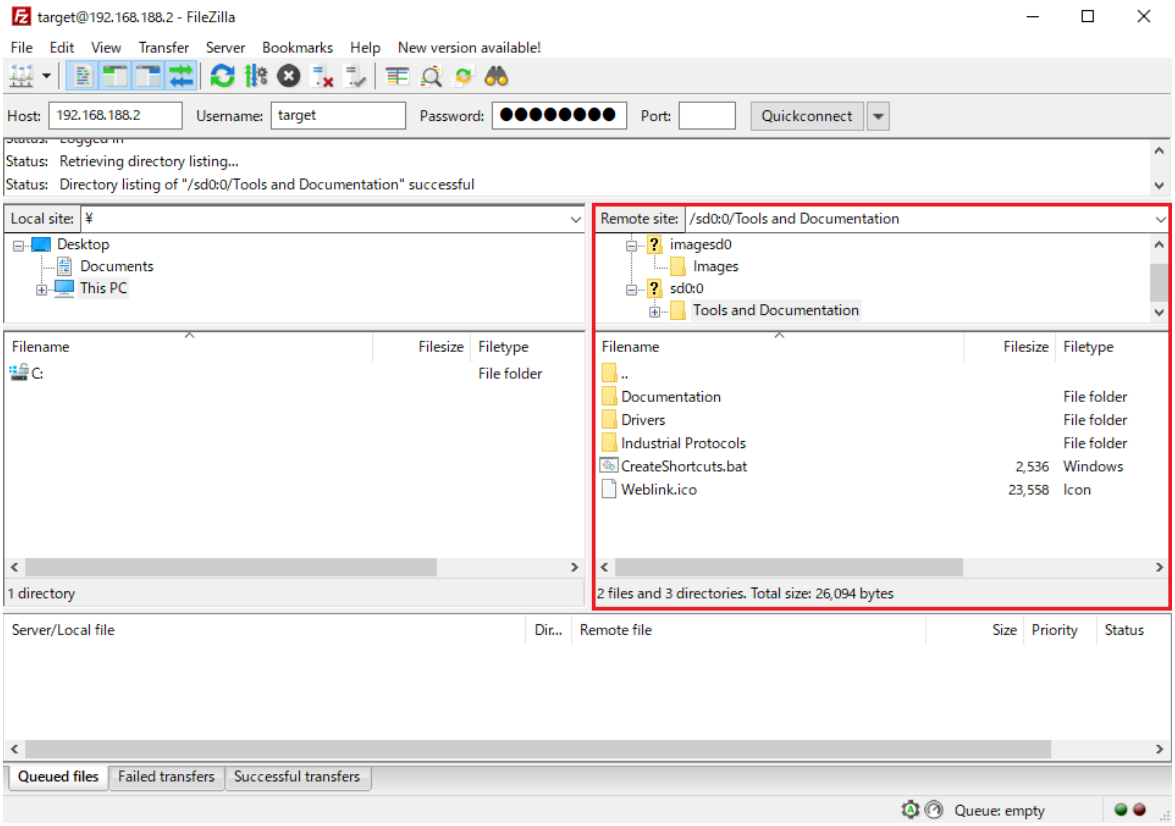
- Download and run FileZilla.

- To connect to the V460-H, enter the following information in the fields shown below and click the **Quickconnect** button.
  - **Host:** 192.168.188.2 (IP address of the V460-H)
  - **Username:** target
  - **Password:** password
  - **Port:** 21

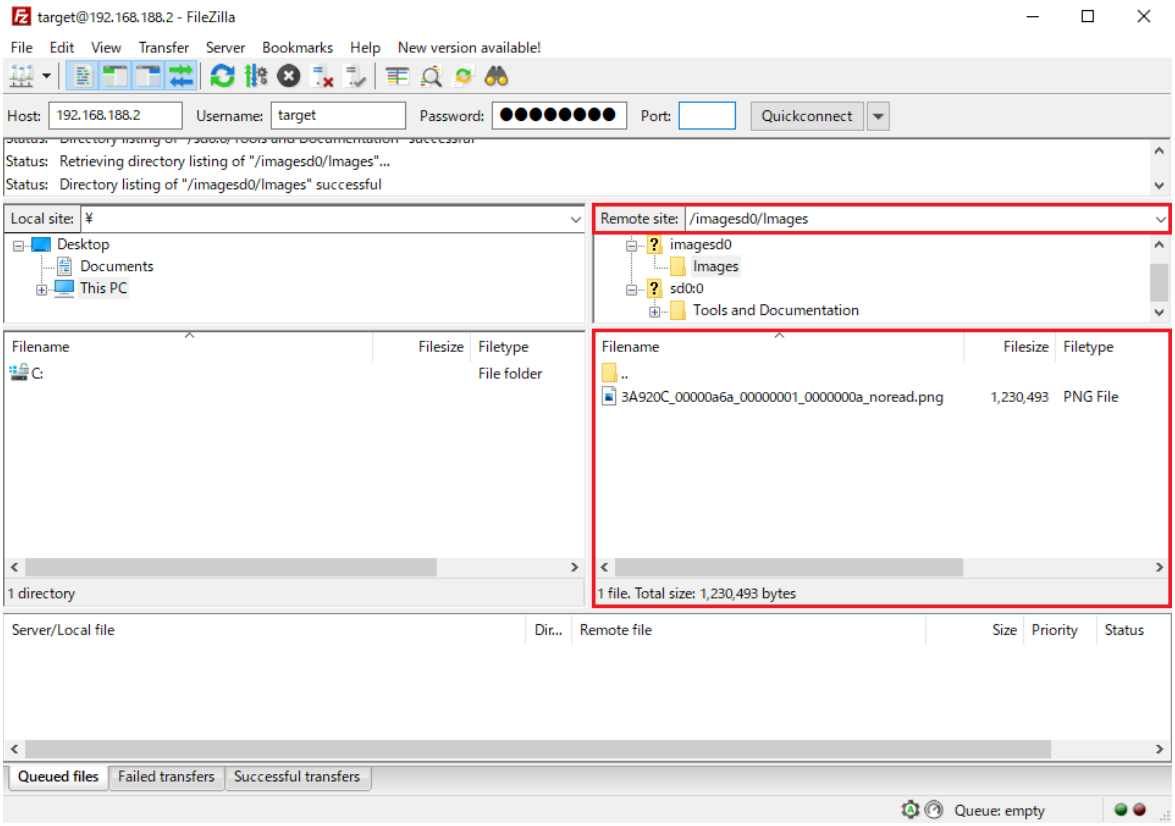


- After connecting to the V460-H, you will its file directory in the **Remote Site** section of the FileZilla interface.

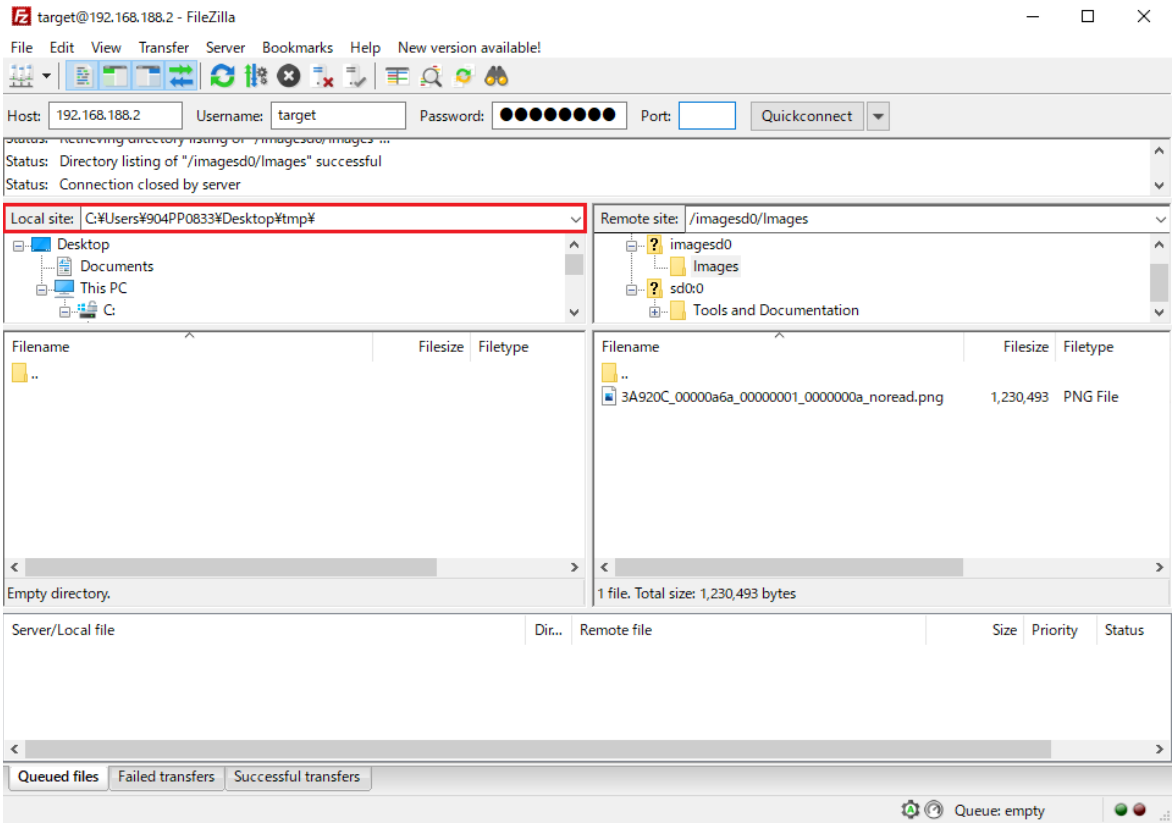
Important: The V460-H's file directory contains files needed to operate the reader. Do not make any changes to files or folders in the directory other than those specified in this procedure. Incorrect organization of the file directory can damage the V460-H's internal configuration and prevent it from booting.



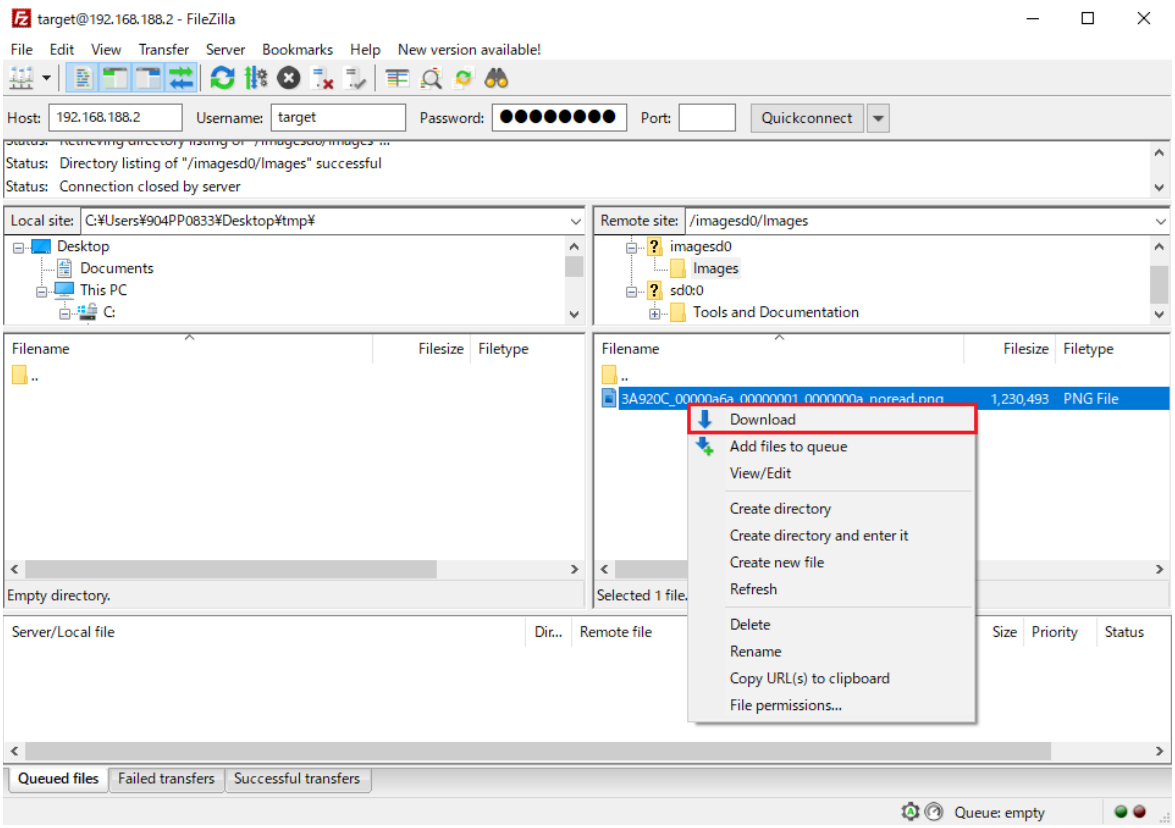
- Enter **/imagesd0/Images** in the **Remote Site** field. In the **Filename** section, you will see the captured images and read cycle reports that are stored on the V460-H's RAM drive.



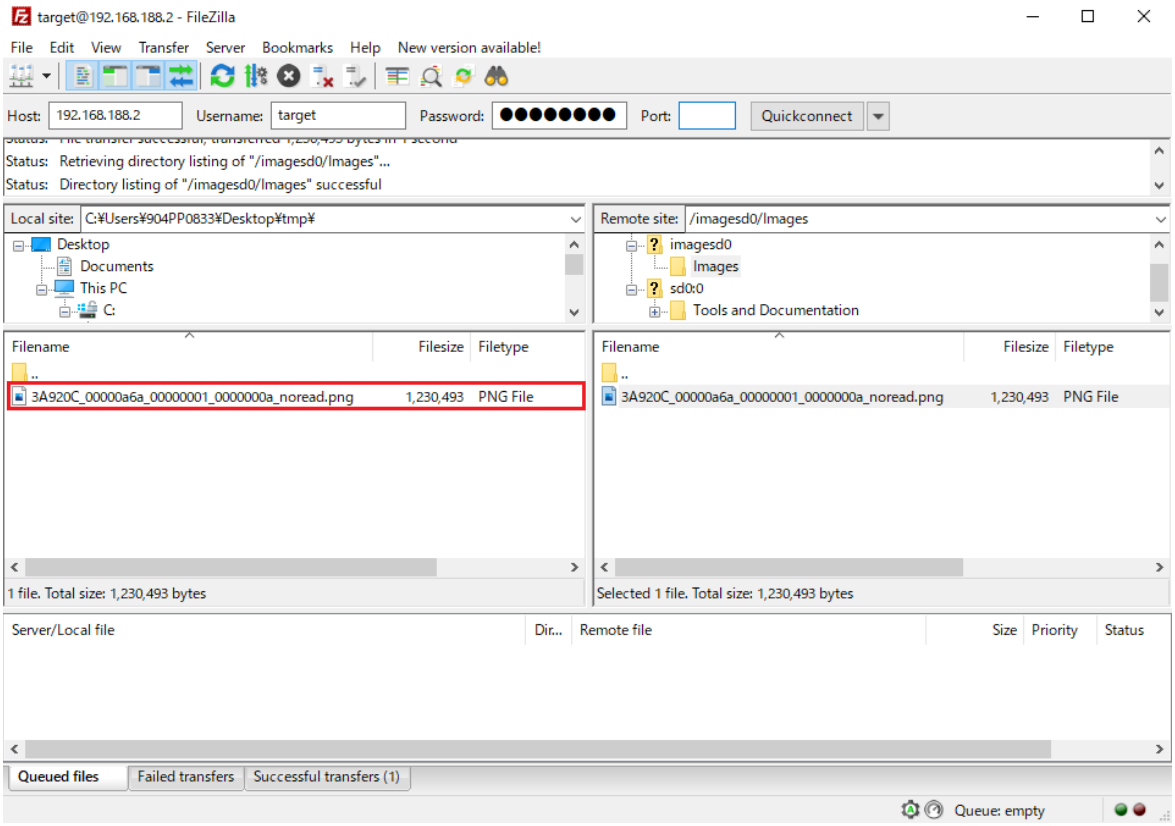
- In the **Local Site** section of the interface, navigate to the folder where you want to save the downloaded image. The folder location will be displayed in the **Local Site** field shown below.



- In the **Filename** section, right-click the image you want to download from the V460-H and select **Download**. In the example below, the image filename is **3A920C_00000a6a_00000001_0000000a_noread.png**.



- The image file will be downloaded from the V460-H's RAM drive to the **Local Site** folder you selected. This completes the image acquisition.



V460-H Image Storage Options Settings

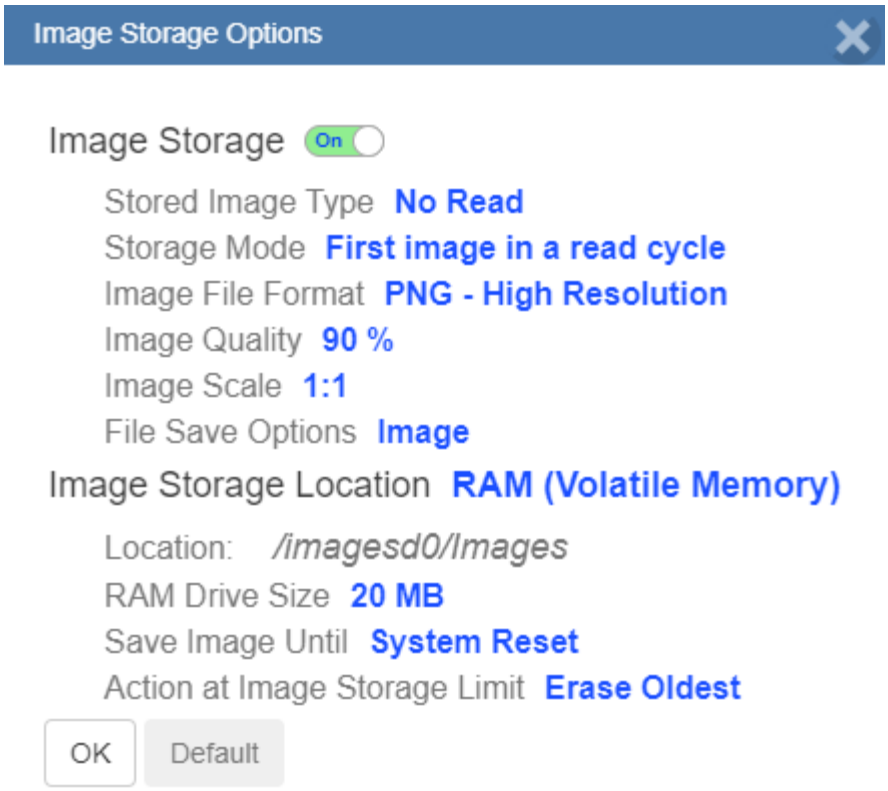
For the **RAM drive** procedure to function, **Image Storage Options** must be configured as shown below.

- Click the **gear icon** at the upper right of the WebLinkHH interface to open the **Application Settings** menu.

- Click the **Image Storage** icon in the Application Settings menu.

- In the **Image Storage Options** dialog, set **Image Storage** to **On**.

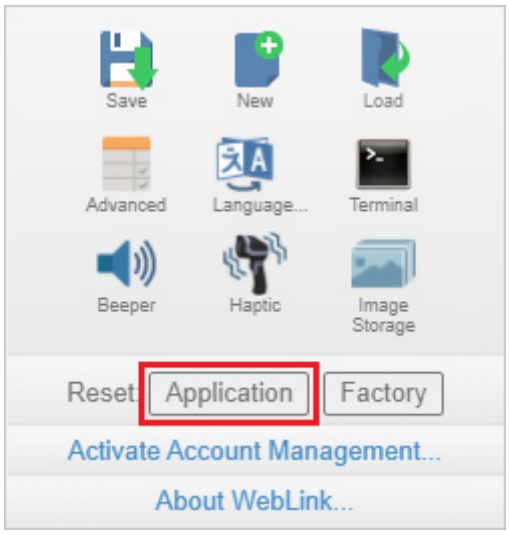
- Set **Image Storage Location** to **RAM (Volatile Memory)** and configure **RAM Drive Size**, **Save Image Until**, and **Action at Image Storage Limit** as required for your application.


Image Storage Options
Image Storage
On
Stored Image Type No Read
Storage Mode First image in a read cycle
Image File Format PNG - High Resolution
Image Quality 90 %
Image Scale 1:1
File Save Options Image
Image Storage Location RAM (Volatile Memory)
Location: /imagesd0/Images
RAM Drive Size 20 MB
Save Image Until System Reset
Action at Image Storage Limit Erase Oldest
OK
Default

Reset Application or Factory Settings

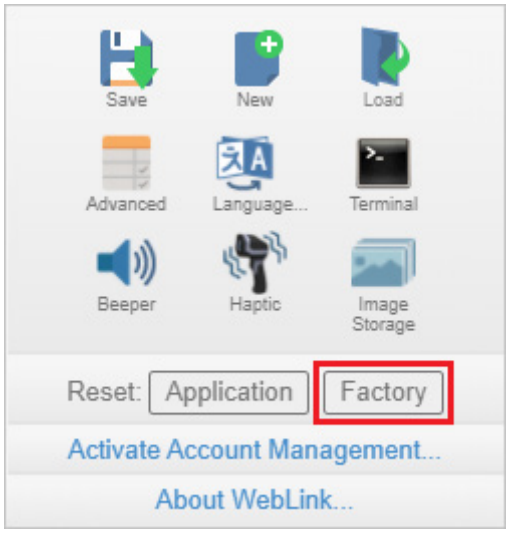
Reset Options

Reset Application Settings

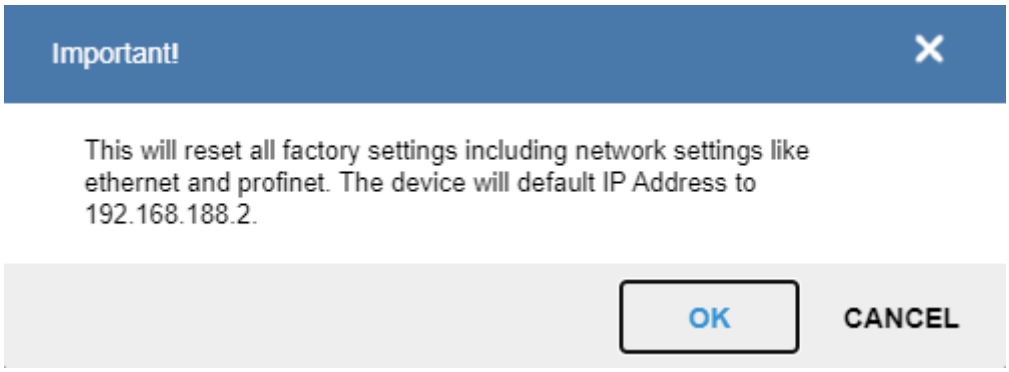


Clicking the **Application** button returns the reader to default settings, not including Communications settings. The reset is saved to flash memory.

Reset to Factory Settings



Clicking the **Factory** button returns the reader to default settings, including Communications settings. The reset is saved to flash memory. Because all settings will defaulted to their factory configuration, the following warning will appear:

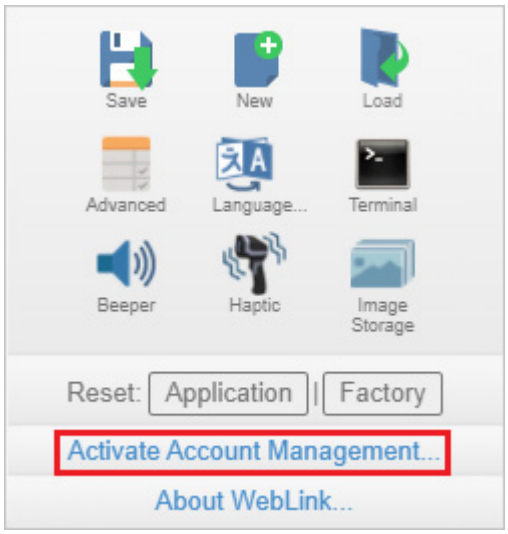

Important!
This will reset all factory settings including network settings like ethernet and profinet. The device will default IP Address to 192.168.188.2.
OK
CANCEL

Activate Account Management

Activate Account Management allows you to set a password that will be required to open any session of WebLinkHH. An Administrator can create, update, and delete users from an Administrator user interface. While management is active, every user must log in with a username and password established by the Administrator to use WebLinkHH. There are three different user types, each with a different privilege level that determines their access:

- **Administrator** (Full Access as well as the ability to manage user accounts and enable or disable Account Management)
- **Controller** (Full Access)
- **Monitor** (View-Only Access)

Click the gear icon at the upper right of the WebLinkHH user interface to open the **Application Settings** menu.

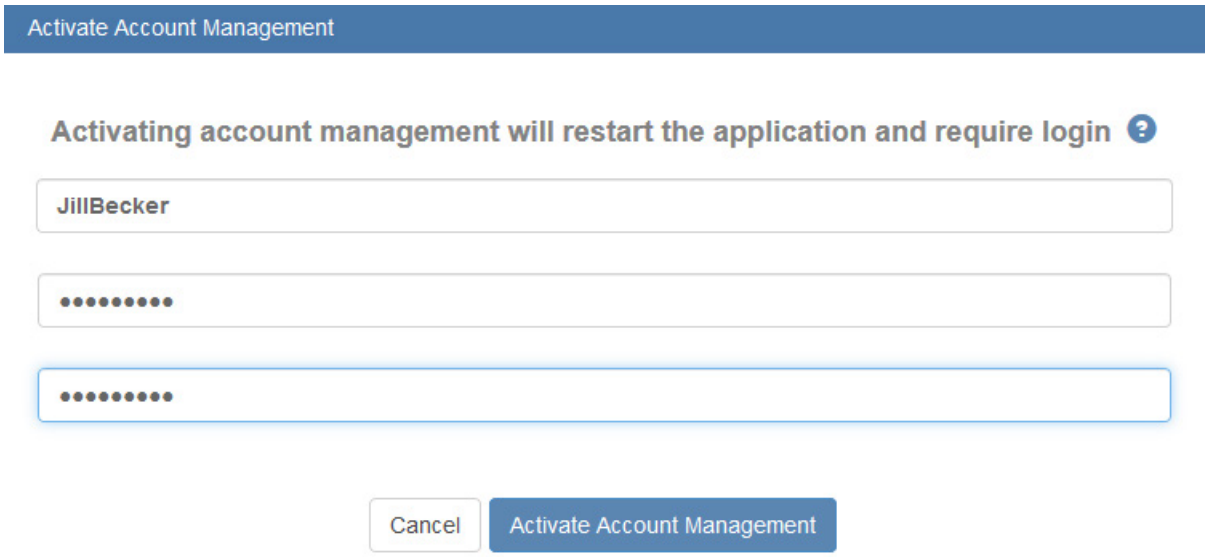


Then click **Activate Account Management** to open the dialog shown below.

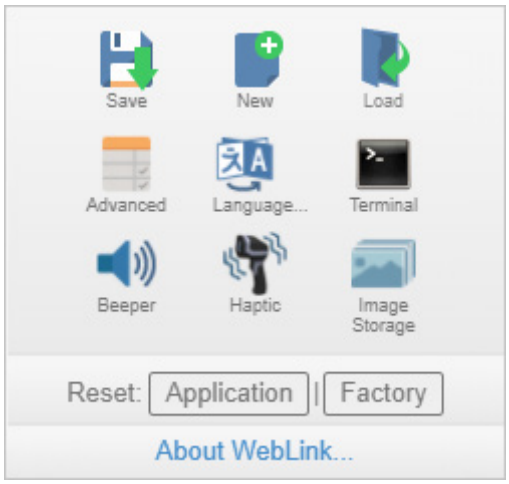
Enter and verify a new username and password and then click **Activate Account Management** to password-protect the WebLinkHH configuration. The password must be at least 5 ASCII-readable characters.

The Activate Account Management button brings up a dialog allowing you to create an Administrator account and to Activate Account Management. This is the same account information that you will use to log in to the application later, so be sure to remember it. After entering valid credentials, click the blue

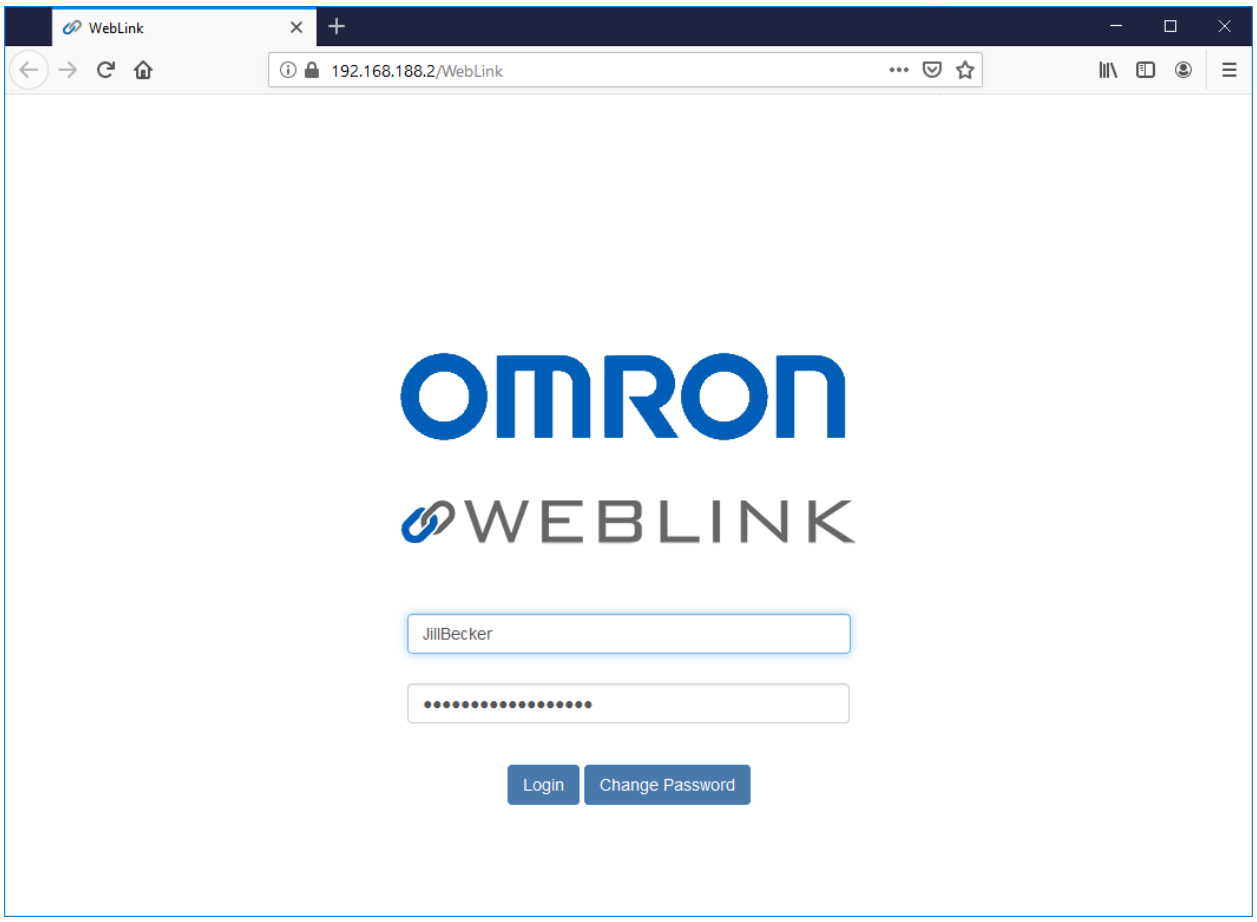
Activate Account Management button. Clicking this button will create the Administrator account and will restart the application.



Note: When **Account Management** is active, **Activate Account Management** will not appear in the Application Settings menu.

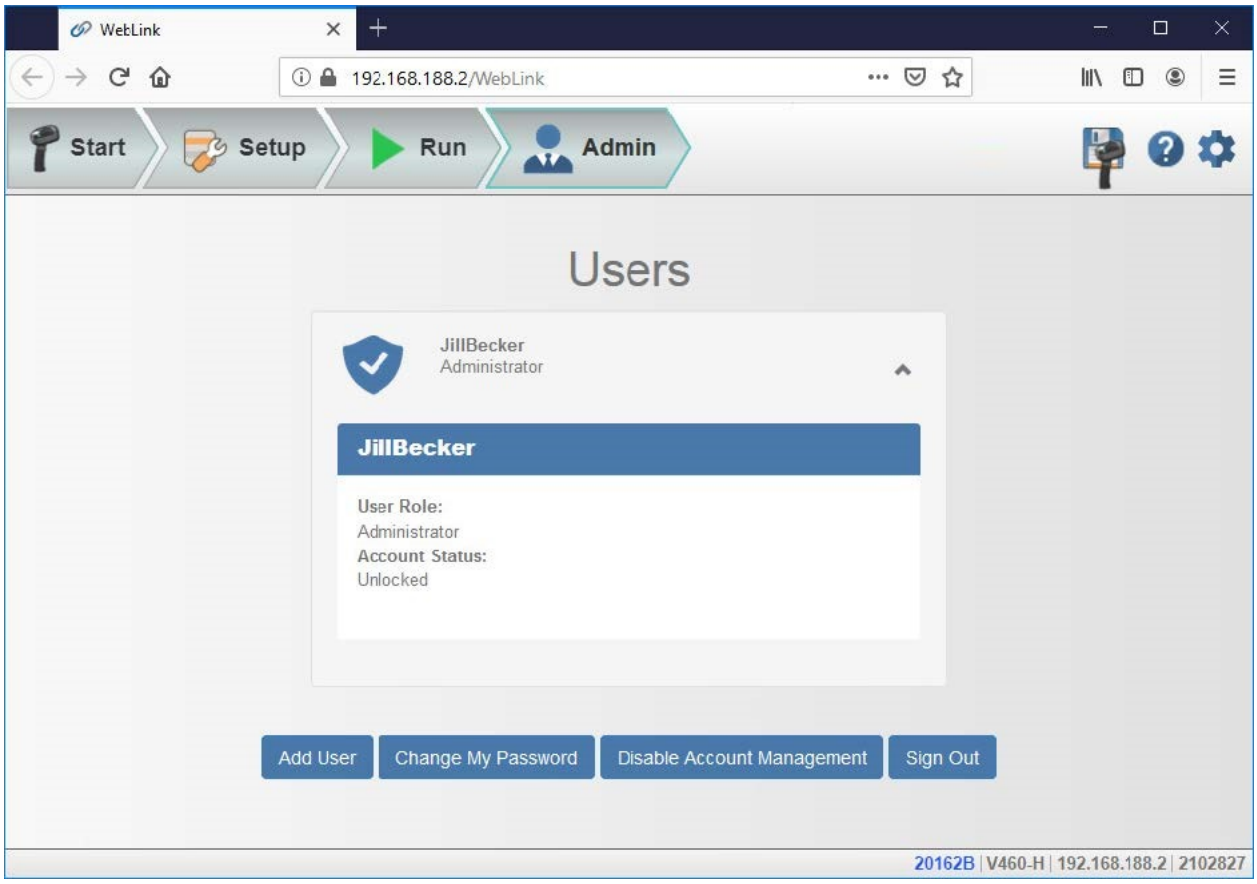


After you've clicked **Activate Account Management**, the WebLinkHH application will be refreshed and you will see the login screen shown below. Since you haven't created other users yet, you must enter your own newly-created Administrator credentials.



Admin View

After successfully logging in, you will see an **Admin** tab to the right of the **Start**, **Setup**, and **Run** tabs. Click the **Admin** tab to view the **Account Management** interface. This interface is only visible to the Administrator.



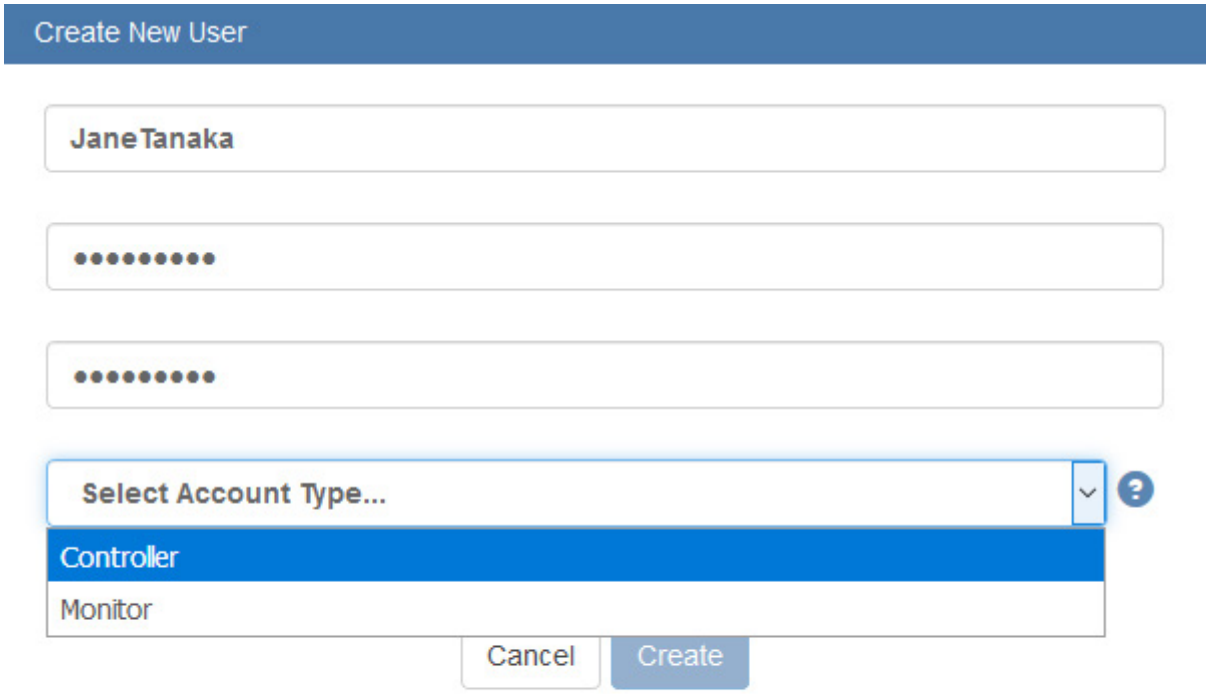
There are four primary buttons in the **Admin** view:

- **Add User:** Create a new user by establishing a username, password, and account type.
- **Change My Password:** Change Administrator password.
- **Disable Account Management:** Turn off Account Management with the option to reactivate it with existing users, or to turn off account management and delete all current users (including Administrator).
- **Sign Out:** Sign out of this account and return to the login screen.

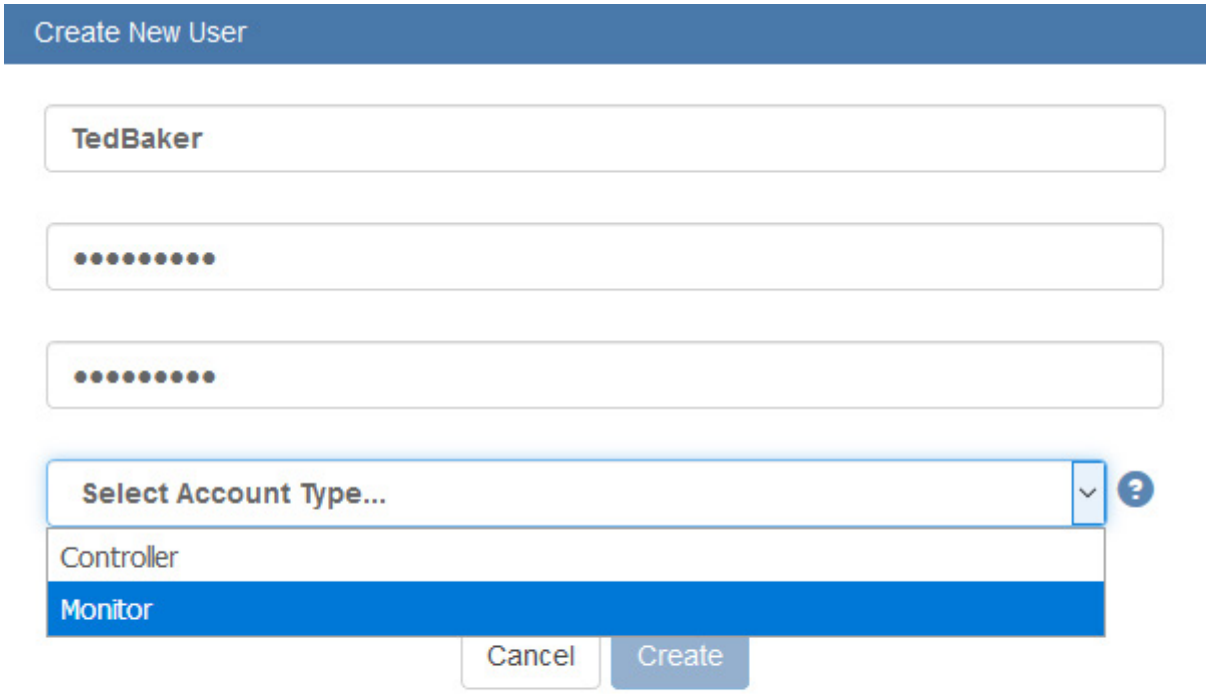
When multiple user accounts have been created, all users are shown in the list above the four primary buttons. Initially only the Administrator will be shows, but the list will grow as you create more users. Each user tab can be expanded by clicking on the chevron icon on the far right. Before expanding, notice the basic layout of the user panel. It contains user information on account type, username, and an icon that represents the account type.

Managing User Accounts

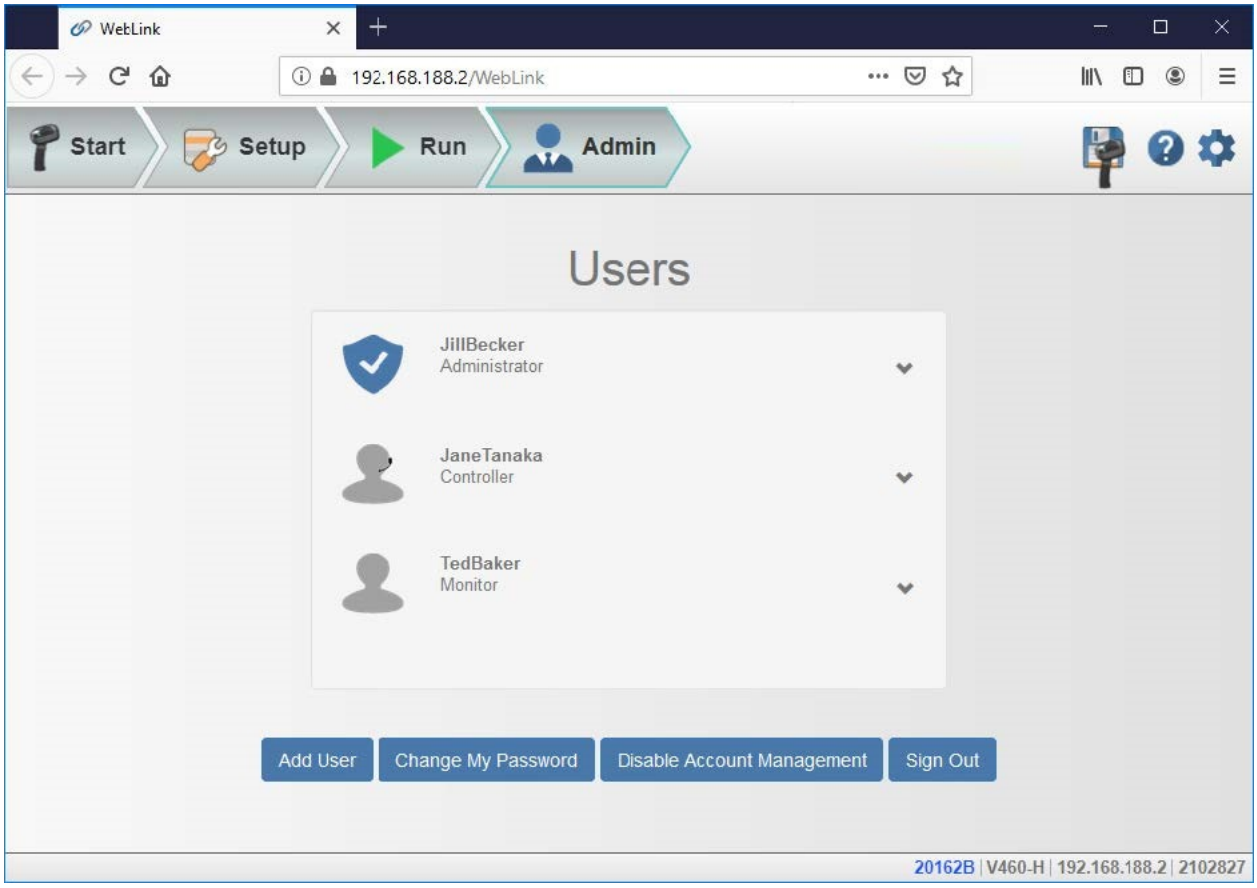
When you select **Add User**, you will see the **Create New User** dialog, which allows you to set the username, password, and account type (**Controller** or **Monitor**).



You can create users of either account type.



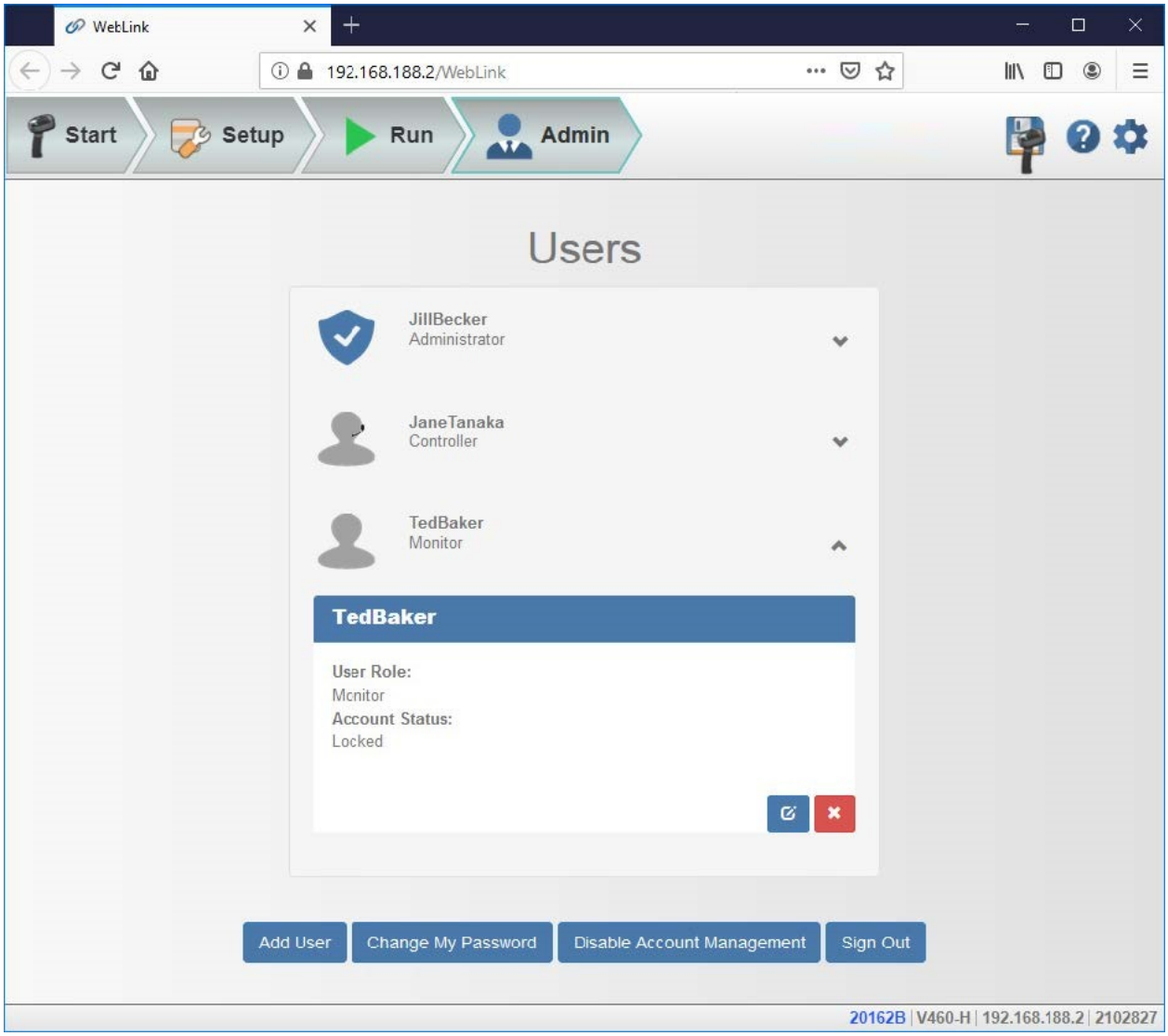
Each time you add a user, that user's information is added to the Admin view, as shown below.



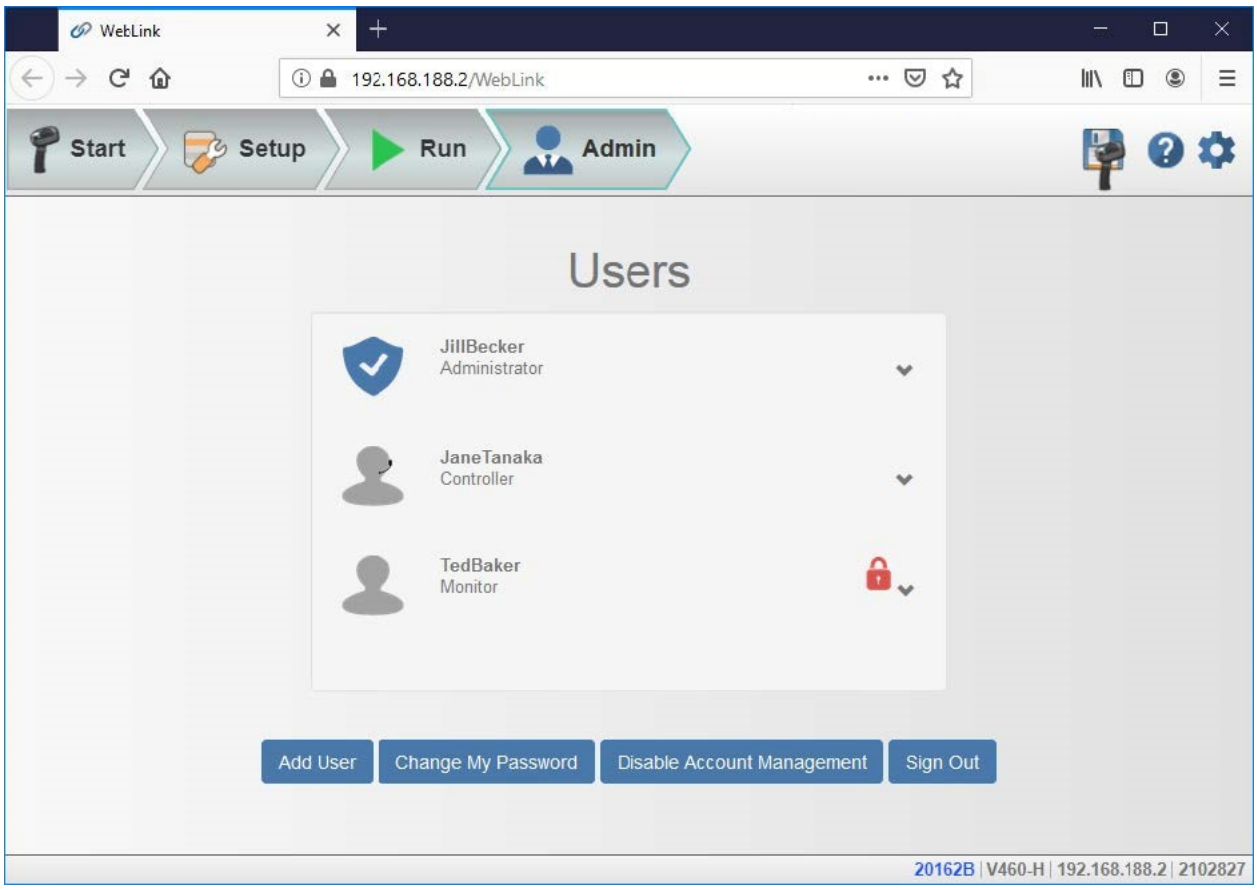
Clicking on the down arrow to the right of each user opens a view similar to the one shown below. This view allows you to update the **User Role** and **Account Status**.

You can also delete a user from this view.

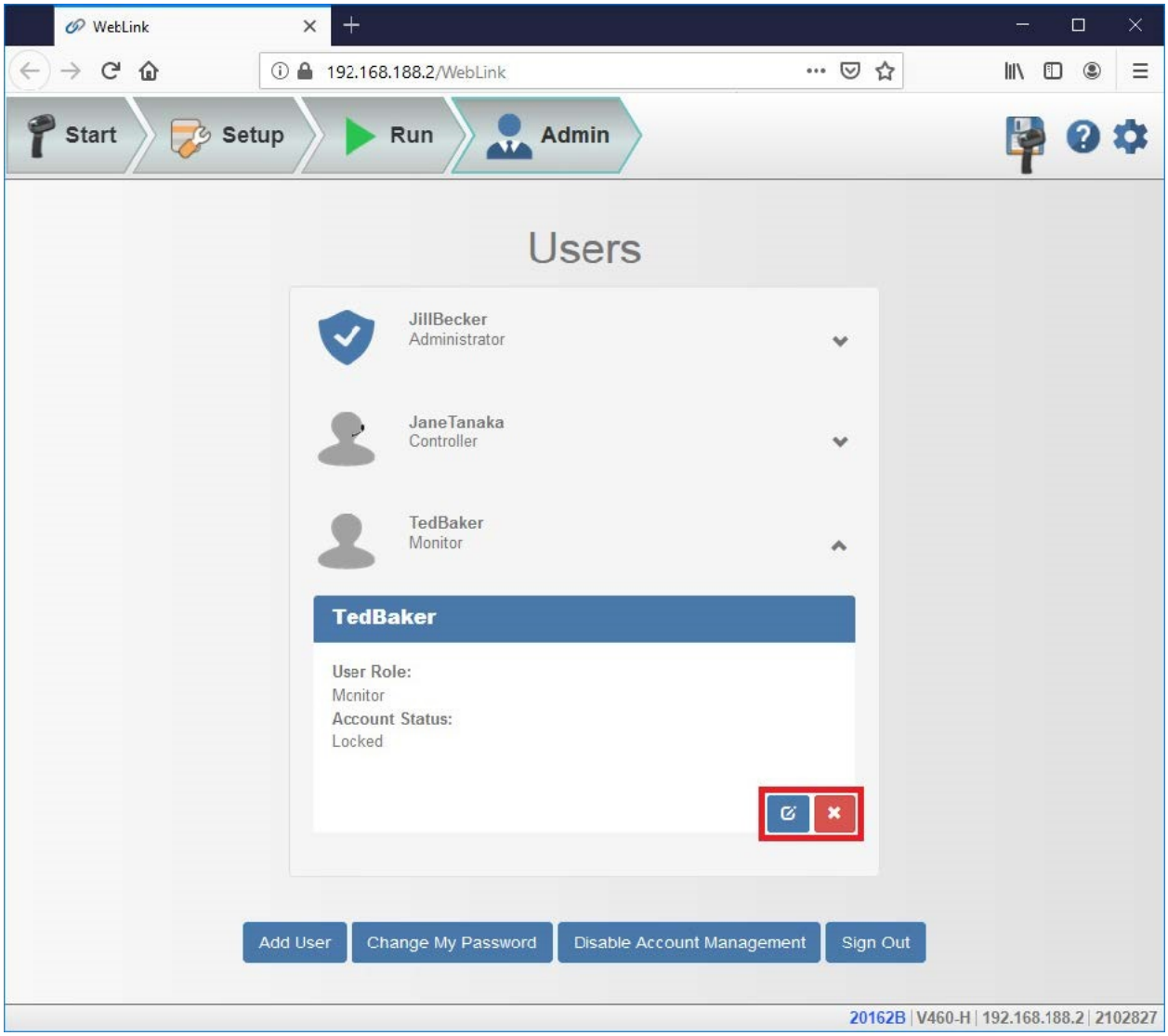
In the example shown here, the Administrator has changed the user's account from **Unlocked** to **Locked**.



When a user's account is locked, a lock icon will appear to the right of the user's name.



Two buttons appear in the lower right of each user profile when it is expanded. These buttons allow the Administrator to make changes to user accounts.





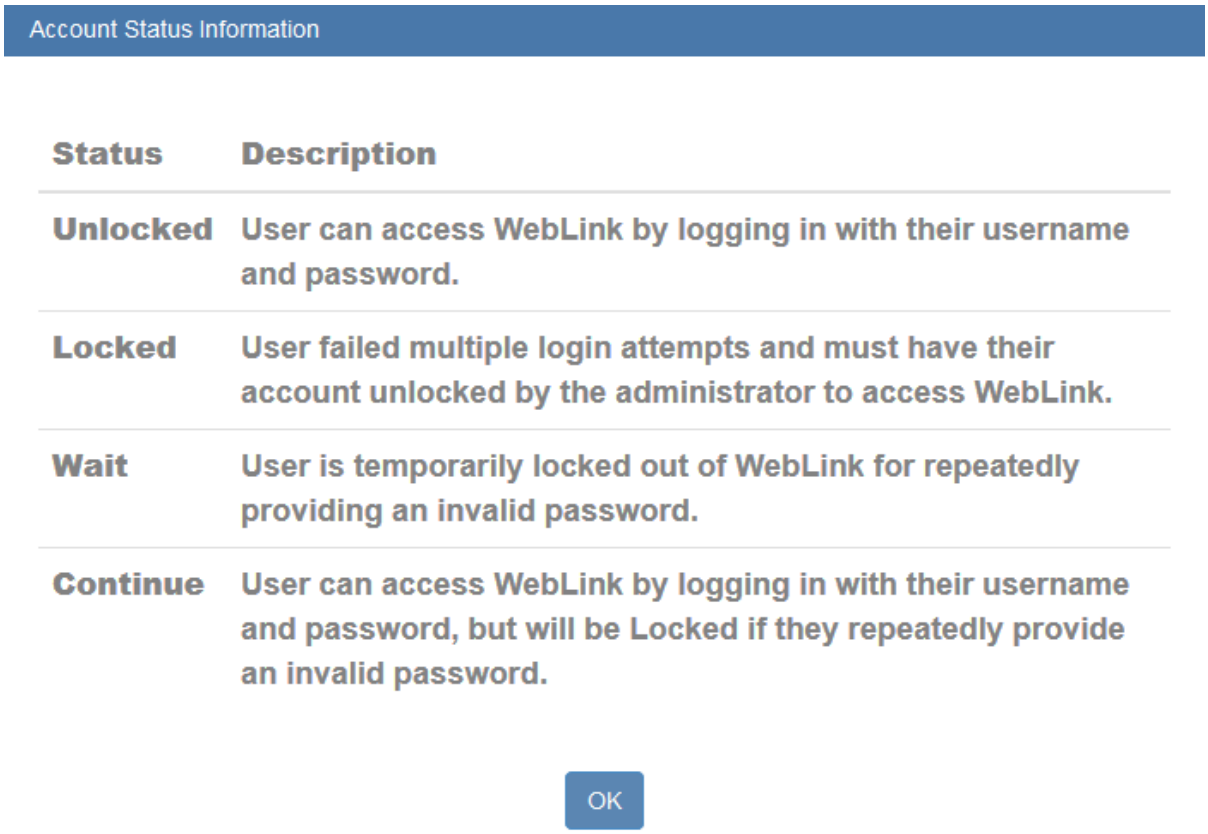
The blue button allows the Administrator to modify user information, such as password, account type, or account status.



The red button allows the Administrator to delete the user.

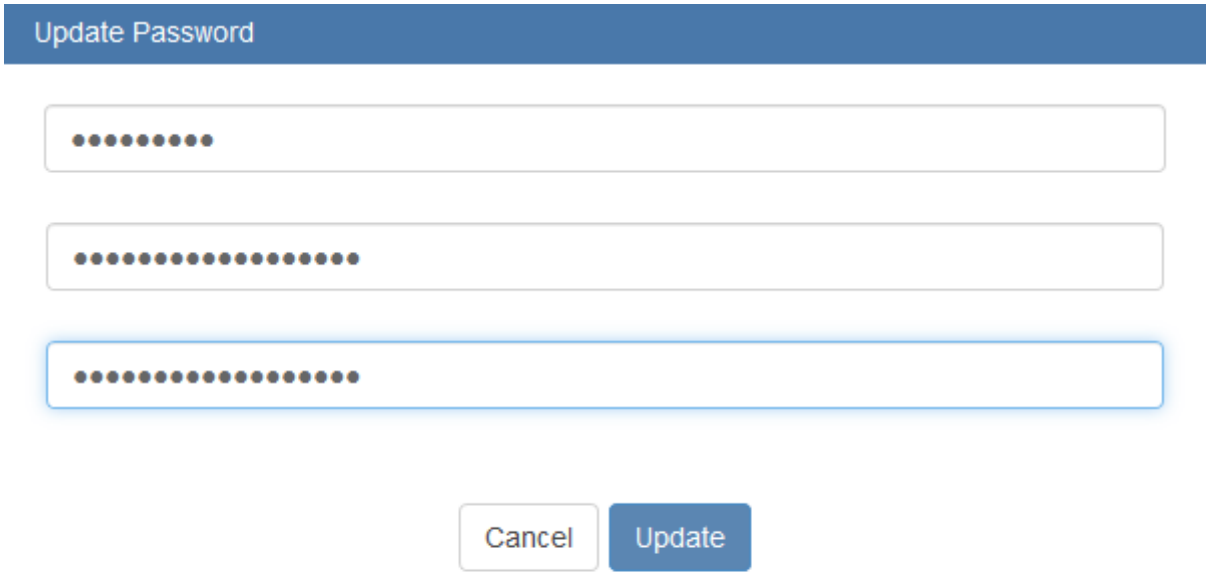
Account Status

There are four types of User Account Status: **Unlocked**, **Locked**, **Wait**, and **Continue**. Each status is described below.



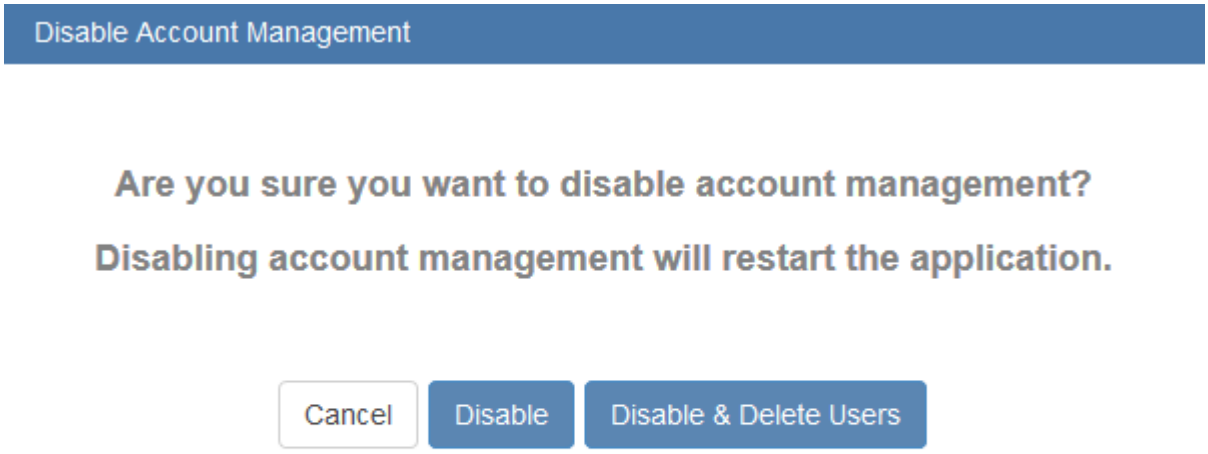
Changing Your Password

Clicking **Change My Password** causes the following dialog to appear, allowing you to enter and verify a new password of your choice.

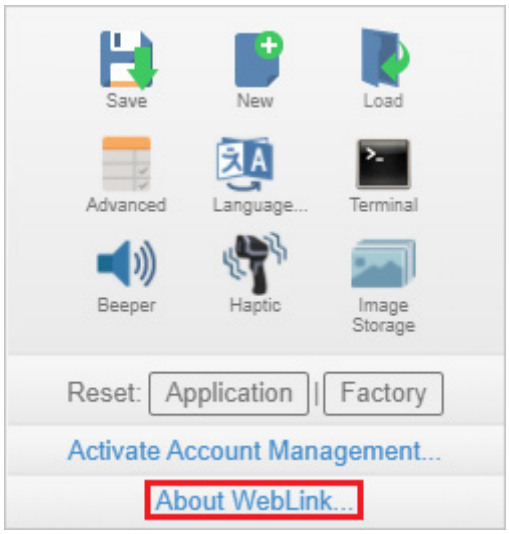


Disabling Account Management

If you are the Administrator, you can either **Disable** Account Management and retain your account information and that of the other users, or you can **Disable and Delete Users**, which will erase your account information and that of the other users.



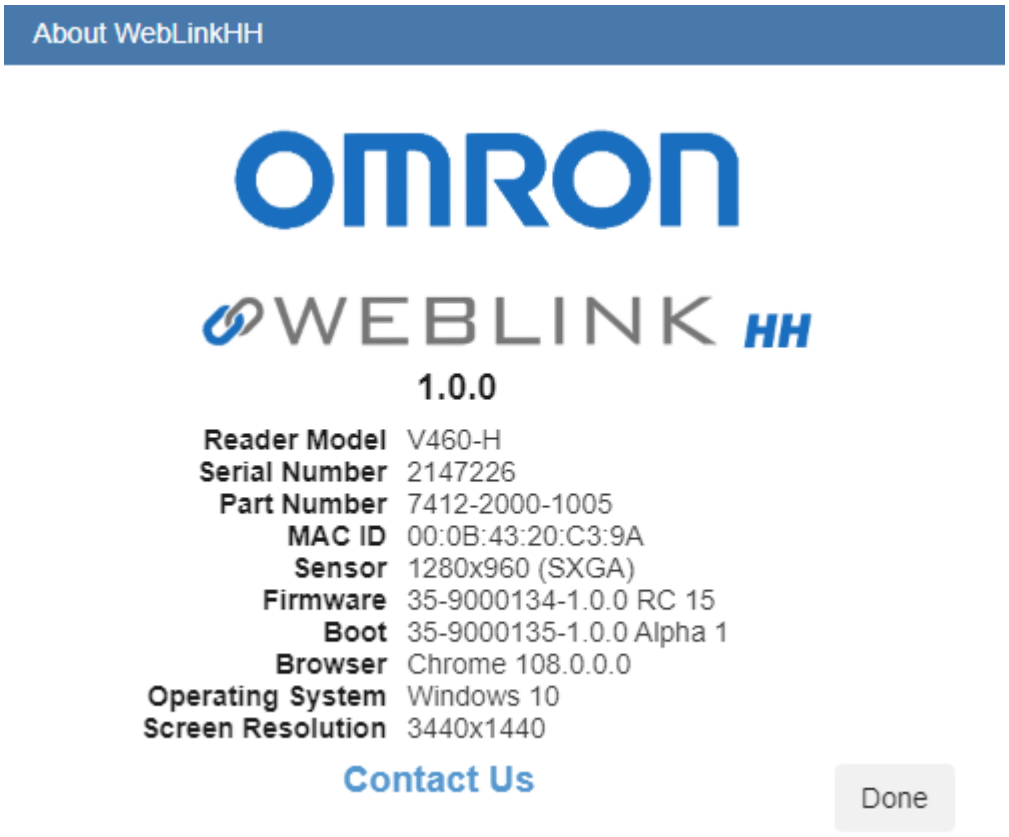
About WebLinkHH



About WebLinkHH opens the dialog shown below, which shows the current **WebLinkHH version**, **Reader Model**, **Serial Number**, **Part Number**, **MAC ID**, **Sensor**, **Firmware version**, **Boot version**, **Browser**, **Operating System**, and **Screen Resolution**.

Note: The information in this dialog is selectable so that you can copy it to a clipboard.

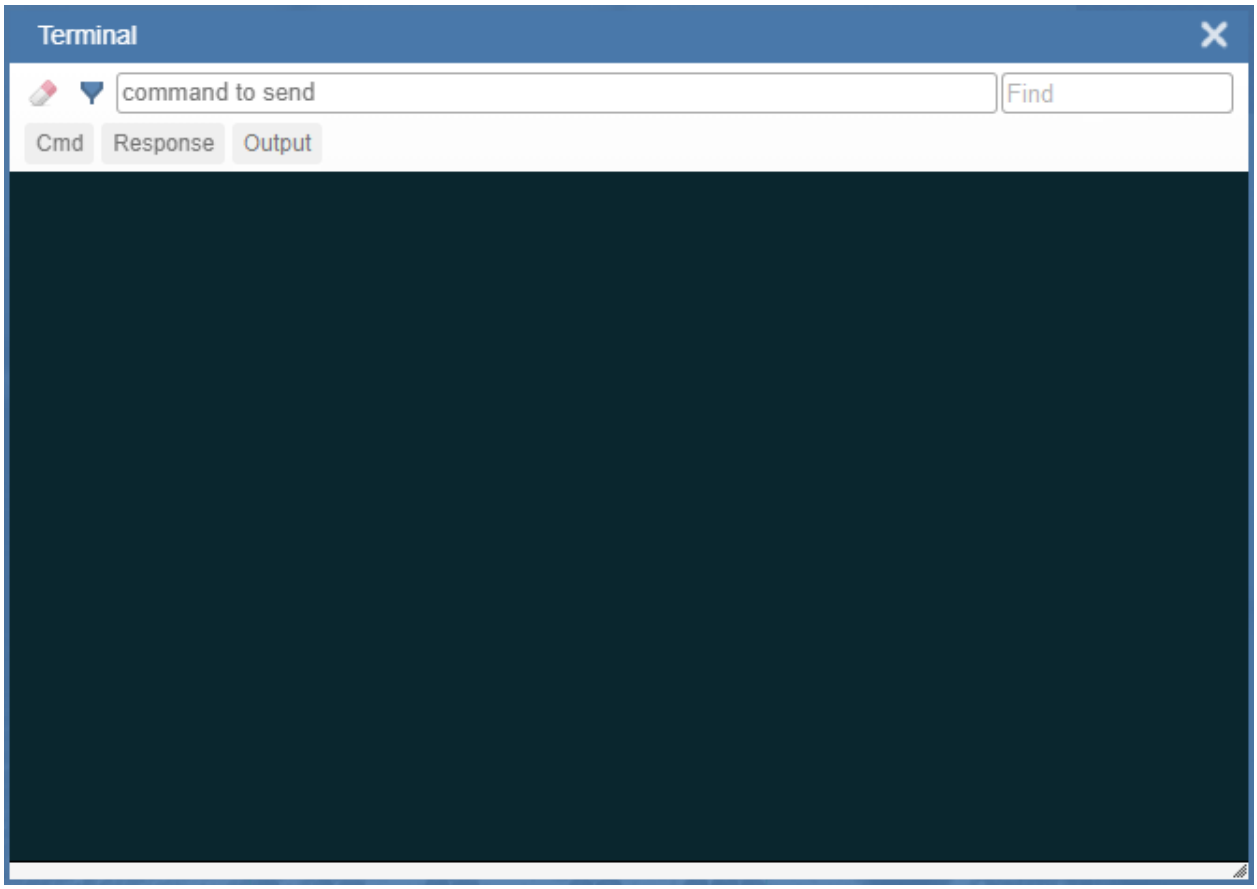
Clicking **Contact Us** takes you to **https://info.omron.com/technical-support**.


About WebLinkHH
OMRON
WEBLINK HH
1.0.0
Reader Model V460-H
Serial Number 2147226
Part Number 7412-2000-1005
MAC ID 00:0B:43:20:C3:9A
Sensor 1280x960 (SXGA)
Firmware 35-9000134-1.0.0 RC 15
Boot 35-9000135-1.0.0 Alpha 1
Browser Chrome 108.0.0.0
Operating System Windows 10
Screen Resolution 3440x1440
Contact Us
Done

Terminal

The **Terminal** provides immediate visibility of decode output, allows you to send serial commands to the reader, and allows you to find specific strings within large amounts of data.

Important: The Terminal is for advanced users only. It may be possible to send invalid commands to the reader using the Terminal that cause unexpected results in WebLinkHH and/or the reader.



Send

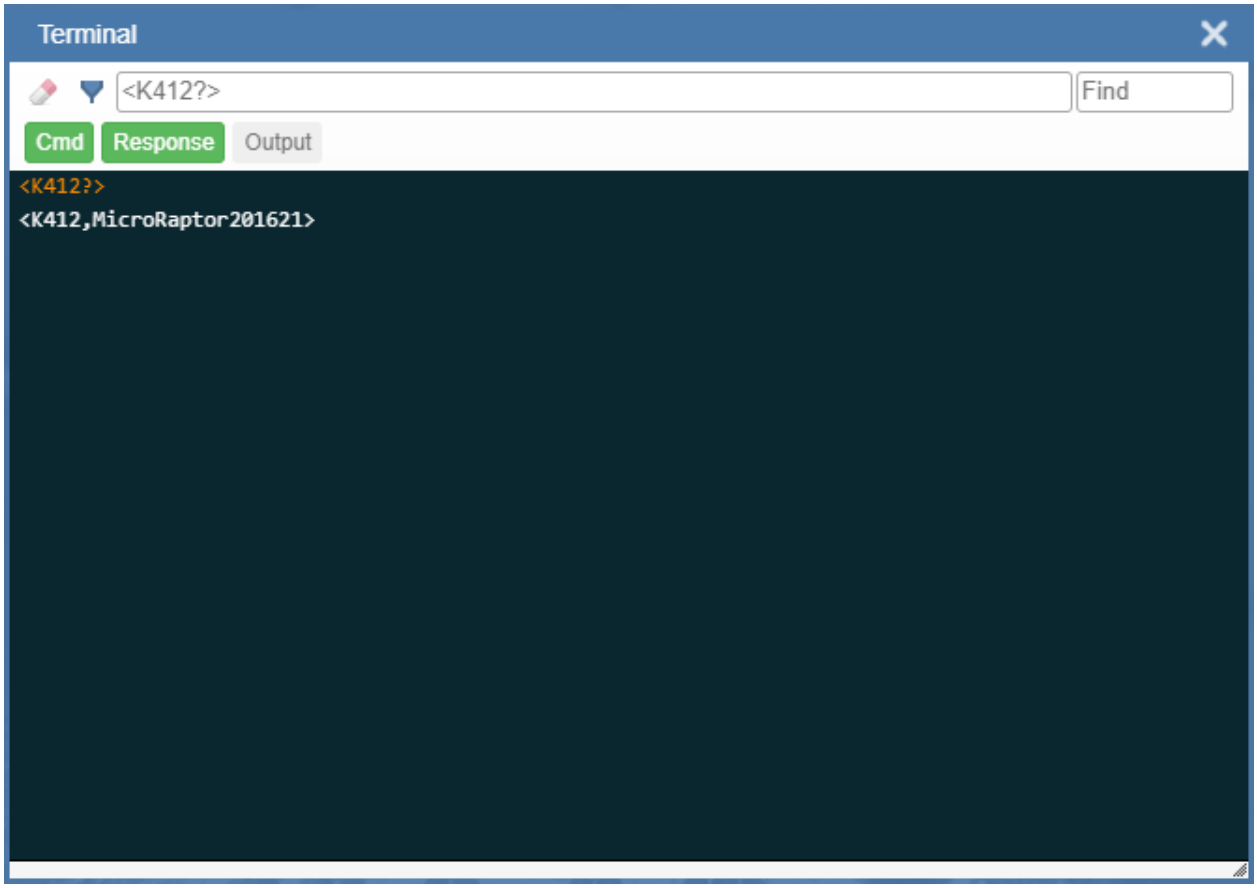
The Terminal features an auto-complete function that shows several common serial command options as soon as you start typing in the **command to send** field.

Important: The Terminal is for advanced users only. It may be possible to send invalid commands to the reader using the Terminal that cause unexpected results in WebLinkHH and/or the reader.

The Terminal automatically adds the **<** and **>** characters to commands entered in the **command to send** field.

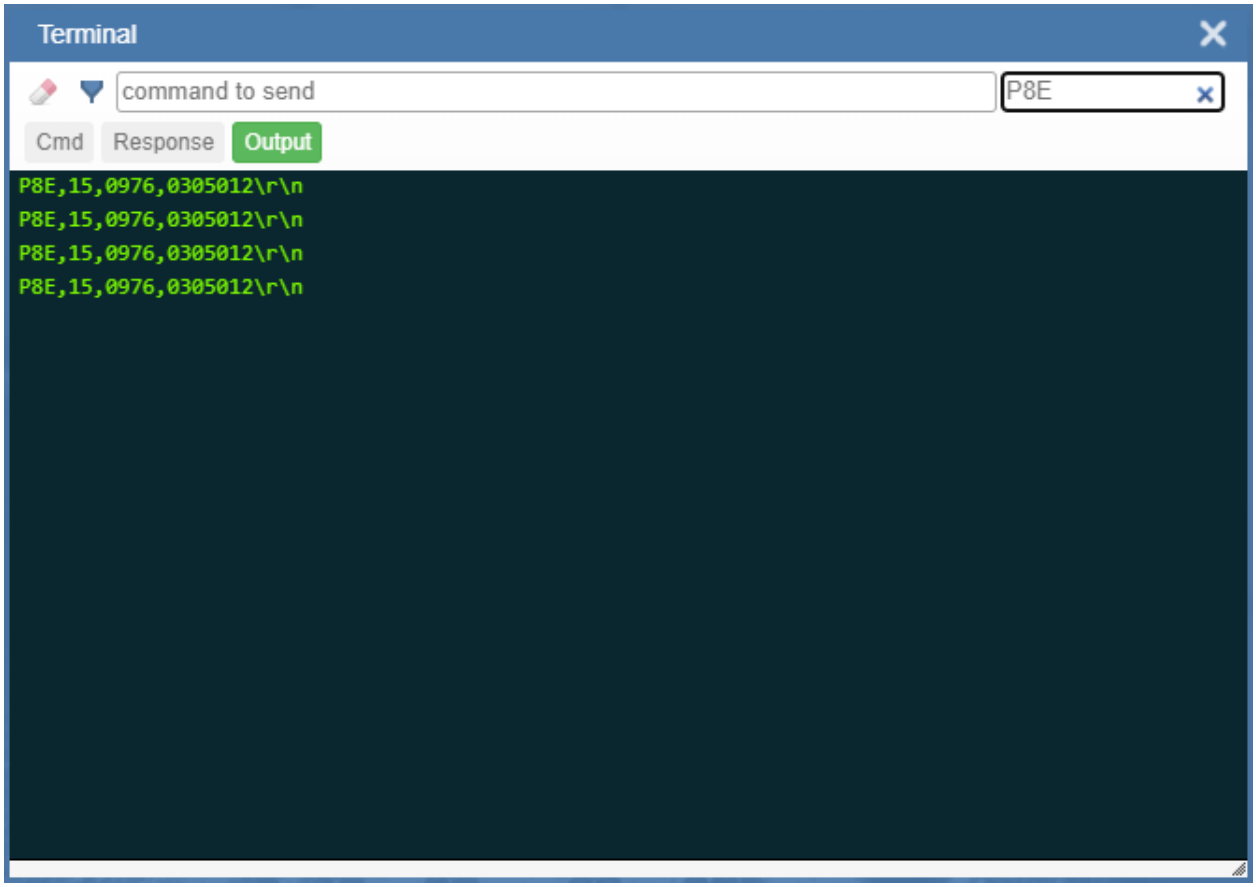
Serial commands sent from the Terminal appear in yellow text and reader output is returned in white text.

Click the **eraser icon** to clear the Terminal screen of all commands, reader responses, and decode output.



Find

The **Find** field in the top right of the window allows you to enter a specific character string to locate within the data on the Terminal screen.

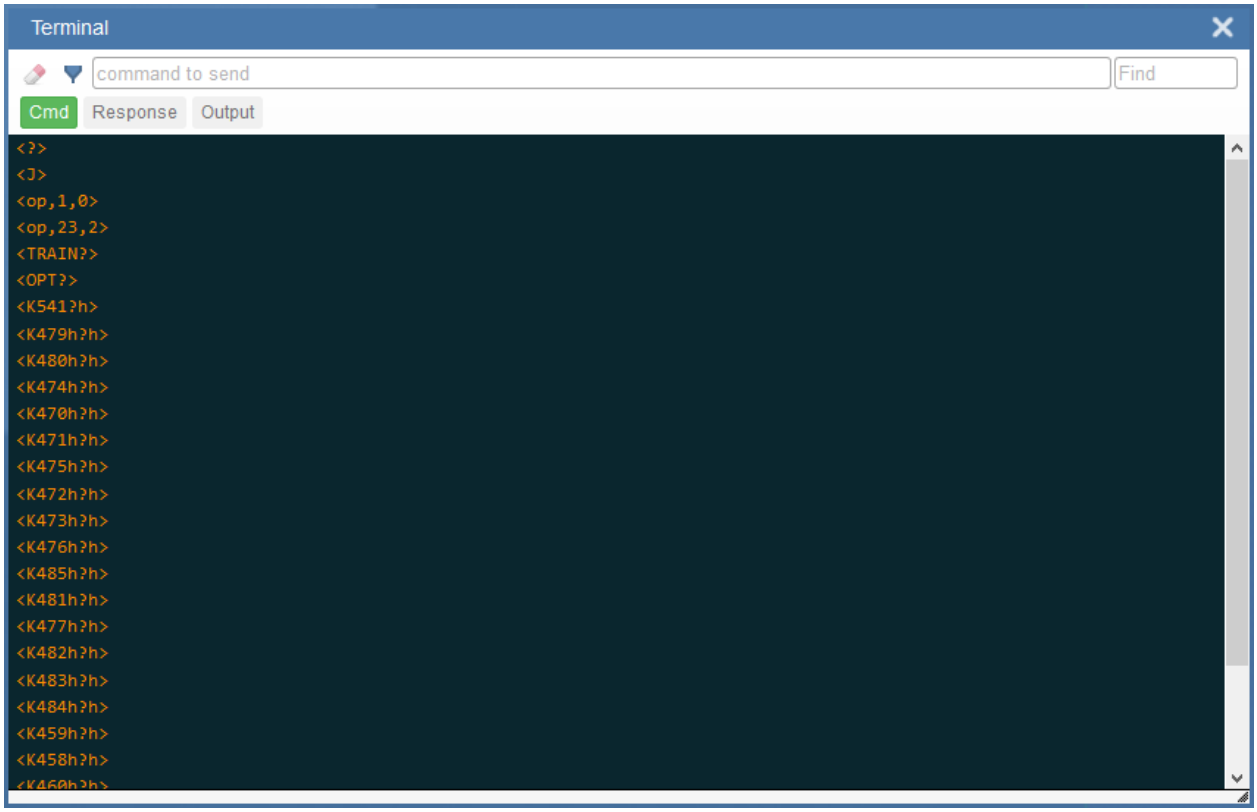


Filters

Click the **filter icon** to the right of the erase icon to display the three filter buttons.

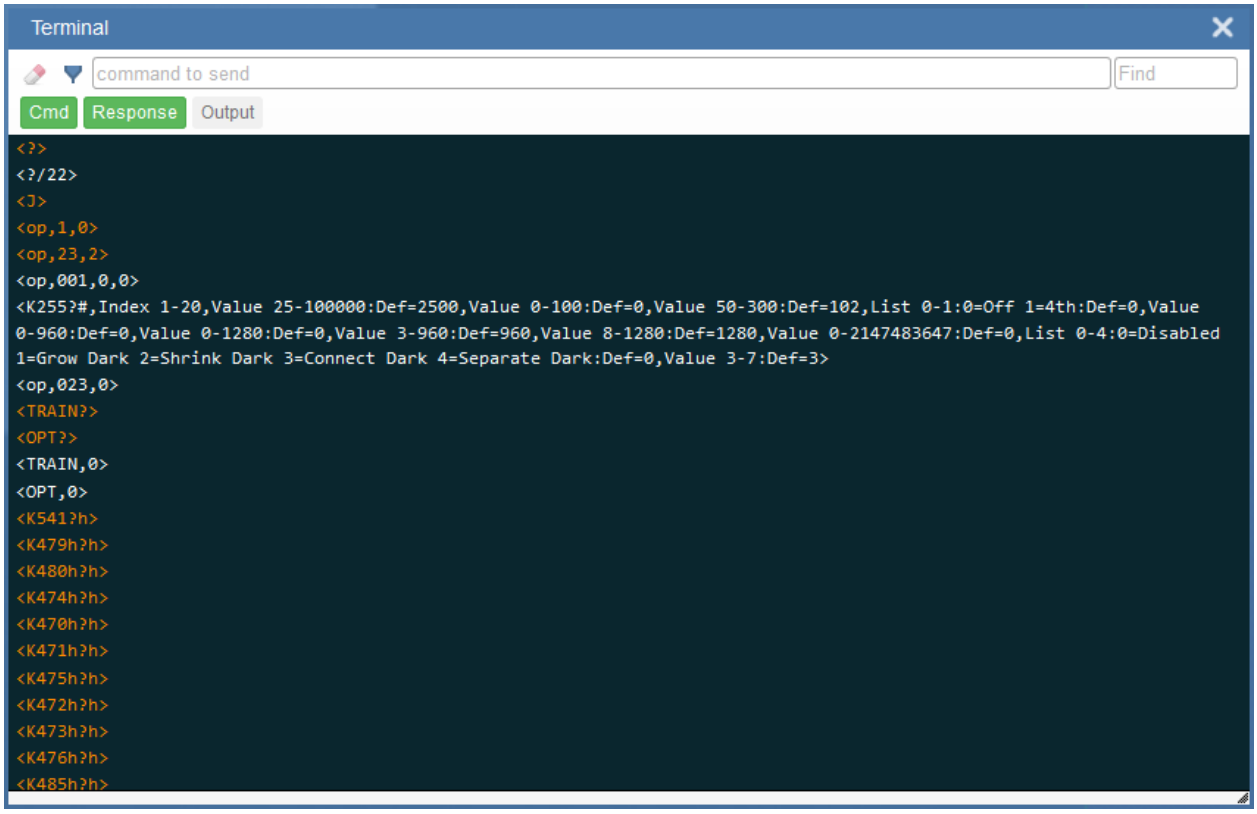
Cmd

When the **Cmd** filter button is selected, serial commands sent from the Terminal are shown. When only the Cmd button is selected, only serial commands are shown.



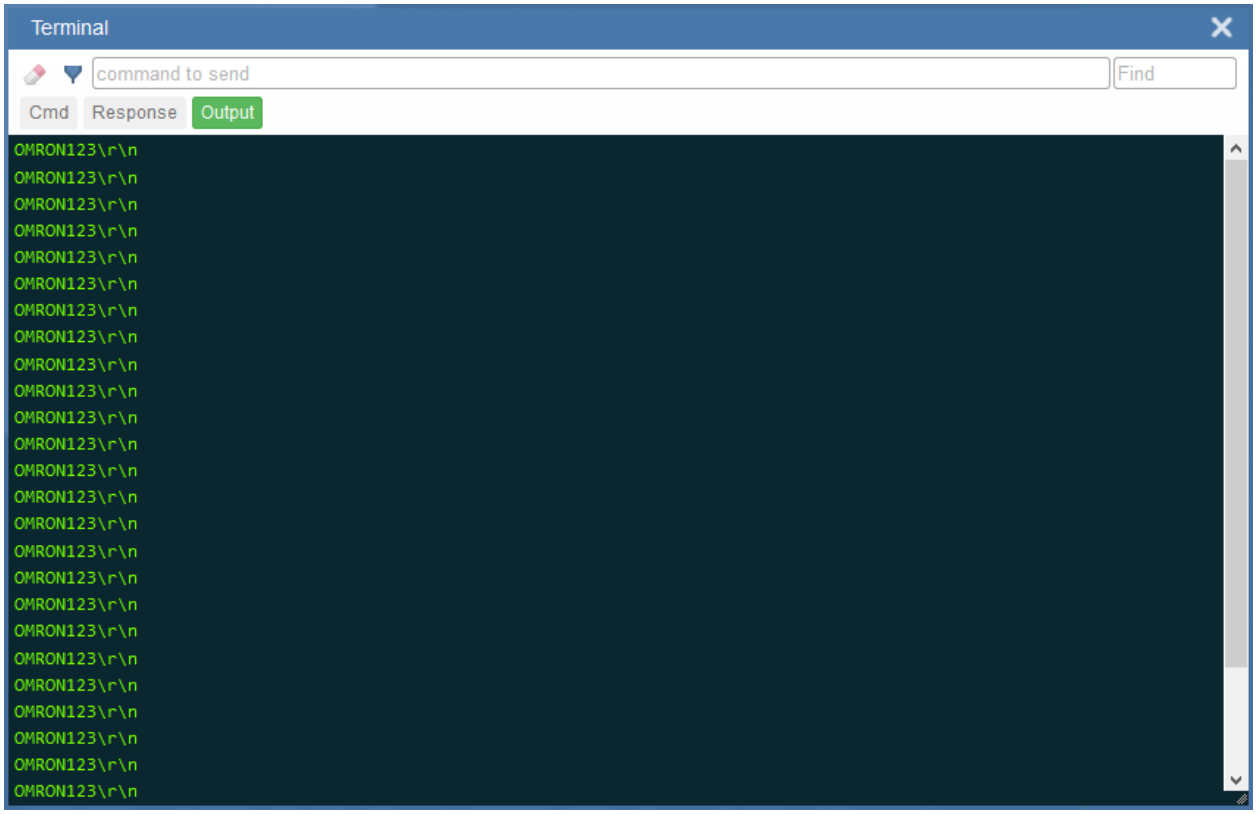
Response

When the **Response** filter button is selected, responses sent back from the reader are shown. When only the Response button is selected, only responses sent back from the reader are shown.



Output

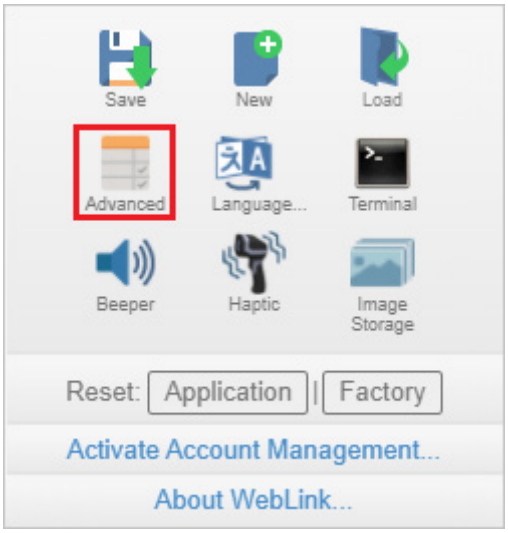
When the **Output** filter button is selected, decode output from the reader is shown. When only the Output button is selected, only decode output from the reader is shown.


Terminal
command to send
Find
Cmd
Response
Output
OMRON123\r\n

Advanced Settings

Click the **gear icon** to the right of the **help icon** to open the **Application Settings** menu. One of the options you will see is **Advanced**.





WebLink's **Advanced** settings allow you to make fine adjustments to individual command parameters in all areas of your reader's functionality: **Camera Setup**, **Communications**, **Read Cycle**, **Symbologies**, **I/O**, **Symbol Quality**, **Match String**, **Diagnostics**, **Image Storage**, and **Configuration Database**. Many of these commands can be configured directly in the WebLinkHH user interface, but all parameters can be configured and examined in Advanced settings.

Advanced settings are an efficient way to send complex, multi-parameter commands to the reader.

Each menu of Advanced settings commands is shown in the following sections, and an additional section is included that shows an example of the **Differences from Default** menu, which shows only commands that are different from WebLinkHH defaults.

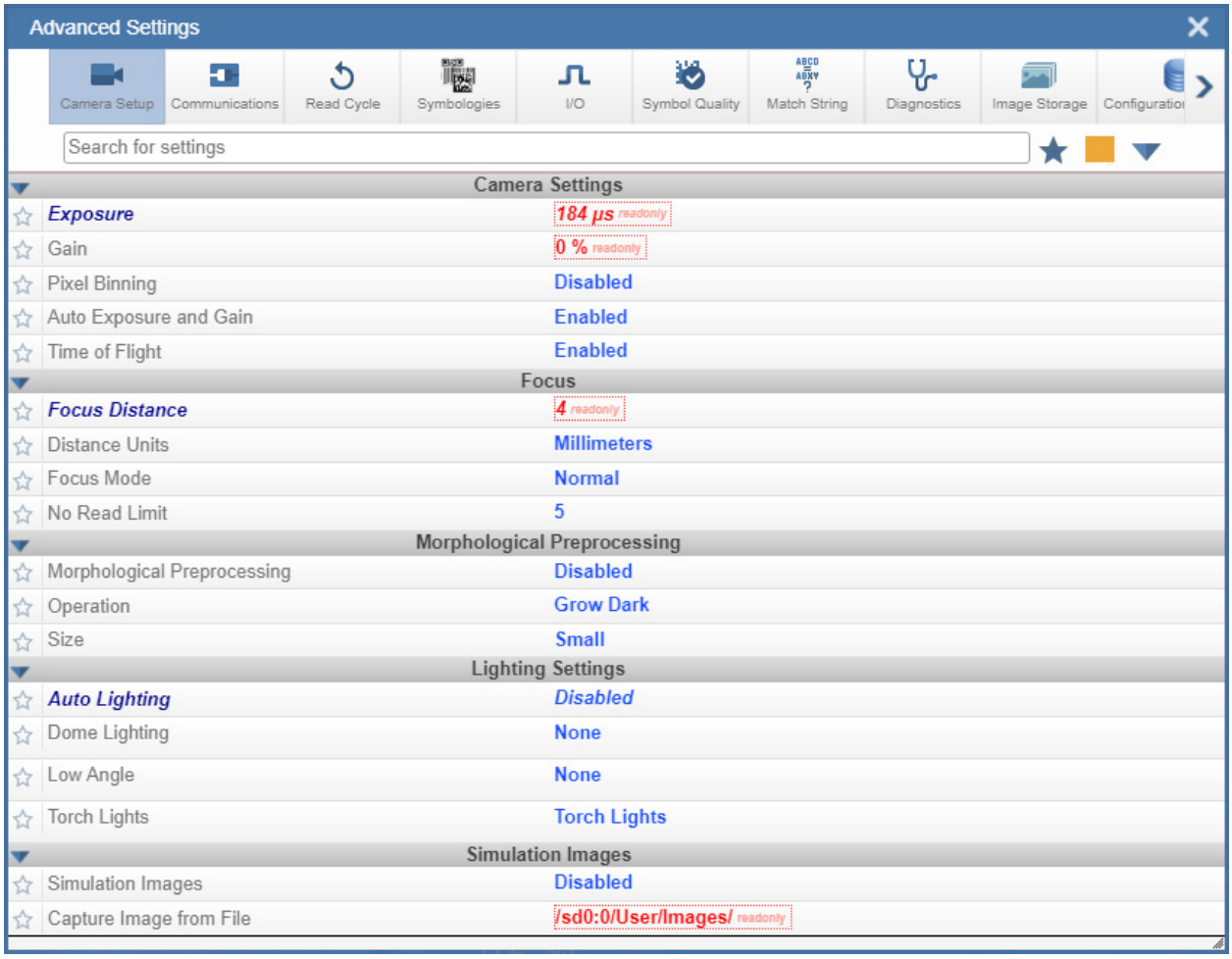
Camera Setup

The **Camera Setup** menu shows all the commands that control the function of the reader's camera. Many of these command settings can also be controlled from the WebLinkHH user interface. For example, the **Exposure** and **Gain** settings in the **Camera Settings** command can be configured in the **Acquire** section located in the left panel of the **Setup** view.

Command parameters can be changed directly from this menu.

Camera Setup Menu

Important: Detailed explanations of the following commands and parameters are located in the **Camera and Image Processing Setup** section of the *V460-H Industrial Handheld DPM Reader User Manual*.



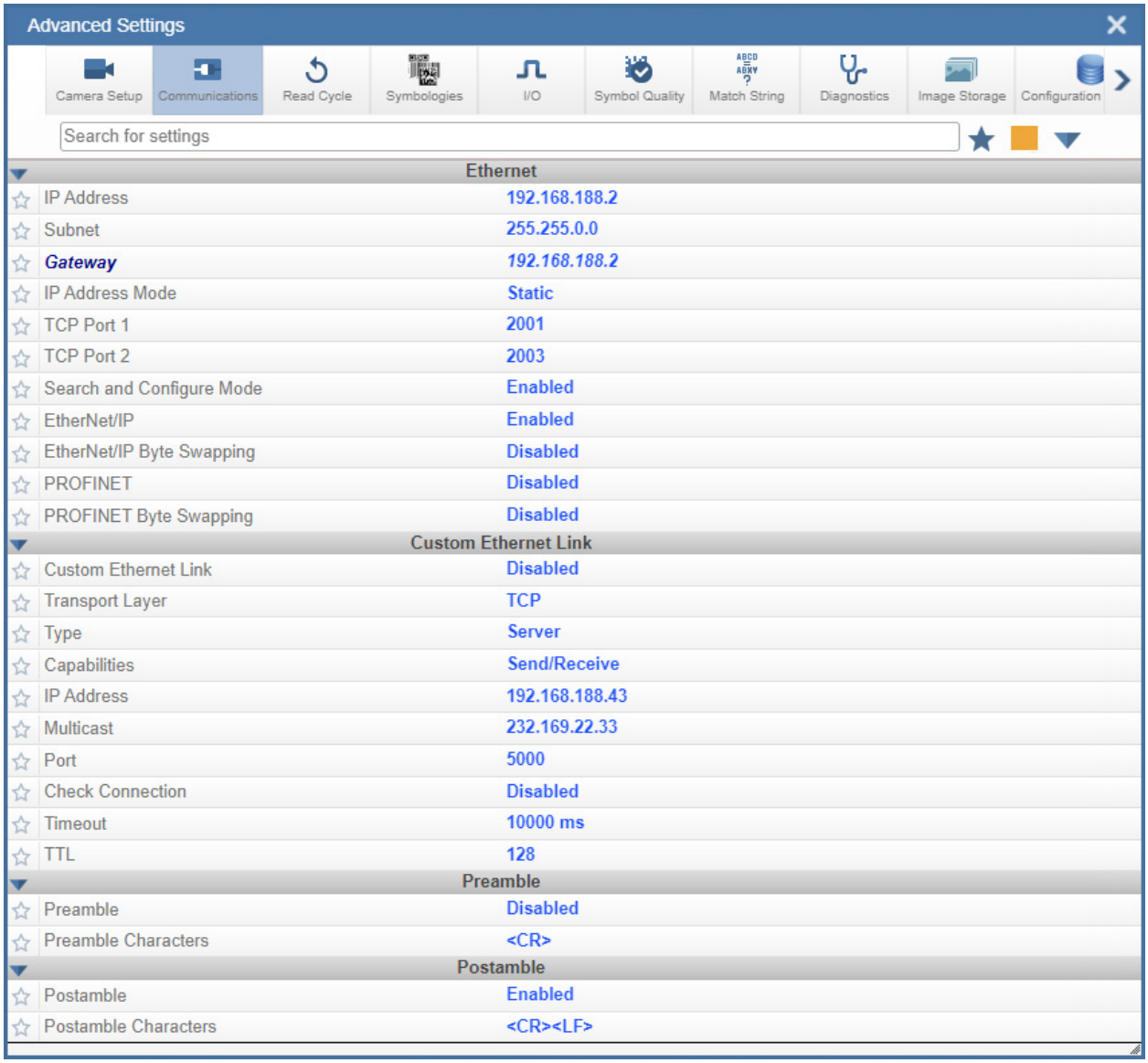
Communications

The **Communications** menu shows all the commands that control the reader's connectivity to the host and to your application's network. These commands also control **Preamble** and **Postamble** settings for decoded data output.

Command parameters can be changed directly from this menu.

Communications Menu

Important: Detailed explanations of the following commands and parameters are located in the **Communications** section of the *V460-H Industrial Handheld DPM Reader User Manual*.



EtherNet/IP and PROFINET Byte Swapping

EtherNet/IP Byte Swapping and PROFINET Byte Swapping allows you to switch the order in which bytes are transmitted (big-endian or little-endian) between the reader and the PLC. If enabled, the bytes are swapped for 2-byte words. When byte swapping is enabled, decoded data is stored in little-endian format. When byte swapping is disabled, decoded data is stored in big-endian format.

EtherNet/IP	Enabled
EtherNet/IP Byte Swapping	Disabled
PROFINET	Disabled
PROFINET Byte Swapping	Disabled

Custom Ethernet Link

Important: If reader settings are not saved, do not change the reader's IP address. The IP address can be changed after reader settings are saved.

By default, the reader operates as a server, and communicates with the host over TCP/IP for both commands and data.

Custom Ethernet Link gives you the ability to create an Ethernet interface that is bound to the command processor per your own requirements. You can set the **Transport Layer** to **UDP** or **TCP**, set the message **Type** to **Server** or **Client**, and set **Capabilities** to **Send Only**, **Receive Only**, or **Send/Receive**.

Custom Ethernet Link	
Custom Ethernet Link	Disabled
Transport Layer	TCP
Type	Server
Capabilities	Send/Receive
IP Address	192.168.1.65
Multicast	232.169.247.185
Port	5000
Check Connection	Disabled
Timeout	10000 ms
TTL	128

Custom Ethernet Link is intended for advanced users. This feature permits the establishment of a connection to the reader on any port, using the protocols UDP/IP, TCP, and Multicast on a specified port. A bi-directional communication configuration is available to send commands to the reader, obtain barcode output data, or form a single direction of communication, i.e. sending commands to the reader only, or receiving barcode data from the reader only, without having both directions open.

In addition to the ability to move ports, you can also force the connection created by the Custom Ethernet Link to act as a client. Instead of "reaching out" to the reader, it is possible to configure the reader to “go out and connect to” a specified server. This increases flexibility when integrating readers into customer applications. Without this feature, users are limited to static communication into and out of the reader (UDP=80, TCP1=2001, TCP2=2003).

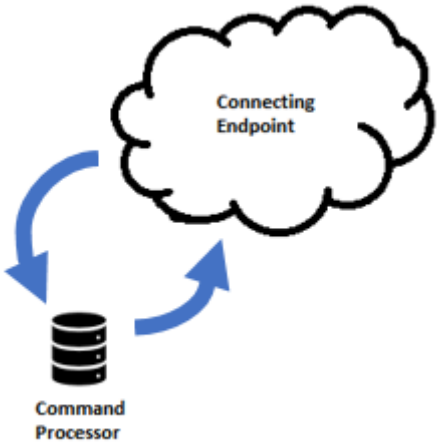
The following section will cover the implementation of how the custom Ethernet object is implemented in an Ethernet-based reader. This additional Ethernet-based transport layer allows you to:

- Send "and/or" commands to the device from a specified endpoint;
- Send barcode data to a receiving endpoint (i.e. a client or server);
- Handle more than one connecting endpoint connection.

With Custom Ethernet Link functionality, users can configure:

- Transport Layer;
- TCP, UDP, or Multicast;
- Message Type;
- Server or Client;
- The type of data sent and/or received from the device;
- The endpoint to send and receive data, send only barcode data, receive only commands.

Custom Ethernet Link functionality is bound to the reader's command processor as shown in the figure below. This enables an outside endpoint to still send commands to the device as well as receive data (commands and barcode) to the receiver.



Server Implementation

In cases where the endpoint is configured as a server, the reader is only able to handle 10 simultaneous connections for any transport layer. For TCP, the reader will refuse the connection. UDP and Multicast will simply ignore the connection request due to the connectionless nature of the transport layer.



Client Implementation

In cases where the endpoint is configured as a client, the reader is only able to handle one connection to a server. This means the following restrictions apply:

TCP: The reader can only connect to one server when configured as a client.
UDP and Multicast: The reader can only send data out on to one UDP port.



UDP is limited to UDP/IP in order to avoid broadcasting data on the network.

Configuration

This section explains how to configure the custom Ethernet object in the reader. The Custom Ethernet Link Command **<K166>** allows you to configure the custom Ethernet object in the reader.

The following section explains the command parameters that configure the custom Ethernet object. Note that each parameter described below corresponds with each parameter shown in the **Custom Ethernet Link** section of WebLink's **Communications** menu shown at the beginning of this topic.

Command Format: <**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,check connection,timeout (milliseconds),TTL*>

Status

<**K166,*status***,*transport layer,type,capabilities,IP address,multicast address,port,check connection,timeout (milliseconds),TTL*>

Status of the custom Ethernet object in the device.

0 = Disabled (Default) – The custom Ethernet object is not started.
1 = Enabled – The custom Ethernet object has started with the parameters configured.

Transport Layer

<**K166,***status,**transport layer**,type,capabilities,IP address,multicast address,port,check connection,timeout (milliseconds),TTL*>

The transport layer used by the custom Ethernet object to send/receive data. This transport layer obeys the OSI Model (layer 4). The multicast implementation uses UDP (User Datagram Protocol) as the transport layer.

0 = TCP (Default)
1 = UDP
2 = Multicast

Type

<**K166,***status,transport layer,**type**,capabilities,IP address,multicast address,port,check connection,timeout (milliseconds),TTL*>

This is the how the feature runs on the device and follows the server client model.

0 = Server (Default) – In server mode the device will be listening on the configured port number. The server can handle up to 10 different connections at one time independent of the transport layer selection. Once the limit has been reached the server will reject other connections.
For Multicast server configuration the user can either use a specified Multicast address or leave the Multicast address to the configured Multicast APIPA Address. This Multicast address is safe to use according to RFC 4607 stating that Multicast ranges from 232.0.0.0 – 232.255.255.255 are okay to use for source specific applications. By default, the unit creates a unique Multicast address in the range of 232.169.xxx.xxx so it does not conflict with other multicast addresses.
1 = Client – In client mode the device will send data to the specified server. The user must configure the IP Address (or Multicast Address) of the server and the port number that the specified server is listening on. Improper configuration will either yield an error on startup or result in no data being transmitted from the device to the outside world.

Capabilities

<**K166,***status,transport layer,type,**capabilities**,IP address,multicast address,port,check connection,timeout (milliseconds),TTL*>

Capabilities is how the user configures the custom Ethernet object's read/write settings.

1 = Receive – The device will only receive data from the connecting endpoint. The device will not send data out to any connecting endpoints.
2 = Send – The device will only send data to the connecting endpoint. Any data received is immediately disposed of and not processed.

3 = Send/Receive (Default) – The device will be able to send and receive data to the connecting endpoint.

IP Address

<**K166,***status,transport layer,type,capabilities,**IP address**,multicast address,port,check connection,timeout (milliseconds),TTL*>

If the unit is configured as a client, the IP Address is determined by the Transport Layer.

TCP – This is the server's IP Address.
UDP – If the server uses UDP/IP, this is the IP Address of the server. Otherwise, it is ignored and the device will send data on the specified port.
Multicast – This parameter is the device's IP Address used to send out the Multicast message. You do not need to configure this parameter.

Default = Unit's IP Address

Multicast Address

<**K166,***status,transport layer,type,capabilities,IP address,**multicast address**,port,check connection,timeout (milliseconds),TTL*>

In **Server mode**, this is the multicast address that clients can connect to in order to send/receive data. The port number is the port that the connecting endpoints will use.
In **Client mode**, this is the multicast address of the server that the device is sending data to. The port number is the port the multicast server is listening on.

Default = 232.169.xxx.xxx (Multicast APIPA Address)

Port

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,**port**,check connection,timeout (milliseconds),TTL*>

In **Server mode**, this is the port number that the connecting endpoints will use to connect to the device.
In **Client mode**, this is the port number that the server is listening on.

5000 (Default)

Check Connection

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,**check connection**,timeout (milliseconds),TTL*>

This feature is only applicable for Transport Layer UDP in Client mode. The device will transmit 0 length UDP packets to the specified port that the server is listening on. If the device receives an ICMP (Port Destination Not Found) than it will continue to send 0 length packets in an exponential back-off delay until the device no longer receives ICMP packets. This feature is disabled by default.

0 = Disabled (Default)
1 = Enabled

Timeout (Milliseconds)

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,check connection,***timeout (milliseconds),***TTL*>

For TCP this is the timeout before the socket is forcibly closed. For UDP and Multicast this parameter has no effect.

Default = 10000

TTL

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,check connection,timeout (milliseconds),***TTL***>

For Multicast this is the **T**ime **T**o **L**ive counter, or how many hops before the message is discarded by the network. By default, the counter is set to 128 hops which is more than enough for a typical packet to reach its destination host but can be configured to last longer or shorter per network requirements.

Default = 128

Examples

The following section provides examples of how to configure the custom Ethernet object using the **Custom Ethernet Link** K Command **<K166>** described in the **Configuration** section earlier in this topic.

TCP
Server Mode
Send/Receive Capabilities
<K166,1,0,0,3>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = TCP (Default), Type = Server (Default), Capabilities = Send/Receive (Default)

Send-Only Capabilities
<K166,1,0,0,2>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = TCP (Default), Type = Server (Default), Capabilities = Send

Client Mode
The following client modes will connect to a TCP Server with IP Address **192.168.188.5** listening on port **5050**.



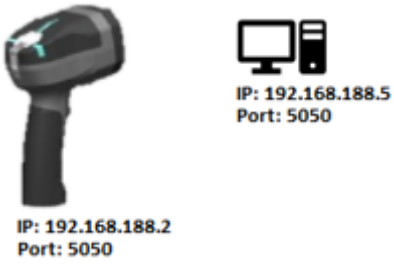
Send/Receive Capabilities
<K166,1,0,1,3,192.168.188.5, ,5050>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = TCP (Default), Type = Client, Capabilities = Send/Receive (Default), IP Address = 192.168.188.5, Port = 5050.

Send-Only Capabilities
<K166,1,0,1,2,192.168.188.5, ,5050>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = TCP (Default), Type = Client, Capabilities = Send, IP Address = 192.168.188.5, Port = 5050.

UDP
Server Mode
Send/Receive Capabilities
<K166,1,1,0,3>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = UDP, Type = Server (Default), Capabilities = Send/Receive (Default).

Send-Only Capabilities
<K166,1,1,0,2>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = UDP, Type = Server (Default), Capabilities = Send.

Client Mode
The following client modes will connect to a UDP Server with IP Address **192.168.188.5** listening on port **5050**.



Send/Receive Capabilities
<K166,1,1,1,3,192.168.188.5, ,5050>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = UDP, Type = Client, Capabilities = Send/Receive (Default), IP Address = 192.168.188.5, Port = 5050.

Send-Only Capabilities
<K166,1,1,1,2,192.168.188.5, ,5050>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = UDP, Type = Client, Capabilities = Send, IP Address = 192.168.188.5, Port = 5050.

Multicast
Server Mode
The following uses the default Multicast IP Address generated in the device.

Send/Receive Capabilities
<K166,1,2,0,3>

Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = Multicast, Type = Server (Default), Capabilities = Send/Receive (Default).

Send-Only Capabilities
<K166,1,2,0,2>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = Multicast, Type = Server (Default), Capabilities = Send.

Client Mode
The following client modes will connect to a Multicast server with IP Address **224.0.1.90** listening on port **5050**.



Send/Receive Capabilities
<K166,1,2,1,3, ,224.0.1.90,5050>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = Multicast, Type = Client, Capabilities = Send/Receive (Default), IP Address = 224.0.1.90, Port = 5050.

Send-Only Capabilities
<K166,1,2,1,2, ,224.0.1.90, ,5050>
Interpretation of K Command Settings: Custom Ethernet Link Enabled (Default), Transport Layer = Multicast, Type = Client, Capabilities = Send, IP Address = 224.0.1.90, Port = 5050.

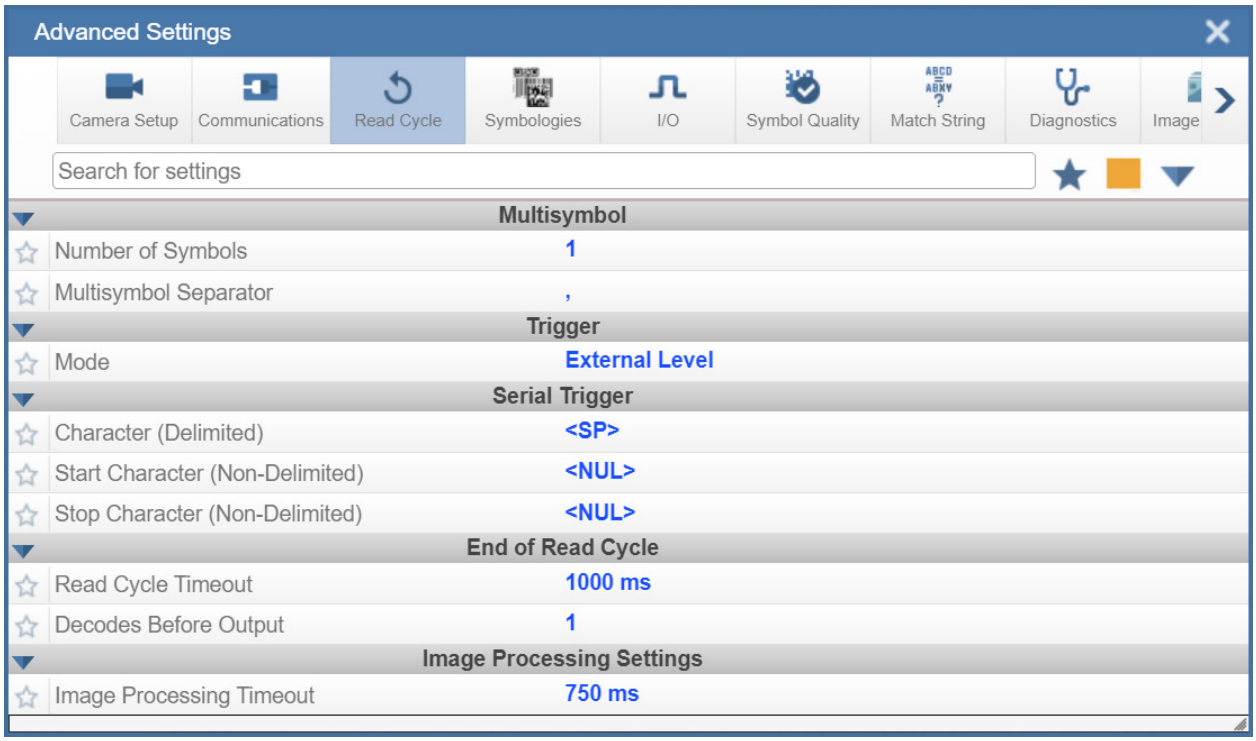
Read Cycle

The **Read Cycle** menu shows all the commands that control all aspects of read cycle, including triggering, read cycle timing, and image processing.

Command parameters can be changed directly from this menu.

Read Cycle Menu

Important: Detailed explanations of the following commands and parameters are located in the **Read Cycle** section of the *V460-H Handheld Code Reader User Manual*.



Symbologies

The **Symbologies** menu shows all the commands that allow you precise control of the parameters of all enabled code types. Parameters differ depending on the unique standards of each code type.

Command parameters can be changed directly from this menu.

Symbologies Menu

Important: Detailed explanations of the following commands and parameters are located in the **Symbologies** section of the *V460-H Handheld Code Reader User Manual*.

DotCode

DotCode is a special code type that can be enabled using the standard Code Type dialog box or using Advanced Settings.

Important: When **DotCode** is enabled, no other symbologies will be decodable. You must disable DotCode to decode symbols of any other type.

DotCode parameters can be found in the Symbologies menu located in WebLink's Advanced Settings.

By default, DotCode will look for either horizontal or vertical codes with no rotation (plus or minus 3 degrees). The user can set Rotation Mode to Low Rotation (plus or minus 10 degrees) or to Omni Directional.

	DotCode
DotCode	***Enabled***
Rotation Mode	No Rotation
Expected Rows	0
Expected Columns	0

When using DotCode, the user can specify the exact number of rows and columns in the code to minimize the possibility of decoding errors and no reads. If you specify the exact row and column dimensions, only DotCode symbols of the same dimension are decoded.

To do this, you must enter the row and column values using a K command via the Terminal under Settings, or via another serial link.



Important: DotCode must be enabled for the column and row settings to take effect.

Serial K Command: **<K561,*Custom Feature Command String*>**

Default Setting: **“ ”**

Options: **DOTCODE_COL_ROW=?#?#**

The **?** character in **DOTCODE_COL_ROW=?#?#** should be changed to the expected number of columns and rows in the DotCode symbol.

In the example below, **40** is the number of columns, and **7** is the number of rows.

<K561,DOTCODE_COL_ROW=40#7#>



Swap columns and rows when the same symbol is oriented vertically.

<K561,DOTCODE_COL_ROW=7#40#>



Advanced Decoding Parameters

Advanced Decoding Parameters can help you read difficult and damaged symbols, and are optimized for direct part marks (DPM).

Advanced	
☆ *Fast Linear Mode*	*Vertical*
☆ Curved 2D	Disabled
☆ Convert Shift-JIS to UTF-8	Disabled
☆ 1D Quiet Zone Violation	Disabled
☆ *Scale Image*	*Both Up and Down*
☆ 2D Damaged Mode	Disabled
☆ Attempt Morphology Manipulation	Disabled

Fast Linear Mode

Fast Linear Mode optimizes 1D symbol decoding. Fast Linear Mode accelerates 1D decode speeds by restricting the orientation in which barcodes can be aligned, and only decoding barcodes in that orientation.

If you know the direction the application's symbols will be oriented relative to the reader (horizontally or vertically), set Fast Linear Mode to match that direction. This will cause the reader to decode only symbols in that orientation, thereby reducing the processing needed and speeding up decode times.

If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

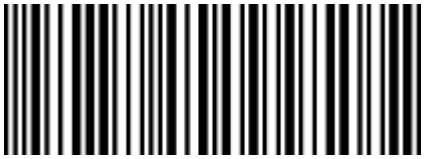
Serial Command: **<K562,***Fast Linear Mode***>**

Default Setting: **Disabled**

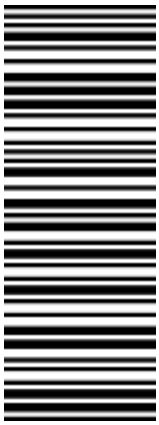
Options:
0 = Disabled
1 = Horizontal
2 = Vertical

Examples:
<K562,*0*> = Disabled
<K562,*1*> = Horizontal
<K562,*2*> = Vertical

Horizontal requires that the entire symbol be oriented horizontally in the reader's field of view.



Vertical requires that the entire symbol be oriented vertically in the reader's field of view.



Curved 2D

Curved 2D is designed for **Data Matrix** and **QR Code** symbols on bottles and other cylinders.

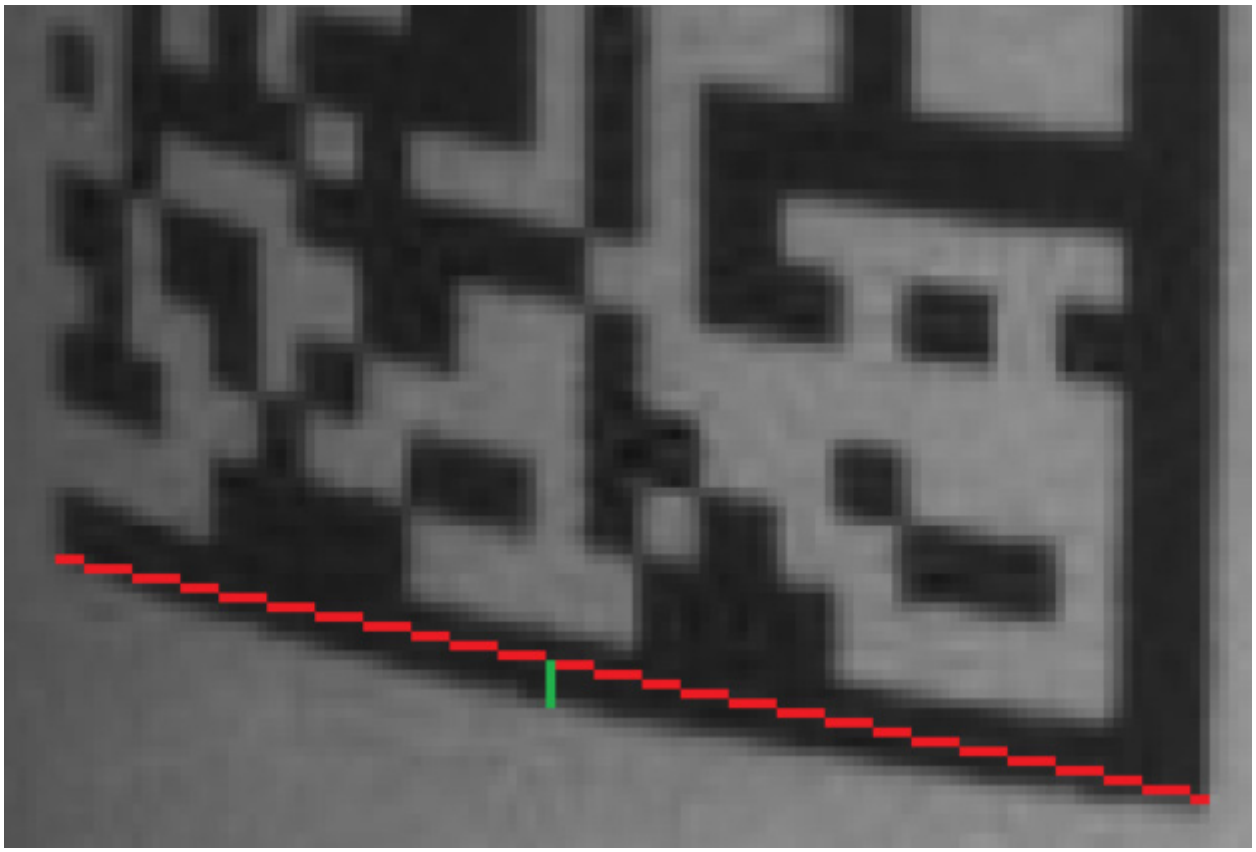


Curved Data Matrix



Curved QR Code

Curvature in a captured image is usually created when the reader is pointing to the symbol at an angle. This algorithm, when enabled, will only be active when the curvature is great enough. If the length ratio between the red and green line shown in the example below is greater than **20:1**, the Curved 2D algorithm will be activated.



If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

Serial Command: **<K563,***Curved 2D***>**

Default Setting: **Disabled**

Options:
0 = Disabled
1 = Enabled

Examples:
<K563,*0*> = Disabled
<K563,*1*> = Enabled

Convert Shift-JIS to UTF-8

For any symbol (often QR Code but not always), this feature converts decoded **Shift-JIS** characters to **UTF-8** characters.

If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

Serial Command: **<K564,***Convert Shift-JIS to UTF-8***>**

Default Setting: **Disabled**

Options:
0 = Disabled
1 = Enabled

Examples:
<K564,*0*> = Disabled
<K564,*1*> = Enabled

1D Quiet Zone Violation

This feature allows a symbol to be decoded even when there is noise in the quiet zone on one or both sides of a symbol. This command is specific to UPC, Code 128, Code 39, and Codabar.

If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

Serial Command: **<K565,***1D Quiet Zone Violation***>**

Default Setting: **Disabled**

Options:
0 = Disabled
1 = Enabled

Examples:
<K565,*0*> = Disabled
<K565,*1*> = Enabled

Scale Image (Up, Down, or Both)

Scale Image allows you to scale the captured image up or down.

Scale Up is intended for symbols with low PPE (pixels per element) and small quiet zones. It scales up the image by 2x (4x by area). The maximum zoomed image size is 2600 x 2048. If the original image is greater than 1300 x 1024, it will be cropped to the center portion.

Scale Down scales the captured image to the ideal size for the reader's decoder (1/4 or 1/16 if necessary) and filters out image noise.

There is also a **Both** option that allows you to scale the image up or down.

If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

Serial Command: **<K566,***Scale Image***>**

Default Setting: **Disabled**

Options:
0 = Disabled

1 = Scale Up
2 = Scale Down
3 = Both

Examples:
<K566,*0*> = Disabled
<K566,*1*> = Scale Up
<K566,*2*> = Scale Down
<K566,*3*> = Both

2D Damaged Mode

2D Damaged Mode allows you to decode symbols with distorted grid alignment or bad cell registration.

If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

Serial Command: **<K567,***2D Damaged Mode***>**

Default Setting: **Enabled**

Options:
0 = Disabled
1 = Enabled

Examples:
<K567,*0*> = Disabled
<K567,*1*> = Enabled

Attempt Morphology Manipulation

Attempt Morphology Manipulation applies morphology dilation and attempts to decode. If this isn't successful, it applies morphology erosion and attempts to decode.

If you prefer to use serial commands, the following command allows you to enter your settings via a Terminal.

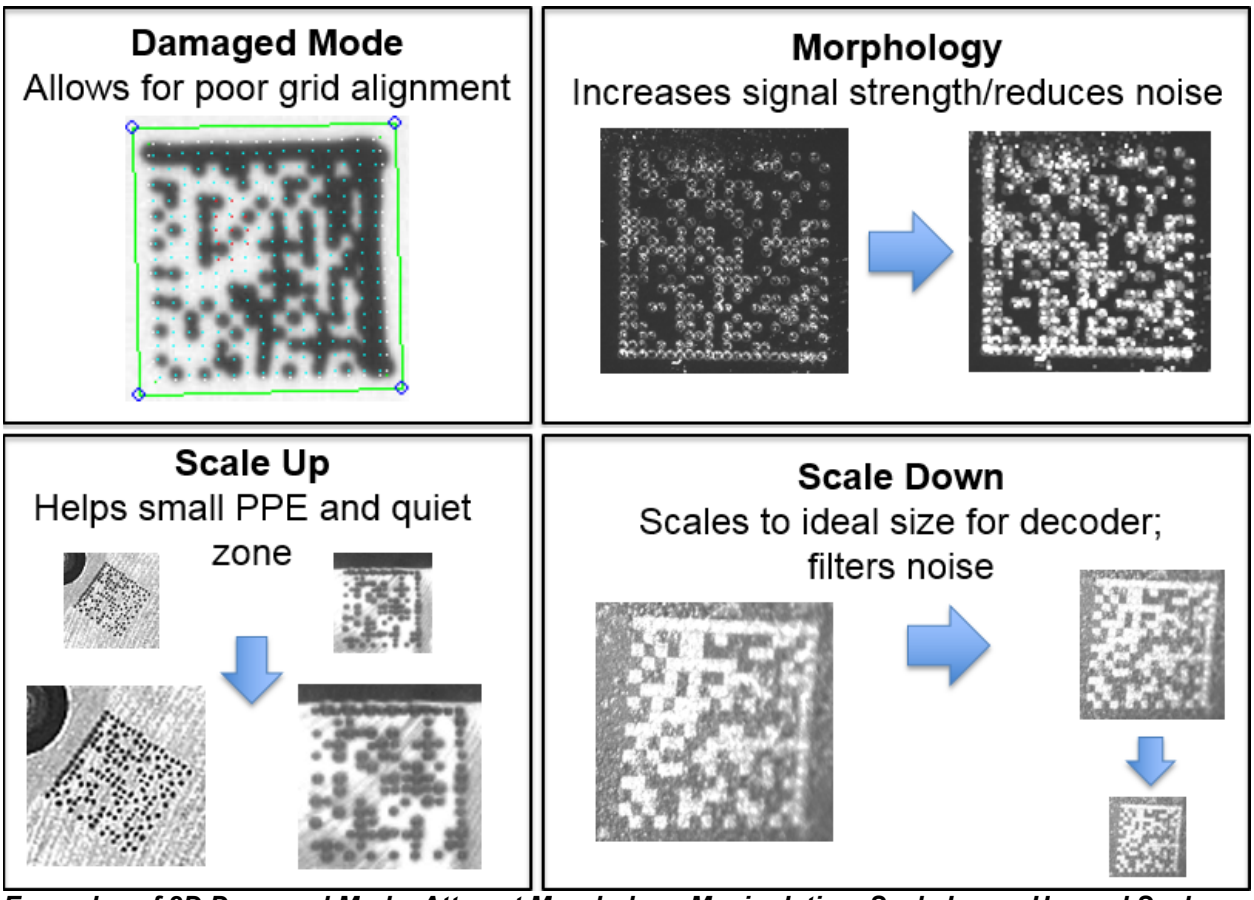
Serial Command: **<K568,***Attempt Morphology Manipulation***>**

Default Setting: **Disabled**

Options:
0 = Disabled
1 = Enabled

Examples:
<K568,*0*> = Disabled
<K568,*1*> = Enabled

Advanced Decoding Parameters Examples



Examples of 2D Damaged Mode, Attempt Morphology Manipulation, Scale Image Up, and Scale Image Down

Combining Advanced Decoding Parameters

Some Advanced Decoding Parameters can be combined and others cannot, as follows:

- **Curved 2D** and **Convert Shift-JIS to UTF-8** can be combined with each other, and both will be activated.

- **Scale Up**, **Scale Down**, **Attempt Morphology Manipulation**, and **2D Damaged Mode** can be combined with each other.

- **Fast Linear Mode Horizontal** and **Fast Linear Mode Vertical** cannot be combined with other **Advanced Decoding Parameters** commands.

- **1D Quiet Zone Violation** cannot be combined with other Advanced Decoding Parameters commands.

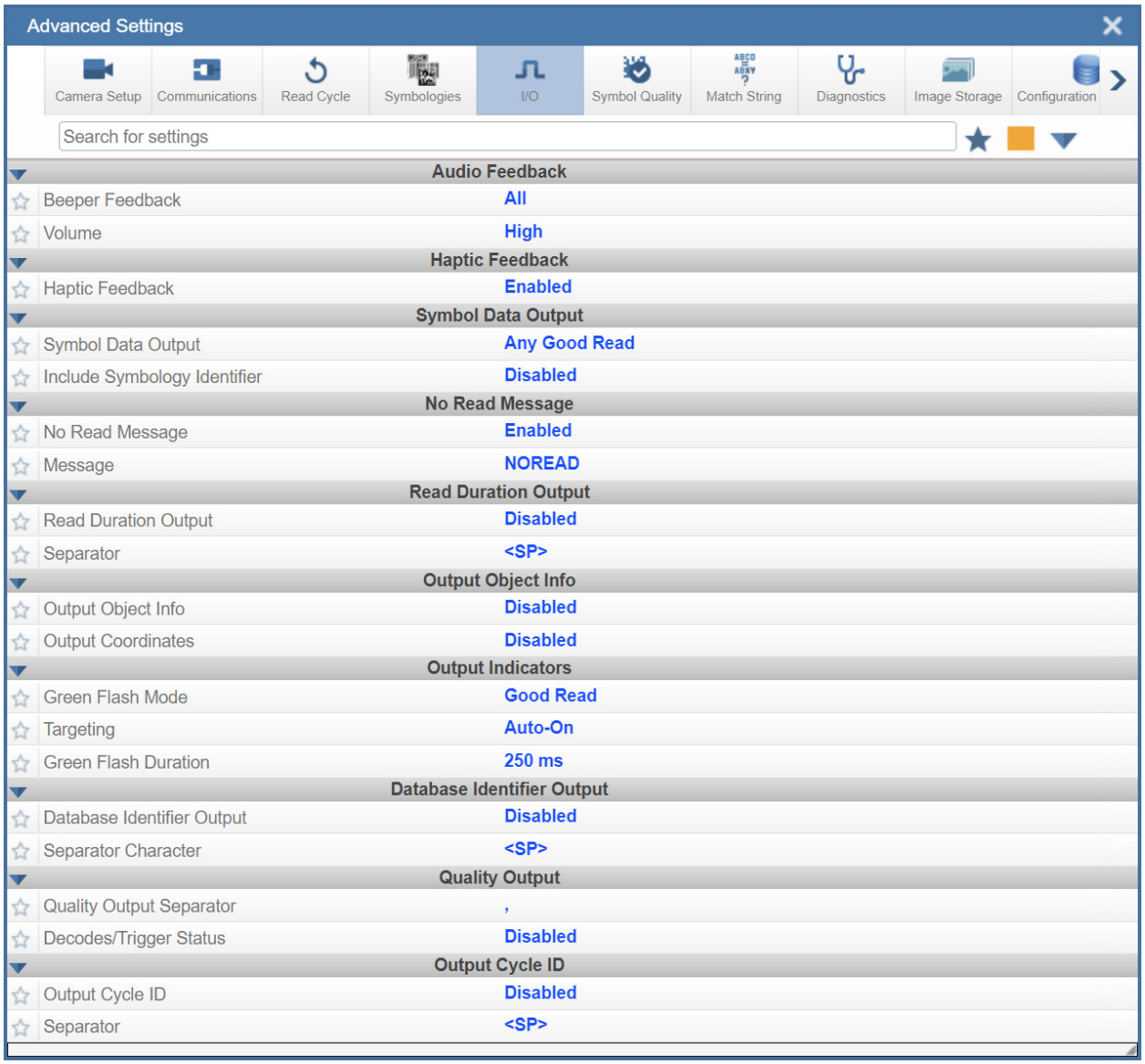
I/O

The **I/O** menu shows all the commands that control a wide range of real-world reader behavior, including the enabling or disabling of messages about various reader states, the configuration of the LEDs, the enabling or disabling of messages about symbol quality, and the sending of signals to external systems such as conveyors and light stacks.

Command parameters can be changed directly from this menu.

I/O Menu

Important: Detailed explanations of the following commands and parameters are located in the **I/O Parameters** section of the *V460-H Industrial DPM Reader User Manual*.



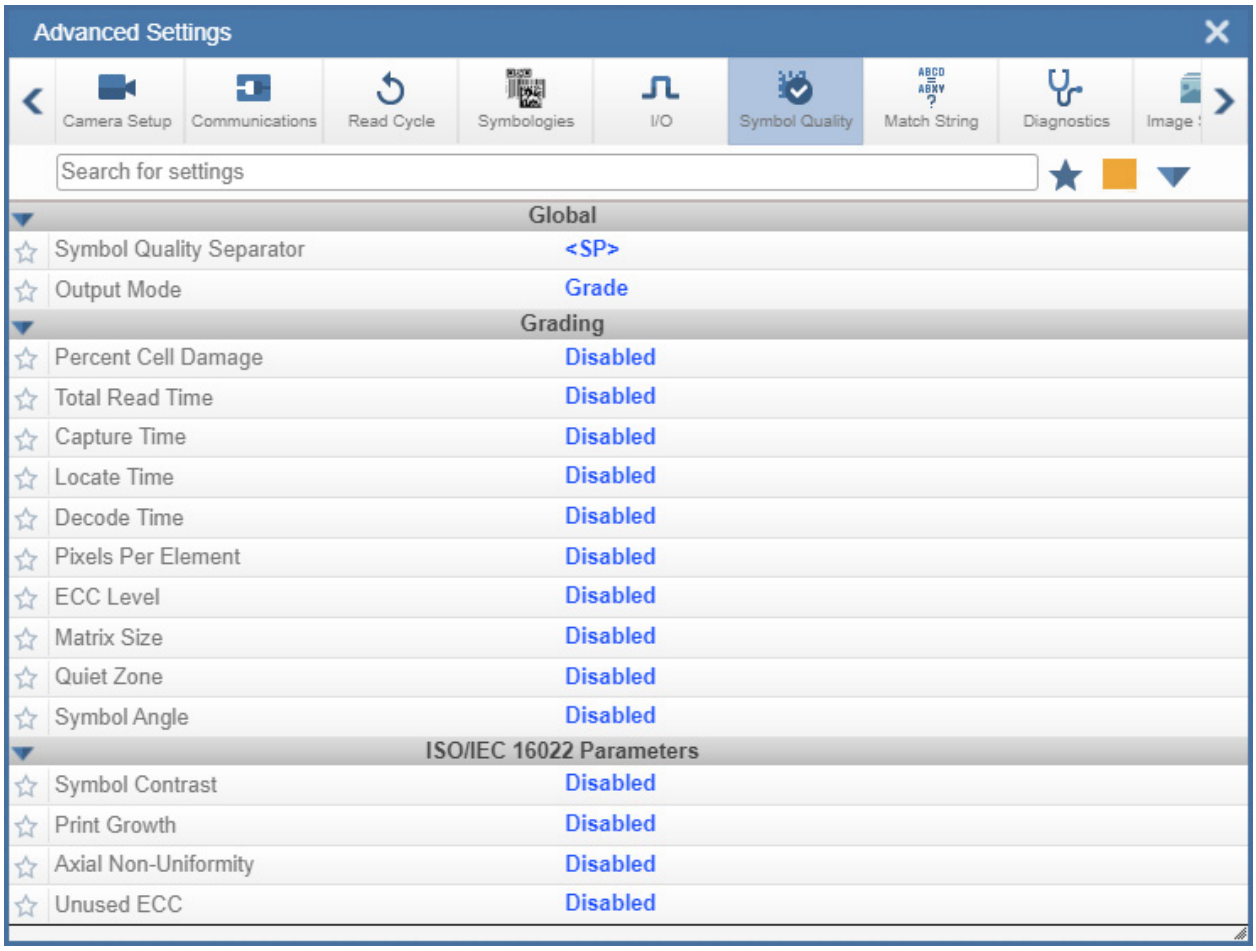
Symbol Quality

The **Symbol Quality** menu shows commands that allow you to define the evaluation of symbols per the ISO/IEC 16022 specification, or by a collection of commonly-used grading parameters. The two **Global** commands allow you to define the separator that will appear between instances of symbol quality output, and the format in which symbol quality evaluations will be output.

Command parameters can be changed directly from this menu.

Symbol Quality Menu

Important: Detailed explanations of the following commands and parameters are located in the **Symbol Quality** section of the *V460-H Handheld Code Reader User Manual*.



Symbol Grading

Grading Overview

The symbol grading features presented here are not intended to be, and should not be confused with, barcode verification. The individual parameter measurements in symbol grading are implemented in

accordance with verification standards. However, calibration and other methodologies needed for compliant verification are not feasible in a reader configuration. Compliant verification is beyond the scope of this help topic, but reviewing a few topics can help in understanding how to deploy the features and functionality provided.

Verifiers are integrated systems designed to meet the rigorous demands of the verification specifications. To provide compliant verification, verifier systems are designed with specific features and functionality. In addition to specific requirements that are explicitly defined in the standards themselves, verifiers also incorporate general design features to eliminate sources of variability that can have adverse effects on the accuracy and repeatability of measurements. Handheld readers are designed to provide maximum product flexibility for integration into systems that require reading for traceability. Key handheld design specifications such as size, cost, read range, and read rate are a few factors that drive fundamental differences between verifier and handheld designs. Understanding these tradeoffs in design can help users to optimize their systems to provide better accuracy and repeatability when grading.

The V460-H reader provides no calibration features. The image captured by the reader is processed as-is and the intensity values of the image (0 – 255) are directly mapped to 0 – 100% reflectance grading purposes.

Illumination Distribution

Evenly-distributed illumination over the inspection area is a key component for accurate and repeatable grading. It is important to take care in achieving as flat a response as possible of the inspection area. Uneven illumination will not only impact the grade of a given symbol – it can also have a very large impact on repeatability of measurements. For example, a given symbol may achieve a different result in the center of the field of the view than it does near the edges or corners. Illumination providing a perfectly flat response will remove locational variance, but this is not always possible. Care in symbol presentation, location, and consistency will have a significant impact on grading.

Optical Distortion

Optical distortion of the symbol under test can also impact results. Optical distortion is introduced through a few different sources. The optics themselves will introduce non-linear distortions. These distortions will have a more significant impact on the symbol as the working distance is shortened. Lengthening the working distance reduces the variation in angle at which light traveling from the symbol enters the lensing system. Moving the symbol farther away also reduces the pixel per element resolution and changes illumination profiles, so care must be taken to optimize these parameters together. The symbol should be presented as close to 90 degrees to the imager as possible. Off-axis imaging will introduce distortion. Optical distortion typically impacts Axial Non-Uniformity, but has cascading effects on other metrics.

Digital Resolution

A minimum digital resolution in the image is required to allow the software enough data to accurately measure the grading parameters. 6 pixels per nominal symbol element are recommended for accurate grading. This is system-dependent and requires optimal system focus and illumination. Not having enough resolution will impact repeatability and introduce overall degradation in dependent parameters.

Optical Resolution

Optical resolution is the ability of the optics to resolve detail in the image. High digital resolution of the symbol in the image does not equate to a high optical resolution. The system needs to resolve the detail of the image accurately. This requires making sure you are at optimal focus and that other considerations

such as working distance and color of illumination have been evaluated to ensure they are not negatively impacting optical resolution in the system. When designing an optical setup you should evaluate and optimize to achieve the best possible modulation transfer function (MTF) for the imager. Poor optical resolution typically results in a degraded modulation score can have a cascading effect on other metrics.

General Grading Functionality

The Grading Process

Grading evaluation does not take place until a Data Matrix has been identified by the X-Mode decoder. Once the Data Matrix has been decoded by the X-Mode decoder, a separate grading evaluation begins. Note that this evaluation can potentially add significant processing time to the overall process, and each specification requires independent evaluation. Furthermore, enabling any single parameter within a given specification requires the complete grading evaluation.

Grading – ISO/IEC 16022

Overview

This section outlines the grading implementation of **ISO/IEC 16022** available in the reader firmware. Please refer to the ISO/IEC 16022 standard itself for further information about specifications.

Supported Symbologies

The ISO/IEC 16022 standard defines the symbology requirements for the **Data Matrix** symbology.

Minimum Resolution

6 pixels per element is the **Minimum Resolution**.

Symbol Contrast

Symbol Contrast measurements assume that **8-bit 0 – 255 intensity** in the captured image correlates directly to **0 – 100% reflectance**. Symbol Contrast is calculated and graded for each scan and provided for the overall grade calculation in accordance with the ISO/IEC 16022 specification. The parameter grade and value provided for output is an average of all measured scans across the entire symbol.

Axial Non-Uniformity

Axial Non-Uniformity measures the relationship between the overall dimensions of the two axes of the symbol. Axial Non-Uniformity is calculated in accordance with the ISO/IEC 16022 specification.

Unused Error Correction

Unused Error Correction measures the remaining error correction available after correcting the errors within the decoded symbol. It is calculated in accordance with the ISO/IEC 16022 specification.

Usage / Notes

- Uniform lighting across the field of view is required for reliable grading results.
- The lowest parameter grade becomes the overall grade for the Data Matrix symbol.

Match String

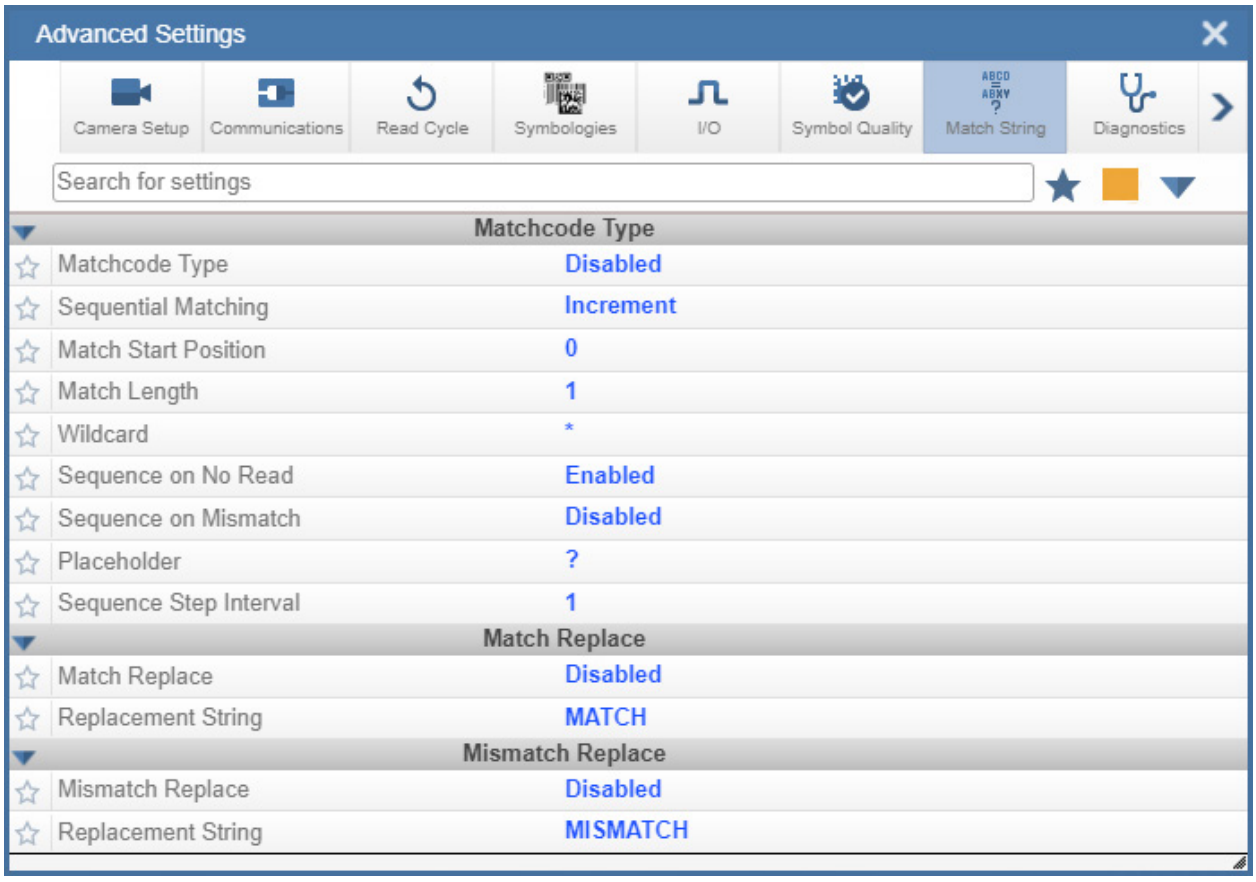
Note: Match String can only be used in **Triggered**, **Start/Stop**, and **Custom** modes. It cannot be used in Presentation mode.

The **Match String** menu shows commands for configuring the reader's matching behavior. It also shows the character strings intended to replace a string of decoded data (either a match or mismatch) with the user-defined match string.

Command parameters can be changed directly from this menu.

Match String Menu

Important: Detailed explanations of the following commands and parameters are located in the **Matchcode** section of the *V460-H Handheld Code Reader User Manual*.



Diagnostics

The **Diagnostics** menu shows commands that allow you to change various service messages as well as the reader's name. It also allows you to examine the read-only count values for multiple reader functions and states.

Command parameters can be changed directly from this menu.

Diagnostics Menu

Important: Detailed explanations of the following commands and parameters are located in the **I/O Parameters** section of the *V460-H Handheld Code Reader User Manual*.

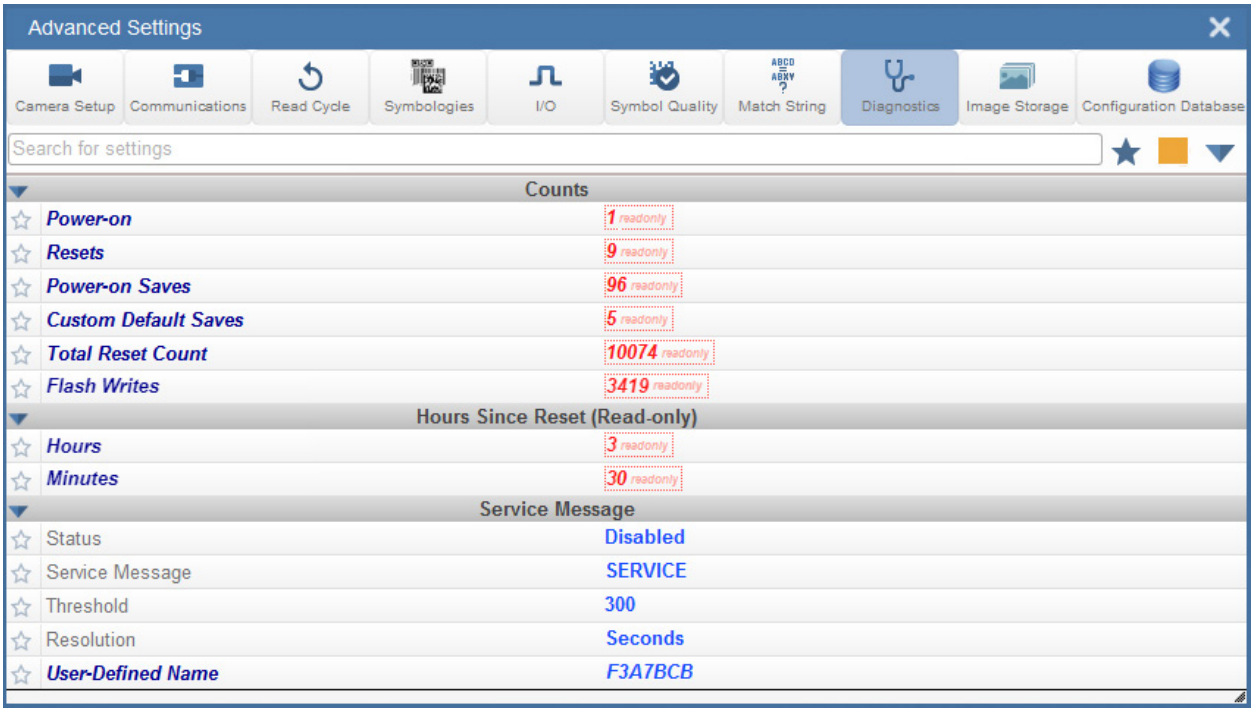
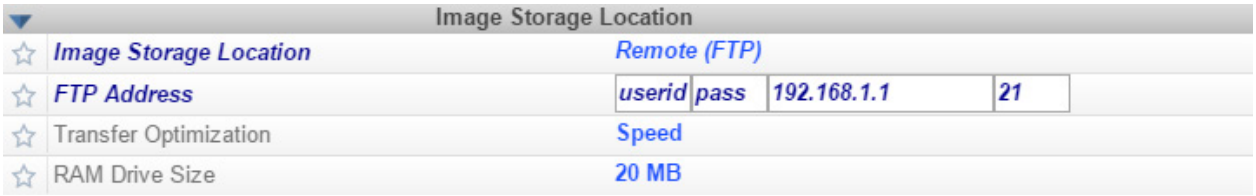


Image Storage

The **Image Storage** menu shows commands that allow you to control how, when, and where images captured by the reader are stored.

The **Image Storage** and **Image Storage Location** commands shown below are functionally identical to those described in **Application Settings**. For example, when you configure the **FTP Address** command as shown below, the outcome is the same as it would have been had you used the graphic user interface accessible from the Application Settings menu.

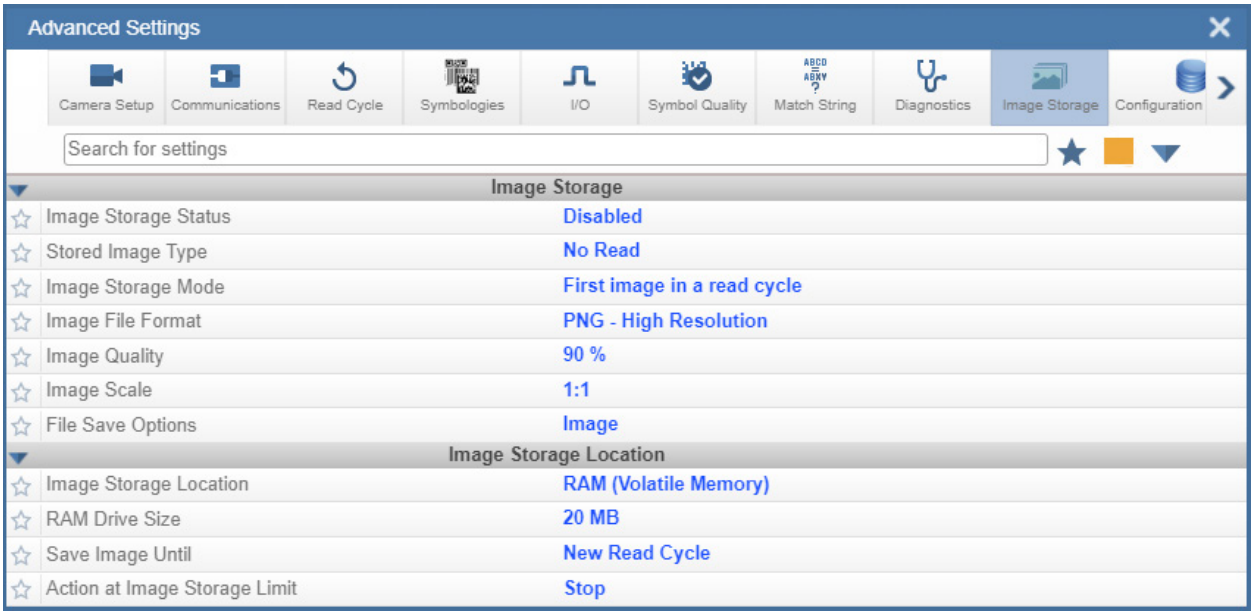
For a detailed list of parameters, refer to **Application Settings > Image Storage**.



Command parameters can be changed directly from this menu.

Image Storage Menu

Important: Detailed explanations of the following commands and parameters are located in the **I/O Parameters** section of the *V460-H Handheld Code Reader User Manual*.



Configuration Database

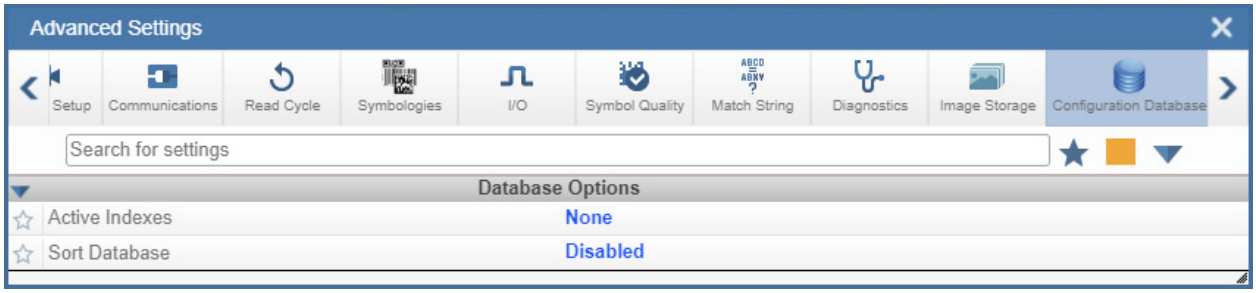
The **Configuration Database** menu allows you to:

- Set the number of database records (groups of settings) that will be used automatically during the read cycle;
- Move the database entry that produced a successful decode to the first position in the list of database entries.

Command parameters can be changed directly from this menu.

Configuration Database Menu

Important: Detailed explanations of the following commands and parameters are located in the **Configuration Database** section of the *V460-H Handheld Code Reader User Manual*.

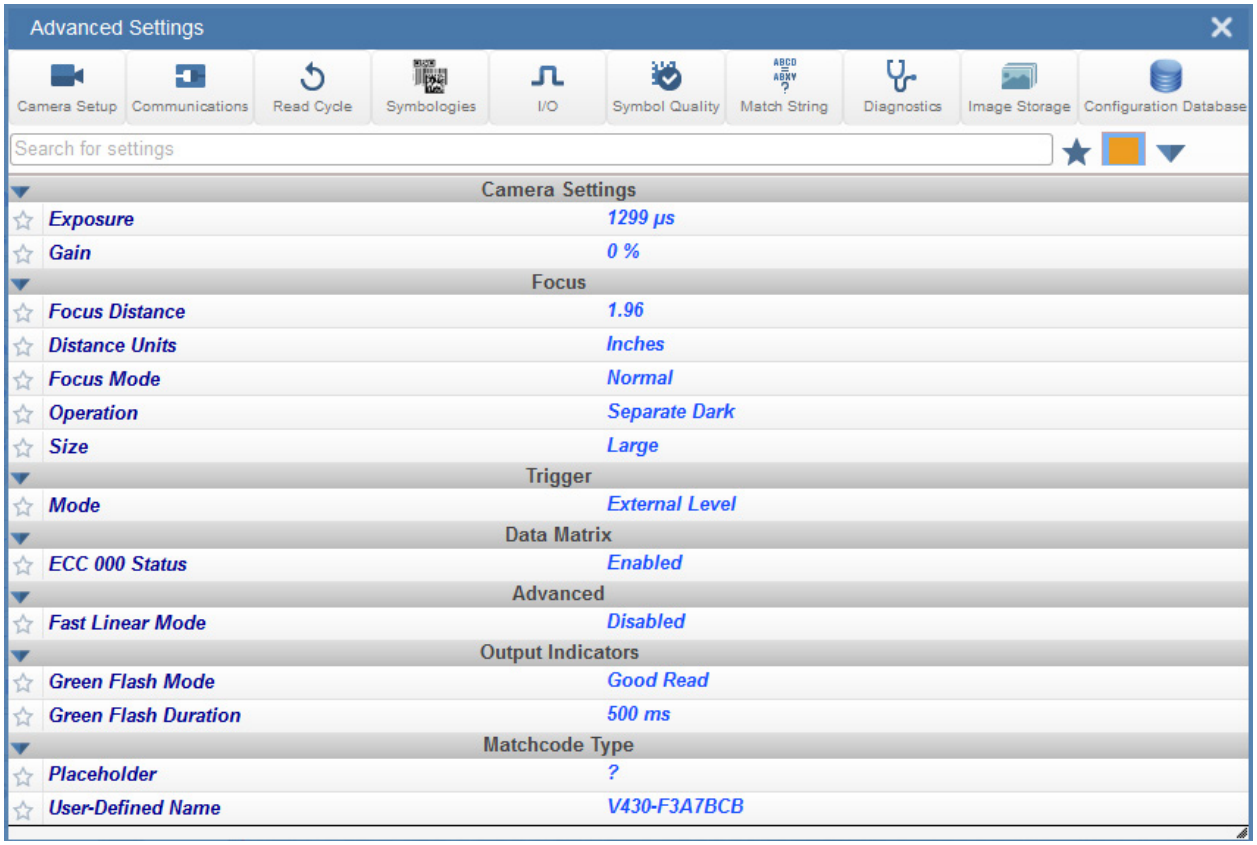


Differences from Default

The **Differences from Default** menu shows only commands whose parameters are not currently set to WebLinkHH defaults. Commands from any of the eight categories may appear in this menu.

Command parameters can be changed directly from this menu.

Differences from Default Menu



5

Reader Parameters

This section provides detailed information about specific features that are useful for both basic and advanced applications. These features can be activated directly via WebLinkHH and also via serial commands (Ethernet communication).

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5-1 Calibration

5-1-1 Calibration Serial Commands

Calibration Options	<**K529,***gain,exposure,focus position,symbol type,WOI framing, WOI margin,line scan height,processing*>

5-1-1 Calibration Serial Commands

Calibration is one of the most powerful features of the reader. The calibration process can be initiated by serial command.

Important: Calibration cannot be initiated from the WebLinkHH interface.

When the reader enters calibration, it runs through an optimization cycle that sets the ideal parameters for reading symbols at the highest possible level of performance. Calibration can be specially configured to optimize specific parameters, such as gain, exposure, and symbol type.

5-1-1 Calibration Options

This command specifies the operation of the calibration feature. The default configuration performs calibration on gain and symbol type. The calibration process optimizes the gain setting for the configured exposure.

Gain

Definition:	When enabled, gain is calibrated to provide the best available image quality and performance. When disabled, gain is fixed and is not part of the calibration process.
Serial Cmd:	<**K529,*gain***,*exposure,focus position,symbol type,WOI framing,WOI margin, line scan height,processing*>
Default:	**Quick Calibrate**
Options:	0 = Disabled 1 = Enabled (Decode Required) **2 = Quick Calibrate**

Note: If you choose to calibrate the reader by sending a **<@CAL>** command, a decode is also required for the calibration process to be completed successfully.

● Disabled

When disabled, gain is fixed and is not part of the calibration process.

● Enabled

When enabled, gain is calibrated to provide the best image quality and performance for the symbol present in the field of view. Calibration requires that a decodable symbol be placed in the field of view, as feedback from the symbol decoding process is used to select the best gain setting. If a symbol is not decoded the process will result in a fail condition.

● Quick Calibrate

Quick Calibrate uses the automatic gain control (AGC) feature of the image sensor to adjust the gain value such that the current image falls into a desirable region of the image sensor's sensitivity range, ensuring optimal image luminance. The image sensor converges on the optimal gain value within a few image frames.

● Exposure

Definition: Unless the application is static, exposure should be configured based on the application's line speed. The table below is a general guideline for exposure configurations at various line speeds.

Serial Cmd: <**K529,***gain,***exposure**,*focus position,symbol type,WOI framing,WOI margin, line scan height,processing*>

Default: **Quick Calibrate**

Options: 0 = Disabled

1 = Enabled (Decode Required)

2 = Quick Calibrate

- **Note:** If you choose to calibrate the reader by sending a <@CAL> command, a decode is also required for the calibration process to be completed successfully.
- **Note:** This table shows guidelines for exposure settings based on various line speeds. The settings shown depend on the reader's optical configuration and on symbol element size.

Exposure	Line Speed
100,000 – 4,000	Static
4,000 – 1,250	5" / sec
1,250 – 700	10" / sec
700 – 500	15" / sec
500 – 400	20" / sec

Disabled

When disabled, exposure is fixed and is not part of the calibration process.

Enabled (Decode Required)

When enabled, exposure is calibrated to provide the best image quality and performance for the symbol present in the field of view. Calibration requires that a decodable symbol be placed in the field of view, as feedback from the symbol decoding process is used to select the best exposure setting. If a symbol is not decoded the process will result in a fail condition.

Quick Calibrate

Quick Calibrate uses the automatic exposure control feature of the image sensor to adjust the exposure value such that the current image falls into a desirable region of the image sensor's sensitivity range, ensuring optimal image luminance. The image sensor converges on the optimal exposure value within a few image frames.

5-1-2 Focus Position

Definition: The reader's focus position can be configured by entering the target distance value, so focus position can usually be configured without calibration. However, if it is necessary to calibrate the focus distance there are two methods: the standard **Search Method** and a **Quick Focus** method, both of which are defined below.

Serial Cmd: <**K529,***gain,exposure,****focus position****,symbol type,WOI framing,WOI margin, line scan height,processing*>

Default: **Quick Focus**

Options: 0 = Disabled

1 = Enabled (Decode Required)

2 = Quick Focus

Disabled

The focus position is fixed and is not part of the calibration process.

Enabled (Search Method)

Focus position is calibrated to provide the best image quality and performance. This method is a simple search algorithm that cycles through focus settings and configurates camera settings to try and locate the desired focus as quickly as possible. This is accomplished when a symbol is decoded. Once a focus distance that produces a successful decode has been located, the algorithm fine tunes the search to locate the inside and outside focal distances. The final focus distance is between the inside and outside values. This method may be time-consuming if the focus is not found on the first pass.

Quick Focus

Quick Focus is quickly locates the focus setting for an object at the center of the field of view. This is accomplished with minimal image processing, by analyzing a histogram of the image frame. Before performing focus calibration, a value for exposure and gain is determined. The process then steps through the focus range of the system capturing the required number of image frames for each focal position. Then a histogram is performed on each image frame, and the histogram results for each focal position are averaged. When the process is finished, the data is analyzed and the optimal focus position is determined.

Note: This method may not work for all applications. This method is not ideal for very small symbols.

5-1-3 Symbol Type

Serial Cmd: <**K529,***gain,exposure,focus position,**symbol type**,WOI framing,WOI margin,line scan height,processing*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

Disabled

When this feature is disabled, only the current enabled symbologies will be considered during the calibration process.

Enabled

When this feature is enabled, autodiscrimination is in effect during the calibration process. All supported symbologies except PDF417 and Pharmacode will be attempted during calibration. Any new symbologies successfully decoded during calibration will remain enabled at the end of the process. All enabled symbologies will remain enabled. For example, assume that only Code 39 is enabled at the beginning of calibration. If a Code 128 symbol is decoded during calibration, then Code 128 as well as Code 39 will be enabled.

5-1-4 Window of Interest (WOI) Margin

Definition: Sets the margin size that is applied to the calibrated symbol. This parameter is expressed in number of pixels. If the margin causes the image to exceed the maximum image size, it will be reduced accordingly.

Serial Cmd: <**K529,***gain,exposure,focus position,symbol type,WOI framing,**WOI margin**,line scan height,processing*>

Default: **75 (pixels)**

Options: 20 to 1280

5-1-5 Processing

Definition: This setting defines the amount of time and effort the reader will spend attempting to decode a symbol for each parameter configuration.

Serial Cmd: <**K529,***gain,exposure,focus position,symbol type,WOI framing,WOI margin,line scan height,****processing***>

Default: **Medium**

Options:

0 = Low	**1 = Medium**
2 = High	3 = Definable

Low

The reader will spend a low amount of effort attempting to decode the given symbol for each parameter configuration.

Medium

The reader will spend a medium amount of effort attempting to decode the given symbol for each parameter configuration.

High

The reader will spend a high amount of effort attempting to decode the given symbol for each parameter configuration.

Definable

The processing time for each image frame is defined by **Image Processing Timeout**.

Additional Notes about Calibration

The following conditions apply to the reader's calibration process. Some of these items are noted at various points throughout this section, or in other sections of the reader's documentation.

1. **Image Processing Mode** will not be altered during calibration.
2. If **Symbol Type** is enabled for calibration (**Autodiscriminate**), then Interleaved 2 of 5 **Range Mode Status (Interleaved 2 of 5)** **<K472>** will be enabled. This allows variable-length Interleaved 2 of 5 symbols to be decoded. If an Interleaved 2 of 5 symbol is decoded during calibration, then code length # 1 will be set to the decoded symbol length at the end of calibration. Otherwise, the symbol lengths will be restored to their original configurations.
3. **Pharmacode** is not calibrated.
4. All symbol types that were enabled before calibration will still be enabled after calibration. For example, if Data Matrix ECC 200 was enabled before calibration, and the calibration routine was performed on a Code 128 symbol, then after calibration is completed both Data Matrix ECC 200 and Code 128 will be enabled.
5. Calibration does not modify the global **Composite** status **<K453>**. The global Composite status must be configured properly before calibration.
6. If the user requires calibration of a **stacked** symbology **<K482>**, **<K483>**, or **<K484>**, that symbology must be enabled and configured appropriately before calibration.

5-2 Read Cycle

5-2-1 Read Cycle Serial Commands

Trigger Mode/Filter Duration	<**K200,***trigger mode*>
Serial Trigger Character	<**K201,***serial trigger character*>
End of Read Cycle	<**K220,***end of read cycle mode,read cycle timeout*>
Decodes Before Output	<**K221,***good decode(s) needed*>
Multisymbol	<**K222,***number of symbols,multisymbol separator*>
Start Trigger Character	<**K229,***start character*>
Stop Trigger Character	<**K230,***stop character*>
Image Processing Timeout	<**K245,***image processing timeout*>

Read Cycle Setup

Setting up read cycle and triggering parameters will involve a series of decisions based on your particular application, as follows:

1. Select the number of symbols to be read in a single cycle. The reader can read multiple symbols in a single image frame.
2. Decide on the trigger type to be used: if serial, coose a serial character; if external, choose either **Level** or **Edge**.
3. Designate how the read cycle should end (**Timeout**, **New Trigger**, **Last Frame**).
4. Select **Capture Mode**, **Continuous Mode**, or **Rapid Mode**.
5. Select **Number of Captures** (if in **Rapid Capture Mode**).
6. Set the **Time Before First Capture** and **Time Between Captures**, if any.

Note: The capture rate increases as the frame size decreases.

Multisymbol

Usage: Multisymbol is commonly used in shipping applications where a shipping symbol contains individual symbols for part number, quantity, etc. This feature allows on trigger to pick up all the symbols.

Definition: **Multisymbol** allows the user to define up to 100 symbols that can be read in a single read cycle.

Conditions: The following conditions apply:

- Each symbol must be different to be read, unless in **Rapid Capture Mode**, configured for “triggered capture”.
- The maximum number of characters in a read cycle is 3,000 for all symbols.
- All No-Read messages are posted at the end of the data string, unless output filtering is enabled.
- If more than one symbol is within the field of view at the same time, symbol data may not be displayed in the order of appearance.
- If **Matchcode Type** is set to **Sequential** or if **Trigger** is set to **Continuous Read 1 Output**, the reader will behave as if **Number of Symbols** were set to **1**, regardless of the user-defined configuration.

5-2-2 Number of Symbols

Definition: **Number of Symbols** is the number of different symbols that can be read in a single read cycle.

Serial Cmd: <**K222,*number of symbols***, *multisymbol separator*>

Default: **1**

Options: 1 to 100

5-2-3 Multisymbol Separator

Usage: Used to delimit or separate data fields with a user defined character.

Definition: Any valid ASCII character, inserted between each symbol read when Multisymbol is set to any number greater than 1.

Serial Cmd: <**K222,***number of symbols,****multisymbol separator***>

Default: **,** (comma)

Options: Any available ASCII character.

- **Note:** If No-Read messages are disabled and there are No-Reads occurring, separators will only be inserted between symbol data outputs.

Trigger Mode and Filter Duration

5-2-4 Trigger Mode

Definition: The **Trigger** is the event that initiates a read cycle.

Note: Presentation Mode in WebLinkHH corresponds to **Trigger Mode** being set to **Continuous Read** or **Continuous Read 1 Output** (default). When in this mode, it is important to have **End of Read Cycle** set to **Timeout** (**<K220,0>**).

Start/Stop in WebLinkHH corresponds to **Trigger Mode** being set to **External Level**. When in this mode, it is important to have **End of Read Cycle** set to **Timeout or New Trigger** (**<K220,2>**).

Trigger in WebLinkHH corresponds to **Trigger Mode** being set to **External Edge**, **Serial Data**, or **Serial Data and Edge** (default). When in this mode, it is important to have **End of Read Cycle** set to **Timeout or New Trigger** (**<K220,2>**).

Note: When calibrating the reader or testing read rate, the current trigger setting will be disregarded.

Serial Cmd: <**K200,*trigger mode***>

Default: **External Level**

Options:
0 = Continuous Read
1 = Continuous Read 1 Output
2 = External Level
3 = External Edge
4 = Serial Data
5 = Serial Data and Edge

Continuous Read

Usage: **Continuous Read** is useful in testing symbol readability or reader functions. It is not recommended for normal operations.

Definition: In **Continuous Read**, trigger input options are disabled, the reader is always in the read cycle, and it will attempt to decode and transmit every capture. If a single symbol stays within read range for multiple read cycles, its data will be transmitted repeatedly until it leaves the read range.

The reader sends replies to serial commands that require responses when symbol data is transmitted, or read cycle timeout is enabled and a timeout occurs *and* at least one captured image has been processed. Depending on the combination of enabled symbologies, the reader may take longer than the timeout to process a captured image.

Note: No-Read options have no affect on **Continuous Read**.

Serial Cmd: <**K200,*0***>

Continuous Read 1 Output

Usage: **Continuous Read 1 Output** can be useful in applications where it is not feasible to use a trigger and all succeeding symbols contain different information. It is also effective in applications where the objects are presented by hand.

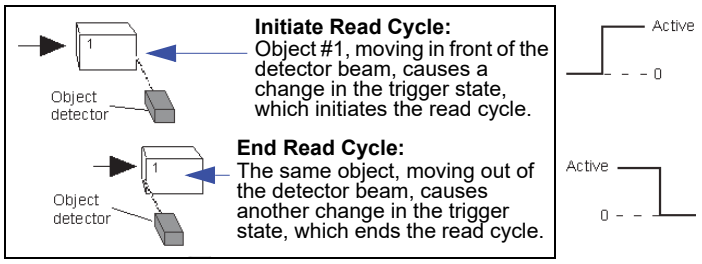
Definition: In **Continuous Read 1 Output** the reader self-triggers whenever it decodes a new symbol or a timeout occurs.

If **End of Read Cycle** is set to **Timeout** and the symbol doesn't change, the output is repeated at the end of each timeout period. For example, if **Timeout** is set to one second, the reader sends the symbol data immediately and repeats the output at intervals of one second for as long as it continues to capture the symbol.

Serial Cmd: <**K200,*1***>

- **Caution:** In automated environments, **Continuous Read 1 Output** is not recommended because there is typically no reliable way to verify that a symbol was missed.
- **Note:** If **Trigger Mode** is set to **Continuous Read 1 Output**, the reader will behave as if **Number of Symbols** were set to **1**, regardless of the user-defined configuration.

External Level



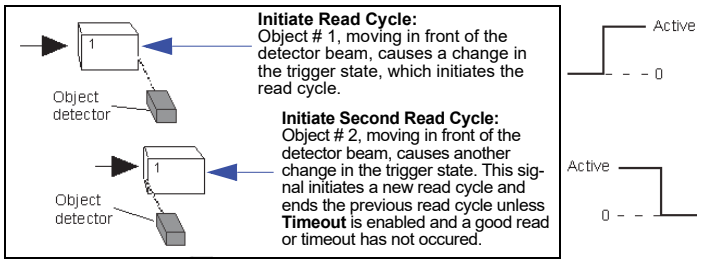
Usage: This mode is effective in an application where the speeds of the conveying apparatus are variable and the time the reader spends reading each object is not predictable. It also allows the user to determine if a No-Read has occurred.

Definition: **External Level** allows the read cycle (active state) to begin when a trigger (change of state) from an external sensing device is received. The read cycle persists until the object moves out of the sensor range and the active trigger state changes again.

Serial Cmd: **<K200,*2*>**

- **Important: Level** and **Edge** apply to the active logic state (**Active Open** or **Active Closed**) that exists while the object is in a read cycle, between the rising edge and the falling edge. *Rising edge* is the trigger signal associated with the appearance of an object. *Falling edge* is the trigger signal associated with the subsequent disappearance of the object. This applies both to **External Level** and **External Edge**.

External Edge



Usage: This mode is highly recommended in any application where conveying speed is constant, or if spacing, object size, or read cycle timeouts are consistent.

Definition: **External Edge**, as with Level, allows the read cycle (active state) to begin when a trigger (change of state) from an external sensing device is received. However, the passing of an object out of sensor range does not end the read cycle. The read cycle ends with a good read output, or, depending on the **End of Read Cycle** setting, a timeout or new trigger occurs.

Serial Cmd: **<K200,*3*>**

Serial Data

Usage: **Serial Data** is effective in a highly controlled environment where the host knows precisely when the object is in the field of view. It is also useful in determining if a No-Read has occurred.

Definition: In **Serial Data**, the reader accepts an ASCII character from the host or controlling device as a trigger to start a read cycle. A **Serial Data** trigger behaves the same as an **External Edge** trigger.
Serial commands are entered inside angle brackets, as shown here: **<t>**.

Serial Cmd: <**K200,*4***>

- **Note:** In **Serial Data**, sending a non-delimited start serial character will start a read cycle; however, a non-delimited stop serial character has no effect.

Serial Data and Edge

Usage: **Serial Data or External Edge** is seldom used but can be useful in an application that primarily uses an external sensing device but occasionally needs to be triggered manually.

Definition: In this mode the reader accepts either a serial ASCII character or an external trigger pulse to start the read cycle.

Serial Cmd: <**K200,*5***>

- **Note:** In Serial Data, sending a non-delimited start serial character will start a read cycle; however, a non-delimited stop serial character has no effect.

Serial Trigger

Usage: Allows the user to define the trigger character and delimiters that start and stop the read cycle.

Definition: A serial trigger is considered an online host command and requires the same command format as all host commands. It must be entered within angle bracket delimiters **< >** or, in the case of non-delimited triggers, it must define individual start and stop characters.

5-2-5 Serial Trigger Character (Delimited)

Usage: Allows the user to define the trigger character that initiates the read cycle.

Definition: A single ASCII host serial trigger character that initiates the read cycle.
A delimited trigger character is one that either starts or ends the read cycle and is enclosed by delimiters such as **< >**.

Serial Cmd: <**K201,*serial trigger character***>

Default: **Space bar**

Options: Any single ASCII character, including control characters, except NUL (0x00 in hex), an existing host command character, or an on-line protocol character. Control characters entered on the command line are displayed in the menu as mnemonic characters.

- **Note: Serial Data** or **Serial Data or External Edge** triggering mode must be enabled for **Serial Trigger Character** to take effect.

Start Trigger Character (Non-Delimited)

Usage: Useful in applications where different characters are required to start a read cycle.

Definition: A single ASCII host serial trigger character that starts the read cycle and is not enclosed by delimiters such as **<** and **>**.

Non-delimited **Start** characters can be defined and will function according to the trigger event.

When defining **Start** trigger characters, the following rules apply:

- In **External Edge** the reader looks only for the **Start** trigger character and ignores any **Stop** trigger character that may be defined.
- In **External Level** the **Start** trigger character begins the read cycle and the **Stop** trigger character ends it. Note that even after a symbol has been decoded and the symbol data transmitted, the reader remains in **External Level** trigger read cycle until a **Stop** character is received.
- In **Serial Data or External Edge** trigger mode, either a **Start** trigger character or a hardware trigger can start an edge trigger read cycle.

Serial Cmd: <**K229,*start character***>

Default: **NUL** (00 in hex) (disabled)

Options: Two hex digits representing any ASCII character except **XON** and **XOFF**.

Stop Trigger Character (Non-Delimited)

Usage: Useful in applications where different characters are required to end a read cycle.

Definition: A single ASCII host serial trigger character that ends the read cycle and is not enclosed by delimiters such as **<** and **>**.

Non-delimited **Stop** characters can be defined and will function according to the trigger event.

When defining **Stop** trigger characters, the following rules apply:

- In **External Edge** the reader looks only for the **Start** trigger character and ignores any **Stop** trigger character that may be defined.
- In **External Level** the **Start** trigger character begins the read cycle and the **Stop** trigger character ends it. Note that even after a symbol has been decoded and the symbol data transmitted, the reader remains in **External Level** trigger read cycle until a **Stop** character is received.
- In **Serial Data or External Edge** trigger mode, either a **Start** trigger character or a hardware trigger can start an edge trigger read cycle.

Serial Cmd: <**K230,*stop character***>

Default: **NUL** (00 in hex) (disabled)

Options: Two hex digits representing an ASCII character.

Image Processing Timeout

Usage:	Useful in higher speed applications where image processing time is long enough that not all captures have an opportunity to be processed.
Definition:	Specifies the maximum amount of time to process a captured image. When the timeout expires, the image processing is aborted. This timeout works in both **Rapid Capture** and **Continuous Capture** modes, as well as with the Configuration Database.
Serial Cmd:	<**K245,*image processing timeout***>
Default:	**750 ms**
Options:	1 to 65535 (in 1 ms increments)

Notes:

- The timeout period does not include capture time.
- If a timeout occurs during processing and no symbols in the field of view have been decoded, the image will be recorded as a No-Read. For this reason, a longer timeout should be tried to ensure that the symbol is decoded successfully.

Decodes Before Output

5-2-6 Good Decode(s) Needed

Definition: This value specifies the number of times a symbol needs to be read to qualify as a good read.

Serial Cmd: <**K221,*good decode(s) needed***>

Default: **1**

Options: 1 to 255

5-3 Symbol Quality

5-3-1 Symbol Quality Serial Commands

Symbol Quality Separator / Output Mode	<***K708,****symbol quality separator, output mode*>
ISO/IEC 16022 Symbol Quality Output	<***K709,****symbol contrast,print growth,axial non-uniformity, unused ECC*>
Omron Microscan Symbol Quality Output	<***K710,****percent cell damage,total read time,capture time,locate time,decode time,pixels per element,ECC level,matrix size,quiet zone,symbol angle*>

Overview of Symbol Quality

The V460-H reader supports ISO/IEC 16022 standard for Data Matrix.

ISO/IEC 16022 *1	Data Matrix (ECC200, GS1)

Symbol Quality parameters are separated into ISO/IEC 16022 Symbol Quality Output and Omron Microscan Symbol Quality Output.

Total Read Time, **Symbol Quality Separator**, and **Output Mode** are common parameters.

Symbol Quality Separator/Output Mode

Symbol Quality Separator applies to all Symbol Quality groups: ISO/IEC 16022 Symbol Quality Output and Omron Microscan Symbol Quality Output.

5-3-2 Symbol Quality Separator

Definition: Inserts a separator between each enabled field of the symbol quality output.
Serial Cmd: <**K708,*symbol quality separator***,*output mode*>
Default: **<SP>** (space character)
Options: Any ASCII character.

5-3-3 Output Mode

- **Note: Output Mode** applies to ISO/IEC 16022 symbol quality parameters.

Definition: Output Mode specifies how the output parameters, if enabled, are formatted.
Serial Cmd: <**K708,***symbol quality separator*,***output mode***>
Default: **Grade**
Options: **0 = Grade** 1 = Value 2 = Score

Grade

If in **Grade Mode**, a grade (A,B,C,D,F) is appended to the symbol data.

Value

If in **Value Mode**, the calculated value for the given parameter is appended to the symbol data.

Score

If in Score Mode, a percentage of passing lines for that parameter is appended to the symbol data.

ISO/IEC 16022 Symbol Quality Output

Symbol Quality Parameters for Data Matrix symbols specified by ISO/IEC 16022.

5-3-4 Symbol Contrast

Usage: Lets the user know if contrast settings are less than acceptable.

Definition: All the pixels that fall within the area of the test symbol, including its required zone, will be sorted by their reflectance values to select the darkest 10% and the lightest 10% of the pixels. The arithmetic mean of the darkest and the lightest pixels is calculated and the difference of the two means is the Symbol Contrast.

(ANSI) Symbol Contrast grading is defined this way:

A (4.0) if SC > 70%
B (3.0) if SC > 55%
C (2.0) if SC > 40%
D (1.0) if SC > 20%
F (0.0) if SC < 20%

If enabled, the symbol contrast is appended to the symbol data according to the **ISO/IEC 16022 Symbol Quality Output Mode** setting.

Serial Cmd: <**K709,*symbol contrast*,***print growth*,*axial non-uniformity*,*UEC***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-5 Print Growth

Definition: The extent to which dark or light markings appropriately fill or exceed their module boundaries. These values are determined by counting pixels in the clock pattern of the binary digitized image, then comparing it to a nominal value and minimum and maximum values. The print growth grade is defined in this way:

A (4.0) if -0.50 < PG < 0.50
B (3.0) if -0.70 < PG < 0.70
C (2.0) if -0.85 < PG < 0.85
D (1.0) if -1.00 < PG < 1.00
F (0.0) if PG < -1.00 or PG > 1.00

If enabled, the print growth is appended to the symbol data according to the **ISO/IEC 16022 Symbol Quality Output Mode** setting.

Serial Cmd: <**K709,***symbol contrast*,***print growth***,*axial non-uniformity*,*UEC***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-6 Axial Non-Uniformity (Data Matrix Only)

Definition: Axial non-uniformity is a measure of how much the sampling point spacing differs from one axis to another, namely AN = abs (XAVG - YAVG) / ((XAVG + YAVG)/2) where abs () yields the absolute value. If a symbology has more than two major axes, then AN is computed for those two average spacings which differ the most. (ANSI) axial non-uniformity grading is defined this way:

A (4.0) if AN < .06
B (2.0) if AN < .08
C (2.0) if AN < .10
D (1.0) if AN < .12
F (0.0) if AN > .12

If enabled, the axial non-uniformity is appended to the symbol data according the **ISO/IEC 16022 Symbol Quality Output Mode** setting.

Serial Cmd: <**K709,***symbol contrast,print growth,**axial non-uniformity**,UEC*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-7 Unused Error Correction (Data Matrix Only)

Definition: The correction capacity of Reed-Solomon decoding is expressed in the equation: e + 2d < d - p, where **e** is the number of erasures, **d** is the number of error correction code words, and **p** is the number of code words reserved for error detection.

A (4.0) if UEC > .62
B (3.0) if UEC > .50
C (2.0) if UEC > .37
D (1.0) if UEC > .25
F (0.0) if UEC < .25

If enabled, the UEC is appended to the symbol data according to the **ISO/IEC 16022 Symbol Quality Output Mode** setting.

Serial Cmd: <**K709,***symbol contrast,print growth,axial non-uniformity,**UEC***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Omron Microscan Symbol Quality Output

5-3-8 Percent Cell Damage (Data Matrix Only)

Definition: When this feature is enabled, the cell damage percentage is appended to data output.

Serial Cmd: <**K710,*percent cell damage***,*total read time,capture time,locate time,decode time,pixels per element,ECC level,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-9 Total Read Time

Definition: The time that transpires between the image capture and the output of the decoded data, including locate time.
When enabled, the total read time is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,****total read time****,capture time,locate time,decode time,pixels per element,ECC level,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-10 Capture Time

Definition: Capture time (in milliseconds) is a fixed “overhead” that includes the time of capture and transfer of the image.
When enabled, the capture time is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,****capture time****,locate time,decode time,pixels per element,ECC level,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-11 Locate Time

Definition: The time in milliseconds from the start of image processing until the symbol has been located and is ready to be decoded.
When enabled, the locate time is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,****locate time****,decode time,pixels per element,ECC level,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-12 Decode Time

Definition: The time in milliseconds required to decode a symbol.
When enabled, the decode time is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,locate time,****decode time****,pixels per element,ECC level,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-13 Pixel Per Element (Data Matrix Only)

Definition: The number of pixels for each element, either dark or light for both **x** and **y** directions.
When enabled, the pixels per element value is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,locate time,decode time,**pixels per element**,ECC level,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-14 Error Correction Level (Data Matrix Only)

Definition: Outputs the Data Matrix ECC level.
When enabled, the ECC level is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,locate time,decode time,pixels per element,**ECC level**,matrix size,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-15 Matrix Size (Data Matrix Only)

Definition: Defines the symbol matrix size, in number of pixels in both the **x** and **y** axis.
When enabled, the matrix size value is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,locate time,decode time,pixels per element,ECC level,**matrix size**,quiet zone,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-16 Quiet Zone (Data Matrix Only)

Definition: When this feature is enabled, the size of the quiet zone is evaluated and a PASS or FAIL message is appended to the symbol data.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,locate time,decode time,pixels per element,ECC level,matrix size,**quiet zone**,symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-3-17 Symbol Angle (Data Matrix Only)

Definition: When this feature is enabled, the symbol orientation is appended to data output as a degree value representing the angle of the Data Matrix symbol's L-shaped finder pattern relative to the reader.

Serial Cmd: <**K710,***percent cell damage,total read time,capture time,locate time,decode time,pixels per element,ECC level,matrix size,quiet zone,**symbol angle*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-4 Matchcode

5-4-1 Matchcode Serial Commands

Matchcode	<**K223,***matchcode type,sequential matching,match start position,match length,wildcard character, sequence on No-Read,sequence on mismatch,placeholder character*>
Number of Master Symbols	<**K224,***number of master symbols*>
Sequence Step Interval	<**K228,***sequence step interval*>
Master Symbol Data	<**K231,***index,master symbol data*>
Match Replace	<**K735,***status,match replacement string*>
Mismatch Replace	<**K736,***status,mismatch replacement string*>

Overview of Matchcode

Definition: **Matchcode** allows the user to store master symbol data in the reader's memory, compare that data against other symbol data, and define how symbol data and/or discrete signal output will be directed.

A master symbol database can be set up for up to 10 master symbols.

Note: Matchcode will function with multiple symbols; however, if **Matchcode Type** is set to **Sequential**, the reader will behave as if **Number of Symbols** were set to **1**, regardless of the user-defined configuration.

Usage: Matchcode is used in applications to sort, route, or verify data based on matching the specific symbol in a variety of ways as defined in this section. For example, a manufacturer might sort a product based on dates that are embedded in the symbol.

Steps for Entering and Using Master Symbols

WebLinkHH is the primary method for entering and using master symbols. The following is an alternate method.

1. Set **Triggering Mode** to **External** or **Serial**.
2. Choose the method of symbol comparison that fits your application.
3. Define the output you want to achieve with your matchcode setup:
   - **(a) Symbol data output**
4. Select the number of master symbols you want to create.
5. Decide which way you want to enter your master symbol(s):
   - **(a) Send a serial command with symbol data in the form of <M231,*master symbol#, data*>.**
   - **(b) Send a <G> (Read Next Symbol as Master Symbol) command.**

Matchcode Type

Definition: Allows the user to choose the way that master symbols will be compared with subsequently read symbols.

Note: First set **Triggering Mode** to **External** or **Serial**.

Serial Cmd: <**K223,*matchcode type***,*sequential matching,match start position, match length,wild card character,sequence on No-Read,sequence on mismatch,placeholder character*>

Default: **Disabled**

Options: **0 = Disabled**
1 = Enabled
2 = Wild Card
3 = Sequential

Disabled: Has no effect on operations.

Enabled: Instructs the reader to compare symbols or portions of symbols with the master symbol.

Wild Card: Allows the user to enter user-defined wild card characters in the master symbol.

Sequential: Instructs the reader to sequence after each match (numeric only) and compare symbols or portions of symbols for sequential numbers.

Note: If **Matchcode Type** is set to **Sequential**, the reader will behave as if **Number of Symbols** were set to **1**, regardless of the user-defined configuration.

5-4-2 Sequential Matching

Usage: Useful in tracking product serial numbers that increment or decrement sequentially.

Definition: With Sequential enabled, Sequential Matching determines if a count is in ascending (incremental) or descending (decremental) order.

Serial Cmd: <**K223,***matchcode type,****sequential matching****,match start position,match length,wild card character,sequence on No-Read,sequence on mismatch, placeholder character*>

Default: **Increment**

Options: **0 = Increment** 1 = Decrement

5-4-3 Match Start Position

Usage: **Match Start Position** is useful in defining specific portions of a symbol for comparison. For example, if a symbol contains a part number, manufacturing date, and lot code info, but you are only interested in the part number information, you can set the reader to sort only the part number and ignore the other characters.

Definition: **Match Start Position** determines the portions of symbols that will be matched by defining the first character in the symbol (from left to right) that will be compared with those of the master symbol, when **Matchcode Type** is set to **Enabled** or **Sequential**.

Function: For example, if **Match Start Position** is set to **3**, the first 2 characters read in the symbol will be ignored and only the 3rd and subsequent characters to the right will be compared, up to the number of characters specified by **Match Length**.

Serial Cmd: <**K223,***matchcode type,sequential matching,****match start position****, match length,wild card character,sequence on No-Read,sequence on mismatch,placeholder character>*

Default: **0**

Options: 0 to 3000

- **Note: Match Start Position** must be set to **1** or greater to enable this feature. A **0** setting will disable this feature.

5-4-4 Match Length

Usage: *Example:* If **Match Length** is set to **6** in a 10-character symbol, and **Match Start Position** is set to **2**, only the 2nd through 7th characters (from left to right) will be compared.

Definition: Defines the length of the character string that will be compared with that of the master symbol when **Match Start Position** is set to **1** or greater. When **Match Start Position** is set to **0**, no comparison will occur.

Serial Cmd: <**K223,***matchcode type,sequential matching,match start position,****match length****,wild card character,sequence on No-Read,sequence on mismatch, placeholder character>*

Default: **1**

Options: 1 to 3000

5-4-5 Wild Card Character

Usage: *Example:* With **Wild Card Character** defined as the default asterisk, defining **CR*34** as the master symbol will result in matches for CR**1**34 and CR**2**34, but not CR2345. Entering URGENT** as your master symbol will result in matches for URGENT, URGENT1, and URGENT12 but not for URGENT123. This means any wild cards appended to the master symbol data will result in matches of symbols in variable lengths up to the master symbol lengths but not over. However, wild cards in the beginning or center of a symbol (e.g., UR**NT) do not allow for variable symbol lengths.

Definition: Wild Card Character allows a user to define a wild card character as part of the master symbol.

Serial Cmd: <**K223,***matchcode type,sequential matching,match start position,match length,****wild card character****,sequence on No-Read,sequence on mismatch, placeholder character>*

Default: ***** (asterisk)

Options: Any ASCII character.

5-4-6 Sequence on No-Read

Usage: **Sequence on No-Read** is useful when the reader needs to stay in sequence even if no decode occurs.

Definition: When **Sequence on No-Read** is **Enabled** and **Matchcode** is set to **Sequential**, the reader sequences the master symbol on every match or No-Read. When disabled, it does not sequence on a No-Read.

Serial Cmd: <**K223,***matchcode type,sequential matching,match start position,match length,wild card character,***sequence on No-Read***,sequence on mismatch, placeholder character>*

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

As an example of **Sequence on No-Read Enabled**, consider the following decodes:

Master Symbol	*Decoded Symbol*	*Master Symbol after Decode*
001	001	002
002	002	003
003	No-Read	004 (sequenced on No-Read)
004	004	005
005	No-Read	006 (sequenced on No-Read)
006	No-Read	007 (sequenced on No-Read)
007	007	008

As an example of **Sequence on No-Read Disabled**, consider the following series of decodes:

Master Symbol	*Decoded Symbol*	*Master Symbol after Decode*
001	001	002
002	002	003
003	No-Read	003 (not sequenced)
003	003	004
004	No-Read	004 (not sequenced)
004	No-Read	004 (not sequenced)
004	004	005

5-4-7 Sequence on Mismatch

- **Note: Matchcode** must be set to **Sequential** for this command to function.

Usage: Enable this parameter if every trigger event should have a decode *and* more than one consecutive mismatch may occur.
Disable this parameter if every trigger event should have a decode but no more than one consecutive mismatch may occur.

Definition: When set to Enabled, the master symbol sequences on every decode, match, or mismatch.
When set to Disabled, the master symbol will not sequence whenever consecutive mismatches occur.

Serial Cmd: <**K223,***matchcode type,sequential matching,match start position,match length,wild card character,sequence on No-Read,***sequence on mismatch***, placeholder character>*

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

(1) The reader will sequence the master to one more or one less than the decoded symbol.

As an example of **Sequence on Mismatch Enabled**, consider the following decodes:

Master Symbol	*Decoded Symbol*	*Master Symbol after Decode*
001	001	002
002	002	003
003	abc	004 (sequenced on mismatch)
004	004	005
005	def	006 (sequenced on mismatch)
006	ghi	007 (sequenced on mismatch)
007	007	008

As an example of **Sequence on Mismatch Disabled**, consider the following decodes:

Master Symbol	*Decoded Symbol*	*Master Symbol after Decode*
001	001	002
002	002	003
003	abc	003
003	004	003
003	003	004
004	004	005

5-4-8 Placeholder Character

Usage: With **Placeholder Character** defined as the default question mark, defining CR?34 as the master symbol will result in matches for CR134 and CR234, but not CR2234. Entering URGENT?? as your master symbol will result in matches for URGENT12 but not for URGENT123. Any placeholder character represents only one symbol length.

Definition: **Placeholder Character** allows a user to define one character as part of the master symbol.

Serial Cmd: <**K223,***matchcode type,sequential matching,match start position,match length,wild card character,sequence on No-Read,sequence on mismatch,****placeholder character***>

Default: **?** (question mark)

Options: Any ASCII character.

Sequence Step Interval

Usage:	Useful in applications in which it is desirable to count by intervals other than 1.
Definition:	Sequencing in Matchcode operations can occur in steps from 1 to 32,768. Sequencing performs like a mechanical counter by displaying positive integers and a specific number of digits after roll-overs. For example, 000 – 3 = 997 (not -3) and 999 + 3 = 002 (not 1002).
Serial Cmd:	<**K228,*sequence step interval***>
Default:	**1**
Options:	Any number from 1 to 32768

Example: If **Sequence Step** is set to **3** and **Sequential Matching** is set to **Increment**:

Master Symbol	***Decoded Symbol***	***Master Symbol after Decode***
003	001	003
003	002	003
003	003	006
006	004	006
006	005	006
006	006	009

Match Replace

Usage: Provides a convenient shortcut for applications that need to output a predefined text string whenever a symbol matches a master symbol.

Definition: Outputs a user-defined data string whenever a match occurs and **Matchcode** is enabled.

Serial Cmd: <**K735,*status***,*replacement string*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-4-9 Replacement String

Definition: User-defined data string that, when enabled, replaces symbol data whenever a match occurs.

Serial Cmd: <**K735,***status*,***replacement string***>

Default: **MATCH**

Options: An ASCII string up to 64 characters.

Mismatch Replace

Usage: Provides a convenient shortcut for applications that need to output a predefined text string whenever a symbol does not match a master symbol.

Definition: Outputs a user-defined data string whenever a mismatch occurs and **Matchcode** is enabled.

Serial Cmd: <**K736,*status***,*replacement string*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-4-10 Replacement String

Definition: User-defined data string that, when enabled, replaces symbol data whenever a mismatch occurs.

Serial Cmd: <**K736,***status*,***replacement string***>

Default: **MISMATCH**

Options: An ASCII string up to 64 characters.

5-5 Camera and Image Processing Setup

5-5-1 Camera and Image Processing Setup Serial Commands

LED Lighting Configuration	<**K508,***dome lighting,low-angle lighting,torch lighting*>
Time of Flight	<**K509,***Time of Flight*>
Exposure / Gain and Auto-Switch Lighting	<**K510,***calculate exposure and gain,auto-switch lighting*>
Damaged Symbol	<**K519,***damaged symbol status*>
Focus Setup	<**K525,***focal distance,distance units,focus mode,no-read limit*>
Camera Settings	<**K541,***exposure,gain*>
Pixel Binning	<**K542,***pixel binning status*>
Morphological Pre-Processing	<**K550,***status*>
Morphological Operation	<**K551,***morphological operation,operator size*>
Set License	<**K556,***license file name,license key*>
Linear Security Level	<**K560,***linear security level*>
Custom Features	<**K561,***custom features*>
Fast Linear Mode	<**K562,***Fast Linear Mode*>
Curved 2D	<**K563,***Curved 2D*>
Shift-JIS to UTF-8	<**K564,***Shift-JIS to UTF-8*>
1D Quiet Zone Violation	<**K565,***1D Quiet Zone Violation*>
Scale Image	<**K566,***Scale Image*>
2D Damaged Mode	<**K567,***2D Damaged Mode*>
Attempt Morphology Manipulation	<**K568,***Attempt Morphology Manipulation*>
Virtual Image On / Off	<**K903,***Virtual Image On / Off,Virtual Image Path*>

LED Lighting Configuration

5-5-2 Dome Lighting

Definition: When enabled, determines the dome lighting LED color(s) used by the reader.
Serial Cmd: <**K508,*dome lighting***,*low-angle lighting,torch lighting*>
Default: **0 = Disabled**
Options: **0 = Disabled**
1 = Red
2 = Green
3 = Red + Green = Yellow
4 = Blue
5 = Red + Blue = Magenta
6 = Green + Blue = Cyan
7 = Red + Green + Blue = White

5-5-3 Low-Angle Lighting

Definition: When enabled, determines the direction of low-angle ligting used by the reader.
Serial Cmd: <**K508,***dome lighting,****low-angle lighting***,torch lighting*>
Default: **0 = Disabled**
Options: **0 = Disabled**
1 = South
2 = North
3 = South + North

5-5-4 Torch Lighting

Definition: Enables or disables torch lighting.
Serial Cmd: <**K508,***dome lighting,low-angle lighting,****torch lighting***>
Default: **1 = Enabled**
Options: 0 = Disabled
1 = Enabled

Time of Flight

5-5-5 Time of Flight Sensor

Important: Omron recommends leaving the Time of Flight sensor **enabled**.

Definition: Enables or disables the Time of Flight sensor.

Serial Cmd: <**K509,*time of flight***>

Default: **Enabled**

Options: 0 = Disabled

1 = Enabled

Exposure / Gain and Auto-Switch Lighting

5-5-6 Calculate Exposure and Gain

Important: Omron recommends leaving Calculate Exposure and Gain **enabled**. Only advanced users should disable this feature.

Definition: When enabled, calculates the exposure and gain values.

Serial Cmd: <**K510,*calculate exposure and gain***,*auto-switch lighting*>

Default: **1 = Enabled**

Options: 0 = Disabled

1 = Enabled

5-5-7 Auto-Switch Lighting

Definition: When enabled, allows auto-switching of lighting settings described in **LED Lighting Configuration**.

Serial Cmd: <**K510,***calculate exposure and gain*,***auto-switch lighting***>

Default: **1 = Enabled**

Options: 0 = Disabled

1 = Enabled

Pixel Binning

Definition: In addition to windowing the image sensor, smaller resolutions can be obtained by down sampling the entire captured image by using pixel binning. Pixel binning can increase the signal to noise ratio and produce a more pleasing output image with reduced artifacts. It will also improve low-light performance. It is important to note that enabling pixel binning does not affect the sensor frame rate as the pixels still need to be processed in order to be averaged and binned.

Usage: <**K542,***pixel binning*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Disabled

Pixel-binning is disabled.

Enabled

Two column pixels and two row pixels are averaged to create a single pixel value providing a 2:1 reduction in the vertical pixels and a 2:1 reduction in the horizontal pixels for a combined 4:1 reduction. An image with dimensions of 1280 x 960 will be scaled to 640 x 480.

Camera Settings

Camera Settings are typically obtained during the calibration process, and do not necessarily need to be modified directly by the user.

5-5-8 Exposure

Usage: Faster exposures reduce blurring in faster applications.
Slower exposures are useful in slower applications and lower contrast applications.

Definition: This value sets the exposure or integration time (in micro-seconds) for the image sensor pixels. The exposure setting in relation to the speed of the object is critical. If an object is moving rapidly and too long an exposure value is selected, blurring or smearing of the object will occur. As exposure time is decreased the movement of the object becomes less of a factor but, with the duration of light collection by the pixels reduced, the image sensor gain will need to be increased to compensate.

Serial Cmd: <**K541,*exposure*,***gain***>

Default: **All versions: 2,500 µs**

Options: Any number between 50 – 100,000

Note: The Exposure parameter is read-only when the reader is in **Continuous Read Auto Trigger Mode**.

5-5-9 Gain

Usage: Can be used to adjust the brightness of the image.

Definition: Sets the gain value for the image sensor and is a percentage value from 0 (lowest gain) to 100% (highest gain). This setting can be configured through auto-calibration. A higher gain value will increase the brightness of the image, but the noise performance of the system will be reduced. Before configuring the gain, the required exposure should be set, and the gain should be configured to optimize the exposure setting.

Serial Cmd: <**K541,***exposure*,***gain***>

Default: **SXGA: 0%**

Options: Any number between 0 – 100, representing 0% to 100%

- **Important:** There are 4 levels of Gain. Each level corresponds to 25 percentage points.
  - Level 1 = 0 to 24%
  - Level 2 = 25 to 49%
  - Level 3 = 50 to 74%
  - Level 4 = 75 to 100%

Focus Setup

5-5-10 Focal Distance

Definition: Provides the focal distance adjustment for the camera.
Any value outside this range will be rejected.
If you attempt to set the Focal distance as the out of range value of your model, the parameter will be left as-is.

Serial Cmd: <**K525,*focal distance***,*distance units,focus mode,no-read limit*>

Default: **102**

Options: 0 to 250 mm
0 to 9.85 in.

5-5-11 Distance Units

Definition: Defines the measurement unit value of the **Focal Distance** parameter.

Serial Cmd: <**K525,***focal distance,****distance units***,focus mode,no-read limit*>

Default: **Millimeters**

Options: **0 = Millimeters**
1 = 1/100 inch

For example, the following are valid configurations to set the Focal Distance to three distances:

Required Focal Distance	Distance Units = mm (0)	Distance Units = 1/100 in. (1)
2 inch, or 50 mm	<K525,50,0>	<K525,200,1>
3 inch, or 76 mm	<K525,76,0>	<K525,300,1>
6 inch, or 152 mm	<K525,152,0>	<K525,600,1>

5-5-12 Focus Mode

Definition: This field set to **1** enables the autofocus mode to be enabled. The read cycle must also be a **Continuous Read** mode or **Continuous Read Auto** (Auto Photometry) mode. Autofocus mode does not apply to triggered read cycles. If the value is set to **0**, only the distance value is used.

Serial Cmd: <**K525,***focal distance,distance units,****focus mode***,no-read limit*>

Default: **Fixed User**

Options: **0 = Fixed User**
1 = No-Read Autofocus

5-5-13 No-Read Limit

Definition: This is the number of no-reads that are encountered consecutively in a **Continuous Read** mode to trigger an **Autofocus** pass.

Serial Cmd: <**K525,***focal distance,distance units,focus mode,****no-read limit***>

Default: **5**

Options: 1 to 255

Morphological Pre-Processing

Morphological Pre-Processing allows you to select the method for processing images, and to choose the operator size for that method.

Important: This command must be set to **Enabled** for **Morphological Operation** to function.

Serial Cmd: <**K550,*morphological pre-processing***>
Default: **Disabled**
Options: **0 = Disabled** 1 = Enabled

Morphological Operation and Operator Size

5-5-14 Morphological Operation

Definition: **Morphological Operation** allows the user to select the method for processing captured images.

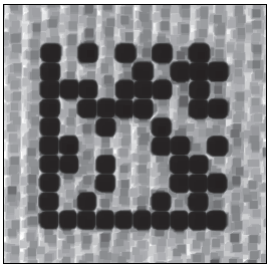
Serial Cmd: <**K551,*0,morphological operation***,*operator size*>

Default: **Grow Dark**

Options: **0 = Grow Dark**
1 = Shrink Dark
2 = Connect Dark
3 = Separate Dark

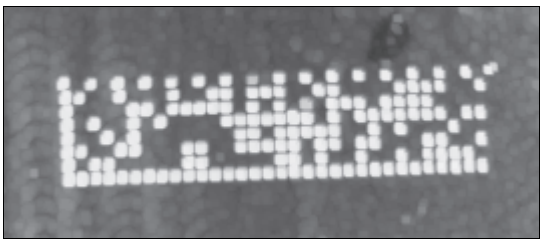
Erode (Grow Dark)

Erode increases the dark cell size of a symbol. Useful for increasing the dark cell size of a dark-on-light Data Matrix symbol.



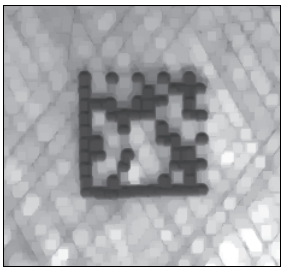
Dilate (Shrink Dark)

Dilate increases the light cell size of a symbol. Useful for increasing the light cell size of a light-on-dark Data Matrix symbol.



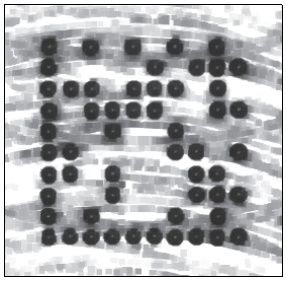
Open (Connect Dark)

Open removes minor light defects of dark cells by performing a **Dilate** function followed by an **Erode** function.



Close (Separate Dark)

Close removed minor dark defects of light cells by performing an **Erode** function followed by a **Dilate** function.



5-5-15 Operator Size

Definition: **Operator Size** determines the size of the area or “pixel neighborhood” (measured in pixels) in which the morphological operation is being performed.

Serial Cmd: <**K551,***0,morphological operation,***operator size**>

Default: **Small**

Options: **3 = Small (3 pixels by 3 pixels)**

5 = Medium (5 pixels by 5 pixels)

7 = Large (7 pixels by 7 pixels)

Damaged Symbol

Definition: When **Damaged Symbol** is enabled, the reader will make additional attempts to decode damaged Code 128 and Code 39 symbols. It is effective on symbols with high noise and partial bar missing. Enabling Damaged Symbol may significantly increase decode time.

Serial Cmd: <**K519,***damaged symbol status*>

Default: **Disabled**

Options: **0 = Disabled**

1 = Enabled

Linear Security Level

Definition: **Linear Security Level** is intended to prevent misreads. When it is set to a higher level, it requires more scan lines to decode the same result, making it more secure.

Note: Linear Security Level is for 1D symbols only.

Serial Cmd: <**K560,***linear security level*>

Default: **Aggressive**

Options: **0 = Aggressive**

1 = Normal

2 = Secure

Advanced Decoding Parameters

Definition: **Advanced Decoding Parameters** can help you read difficult and damaged symbols, and are optimized for direct part marks (DPM).

Important: The following K commands are described in detail in the **Advanced Decoding Parameters** section of **Advanced Settings**.

Serial Cmd: <**K562,***Fast Linear Mode*>
<**K563,***Curved 2D*>
<**K564,***Shift-JIS to UTF-8*>
<**K565,***Linear Quiet Zone Violation*>
<**K566,***Scale Image*>
<**K567,***2D Damaged Mode*>
<**K568,***Attempt Morphology Manipulation*>

Virtual Image On / Off

Virtual Image allows you to use stored images for simulation purposes (**Simulation Images**). When Virtual Image is enabled, the reader will use the images stored in the reader's flash memory instead of capturing a live image. This feature helps you adjust the reader's configuration so you can read codes that cannot otherwise be read using default settings.

Important: Use of Simulation Images is described in detail in the **Storing Images for Simulation** section.

5-5-16 Virtual Image Status

Definition: Enables and disables virtual image.
Serial Cmd: <**K903,*virtual image status***,*virtual image path*>
Default: **0 = Disabled**
Options: **0 = Disabled**
1 = Enabled

5-5-17 Virtual Image Path

Definition: Presents the path of the folder where the virtual image should be stored on the host.
Serial Cmd: <**K903,***virtual image status*,***virtual image path***>
Default: **/sd0:0/User/Images/**
Options: Read-only. Cannot be modified.

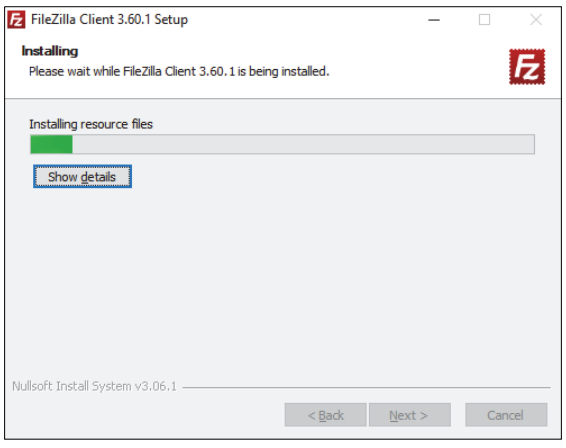
5-5-18 Storing Images for Simulation

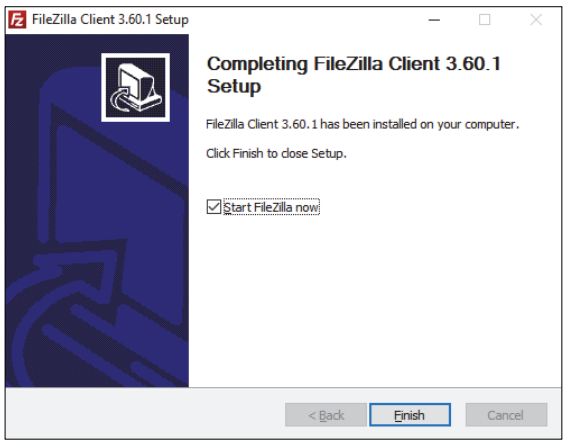
An external FTP client can be used to store images in the reader's flash memory for simulation purposes.

The following procedure describes how to set up an external FTP client.

The example procedure shown here uses FileZilla Client, which can be downloaded from https://filezilla-project.org/. Note that FileZilla Client is available for several platforms (Win32, Win64, MacOS, and Linux). Please select the file appropriate for your platform.

- Download and install **FileZilla Client**.





To access the file system, connect the FTP client to the IP address of the reader using the following credentials:

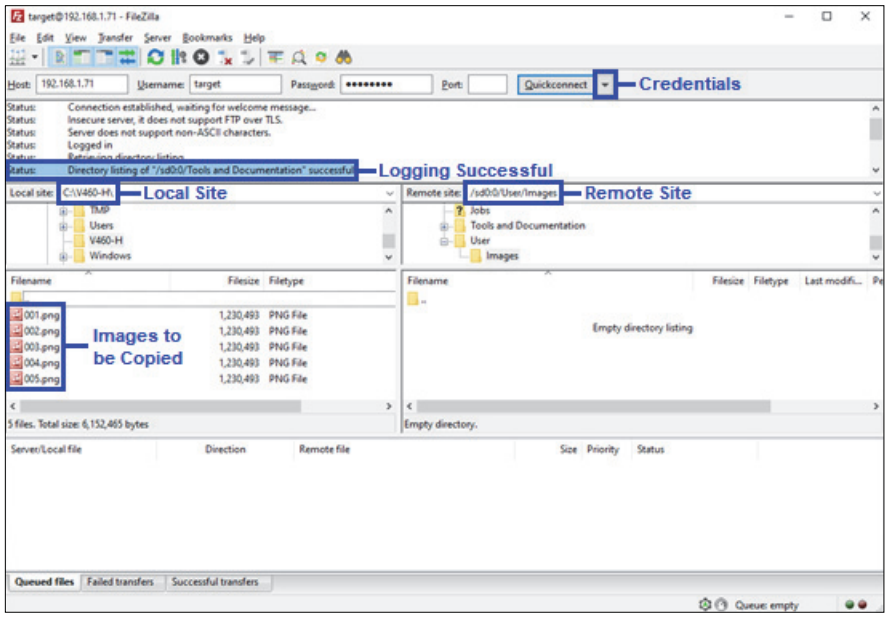
Host: IP address of the reader (default 192.168.188.2)

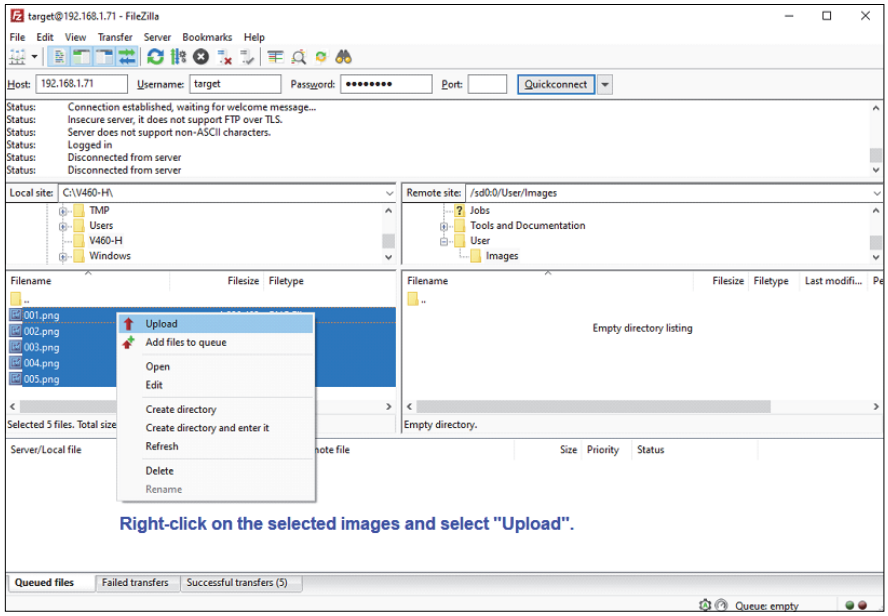
Username: target (case sensitive)

Password: password (case sensitive)

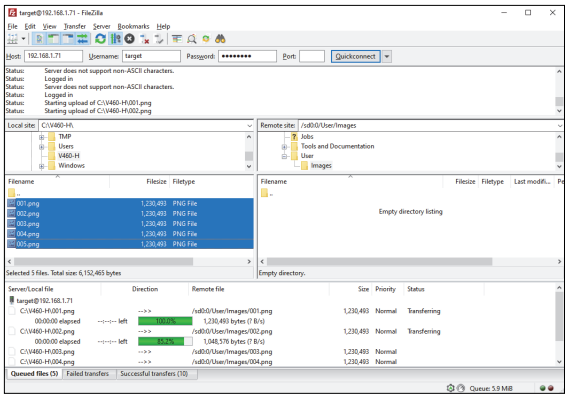
Port: Port21 (default port for FTP)

- Define the **Remote site** as **/sd0:0/User/Images** and copy the desired images from **Local site**:

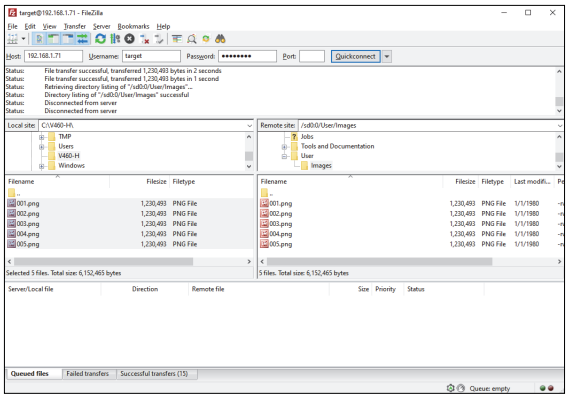




The images will be uploaded to the reader.

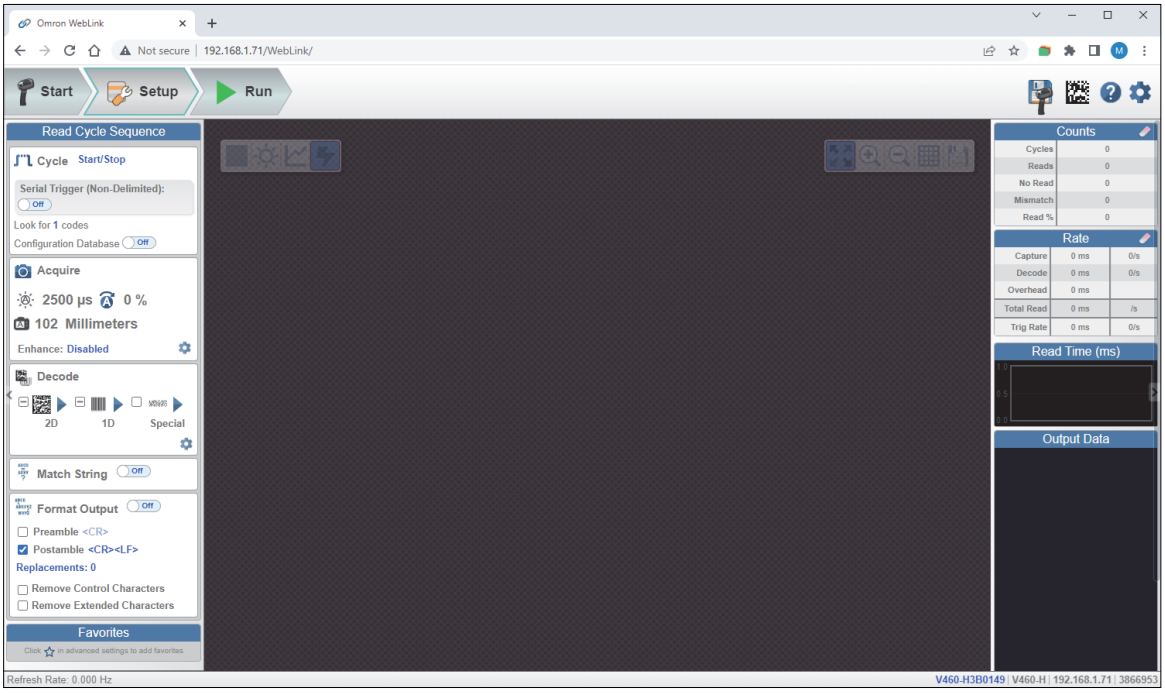


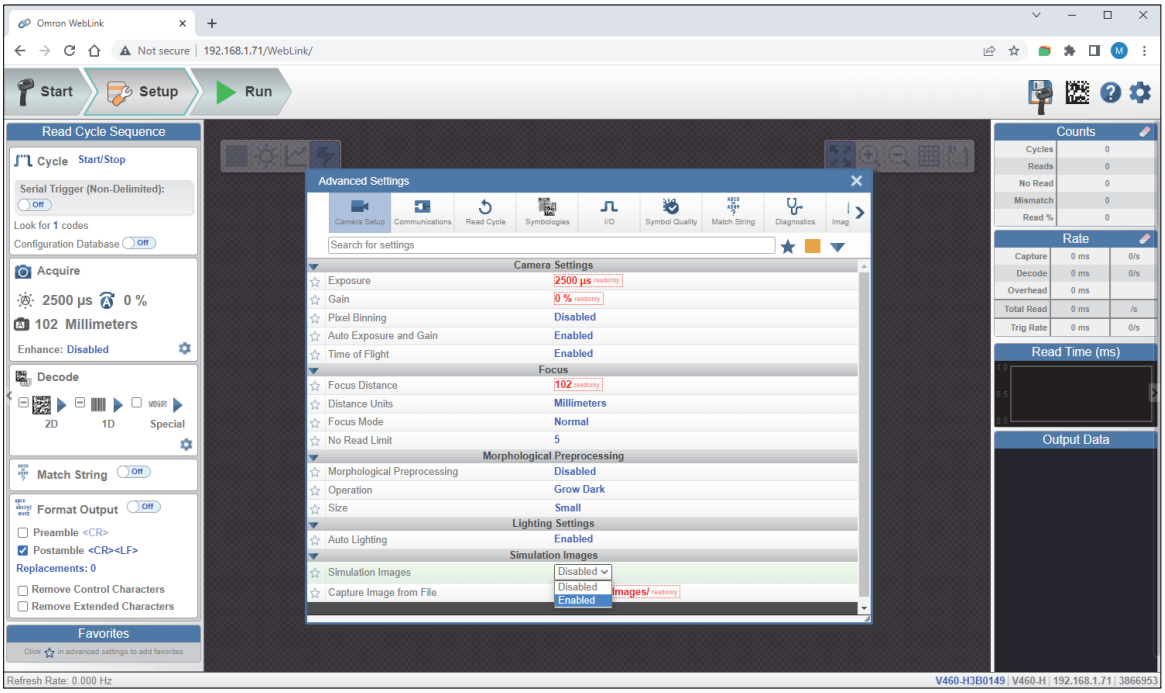
When the images are finished downloading, they can be used for simulation purposes.



- Once the upload task has been finished, you can close FileZilla Client and connect to the reader via **WebLinkHH**.

- Open **Advanced Settings** and enable the **Simulation Images** option (**Camera Setup** > **Simulation Images**):

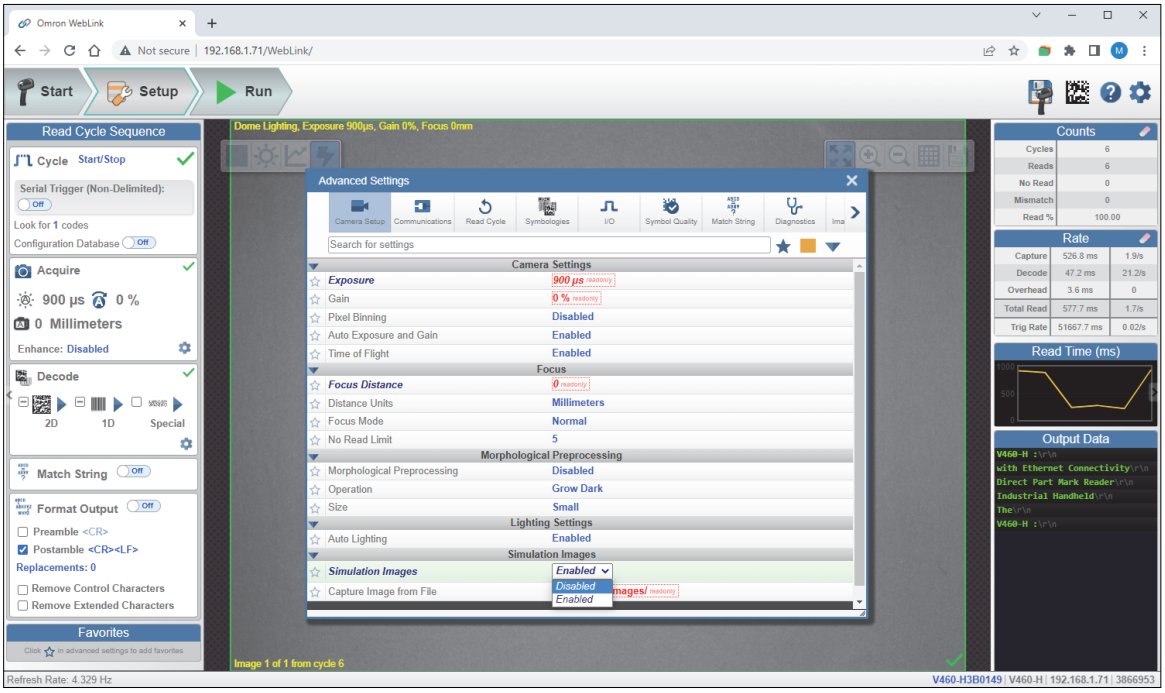


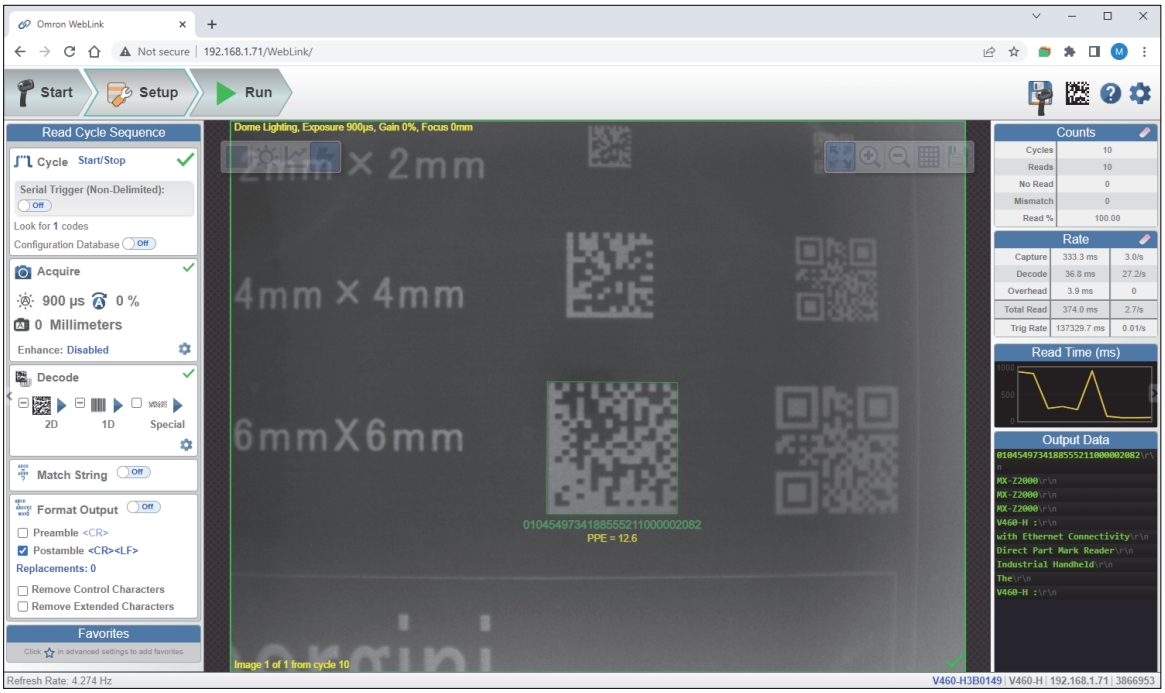


- After this, each trigger will use one of the images you have stored in the reader's flash memory, sequentially:



- To finish the use of Simulation Images and to start capturing live images again, disable the Simulation Images option in the Advance Settings (Camera Setup > Simulation Images):





5-6 Configuration Database

For the Configuration Database, the following functions as the bank switching function are possible to achieve.

- Up to 20 settings can be held.
- Settable parameters: Exposure, Gain, Focal Distance, Pixel Binning, Symbology, Morphology Operator, and Morphology Size.
- Switch command of the database: <K255-,index>
- Automatic switching function of the database: <K252,number of active indexes>

Configuration Database Serial Commands

Number of Active Indexes	<**K252,***number of active indexes,sort database*>
Configuration Database Status	<**K255,***index,exposure,gain,focal distance,pixel binning,symbology,morphology operator,morphology size,0,0,0,dome light,low angle light,torch light,time of flight*>
Save Current Settings to Database	<**K255+,***index*>
Load Current Settings from Database	<**K255-,***index*>
Request Selected Index Settings	<**K255?,***index*>
Request All Database Settings	<**K255?**>

Number of Active Indexes

Usage: Useful for applications that require several different complex reader configurations to be applied sequentially. Multiple database indexes allow you to concatenate configuration profiles, and to perform more complex operations than would be possible with only one set of configuration parameters.

Definition: This feature allows you to set the number of database records (groups of settings) that will be used automatically during the read cycle. If **Number of Active Indexes** is set to 0, only the current reader settings will be used, not database entry settings.

Serial Cmd: <**K252,*number of active indexes***,*sort database*>

Default: **0 (Disabled)**

Options: 0 to 20

5-6-1 Sort Database

Definition: **Sort Database** moves the database entry that produced a successful decode to the first position in the list of database entries.

Serial Cmd: <**K252,***number of active indexes*,***sort database***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Configuration Database Status

5-6-2 Index

Usage: Useful for applications that require several different complex reader configurations to be applied sequentially. Multiple database indexes allow you to concatenate configuration profiles, and to perform more complex operations than would be possible with only one set of configuration parameters.

Definition: Determines the specific database index that will be used.

Serial Cmd: <**K255,*index,***exposure,gain,focal distance,pixel binning,symbology,morphology operator,morphology size,dome light,low angle light,torch light,time of flight*>

Options: 1 to 20

5-6-3 Exposure

Serial Cmd: <**K255,***index,***exposure,***gain,focal distance,pixel binning,symbology,morphology operator,morphology size,dome light,low angle light,torch light,time of flight*>

Default: **2500**

Options: 25 to 100,000

- **Note:** The Exposure parameter is read-only when the reader is in **Continuous Read** mode.

5-6-4 Gain

Serial Cmd: <**K255,***index,exposure,***gain,***focal distance,pixel binning,symbology,morphology operator,morphology size,dome light,low angle light,torch light,time of flight*>

Default: **0**

Options: 0 to 100

5-6-5 Focal Distance

Definition: Provides the focal distance adjustment for the camera.
Any value outside this range will be rejected.
If you attempt to set the Focal distance as the out of range value of your model, the parameter will be left as-is.

Serial Cmd: <**K255,***index,exposure,gain,***focal distance,***pixel binning,symbology,morphology operator,morphology size,dome light,low angle light,torch light,time of flight*>

Default: **400**

Options: 0 to 250 mm
0 to 985 (1/100 inch)

5-6-6 Pixel Binning

Serial Cmd: <**K255,***index,exposure,gain,focal distance,***pixel binning,***symbology,morphology operator,morphology size,dome light,low angle light,torch light,time of flight*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

- **Important:** Pixel Binning has no effect when the **Image Dimension** mode is configured as **Region of Interest** in the **Database Mode** command. This is because the **Window of Interest** camera settings are determined by the software based on the **Region of Interest** setup. There is no benefit to Pixel Binning to increase processing speed when ROI is configured, because the frame size would need to be increased to make Pixel Binning possible.

5-6-7 Symbology

Definition: This field allows the user to configure the database to enable specific symbologies for selected database indexes. Symbology-specific parameters must be configured with the appropriate symbology command.

For example, if fixed length Code 128 is required, it must first be set up with the Code 128 command: **<K474>**.

To select a particular symbology, add the number value associated with that symbology.

Examples:

If Data Matrix and Code 39 are required, the paramater would be: 2 + 16 = **18**.

If I 2/5, BC412, and DataBar Limited are required, the parameter would be: 128 + 2048 + 16384 = **18560**.

Serial Cmd: <**K255,***index,exposure,gain,focal distance,pixel binning,***symbology,***morphology operator,morphology size,dome light,low angle light,torch light,time of flight*>

Default: **Disabled**

Disabled

When **Symbology** is disabled, the database uses the current **Symbology** setup to determine active symbologies.

Any Symbology (Add 1)

All symbologies *except Pharmacode* are enabled while this database index is being used.

Data Matrix (Add 2)

If enabled, Data Matrix will be active for this database index.

- **Important:** The ECC level must be configured using the Data Matrix command **<K479>**. If no ECC level has been configured, the reader will not decode Data Matrix symbols.

QR Code (Add 4)

If enabled, QR Code will be active for this database index.

Code 128 (Add 8)

If enabled, Code 128 will be active for this database index.

Code 39 (Add 16)

If enabled, Code 39 will be active for this database index.

Codabar (Add 32)

If enabled, Codabar will be active for this database index.

Code 93 (Add 64)

If enabled, Code 93 will be active for this database index.

Interleaved 2 of 5 (Add 128)

If enabled, Interleaved 2 of 5 will be active for this database index.

UPC/EAN (Add 256)

If enabled, UPC/EAN will be active for this database index.

PDF417 (Add 512)

If enabled, PDF417 will be active for this database index.

MicroPDF417 (Add 1024)

If enabled, MicroPDF417 will be active for this database index.

BC412 (Add 2048)

If enabled, BC412 will be active for this database index.

Pharmacode (Add 4096)

If enabled, Pharmacode will be active for this database index.

DataBar-14 (Add 8192)

If enabled, DataBar-14 will be active for this database index.

- **Important:** If the stacked and non-stacked operation is required, the DataBar-14 command must be configured as follows: **<K482,2>**. If the DataBar-14 status parameter in the **<K482>** command is set to either Disabled or Enabled, the reader will only read non-stacked DataBar-14 symbols.

DataBar Limited (Add 16384)

If enabled, DataBar Limited will be active for this database index.

DataBar Expanded (Add 32768)

If enabled, DataBar Expanded will be active for this database index.

- **Important:** If the stacked and non-stacked operation is required, the DataBar Expanded command must be configured as follows: **<K484,2>**. If the DataBar Expanded status parameter in the **<K484>** command is set to either Disabled or Enabled, the reader will only read non-stacked DataBar Expanded symbols.

Micro QR Code (Add 65536)

If enabled, Micro QR Code will be active for this database index.

Aztec (Add 131072)

If enabled, Aztec will be active for this database index.

Postal Symbologies (Add 262144)

If enabled, Postal Symbologies will be active for this database index.

Save Current Settings to Configuration Database

Definition: Allows current, active configuration settings to be saved to a selected database index.

Serial Cmd: <**K255+,***index*>

Example:

<K255+,*5*>

This command phrase saves the reader's current, active configuration settings to database index 5.

Load Current Settings from Configuration Database

Definition: Allows the configuration settings contained in a selected database index to be loaded to current, active configuration settings.

Serial Cmd: <**K255-,***index*>

Example:

<K255-,*5*>

This command phrase loads the configuration settings contained in database index 5 to current, active configuration settings.

Notes on Symbol Type

- The **current** DataBar Expanded status does not change if it is configured as Enabled (Stacked) and the **database** DataBar Expanded status is Enabled.
- The **current** DataBar-14 status does not change if it is configured as Enabled (Stacked) and the **database** DataBar Expanded status is Enabled.
- Data Matrix ECC level is determined by the **current** settings and not by **database** settings. Therefore, the database does not know which ECC level to enable, and has no effect on current Data Matrix ECC settings.

Request Selected Index Settings

Definition: Returns configuration settings for the selected database index.
Serial Cmd: <**K255?,***index*>

Example:

<K255?,*5*>

This command phrase returns the configuration settings for database index 5.

Request All Configuration Database Settings

Definition: Returns configuration settings for all indexes in the Configuration Database.
Serial Cmd: <**K255?**>

Example:

<K255?>

This command phrase returns the configuration settings for all 20 database indexes.

5-7 Utilities

5-7-1 Utility Commands

Type	Command	Name
Counter Request/Clear	<q>	No-Reads Per Read Cycle Counter
	<q0>	No-Reads Per Read Cycle Counter Reset
	<$>	Mismatch Per Read Cycle Counter
	<$0>	Mismatch Per Read Cycle Counter Reset
	<N>	No-Read Counter
	<O>	No-Read Counter Reset
	<T>	Trigger Counter
	<U>	Trigger Counter Reset
	<V>	Match Code Counter
	<W>	Match Code Counter Reset
	<X>	Mismatch Counter
	<Y>	Mismatch Counter Reset
Firmware Verification	<#>	Request All Part Numbers
	<#a>	Request Application Firmware Part Number
	<#b>	Request Boot Code Firmware Part Number
	<!>	Request All Firmware Checksums
	<!a>	Request Application Firmware Checksum
	<!b>	Request Boot Code Firmware Checksum
	<!s>	Request Current Parameter Settings Checksum
Read Rate	<C>	Decodes Per Second Test
	<Cp>	Decode Percent Test
	<J>	Exit Read Rate Tests
	<a1>	Preface PDF417 Output with Data Attributes
Read Cycle Enable/Disable	<I>	End Current Read Cycle until <H>
Parameter Reset/Save	<H>	Enable Read Cycle after <I>
	<A?/1>	Complete Reset when Resets or Save for Power-On Command Has Been Issued
	<A?/0>	Warm Reset if Power-On Command Has Been Issued
Resets	<A>	Software Reset, Current Parameters Retained
	<Ard>	Software Reset, Recall Default Parameters except Communication and Custom Unit Name Parameters
	<Arp>	Software Reset, Recall Power-On Default Parameters
	<Arc>	Software Reset, Recall Customer Default Parameters
Save for Power-On	<Z>	Software Reset, Save Current Settings for Power-On
	<Zc>	Software Reset, Save Current Settings as Customer Default Parameters
	<Zrc>	Software Reset, Recall Customer Default Parameters and Save for Power-On
	<Zrd>	Software Reset, Recall Microscan Default Parameters Except Communication and Custom Unit Name Parameters and Save for Power-On
	<Zrdall>	Software Reset, Recall Microscan Default Parameters Including Communication and Custom Unit Name Parameters and Save for Power-On
Master Database	<G>	Store Next Symbol Read to Database Index 1
	<Gn>	Store Next Symbol Read to Database Index *n*
	<NEWM>	New Master Load Status
Reader Status	<?>	Reader Status Request
Train/Optimize	<TRAIN>	Initiate Train Operation
	<UNTRAIN>	Initiate Untrain Operation
	<TRAIN?>	Train Status Request
	<OPT>	Initiate Optimize Operation
	<UNOPT>	Initiate Un-Optimize Operation
	<OPT?>	Display Optimize Status
Barcode Configuration	<BCCFG>	Enter Barcode Configuration

Read Rate

5-7-2 Read Rate Serial Utility Commands

Enter Decodes/Second Test

Sending **<C>** instructs the reader to transmit the decodes per second and symbol data (if any). The decode rate can vary dramatically due to the angle and location of the symbol in relation to the field of view. This test is very useful in aligning and positioning the reader during setup.

Enter Percent Test

Sending **<Cp>** instructs the reader to transmit the percentage of decodes and any decoded symbol data.

End Read Rate Test

Sending **<J>** ends both the Percent test and the Decodes/Second test.

Counters

5-7-3 Counters by Serial Command

No-Read Counter

Sending **<N>** displays the total number of No-Reads that have occurred since the last reset.

No-Read Counter Reset

Sending **<O>** sets the No-Read Counter to 0.

Trigger Counter

Sending **<T>** displays the total number of triggers since the last reset.

Trigger Counter Reset

Sending **<U>** sets the trigger counter to 0.

Good Read/Match Counter (or Good Read Counter)

Sending **<V>** displays the total number of good reads matching the master symbol, or, if **Master Symbol** is not enabled, the number of good reads since the last reset. This counter is always enabled, but will only work as a match count when **Master Symbol** is enabled. If **Master Symbol** is not enabled, this counter records the number of good reads. This count can be requested at any time.

Good Read/Match Counter Reset

Sending **<W>** sets the Match Counter to 0.

Mismatch Counter

Sending **<X>** displays the number of decoded symbols since the last reset that do not match the master symbol.

Mismatch Counter Reset

Sending **<Y>** sets the Mismatch Counter to 0.

Device Control

5-7-4 Device Control by Serial Command

Disable Reader

Sending **<I>** will turn the reader OFF, end the current read cycle, and will not allow the reader to enter another read cycle until turned ON. This feature is useful during extended periods of time when no symbols are being decoded, or the reader is being configured. Disabling the reader will not affect any commands that have already been downloaded.

Enable Reader

Sending **<H>** will turn the reader ON and allow it to enter read cycles.

Master Database

5-7-5 Master Symbol Database Size

Definition: **Number of Master Symbols** allows you to select **1** to **30** master symbols for the master symbol database.

Serial Cmd: <**K231,*master symbol number,master symbol data***>

Note: You must follow this command with a save command **<A>** or **<Z>**.

Default: **1**

Options: 1 to 30

- **Caution:** Since the total number of characters available for the master symbol database is **3000**, changes to the **Master Symbol Database Size** will re-allocate the number of characters available for each master symbol and could cause existing master symbols to be deleted (except master symbol #1, unless it also exceeds the size limitation).

  The table below specifies the maximum number of characters available to each symbol according the number of master symbols defined, from 1 to 30.

Master Symbol Number	*Maximum Characters*	*Master Symbol Number*	*Maximum Characters*
# 1	3000	# 6	500
# 2	1500	# 7	428
# 3	1000	# 8	375
# 4	750	# 9	333
# 5	600	# 10	300

5-7-6 Enter Master Symbol Data

Usage: Allows you to enter master symbol data for any enabled master symbol index number (1 to 30), provided the total number of characters does not exceed the maximum allowed.

Serial Cmd: <**K231,*master symbol number,master symbol data***>

Options: Enter data for 1 to 30 symbols (any combination of ASCII text up to the maximum allowed.

For example, to enter data for master symbol 9, after making certain that master symbol database size is enabled for 9 or more symbols, send **<K231,*9,data*>**.

Important: The ASCII characters **<**, **>**, and **,** can only be entered as hex values.

Caution: If no data is entered, the existing data will be deleted.

5-7-7 Request Master Symbol Data

Definition: Returns master symbol data for any enabled master symbols from 1 to 30.

For example, to request master symbol # 5, enter **<K231*?,5*>**. The reader transmits master symbol # 5 data in brackets in the following format: **<5/>**.

If no master symbol data is available, the output will be: **<5/>**.

Serial Cmd: <**K231*?,master symbol number***>

Caution: Be sure to add the **?** or you will delete the master symbol.

Note: This command returns the number of master symbols if no number is included.

5-7-8 Request All Master Symbol Data

Definition: This command will return master symbol data for all symbols enabled (up to 30).

Serial Cmd: <**K231*?***>

5-7-9 Read Next Symbol as Master Symbol

Definition: After you've set the size in the database, you can order the reader to read the next symbol as the master symbol for any given master symbol number.

Serial Cmd: <**G*master symbol number***>

To store the next symbol decoded as master symbol # 1, send:
<G> or **<G1>**.

To store the next symbol decoded as the master symbol for any other master symbol database number, send:
<G*master symbol number [1-30]*>.

For example, **<G5>** will cause the next symbol read to be entered as master symbol # 5.

5-7-10 Request New Master Status

Usage: Informs the user when a new master symbol is pending and which position it is in.

Definition: Returns the position in the master symbol database that will be loaded on the next read.

Serial Cmd: <**NEWM**>

The reader returns: **<NEWM/*next master to load*>**

Once a symbol has been read and loaded, the status will be cleared and the response will be **<NEWM/0>**.

5-7-11 Delete Master Symbol Data

Definition: You can directly delete the master symbol data by serial command.

Serial Cmd: <**K231,*master symbol number,***>

To delete a master symbol, enter the database number and a comma, but leave the data field empty. For example, to delete master symbol # 5, send the following: **<K231,*5,*>**. The command is entered with a blank master symbol data field, which tells the reader to delete the selected master symbol from the database.

Firmware

5-7-12 Firmware Update

Application code versions are specific to your reader. Consult with your sales representative before downloading application code. If needed, an application code file will be sent to you.

Firmware Verification

● Request Part Number by Serial Command

- When you send **<#>** (a request for all product part numbers), the reader returns: **<#b/BOOT_P/N><#a/APP_P/N><#p/WEBLINK_P/N><#p/PROFILE_P/N> <#p/TIMEOFFLIGHT_P/N>.**
- When you send **<#b>** (a request for the boot code part number), the reader returns: **<#b/BOOT_P/N>**.
- When you send **<#a>** (a request for the application code part number), the reader returns: **<#a/APP_P/N>**.
- When you send **<#w>** (a request for the WebLinkHH part number), the reader returns: **<#p/WEBLINK_P/N>**.
- When you send **<#p>** (a request for profile module part numbers), the reader returns: **<#p/PROFILE_P/N>**.
- When you send **<#t>** (a request for profile module part numbers), the reader returns: **<#p/TIMEOFFLIGHT_P/N>**.

● Request Checksum by Serial Command

- When you send **<!>** (a request for all available firmware checksums), the reader returns: **<!b/BOOT_CHECKSUM><!a/APP_CHECKSUM>**
- When you send **<!b>** (a request for the boot code checksum), the reader returns: **<!b/BOOT_CHECKSUM>**
- When you send **<!a>** (a request for the application code checksum), the reader returns: **<!a/APP_CHECKSUM>**

Default/Reset/Save

Understanding and controlling your reader's active, saved, and default settings is critical to its successful operation.

	Function	*Serial Cmd*
Resets (not saved for power-on)	Reset	**<A>**
	Reset and Recall Microscan Defaults	**<Ard>**
	Reset and Recall Power-On Parameters	**<Arp>**
	Reset and Recall Customer Default Parameters	**<Arc>**
Saved for Power-on	Save Current Settings for Power-On	**<Z>**
	Save Current Settings as Customer Default Parameters for Power-On	**<Zc>**
	Recall Microscan Default Parameters and Save for Power-On	**<Zrd>**
	Recall Customer Default Parameters and Save for Power-On	**<Zrc>**

5-7-13 Resets

Resets ("**A**" commands) affect only the current settings (active memory) and are not saved for power-on.

5-7-14 Saved for Power-On

Power-on parameters ("**Z**" commands) are saved to NOVRAM and recalled and loaded into current parameters when power is cycled to the reader or the **<Arp>** command is issued.

5-7-15 Defaults

Defaults are Omron Microscan firmware settings or saved customer settings that can be recalled, either by software or hardware reset.

5-7-16 Customer Default Parameters

Customer default parameters (saved by **<Zc>**) are the same set of parameters as power-on parameters but are saved in a different, isolated section of NOVRAM. This allows a user essentially to create a backup set of parameters that can be recalled in the event that the current parameters or power-on parameters have been accidentally changed or are no longer desired.

It is important to note that a hardware default does not affect customer default parameters. For example, a user that has inadvertently changed communication settings and saved them with a **<Z>** command, may not know the correct settings or have the capability to communicate within those settings. By first doing a hardware default to restore the known Omron Microscan defaults, the user can then recall the previous customer saved settings with an **<Arc>** or **<Zrc>** command.

5-7-17 Omron Microscan Default Parameters

Omron Microscan default parameters are contained in the firmware and cannot be changed.

Software Defaults

Default parameters can be recalled (loaded into current settings) with **<Ard>** command or recalled and saved for power-on with the **<Zrd>** command.

Reader Status Requests

5-7-18 <?> Status Byte

The reader responds to a status request **<?>** with a two character hex value, such as **<?/22>**. To determine status:

1 Look up the binary conversion in the table below.

For example, the first hex **2** would be **0 0 1 0** in binary, as read from binary digits **3** through **0**; the second hex **2** is also **0 0 1 0** as read from binary digits **7** through **4**.

2 Next, enter your binary values from the table below in the “Binary” column next to the appropriate bit.

Hex Value	Binary Bit Digits			
	7	*6*	*5*	*4*
	3	*2*	*1*	*0*
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
A	1	0	1	0
B	1	0	1	1
C	1	1	0	0
D	1	1	0	1
E	1	1	1	0
F	1	1	1	1

Bit	*Binary*	*Reader Status*
0	0	Command error detected
1	1	Command received
2	0	Communication error detected
3	0	Flash sector unprotect failure
4	0	Host port buffer overflow
5	1	Reader is in a read cycle

3 Under “Binary,” interpret **1**s as true and **0**s as not true. For example, bit 1 has a **1** in the “Binary” column, indicating “Command Received”. Bit 5 is also a **1**, indicating that the “Reader is in a read cycle”.

5-7-19 <K?> All Status Request

This is the fastest way to learn the reader’s current configuration. Sending this request will return the current settings of all commands, starting with the lowest K command value and ending with the highest K command value.

5-7-20 <K??> All Descriptor Status Request

This request will return all current descriptors for every K command, starting with the lowest K command value and ending with the highest K command value.

5-7-21 <K?#> All Range Status Request

This request will return the current settings of all commands within the user-defined range, starting with the lowest user-defined K command value and ending with the highest user-defined K command value.

5-7-22 <Knnn?> Single Status Request

This request will return the value of the variables associated with the requested K command. The request of a single entry of a database command cannot exceed the number of database slots for the specific command.

5-7-23 <Knnn??> Single Descriptor Status Request

This request returns the basic functional description of all fields in the requested K command.

5-7-24 <Knnn?#> Single Range Status Request

This request will return the value range and storage type description of all fields in the requested K command.

5-7-25 <Knnn?*> Display Command Wildcard

This request will return the individual K command status, description, and range for each parameter.

Other Operational Serial Commands

The following serial utility commands can be entered from **Terminal** or a PLC.

5-7-26 Train and Optimize

Train Symbol

Format: **<TRAIN>**: Initiates a Train operation.

This command will put the product into a mode of operation that will cause it to “train” the next symbol decoded. This mode of operation will remain active until either a symbol is decoded or the call is made to disable the mode and revert back to normal operation. Upon decoding a symbol, the image processing will save pertinent information regarding the target symbol to allow higher readability for the similar symbols.

The data collected by the Train operation can be saved for a power-on condition, using the **<Z>** command.

Un-Train Symbol

Format: **<UNTRAIN>**: Initiates an Un-Train operation.

This command will cause the product to discard any information acquired during a Train operation. The untrained state can be saved for a power-on condition using the **<Z>** command.

After you send the **<UNTRAIN>** command, you must trigger the reader once more for the untrained state to take effect.

Train Status

Format: **<TRAIN?>**: Responds with Train Status

This command will return the current status of the TRAIN operation.

Response: **< TRAIN,0>**: Default, not trained

<TRAIN,1>: Train operation in process

<TRAIN,2>: Symbol trained

Train Persistence

The train state and parameters persist the same as ordinary parameters. Examples:

- A unit in the trained state has not been saved. A power cycle will remove any trained state information and the unit will come up in its configured state.
- A unit is saved in a training state. The unit will come from power up in the training state and train the first symbol read.
- A unit is saved in a trained state. The unit will come from power up in the trained state and only read the trained symbol type.
- A trained unit is issued a reset default command **<Ard>**. The unit will return to an untrained state but if power is cycled will return to its saved state.

Optimize Symbol

Format: **<OPT>** Initiates an Optimize operation.

This command will put the product into a mode of operation that will cause it to “optimize” the next symbol decoded. This mode of operation will remain active until either a symbol is decoded or the call is made to disable the mode and revert back to normal operation. Upon decoding a symbol, the image processing will save pertinent information regarding the target symbol to allow it to be processed quicker and more consistently.

The data collected by the Optimize operation can be saved for a power-on condition, using the **<Z>** command.

Un-Optimize Symbol

Format: **<UNOPT>**: Initiates an Un-Optimize operation.

This command will cause the product to discard any information acquired during an Optimize operation. The unoptimized state can be saved for a power-on condition, using the **<Z>** command.

After you send the **<UNOPT>** command, you must trigger the reader once more for the unoptimized state to take effect.

Optimize Status

Format: **<OPT?>**: Responds with Optimize Status

This command will return the current status of the OPT operation.

Response: **<OPT,0>**: Default, not optimized

<OPT,1>: Optimize operation in-process

<OPT,2>: Symbol optimized

Optimize Persistence

The Optimize state and parameters persist the same as ordinary parameters. Examples:

- A unit in the optimized state has not been saved. A power cycle will remove any optimized state information and the unit will come up in its configured state.
- A unit is saved in a optimizing state. The unit will come from power up in the optimizing state and optimize the first symbol read.
- A unit is saved in a optimized state. The unit will come from power up in the optimized state and only read the optimized symbol type.
- A optimized unit is issued a reset default command **<Ard>**. The unit will return to an un-optimized state but if power is cycled will return to its saved state.

5-7-27 Image Library Request

<op,9> Manages files in a selected directory.

File Source	*Explanation*
(Nothing)	All files in “root” directory
/	All files in “root” directory
/saved	All files in “saved” directory
.	All files in all directories
/del	Deletes all files in the root directory
/saved/del	Deletes all files in the saved directory
del*.*	Deletes files in all directories

5-7-28 Bar Code Configuration Mode

Definition: **Bar Code Configuration Mode** is a way of programming the reader by using ECC 200 Data Matrix symbols.

Serial Cmd: **<BCCFG>**

Bar Code Configuration Mode can be entered in two different ways:

1. By forcing the reader into **Bar Code Configuration Mode** by serial command **<BCCFG>**.
2. By reading a Data Matrix symbol with a special code word used by ISO/IEC 16022 to signify reader programming. This can be either in a regular read cycle or during a read rate test. Reading this symbol in the calibration routine will have no effect.[1]

Once **Bar Code Configuration Mode** has been entered, the Data Matrix symbols can be thought of as serial data. You can configure the reader by printing labels in Omron Microscan's serial command format. Commands are processed as if the data were streamed in through the serial port. The reader will acknowledge the symbol with a green flash, and echo the serial data to the host. If the command causes the reader to produce more serial output, such as serial verification or counter requests, the data will be routed to the host port.

Bar Code Configuration Mode can be exited by any reset **<A>**, **<Z>** or **<J>** command.

The command to exit **Bar Code Configuration Mode** can be included as part of the Data Matrix symbol. For example, try encoding **<K200,4><K220,*1*><J>** into a Data Matrix symbol. This configures the reader to enable **Serial Trigger Mode**, to program a new trigger to end the read cycle, and to exit **Bar Code Configuration Mode** with **<J>**.

- **Note:** The system outputs a Config Code Received message when the configuration symbol is decoded instead of showing the configuration symbol's actual symbol data. A > character is output to the Terminal to indicate that the system is ready for bar code configuration mode.

1. In normal reading modes, it is required to read a special Data Matrix symbol with a special codeword used by ISO/IEC 16022 to signify reader programming.

5-8 Output Format

5-8-1 Output Format Serial Commands

Format Extract	<**K740,***output index,start location,length*>
Format Insert	<**K741,***output index,length,hex string*>
Format Assign	<**K742,***symbol number,status*>
Format Status	<**K743,***output format status*>
Output Filter Configuration	<**K744,***filter number,symbology,length,wildcard,placeholder, data,unused,database index*>
Output Format Count	<**K745,***number of filters*>

Format Extract

5-8-2 Output Index

Definition: **Output Index** refers to the database entry you wish to modify with this command. A formatted output is built by *extracting data from a symbol's original data output* and/or inserting user-defined characters.

It may be helpful to think of individual indexes as positions in the final formatted output you wish to build. Starting with index # 1, enter either an extract or insert command to begin building your desired output string. Then, with the next index number, enter either an extract or insert command to continue building the output string. Continue this process until you are finished building the string.

Serial Cmd: <**K740,*output index***,*start location,length*>

Options: 1 to 20

5-8-3 Start Location

Definition: Defines the location within the symbol data where the character extraction will begin. The first character extracted will also be the first character in the sequence displayed in user-defined output.

Serial Cmd: <**K740,***output index,***start location***,length*>

Default: **0 (disabled)**

Options: 0 to *n* (maximum number of characters in the symbol data).

5-8-4 Length

Definition: Defines the length (in consecutive characters) that will be extracted and placed in user-defined output.

Serial Cmd: <**K740,***output index,start location,***length***>**

Default: **0** (disabled; end of format cell array)

Options: 0 to *n* (maximum number of characters in the symbol data).

Format Insert

5-8-5 Output Index

Definition: **Output Index** refers to the database entry you wish to modify with this command. A formatted output is built by extracting data from a symbol's original data output and/or *inserting user-defined characters*.

It may be helpful to think of individual indexes as positions in the final formatted output you wish to build. Starting with index # 1, enter either an extract or insert command to begin building your desired output string. Then, with the next index number, enter either an extract or insert command to continue building the output string. Continue this process until you are finished building the string.

Serial Cmd: <**K741,*output index***,*length,hex string*>

Options: 1 to 20

5-8-6 Length

Definition: Specifies the length of the user-defined character string that will be inserted. This function is limited to 4 characters per output index, so multiple indexes must be entered in order to insert longer character sequences.

For example, if you wish to insert a 10 character sequence in user-defined output, you would need three commands with consecutive index numbers, where the first two character sequence lengths were 4 and the third was 2.

Serial Cmd: <**K741,***output index,****length****,hex string*>

Default: **0** (disabled; end of format cell array)

Options: 0 to 4

5-8-7 Hex String

Definition: Specifies a character string that represents ASCII characters to be inserted in the database entry. Two hex characters are required for every ASCII character to be inserted in the user-defined output string. These two characters comprise the hex (base 16) value of the ASCII character.

For example, if you wanted to enter the three-character sequence "Hi!" you would enter **3** for the length of the string, and a hex sequence of **486921** for the ASCII sequence to be inserted. (48 = H; 69 = i; 21 = !)

Important: Each pair of hex characters represents one ASCII character. Hex character pairs range from 00 to FF. Since you are limited to 4 ASCII characters per insertion per database entry, you are likewise limited to 8 hex characters per insertion per database entry.

Serial Cmd: <**K741,***output index,length,****hex string***>

Default: **NUL** (00 in hex)

Options: 00 to FF (As many as 4 bytes, or hex values.)

Format Assign

5-8-8 Symbol Number

Definition: **Symbol Number** refers to the number of the symbol to which output formatting will apply. For example, if you wish to enable user-defined formatting to symbol # 2 in a multisymbol read cycle, you would send the command **<K742,2,1>**.

Note that the number of symbols may exceed the format capabilities.

Serial Cmd: <**K742**,***symbol number***,*status*>

Options: 1 to 10

1 = Formatted output status for symbol # 1.

2 = Formatted output status for symbol # 2.

...

10 = Formatted output status for symbol # 10.

5-8-9 Status

Definition: **Status** refers to the user-defined formatting of a selected symbol position in the read cycle result. Note that there is also a global formatting "enable" command that must be set for the formatting to be applied.

Serial Cmd: <**K742**,*symbol number*,***status***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled (Assign parameters to specified symbol.)

Output Format Status

Definition: This is a global enable/disable parameter. In order to use formatting you must set up the format using the insert and extract commands, and you must also assign a symbol to format using the **Format Assign** command.

Serial Cmd: <**K743,*output format status***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

5-8-10 Output Format Status Disabled

When **Output Format Status** is set to **Disabled**, output formatting is globally disabled.

5-8-11 Output Format Status Enabled

When **Output Format Status** is set to **Enabled**, output formatting is enabled. However, **Format Assign**, **Format Insert**, and **Format Extract** must be properly set up as well.

Output Filter Configuration

Definition: Output filtering is a method of providing a set of good read qualifiers and also providing ordered output. There is a filter for up to the first 100 positions in a multisymbol output. The first filter corresponds to the first symbol output at the end of the read cycle. Each filter has settings for the following four parameters: **Symbology**, **Symbol Length**, **Data**, and **Configuration Database Number**.

Serial Cmd: <**K744,***filter number,symbology,length,wildcard,placeholder,data, unused,database index*>

5-8-12 Rules for Output Filter Configuration

Output Filter Configuration Rule # 1

Each symbol that is decoded must match one of the filters before it can be saved to a read cycle record. There is an exception to this rule, however, when the number of symbols required for a read cycle exceeds the number of active filters. In such a case, unfiltered symbols can be placed into unfiltered output positions.

For example, if the number of symbols required is 6 but there are only 4 active filters, the last 2 positions can be filled by any (unfiltered) qualified symbol.

Output Filter Configuration Rule # 2

The same filter setup can be used multiple times.

For example, filters 1, 2, and 3 can be set up to filter Data Matrix symbols, and the output will occur in the order the symbols are decoded.

Output Filter Configuration Rule # 3

All qualified symbols will be sorted and output in the matching filter position. If a symbol matches filter 3, it will be output as the third symbol. If a filter does not have a matching qualified symbol, a No-Read message will be output in place of the symbol (assuming the No-Read message is enabled).

For example, if there is not a symbol that meets filter 3's requirements, then a No-Read message will be output in the third output position.

5-8-13 Filter Number

Definition: This is the filter index number that represents the position of the symbol in the data output at the end of the read cycle. This index number should be entered along with the following filter settings for the predetermined symbol position.

Serial Cmd: <**K744,*filter number***,*symbology,length,wildcard,placeholder,data, unused,database index*>

Options: 1 to 100

5-8-14 Placeholder

Definition: The placeholder character requires a character to be present, but does not compare the data value.

Serial Cmd: <**K744,***filter number,symbology,length,wildcard,**placeholder**,data, unused,database index*>

Default: " **?** " = **3F** (hex)

Options: Any ASCII input in the form of a pair of hex characters.
Example:
3F = ?
00 = disabled

5-8-15 Data

Definition: This is the data string to be used when comparing symbol data for output filtering and ordering. This data string may also contain wildcard and placeholder characters to facilitate matching. Remember that in order to filter or order symbol data, it must meet all the requirements of the selected filter index.
Examples:

- Filter data = "123*". This will match data strings of "123", "123456", and "123ABC", but not "12".
- Filter data = "123*AB?C". This will be interpreted as "123*".
- Filter data = "123?". This will match "1234" and "123A", but not "123", "12345", or "1234C".
- Filter data = "123?A". This will match "1234A" and "123BA", but not "123", "1234C", or "1234ABCD".
- Filter data = "123?A?". This will match "1234AB" and "123BAT", but not "1234A" or "123BATS".
- Filter data = "12??*". This will match "1234", "123456", and "123ABC", but not "12" or "123".
- Filter data = "123?A*". This will match "1234A", "123BA", and "123BATS", but not "1234" or "1234C".

Serial Cmd: <**K744,***filter number,symbology,length,wildcard,placeholder,**data**, unused,database index*>

Default: **00** (NUL)

Options: Any ASCII input in the form of a pair of hex characters.
Maximum length: 63 bytes defined.
Examples:
41422A = AB*
Data [0] = NUL represents string matching disabled.

5-8-16 Database Index

Definition: The index of the database entry that decodes a given symbol must equal this setting for filtering to occur. A setting of **0** allows any database index for this filter entry.

Serial Cmd: <**K744,***filter number,symbology,length,wildcard,placeholder,data, unused,**database index***>

Default: **0** (any index)

Options: 0 to 20

Number of Filters

Definition: **Number of Filters** refers to the number of active output filters. **0** disables all output filters. Any non-zero numeral will enable filtering to be performed using the filter indexes covered by this value.

For example, if the number of filters is **1**, then only filter index # 1 will be applied. If the number of filters is **2**, then only filter index # 1 and filter index # 2 will be applied, etc.

Serial Cmd: <**K745,*number of filters***>

Default: **0**

Options: 0 to 100

6

Interface Parameters

This section provides detailed information about Ethernet communication configuration, which can be performed directly via WebLinkHH and also via serial commands (Ethernet communication).

6-1 Communications 6-2
6-2 Serial Command Syntax 6-11
6-3 I/O Parameters 6-22

6-1 Communications

With WebLinkHH, configuration changes can be made in the menus and then sent and saved to the reader. The user can also send serial commands to the reader via **Terminal**.

Important: The Terminal is for advanced users only. It may be possible to send invalid commands to the reader using the Terminal that cause unexpected results in WebLinkHH and/or the reader.

- The reader opens a port (default: 2001) as TCP server at startup.
- The higher connects to the reader as a TCP client.
- The host sends the “read command” “< >” to the reader .
- The reader sends the “read results” to the host.

The serial (TCP) communications use serial commands stated in this manual.

For example, “Read” commands are described in **Read Cycle**.

The following describes the output format of serial (TCP) communications.

<Header> Read strings <Footer>

In default, the header is “None” and the footer is “CR+LF”. The header and footer can be changed with WebLinkHH. (Gear icon - **Advanced** - **Communications** - **Preamble**/**Postamble**)

For example, When reading a code of 12345, the default output data is below.

Output Format of Serial Communications	**Output Data**						
ASCII Character Notation:	1	2	3	4	5	CR	LF
Hex Notation:	31	32	33	34	35	0D	0A

Addition to read strings, coordinate information of a read code and the print quality evaluation information can be added.

Communications Serial Commands

Ethernet	<**K126,***status,IP address,subnet,gateway,IP address mode*>
Ethernet TCP Ports	<**K127,***TCP port 1,TCP port 2*>
Search and Configure Mode	<**K128,***status,timed window*>
EtherNet/IP	<**K129,***status*>
Preamble	<**K141,***status,preamble characters*>
Postamble	<**K142,***status,postamble characters*>
EtherNet/IP Byte Swap	<**K163,***status*>
PROFINET	<**K164,***status*>
PROFINET Byte Swap	<**K165,***status*>
Custom Ethernet Link	<**K166,***status,transport layer,type,capabilities,IP address, multicast address,port,check connection,timeout (milliseconds), TTL*>
TELNET Port	<**K167,***TELNET port*>
Phy Link LED Status	<**K168,***PHY link LED status*>

Custom Ethernet Link

By default, the reader operates as a server, and communicates with the host over TCP/IP for both commands and data.

Custom Ethernet Link functionality gives you the ability to create an Ethernet interface that is bound to the command processor per your own requirements. You can set the **Transport Layer** to **UDP** or **TCP**, set the message **Type** to **Server** or **Client**, and set **Capabilities** to **Send Only**, **Receive Only**, or **Send/Receive**.

Custom Ethernet Link	
Custom Ethernet Link	Disabled
Transport Layer	TCP
Type	Server
Capabilities	Send/Receive
IP Address	192.168.1.65
Multicast	232.169.247.185
Port	5000
Check Connection	Disabled
Timeout	10000 ms
TTL	128

Custom Ethernet Link is intended for advanced users. This feature permits the establishment of a connection to the reader on any port, using the protocols UDP/IP, TCP, and Multicast on a specified port. A bi-directional communication configuration is available to send commands to the reader, obtain barcode output data, or form a single direction of communication, i.e. sending commands to the reader only, or receiving barcode data from reader only, without having both directions open.

In addition to the ability to move ports, you can also force the connection created by the Custom Ethernet Link to act as a client. Instead of "reaching out" to the reader, it is possible to configure the reader to “go out and connect to” a specified server. This increases flexibility when integrating readers into customer applications. Without this feature, users are limited to static communication into and out of the reader – UDP=80, TCP1=2001, TCP2=2003.

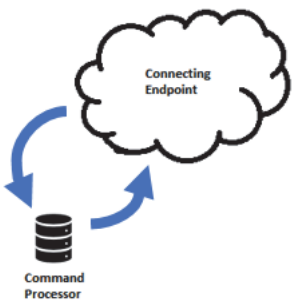
The following section will cover the implementation of how the Custom Ethernet Object is implemented in an Ethernet-based reader. This additional Ethernet-based transport layer allows you to:

- Send "and/or" commands to the device from a specified endpoint;
- Send barcode data to a receiving endpoint i.e. a client or server;
- Handle more than one connecting endpoint connection.

With Custom Ethernet Link functionality, users can configure:

- Transport Layer;
- TCP, UDP, or Multicast;
- Message Type;
- Server or Client;
- The type of data sent and/or received from the device;
- The endpoint to send and receive data, send only barcode data, or receive only commands.

Custom Ethernet Link functionality is bound to the reader's command processor as shown in the figure below. This enables an outside endpoint to still send commands to the device as well as receive data commands and barcode to the receiver.



6-1-1 Server Implementation

In cases where the endpoint is configured as a server, the reader is only able to handle 10 simultaneous connections for any transport layer. For TCP, the reader will refuse the connection. UDP and Multicast will simply ignore the connection request due to the connectionless nature of the transport layer.

6-1-2 Client Implementation

In cases where the endpoint is configured as a client, the reader is only able to handle one connection to a server. This means the following restrictions apply:

TCP: The reader can only connect to one server when configured as a client.

UDP and Multicast: The reader can only send data out on to one UDP port.
UDP is limited to UDP/IP in order to avoid broadcasting data on the network.

6-1-3 Configuration

This section explains how to configure the Custom Ethernet Object in the reader. The **Custom Ethernet Link K Command <K166>** allows you to configure the Custom Ethernet Object in the reader.

The following section explains the command parameters that configure the Custom Ethernet Object. Note that each parameter described below corresponds with each parameter shown in the **Custom Ethernet Link** section of WebLinkHH's **Communications** menu.

K Command Format: <**K166,***status,transport layer,type,capabilities,IP address,multicast address, port,check connection,timeout (milliseconds),TTL*>

Status

<**K166,*status,***transport layer,type,capabilities,IP address,multicast address,port,check connection, timeout (milliseconds),TTL>

Status of the Custom Ethernet Object on the device.

0 = Disabled Default – The Custom Ethernet Object is not started.

1 = Enabled – The Custom Ethernet Object has started with the parameters configured.

Transport Layer

<**K166,***status,**transport layer,**type,capabilities,IP address,multicast address,port,check connection, timeout (milliseconds),TTL>

The transport layer used by the Custom Ethernet Object to send/receive data. This transport layer obeys the **OSI Model layer 4**. The multicast implementation uses **UDP User Datagram Protocol** as the transport layer.

0 = TCP Default

1 = UDP

2 = Multicast

Type

<**K166,***status,transport layer,**type,**capabilities,IP address,multicast address,port,check connection, timeout (milliseconds),TTL>

This is the how the feature runs on the device and follows the server client model.

0 = Server Default – In server mode the device will be listening on the configured port number. The server can handle up to 10 different connections at one time independent of the transport layer selection. Once the limit has been reached the server will reject other connections.

For Multicast server configuration the user can either use a specified Multicast address or leave the Multicast address to the configured Multicast APIPA Address. This Multicast address is safe to use according to RFC 4607 stating that Multicast ranges from 232.0.0.0 – 232.255.255.255 are okay to use for source specific applications. By default, the unit creates a unique Multicast address in the range of 232.169.xxx.xxx so it does not conflict with other multicast addresses.

1 = Client – In client mode the device will send data to the specified server. The user must configure the IP Address or Multicast Address of the server and the port number that the specified server is listening on. Improper configuration will either yield an error on startup or result in no data being transmitted from the device to the outside world.

Capabilities

<**K166,***status,transport layer,type,**capabilities**,IP address,multicast address,port,check connection, timeout (milliseconds),TTL>

Capabilities is how the user configures the Custom Ethernet Object's read/write settings.

1 = Receive – The device will only receive data from the connecting endpoint. The device will not send data out to any connecting endpoints.

2 = Send – The device will only send data to the connecting endpoint. Any data received is immediately disposed of and not processed.

3 = Send/Receive Default – The device will be able to send and receive data to the connecting endpoint.

IP Address

<**K166,***status,transport layer,type,capabilities,**IP address**,multicast address,port,check connection, timeout (milliseconds),TTL*>

If the unit is configured as a client, the **IP Address** is determined by the **Transport Layer**.

TCP – This is the server's IP Address.

UDP – If the server uses UDP/IP, this is the IP Address of the server. Otherwise, it is ignored and the device will send data on the specified port.

Multicast – This parameter is the device's IP Address used to send out the Multicast message. You do not need to configure this parameter.

Default = Unit's IP Address

Multicast Address

<**K166,***status,transport layer,type,capabilities,IP address,**multicast address**,port,check connection, timeout (milliseconds),TTL*>

In **Server Mode**, this is the multicast address that clients can connect to in order to send/receive data. The port number is the port that the connecting endpoints will use.

In **Client Mode**, this is the multicast address of the server that the device is sending data to.

The port number is the port the multicast server is listening on.

Default = 232.169.xxx.xxx Multicast APIPA Address

Port

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,**port**,check connection, timeout (milliseconds),TTL*>

In **Server Mode**, this is the port number that the connecting endpoints will use to connect to the device.

In **Client Mode**, this is the port number that the server is listening on.

5000 (Default)

Check Connection

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,**check connection**, timeout (milliseconds),TTL*>

This feature is only applicable for **Transport Layer UDP** in **Client Mode**. The device will transmit **0** length UDP packets to the specified port that the server is listening on. If the device receives an **ICMP Port Destination Not Found**, then it will continue to send **0** length packets in an exponential back-off delay until the device no longer receives ICMP packets. This feature is disabled by default.

0 = Disabled Default

1 = Enabled

Timeout (Milliseconds)

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,check connection,* ***timeout (milliseconds)****,TTL*>

For TCP, this is the timeout before the socket is forcibly closed. For UDP and Multicast, this parameter has no effect.

Default = 10,000

TTL

<**K166,***status,transport layer,type,capabilities,IP address,multicast address,port,check connection, timeout (milliseconds),* ***TTL***>

For Multicast, this is the Time-To-Live counter, or how many hops before the message is discarded by the network. By default, the counter is set to 128 hops, which is more than enough for a typical packet to reach its destination host. It can, however, be configured to last longer or shorter per network requirements.

Default = 128

6-1-4 Configuration Examples

The following examples demonstrate how to configure the Custom Ethernet Object using the **Custom Ethernet Link K Command <K166>** described in the **Configuration** section earlier in this section.

TCP

● Server Mode

Send/Receive Capabilities

<K166,1,0,0,3>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** TCP Default;
- **Type =** Server Default;
- **Capabilities =** Send/Receive Default

Send-Only Capabilities

<K166,1,0,0,2>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** TCP Default;
- **Type =** Server Default;
- **Capabilities =** Send

● Client Mode

The following client modes will connect to a **TCP Server** with **IP Address 192.168.188.5** listening on **port 5050**.

Send/Receive Capabilities

<K166,1,0,1,3,192.168.188.5, ,5050>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** TCP Default;
- **Type =** Client;
- **Capabilities =** Send/Receive Default;
- **IP Address =** 192.168.188.5;
- **Port =** 5050

Send-Only Capabilities

<K166,1,0,1,2,192.168.188.5, ,5050>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** TCP Default;
- **Type =** Client;
- **Capabilities =** Send;
- **IP Address =** 192.168.188.5, Port = 5050

UDP

● Server Mode

Send/Receive Capabilities

<K166,1,1,0,3>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** UDP;
- **Type =** Server Default;
- **Capabilities =** Send/Receive Default

Send-Only Capabilities

<K166,1,1,0,2>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** UDP;
- **Type =** Server Default;
- **Capabilities =** Send

● Client Mode

The following client modes will connect to a **UDP Server** with **IP Address 192.168.188.5** listening on **port 5050**.

Send/Receive Capabilities

<K166,1,1,1,3,192.168.188.5, ,5050>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** UDP;
- **Type =** Client;
- **Capabilities =** Send/Receive Default;
- **IP Address =** 192.168.188.5;
- **Port =** 5050

Send-Only Capabilities

<K166,1,1,1,2,192.168.188.5, ,5050>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** UDP;
- **Type =** Client;
- **Capabilities =** Send;
- **IP Address =** 192.168.188.5;
- **Port =** 5050

Multicast

● Server Mode

The following uses the default **Multicast IP Address** generated in the device.

Send/Receive Capabilities

<K166,1,2,0,3>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** Multicast;
- **Type =** Server Default;
- **Capabilities =** Send/Receive Default

Send-Only Capabilities

<K166,1,2,0,2>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** Multicast;
- **Type =** Server Default;
- **Capabilities =** Send

● Client Mode

The following client modes will connect to a **Multicast** server with **IP Address 224.0.1.90** listening on **port 5050**.

Send/Receive Capabilities

<K166,1,2,1,3, ,224.0.1.90,5050>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** Multicast;
- **Type =** Client;
- **Capabilities =** Send/Receive Default;
- **IP Address =** 224.0.1.90;
- **Port =** 5050

Send-Only Capabilities

<K166,1,2,1,2, ,224.0.1.90, ,5050>

Interpretation of K Command Settings:

- **Custom Ethernet Link Enabled Default, Transport Layer =** Multicast;
- **Type =** Client;
- **Capabilities =** Send;
- **IP Address =** 224.0.1.90;
- **Port =** 5050

6-2 Serial Command Syntax

This section explains the structure and syntax of Omron Microscan's proprietary serial commands – K commands. K command are used to configure the V460-H Reader. All K commands are described in Appendices D through N.

Serial Command Format

Omron Microscan readers are controlled by two types of serial commands: configuration commands and utility commands.

● Rules that apply to both configuration and utility commands

- Less than '**<**' and greater than '**>**' angle bracket characters enclose the commands.
- Commands and data are case sensitive. Characters must be entered as upper or lower case, as specified.

Serial Utility Commands

Serial Utility Commands are sent during operations and are not followed by **<A>** or **<Z>**.

Serial Configuration Commands (K Commands)

Omron Microscan's serial configuration commands begin with a single "K" character followed by a 3-digit numeric character, comma-separated command fields, and an initializing command, as follows:

<**K***numeric character,data,data,...etc.*><*initializing command*>

An initializing command **<Z>** or **<A>** may follow the command.

- **<Z>** initializes the memory and saves for power-on.
- **<A>** initializes the memory but does not save for power-on, with the exception of Communications parameters.

For example, to enable **UPC** and save the change for power-on, send **<K473,*1*><Z>**.

To change **Baud Rate** and reset without saving changes for power-on, send **<K100,*3*><A>**.

● Serial Configuration Command Conventions

- All command fields (except the last) must be followed by a comma (without a space).
- NULL cannot be used. The characters **<**, **>**, and **,** can be used, but only if entered as hex values.
- All fields preceding a modified field must be included.
- If there is no change in preceding fields, then commas alone can be entered in these fields. For example, if only the last field in the following command is changing, **<K100,*4,1,0,0*>** can be entered as **<K100,,,,*0*>**.
- All fields *following* a modified field can be omitted. For example, to change Baud Rate only, send **<K100,*3*>**.

Concatenating Configuration Commands

Commands can be concatenated (added together) in a single string. For example, **<K145,*1*><K220,*1*><A>** enables **LRC**, sets **End of Read Cycle** mode to **New Trigger**, and resets the data buffers without saving the changes for power-on.

Serial Command Status Request

To ensure that any command was received and accepted, send the **Show Reader Status** command: **<?>**.

The status of a specific serial command can be requested by entering the command followed by a question mark. For example, send **<K142?>** to request the status of **Postamble**.

Entering Control Characters in Serial Commands

To enter control characters within a serial command, hold down the **Ctrl** key while typing the desired character.

Example: To enter a carriage return and line feed (**^M^J**), enter **<K141,1,CNTL-m CNTL-j>**

Ethernet

Enables or disables Ethernet connectivity in the reader. This corresponds to the **<K126>** command. It requires a **<Zrdall>** to return to default settings.

6-2-1 IP Address

This is the IP address of the reader when it is in Static IP Address Mode.

6-2-2 Subnet

This is the subnet of the reader when it is in Static IP Address Mode.

6-2-3 Gateway

This is the gateway IP address of the reader when it is in Static IP Address Mode.

6-2-4 IP Address Mode

Determines how the reader's IP address will be defined.

Static

In **Static Mode**, the reader uses the user-defined IP address. This is the default state for the reader.

DHCP

In **DHCP Mode**, the reader automatically acquires the IP address, Subnet, and Gateway addresses from a DHCP or BOOTP server.

6-2-5 TCP Port 1

One of two TCP ports for Ethernet communication with the reader. The default setting is **2001**.

6-2-6 TCP Port 2

One of two TCP ports for Ethernet communication with the reader. The default setting is **2003**.

Changes to this parameter are saved to NOVRAM and are set to default on power on.

A Reset **<A>** is required for settings to take effect.

- **Important:** Once this setting is Disabled, you will only be able to connect to the reader if you know the IP address and enter it in the IP Address field of the Ethernet TCP/IP connect dialog.

When enabled, **Search and Configure Mode** will find the reader and settings can be changed.

Timed Window

When **Timed Window** is selected, Search and Configure Mode will find the reader and settings can be changed, but only 60 seconds from the last reset. After 60 seconds, Search and Configure Mode will be disabled.

Preamble

6-2-7 Preamble Status

Usage: Useful for identifying and controlling incoming data. For example, defining the preamble as a carriage return and a line feed causes each decoded message to be displayed on its own line.

Definition: Defines a one to four character data string that can be added to the front of the decoded data.

Serial Cmd: <**K141,*status***,*preamble character(s)*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled (within any protocol)

6-2-8 Preamble Characters

Serial Cmd: <**K141,***status*,***preamble character(s)***>

Default: **^M** corresponds to: **carriage return**.

Options: To enter control characters within a serial command, hold down the **Ctrl** key while typing the desired character.

Example: **<K141,1,CNTL-m>** to enter the control character **^M**.

Postamble

6-2-9 Postamble Status

Usage: Useful for identifying and controlling incoming data. For example, defining the postamble as a carriage return and a line feed causes each decoded message to be displayed on its own line.

Definition: Allows the user to enable or disable up to four postamble characters that can be added to the end of the decoded data.

Serial Cmd: <**K142,status**,*postamble character(s)*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled (within any protocol)**

6-2-10 Postamble Characters

Serial Cmd: <**K142,***status*,***postamble character(s)***>

Default: **^M^J** corresponds to: **carriage return/line feed**.

Options: To enter control characters within a serial command, hold down the control key while typing the desired character.

Example: <**K142,1,CNTL-m CNTL-j**> to enter **^M^J**.

EtherNet/IP Byte Swap

For detailed information about EtherNet/IP, see the *V460-H Communication Manual*. Please visit the Omron website for the **Function Blocks Library** and **Sample Program** available for EtherNet/IP.

Definition: Enables or disables EtherNet/IP byte swapping for decode data.
Serial Cmd: <**K163,*status***>
Default: **Disabled**
Options: **0 = Disabled**
1 = Enabled

PROFINET

For detailed information about PROFINET, see the *V460-H Communication Manual*. Please visit the Omron website for the **Function Blocks Library** and **Sample Program** available for PROFINET.

Definition: Enables or disables the PROFINET communications protocol.
Serial Cmd: <**K164,*status***>
Default: **Disabled**
Options: **0 = Disabled**
1 = Enabled

PROFINET Byte Swap

For detailed information about PROFINET, see the *V460-H Communication Manual*. Please visit the Omron website for the *Function Blocks Library* and *Sample Program* available for PROFINET.

Definition: Enables or disables PROFINET byte swapping for decode data.
Serial Cmd: <**K165,*status***>
Default: **Disabled**
Options: **0 = Disabled**
1 = Enabled

TELNET Port

Definition: Enables or disables TELNET port.
Serial Cmd: <**K167,*status***>
Default: **23**
Options: **0 to 65535**

Phy Link LED Status

Definition: Enables or disables Phy Link LED.
Serial Cmd: <**K168,*status***>
Default: **Enabled**
Options: 0 = Disabled
1 = Enabled

Entering ASCII Characters as Hex Values

Commands that require ASCII text fields, such as **Preamble** and **Postamble** commands, can be sent to the reader as hex values.

Serial Cmd Format: <**Knnnh,00-FF**>

To enter ASCII fields as hex values (00 to FF), add a lower-case **h** directly after the command's **K** number, and then enter the hex value that corresponds with the desired ASCII character.

Example:

Consider the **Postamble** command:

Serial Cmd: <**K142,***status,****postamble character(s)***>

Imagine that your application requires the ASCII character **>** to be the postamble in your symbol decode output.

The ASCII characters **<**, **>**, and **,** can only be entered as hex values. So, to make **>** the postamble in your symbol decode output, enter the **Postamble** command as follows:

<K142h,,3E>

Note that the "status" field contains only a **,** . This is because the only field that is being changed is the "postamble character(s)" field. (See **Serial Configuration Command Conventions** for a more detailed explanation of this command shortcut.)

6-3 I/O Parameters

6-3-1 I/O Parameters Serial Commands

Power On/Reset Counts	*<**K406,**power-on,resets,power-on saves,customer default saves>*
Time Since Reset (Read-Only)	*<**K407,**hours,minutes>*
Service Message	*<**K409,**status,service message,threshold,resolution>*
User-Defined Name	*<**K412,**user-defined name>*
Beeper Status and Volume	*<**K702,**beeper status,beeper volume>*
Haptic Feedback	*<**K703,**haptic feedback status>*
Quality Output	*<**K704,**quality output separator,decodes per trigger status>*
Symbol Data Output	*<**K705,**status,symbology identifier status>*
Read Duration Output	*<**K706,**status,separator>*
Cycle ID and Separator	*<**K707,**cycle ID or report,separator>*
No-Read Message	*<**K714,**status,message>*
Output Object Info	*<**K734,**output frame number status,output coordinates status>*
Number of ASCII Characters Replaced	*<**K746,**number of ASCII characters replaced,mute control characters,mute extended characters>*
Output Indicators	*<**K750,**green flash LED status,target pattern LED status,green flash duration>*
Database Identifier Output	*<**K759,**status,separator character>*
Image Push to Host	*<**K763,**Image Storage Location,FTP Host Info,Transfer Optimization,RAM Drive Size in MB,Save Image Until,Action at Image Storage Limit>*
Image Push to Host – Detailed Setup	*<**K764,**Image Storage Status,Stored Image Type,Image Storage, Image File Format,Image Quality,Image Scale,File Save Options>*

Beeper Status and Volume

6-3-2 Beeper Status

Definition: Determines the conditions that cause the reader to beep.
See **8-1 Beeper and LED Definitions** for more detailed information about the beeper.
Serial Cmd: <**K702,*beeper status***,*beeper volume*>
Default: **4 = All Modes On**
Options: 0 = Disabled
1 = Beep on Good Read
2 = Beep on No Read
3 = Boot and Program
4 = All Modes On

6-3-3 Beeper Volume

Definition: Determines beeper volume.
Serial Cmd: <**K702,***beeper status*,***beeper volume***>
Default: **2 = High Volume**
Options: 0 = Low Volume
1 = Medium Volume
2 = High Volume

Haptic Feedback Status

6-3-4 Haptic Feedback Status

Definition: Enables or disables reader vibration.
See **8-1 Beeper and LED Definitions** for the conditions that cause the reader to vibrate.

Serial Cmd: <**K703,*status***>

Default: **1 = Reader Vibration Enabled**

Options: 0 = Disabled
1 = Reader Vibration Enabled

Quality Output

6-3-5 Separator

Definition: The separator character separates quality output data from symbol data.
Serial Cmd: <**K704,*separator*,***decodes per trigger status***>
Default: ,
Options: Any ASCII character.

6-3-6 Decodes per Trigger Status

Definition: When this feature is enabled, the reader enters a state where it processes frames as configured until the end of a read cycle, with or without a successful symbol decode. When the read cycle ends, the reader outputs any decoded symbol data along with the decodes per trigger count.
Serial Cmd: <**K704,***separator,***decodes per trigger status***>
Default: 0
Options: 0 = Disabled 1 = Enabled

Symbol Data Output

6-3-7 Symbol Data Output Status

- **Note: Symbol Data Output** relates to data and should not be confused with **Outputs 1**, **2**, and **3** listed in the **Output Parameters** which describe output states and functions.

Usage: Useful when the host needs symbol data only under certain conditions.

Definition: Defines the conditions under which decoded symbol data is transmitted to the host.

Serial Cmd: <**K705,*symbol data output status***,*symbology identifier status*>

Default: Good Read

Options: 0 = Disabled
1 = Match
2 = Mismatch
3 = Any Good Read
4 = Only If All Good Reads

- **Note: Symbol Data Output Status**, if set to **Match** or **Mismatch**, will not take effect unless **Matchcode Type** is enabled and a master symbol is loaded into memory.

Disabled

Usage: It is useful when an application only needs to use the discrete outputs and can allow the reader to do the decision-making. When **Disabled**, the host does not need the symbol data and the communication lines are used only for setup and status checks.

Definition: When set to **Disabled**, the reader will not transmit any data that is generated during a read cycle (symbols, No-Reads, etc.)

Match

Usage: **Match** is used in an application that requires specific symbol information and needs to sort, route, or verify based on matching the specific symbol data.

Definition: When set to **Match**, the reader transmits symbol data whenever a symbol matches a master symbol. However, if **Matchcode Type** is **Disabled**, it transmits on any good read.

- **Note:** A No-Read can still be transmitted if **Enabled**.

Mismatch

Usage: Mismatch is typically used as a flag within the host system to prevent an item from being routed in the wrong container.

Definition: With Mismatch enabled, the reader transmits symbol data whenever the symbol data information does NOT match the master symbol.

- **Note:** A No-Read can still be transmitted if **Enabled**.

Any Good Read

Usage: **Any Good Read** is used when an application requires all symbol data to be transmitted. It's typically used in tracking applications in which each object is uniquely identified.

Definition: With **Any Good Read** enabled, the reader outputs symbol data for any qualified symbol in the read cycle regardless of **Matchcode Type** setting. **No Read** is output if no symbols are qualified.

Only If All Good Reads

Definition: With **Only If All Good Reads** enabled, the reader outputs symbol data only when all symbols in the read cycle are qualified. **No Read** is output if no symbols are qualified.

6-3-8 Symbology Identifier Status

Serial Cmd: <**K705,***symbol data output status,****symbology identifier status***>
Default: Disabled
Options: 0 = Disabled 1 = Enabled

Disabled

When set to **Disabled**, the symbol data output does not contain symbology information.

Enabled

When set to **Enabled**, the symbol data output contains a three-character symbology identifier sequence.

Read Duration Output

Usage: Useful in evaluating actual read cycle timing results, especially when initially setting up an application to determine maximum line speed (obtainable based on spacing between symbols.)

Definition: When enabled the duration of the read cycle (in milliseconds) is appended to the symbol data.

The read duration is the time from the beginning of the read cycle until data is output.

6-3-9 Read Duration Output Mode

Serial Cmd: <**K706,*status***,*separator*>

Default: Disabled

Options: 0 = Disabled 1 = Enabled

This output can measure over 49 days' worth of duration; if exceeded, the "OVERFLOW" message will be output in place of the duration.

6-3-10 Read Duration Output Separator

Definition: User defined character that separates the symbol information from the **Read Duration Output.**

Serial Cmd: <**K706,***status*,***separator***>

Default: [space character]

Options: Any ASCII character.

Cycle ID and Separator

6-3-11 Cycle ID or Report

Definition: Enables or disables Cycle ID and/or Full Cycle Report.
Serial Cmd: <**K707,*cycle ID or report***,*separator*>
Default: **0 = Disabled**
Options: **0 = Disabled**
1 = Enabled
2 = Full Cycle Report

6-3-12 Separator

Definition: Allows you to choose a separator character.
Serial Cmd: <**K707,***cycle ID or report*,***separator***>
Options: Any character from **0x01** to **0x7F**.
Refer to **Entering ASCII Characters as Hex Values** to enter a separator character as a hex value.

No-Read Message

Usage: Used in applications where the host needs serial verification that a symbol has not been read and especially useful in new print verification.

Definition: When enabled, and if no symbol has been decoded before timeout or the end of the read cycle, the No-Read message will be transmitted to the host.

6-3-13 No-Read Message Mode

Serial Cmd: <**K714,*No-Read message status***,*No-Read message*>

Default: Enabled

Options: 0 = Disabled 1 = Enabled

Disabled

Only symbol data is output after a read cycle.

Enabled

When the reader is in a triggered mode, a No-Read message will be appended for each failed read attempt.

6-3-14 No-Read Message

Definition: Any combination of ASCII characters can be defined as the No-Read message.

Serial Cmd: <**K714,***No-Read message status,***No-Read message***>

Default: NOREAD

Options: A string of up to 64 characters.

- **Note: No-Read Message** will only be transmitted if **Symbol Data Output** is set to **Match**, **Mismatch**, or **Good Read**.

  No-Read Message can be set to any ASCII character.

Output Object Info

6-3-15 Output Frame Number

Serial Cmd: <**K734,*output frame number***,*output coordinates*>
Default: Disabled
Options: **0 = Disabled** 1 = Enabled

Disabled

When **Output Frame Number** is set to **Disabled**, the frame number is not output as part of the symbol data.

Enabled

When **Output Frame Number** is set to **Enabled**, the number of the frame in which the symbol was first decoded is attached to the symbol output information. The output format is "F*nnn*", where "*nnn*" is a 3-digit decimal value from 0 to 255. The frame number rolls over to 0 once it passes 255.

If this feature is enabled, the frame information will follow the symbol data, and it will precede any symbol quality data (if symbol quality settings are enabled—see **Symbol Quality Separator**). The symbol quality separator is located between the end of the already-formatted data and the "F" that precedes the frame number.

6-3-16 Output Coordinates

Serial Cmd: <**K734,***output frame number*,***output coordinates***>
Default: Disabled
Options: **0 = Disabled** 1 = Enabled

Disabled

When **Output Coordinates** is set to **Disabled**, the coordinates are not output as part of the symbol data.

Enabled

When **Output Coordinates** is set to **Enabled**, the four sets of object coordinates for the first successfully decoded symbol are attached to the symbol data output in the following format:

"(*nnn,mmm*)", where "*nnn*" is a 3-digit X-coordinate and "*mmm*" is a 3-digit Y-coordinate. The validation separator is located between the end of the already formatted data and the first coordinate point. The point with the lowest X + Y sum will be output first, followed by the next three points in a clockwise direction.

Example:

(032,040)(287,056)(287,279)(048,271)

Number of ASCII Characters Replaced

6-3-17 Number of ASCII Characters Replaced

Serial Cmd: <**K746,*number of ASCII characters replaced***,*mute control characters,mute extended characters*>

Default: **0**

Options: 0 to 256

6-3-18 Mute Control Characters

Serial Cmd: <**K746,***number of ASCII characters replaced*,***mute control characters***,*mute extended characters*>

Default: Disabled

Options: **0 = Disabled** 1 = Enabled

6-3-19 Mute Extended Characters

Serial Cmd: <**K746,***number of ASCII characters replaced,mute control characters,****mute extended characters***>

Default: Disabled

Options: **0 = Disabled** 1 = Enabled

Output Indicators

V460-H readers have three LED arrays, as follows:

1. A target pattern of blue LEDs for centering the field of view, which is projected from the front of the reader.
2. An array of green LEDs projected from the front of the reader that can be programmed to flash in response to user-defined conditions.
3. A row of five status LEDs on the side of the reader.

6-3-20 Green Flash Mode

Usage:	Used as a visual verification that a good read has occurred.
Definition:	An array of green LEDs in the front of the reader can be programmed to flash in response to user-defined conditions.
Serial Cmd:	<**K750,*green flash mode***,*target pattern status,green flash duration*>
Default:	**Good Read**
Options:	0 = Disabled **1 = Good Read** 2 = Static Presentation 3 = Match 4 = Mismatch

Disabled

Green flash LEDs are disabled.

Good Read

Green flash LEDs will flash when a good read condition is met or when **Matchcode** is enabled and a match occurs.

Static Presentation Mode

Static Presentation Mode is used in conjunction with **Continuous Read Mode**: **<K200,0>**.

When operating in **Static Presentation Mode**, the red LEDs will illuminate while the reader is searching for a symbol in **Continuous Read Mode**. When a symbol is placed in the field of view and a good read occurs, the green LEDs will illuminate and stay on for the duration of time set in **Green Flash Duration**. Only one read will occur during that time unless more than one symbol is enabled in **Number of Symbols**.

- **Note:** If **Static Presentation Mode** is selected but the reader is not in **Continuous Read**, the **Green Flash** will not occur.

To use Static Presentation:

1. Enable **Continuous Read**.
2. Select the number of symbols.
3. Enable **Static Presentation** in **Green Flash Mode**.
4. Select the read time in **Green Flash Duration**.

Match

The green LEDs will flash when a match condition is met. If multisymbol is enabled, then green flash LEDs will illuminate only if all symbols qualify as a match. If matchcode is disabled, then this mode will activate the LEDs on a good read.

Mismatch

Same as **Match**, except that LEDs will illuminate on a mismatch.

6-3-21 Target Pattern

Usage:	Assists users in positioning and locating symbols in the center of the reader's field of view.
Definition:	The user can control when the targeting system is on or off, and can save this condition for power-on.
Serial Cmd:	<**K750,***green flash mode,***target pattern status***,green flash duration*>
Default:	**Auto-On**
Options:	0 = Always Off 1 = On only when not in the read cycle 2 = On only when in the read cycle 3 = Always On **4 = Auto-On**

Always Off

The target pattern will remain off at all times unless overridden by an operational command.

On Only When Not in the Read Cycle

The target pattern is always on except during the read cycle. If the operational command overrides this setting, the target pattern will remain on at all times.

On Only When in the Read Cycle

The target pattern will remain off except during the read cycle. If the operational command overrides this setting, the target pattern will remain on at all times.

Always On

The target pattern is always on.

Auto-On

The target pattern activates when a symbol is moved into the field of view. The target pattern turns off automatically after a period of time when no moment has been detected.

6-3-22 Green Flash Duration

Usage:	Provides visual verification that a good read has occurred.
Definition:	When a good read occurs, the green LEDs will illuminate and stay on for the time set in the **Green Flash Duration** value.
Serial Cmd:	<**K750,***green flash mode,target pattern status,***green flash duration***>**
Default:	**25** (250ms)
Options:	0 to 65535 (in 10 ms increments)

Database Identifier Output

Usage: Useful in keeping track of which database entries read which symbols.
Serial Cmd: <**K759,*status***,*separator*>
Default: 0
Options: 0 = Disabled 1 = Enabled

6-3-23 Output Status

Disabled

When this command is disabled, no database identifier information will be output.

Enabled

When this command is enabled, the reader will append a two-digit number and the characters “DB” to the data output following the separator for each symbol decoded using **Configuration Database**. For example, if the separator is an underscore character and the second database entry reads a symbol encoded with “data capture” during the read cycle, the symbol data output will be “data capture_DB02”. If the database is not active, no identifiers will be attached to output.

6-3-24 Separator

Usage: The separator character separates the symbol data from the database identifier.
Serial Cmd: <**K759,***status*,***separator***>
Default: <space>
Options: Any ASCII character.

Image Storage

Definition: **Image Storage Status** determines whether or not **Image Logging** is active.

Note: Only images that have been processed by the decoder will be saved. If Image Storage Status and **RAM Drive Size in MB** in **<K764>** are switched from **Disable** to **Enable**, a cold boot of the reader will be required in order to create the required RAM Drive, and it will take additional time for the reader to re-initialize. Switching from Enable to Disable does not require a cold boot.

Serial Cmd: <**K763,*image storage status***,*stored image type,image storage,image file format,image quality,image scale,file save options*>

Default: Disabled

Options: 0 = Disabled

1 = Enabled

6-3-25 Stored Image Type

Definition: **Stored Image Type** defines what kind of image you want to log in a read cycle.

Serial Cmd: <**K763,***image storage status,****stored image type***,image storage,image file format,image quality,image scale,file save options*>

Default: No Read

Options: 1 = Good Read

2 = No Read

3 = Good Read + No Read

4 = Match

8 = Mismatch

12 = Match + Mismatch

15 = Good Read + No Read + Match + Mismatch

6-3-26 Image Storage

Definition: **Image Storage** defines which image will be stored within a read cycle.

- **Good Read/Match/Mismatch:** First qualified image or all qualified images.
- **No Read:** First image or all images that have an IP report.

Serial Cmd: <**K763,***image storage status,stored image type,****image storage***,image file format,image quality,image scale,file save options*>

Default: First Image in a Read Cycle

Options: 0 = First Image in a Read Cycle

1 = All Images in a Read Cycle

6-3-27 Image File Format

Definition: **Image File Format** defines the image format you want to use.

Serial Cmd: <**K763,***image storage status,stored image type,image storage,****image file format***,image quality,image scale,file save options*>

Default: PNG

Options: 0 = PNG

1 = JPG

6-3-28 Image Quality

Definition: **Image Quality** defines the amount of image compression you want the image to have.

Serial Cmd: <**K763,***image storage status,stored image type,image storage,image file format,****image quality****,image scale,file save options*>

Default: 90

Options: 1 to 100

6-3-29 Image Scale

Definition: **Image Scale** defines the size you want the image to be.

Serial Cmd: <**K763,***image storage status,stored image type,image storage,image file format,image quality,****image scale****,file save options*>

Default: Full

Options: 0 = Full

1 = 1/4th

2 = 1/8th

6-3-30 File Save Options

Definition: **File Save Options** determines which files you want to save.

Serial Cmd: <**K763,***image storage status,stored image type,image storage,image file format,image quality,image scale,****file save options***>

Default: Image

Options: 1 = Image

2 = Read Cycle Report

3 = Image + Read Cycle Report

Image Storage – Detailed Setup

6-3-31 Image Storage Location

Definition: Defines where the saved image is going to be stored.

Note: When saving images to **RAM**, the system is limited to the actual RAM space available in the system. The number of images that can be saved depends on the **Max RAM Drive Size**. The actual system path is **/imagesd0/Images/**. When saving images to **FTP**, the path is **<last 6 digits of device's MAC Address>_Images/** on the host FTP director. Note that the FTP server needs to grant the user with create directory rights as the system will need to create a directory on the FTP server to store all uploaded images.

File save scheme: The image file will be posted with its system reset count, followed by its read cycle i.d., followed by its image i.d., followed by its stored image type defined in **<K763>**, as follows:

<last 6 digits of device's MAC Address>_<system total reset count>_<read cycle id>_<image id>_<save image type>.{png, jpg}

<last 6 digits of device's MAC Address>_<system total reset count>_<read cycle id>_<image id>_readreport.xml

Serial Cmd: <**K764,*image storage location***,*FTP host info,transfer optimization,RAM drive size in MB,save image until,action at image storage limit*>

Default: RAM

Options: 0 = RAM

1 = FTP

6-3-32 FTP Host Info

Definition: **mscan|pass@192.168.188.1:21** signifies a the user with **mscan** at **192.168.188.1** FTP server on port **21** with **pass** as the FTP login password.

Note: If port is not defined with the FTP server address, it will default to port 21.

Serial Cmd: <**K764,***image storage location,****FTP host info****,transfer optimization,RAM drive size in MB,save image until,action at image storage limit*>

Default: "user|pass@xxx.xxx.xxx.xxx:21"

Options: Maximum 255 characters including the characters "**|**", "**@**", and "**:**".

6-3-33 Transfer Optimization

Definition: **Transfer Optimization** defines how the image is going to be stored in triggered captured modes.

Serial Cmd: <**K764,***image storage location,FTP host info,****transfer optimization****,RAM drive size in MB,save image until,action at image storage limit*>

Default: Speed

Options: 0 = Speed (Lossy)

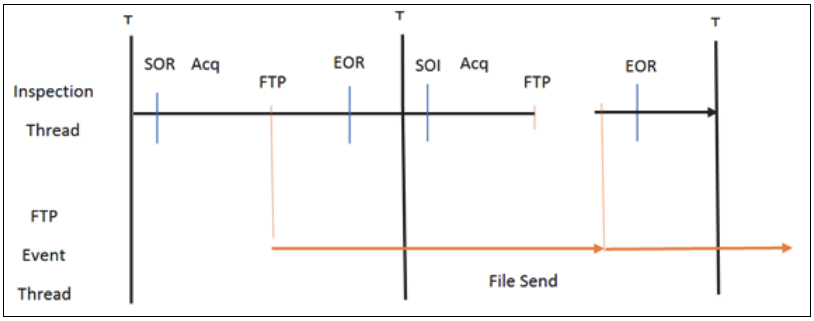
1 = Accuracy (Lossless)

Speed (Lossy)

Images will be saved when possible. Some images may be dropped.

SOR = Start of Read Cycle

EOR = End of Read Cycle

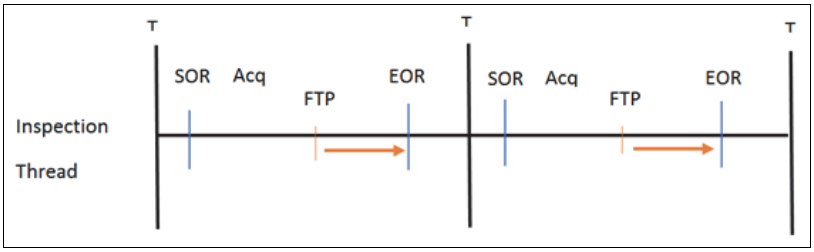


Accuracy (Lossless)

Every image in read cycle is transferred. The read cycle may be delayed due to image saving since each transfer will need to be finished before the end of the read cycle.

SOR = Start of Read Cycle

EOR = End of Read Cycle



6-3-34 RAM Drive Size in MB

Definition: This defines the maximum RAM Drive size on the system. It is also limited to the memory available on the system and affects the max. rapid image count in **<K241>** since the onboard memory may be taken up by the RAM Drive. Images may not be saved if the RAM Drive is not large enough to store all the images in the current read cycle and if **Image Storage Location** is set to **FTP** with **Image Save Mode** set to **Speed**. If Image Storage Location is set to FTP with Image Save Mode set to **Accuracy**, all images in the read cycle will be transferred to the FTP host but the read cycle may be delayed.

Serial Cmd: <**K764,***image storage location,FTP host info,transfer optimization,**RAM drive size in MB**,save image until,action at image storage limit*>

Default: 20

Options: 1 to 50

- Note: The number of images that can be save in the RAM drive vary depending on model, RAM drive size setting, image file format.

The following is a list of the number of images to be saved when the **Image File Format** is **PNG** and, the **Image Scale** is **Full**.

Resolution	No. of images to be saved	
	default: 20MB	Max.: 50MB
0.3 Mpix	57	143
1.2 Mpix	16	42
5 Mpix	4	10

6-3-35 Save Image Until

Definition: This defines how long the image will be stored in the system when the **Image Storage Location** is **RAM**.

If set to **New Read Cycle**, the saved image will be erased upon entering the next read cycle.

If set to **System Reset**, the saved image will be erased upon the next system reset.

Serial Cmd: <**K764,***image storage location,FTP host info,transfer optimization,RAM drive size in MB,**save image until**,action at image storage limit*>

Default: New Read Cycle

Options: 1 = New Read Cycle

2 = System Reset

6-3-36 Action at Image Storage Limit

Definition: This defines what to do when **Action at Storage Full** is reached and when images are saved on **RAM**. When this setting is set to **Erase Oldest First**, the oldest images in the current read cycle will be erased.

Serial Cmd: <**K764,***image storage location,FTP host info,transfer optimization,RAM drive size in MB,save image until,**action at image storage limit*>

Default: Stop

Options: 0 = Stop

1 = Erase Oldest First

Power On/Reset Counts

- **Note: Power On/Reset Counts** is a read-only command.

Power-On

Serial Cmd: <**K406,*power-on***,*resets,power-on saves,power-on flash saves*>

Power-On uses a 16-bit counter that increments each time the reader is powered-on.

Resets

Serial Cmd: <**K406,***power-on*,***resets***,*power-on saves,power-on flash saves*>

Resets uses a 16-bit counter that increments each time the reader is reset. This value is reset at power-on.

Power-On Saves

Serial Cmd: <**K406,***power-on,resets,****power-on saves***,*power-on flash saves*>

Power-On Saves uses a 16-bit counter that increments each time an reader setting is saved for power-on with a **<Z>** command.

Power-On Flash Saves

Serial Cmd: <**K406,***power-on,resets,power-on saves,****power-on flash saves***>

Power-On Flash Saves uses a 16-bit counter that increments each time an reader setting is saved to the customer parameter section of flash memory with a **<Zc>** command.

Time Since Reset

- **Note: Time Since Reset** is a read-only command.

Hours

Serial Cmd: <**K407,*hours*,*minutes***>
Default: 16-bit counter (0 to 65535)

Hours uses a 16-bit counter that increments every 60 minutes.

Minutes

Serial Cmd: <**K407,***hours*,***minutes***>
Default: 16-bit counter (0 to 60)

Minutes uses a 16-bit counter that increments every 60 seconds.

- **Note:** Time counts are reset at power-on, but not with an **<A>** or **<Z>** command.

Service Message

When **Service Message** is enabled, a message of up to 10 ASCII characters is sent whenever the system detects that the service timer's limit has been reached. The service timer is reset at power-on, meaning that the service timer's limit is the amount of time since last reset. Service timer increments can be set in seconds or minutes.

Serial Cmd: <**K409,*status,***service message,threshold,resolution>
Default: 0
Options: 0 = Disabled 1 = Enabled

Service Message

Serial Cmd: <**K409,***status,****service message****,threshold,resolution>
Default: SERVICE
Options: An ASCII string between 1 and 10 characters.

Threshold

Serial Cmd: <**K409,***status,service message,****threshold****,resolution>
Default: 300 (5 minutes)
Options: 1 to 65535

Resolution

Serial Cmd: <**K409,***status,service message,threshold,****resolution***>
Default: Seconds
Options: 0 = Seconds 1 = Minutes

User-Defined Name

Definition:	**User-Defined Name** allows you to enter any string of ASCII characters to help you identify your reader. The user-assigned name is saved at power-on and custom defaults, and is stored as a "sticky" parameter so it cannot be defaulted without a **<Zrdall>** or **<K412d>** command.
Serial Cmd:	<**K412,***user-assigned name*>
Options:	ASCII string, up to 19 characters

7

Symbology Parameters

This section describes the various code types that can be decoded by the V460-H, and the specific parameters that can be configured for such code types. All parameters can be configured directly via WebLinkHH and also via serial commands (Ethernet communication).

7-1 Symbologies 7-2

7-1 Symbologies

7-1-1 Symbologies Serial Commands

Composite	<**K453,***symbology status,separator status,separator character*>
Aztec	<**K458**,*status*>
Micro QR Code	<**K459**,*status*>
Postal Symbologies	<**K460**,*postal symbology type,POSTNET status,PLANET status, USPS4CB status*>
Code 39	<**K470,***status,check character status,check character output status, large intercharacter gap,fixed symbol length status, fixed symbol length,full ASCII set*>
Codabar	<**K471,***status,start/stop match,start/stop output,large intercharacter gap,fixed symbol length status,symbol length,check character type,check character output*>
Interleaved 2 of 5	<**K472,***status,check character status,check character output status, symbol length #1, symbol length #2, guard bar status, range mode status*>
UPC/EAN	<**K473,***UPC status,EAN status,supplemental status,separator status, separator character,supplemental type,format UPC-E as UPC-A*>
Code 128/EAN 128	<**K474,***status,fixed symbol length status,fixed symbol length,EAN 128 status,output format,application record separator status,application record separator character,application record brackets,application record padding*>
Code 93	<**K475,***status,fixed symbol length status,symbol length*>
PDF417	<**K476,***status,unused,fixed symbol length status,symbol length*>
Pharmacode	<**K477,***status,fixed bar count status,fixed bar count,minimum bar count,bar width mode,direction,fixed threshold value,background color*>
DMRE (Data Matrix Rectangular Extension	<**K478,***DMRE status,use alignment pattern*>
Data Matrix	<**K479,***ECC 200 status, ECC 000 status,ECC 050 status, ECC 080 status, ECC 100 status,ECC 140 status,ECC 120 status,ECC 130 status*>
QR Code	<**K480,***status*>
BC412	<**K481,***status,check character output,fixed symbol length status, fixed symbol length*>
DataBar-14 Omnidirectional	<**K482,***status*>
DataBar Limited	<**K483,***status*>
DataBar Expanded	<**K484,***status,fixed symbol length status,fixed symbol length*>
MicroPDF417	<**K485,***status,[unused],fixed symbol length status,fixed symbol length*>
DotCode	<**K497,***status,rotation mode*>

Composite

When set to **Enabled** or **Required**, will decode the 2D composite component of a linear symbol. The linear symbol can be DataBar-14, DataBar Expanded, DataBar Limited, EAN-128, UPC-A, EAN-13, EAN-8, and UPC-E.

Usage: Allows reading by both linear and 2D readers.
Definition: Combines 2D and linear width-modulated symbology on the same symbol where different messages can be read by each reader type.
Serial Cmd: <**K453,*mode,***separator status,separator>
Default: **Disabled**
Options: **0 = Disabled** 1 = Enabled 2 = Required

Enabled

If **Composite** is set to **Enabled**, the reader will decode both the 2D composite and linear components. However, if the 2D composite component is not decoded, the linear data will be sent by itself at the end of the read cycle.

Required

If set to **Required**, the reader must decode both components, or a No-Read will occur.

7-1-2 Separator Status (Composite)

Usage: Allows the user to distinguish between the main and **Supplemental** symbols.
Definition: Separates the linear and the composite component.
Serial Cmd: <**K453,***mode,**separator status**,separator*>
Default: **Disabled**
Options: **0 = Disabled** 1 = Enabled

7-1-3 Separator Character (Composite)

Note: The Separator Character will be the same as the character defined in the **Multisymbol Separator** field of the **<K222>** command.

Usage: As required by the application.
Definition: Allows the user to change the separator character from a comma to a new character.
Serial Cmd: <**K453,***mode,separator status,**separator***>
Default: **,** (comma)
Options: Any ASCII character.

Aztec

Usage: Used in document imaging, railway ticket validation, and some postal applications.

Definition: A 2D matrix symbology built on a square grid with a square “bull’s-eye” pattern at the center. **Aztec** can encode up to 3,832 numeric or 3,067 alphabetical characters, or 1,914 bytes of data.

The level of Reed-Solomon error correction used with Aztec is configurable, from 5% to 95% of the total data region. The recommended error correction level is 23% of symbol capacity plus codewords.

Serial Cmd: <**K458,*status***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Micro QR Code

Usage: Used in various applications that require higher data density than that provided by standard QR Code. Some application examples are automotive inventory, vehicle ID, and mobile phone URL encodation.

Definition: **Micro QR Code** is a 2D matrix symbology that comes in 4 different symbol sizes, the largest capable of encoding 35 numeric characters.

Serial Cmd: <**K459,*status***>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

Postal Symbologies

Important: Postal Symbologies must have a minimum pixels-per-element value of **4** to be decoded reliably by the reader.

The reader must be configured to specific read range, field of view, and camera parameters before decoding Postal Symbologies.

For optimal decode results, position the symbol as close to the center of the reader's field of view as possible.

7-1-4 Postal Symbology Type

Usage: The following 1D **Postal Symbologies** are used in mail sortation, auditing, certified mail, registered mail, metered mail, and point-of-sale (POS) applications.

Definition: Determines the postal symbology that will be decoded by the reader.

Serial Cmd: <**K460,*postal symbology type***,*POSTNET status,PLANET status,USPS4CB status*>

Default: **Disabled**

Options: **0 = Disabled**
1 = U.S. Post (POSTNET, PLANET, USPS4CB)
2 = Australia Post
3 = Japan Post
4 = Royal Mail
5 = KIX
6 = UPU

U.S. Post (POSTNET, PLANET, USPS4CB)

When **U.S. Post** is enabled (**<K460,1>**), the reader will only decode **POSTNET**, **PLANET**, and **USPS4CB** symbols.

Important: POSTNET Status, **PLANET Status**, and **USPS4CB Status** are enabled by default. However, if any of the three U.S. Post symbologies is set to **disabled** individually, symbols of that type will not be decoded by the reader even when U.S. Post is enabled.

For example, if **U.S. Post** is enabled but **POSTNET Status** is disabled (**<K460,1,0>**), **POSTNET** symbols will not be decoded by the reader.

See **POSTNET Status**, **PLANET Status**, and **GS1 DataBar** for more detail about U.S. Post symbologies.

Australian Post

When **Australia Post** is enabled (**<K460,2>**), the reader will only decode Australia Post symbols.

Japan Post

When **Japan Post** is enabled (**<K460,3>**), the reader will only decode Japan Post symbols.

Royal Mail

When **Royal Mail** is enabled (**<K460,4>**), the reader will only decode Royal Mail symbols.

KIX

When **KIX** is enabled (**<K460,5>**), the reader will only decode KIX symbols.

UPU

When **UPU** is enabled, the reader will decode UPU symbols.

For example, if **Postal Symbology Type** is set to **UPU** and **POSTNET Status** is enabled and (**<K460,6,1>**), the reader will attempt to decode both UPU and POSTNET symbols.

7-1-5 POSTNET Status

Usage: **POSTNET** is used by the United States Postal Service to direct mail. The ZIP Code or ZIP+4 Code is encoded in the symbol. Data is encoded in half-height and full-height bars, making POSTNET a “2-state” symbology. The delivery point (usually the last two digits of the address or post office box number) is also typically encoded in POSTNET symbols.

Definition: If **U.S. Post** and **POSTNET Status** are both enabled, the reader will decode POSTNET symbols.

Serial Cmd: <**K460,***postal symbology type*,***POSTNET status***,*PLANET status, USPS4CB status*>

Default: **Enabled**

Options: 0 = Disabled

1 = Enabled

7-1-6 PLANET Status

Usage: **PLANET (Postal Alphanumeric Encoding Technique)** is a symbology used by the United States Postal Service to track and identify items during delivery. Each PLANET symbol is either 12 or 14 digits long, and encodes data in half-height and full-height bars, making PLANET a “2-state” symbology. The symbol always starts and ends with a full-height bar, or “guard rail”, and each individual digit is represented by a set of five bars in which two of the bars are always short.

Definition: If **U.S. Post** and **PLANET Status** are both enabled, the reader will decode PLANET symbols.

Serial Cmd: <**K460,***postal symbology type*,*POSTNET status*,***PLANET status***, *USPS4CB status*>

Default: **Enabled**

Options: 0 = Disabled

1 = Enabled

7-1-7 USPS4CB Status

Usage: **USPS4CB**, also called **Intelligent Mail**, is used by the United States Postal Service to sort and track individual items as well as flats of mail. USPS4CB combines the capabilities of POSTNET and PLANET, and can encode 31 digits (65 bars). USPS4CB symbols are slightly longer than POSTNET symbols, and offer additional flexibility in choosing symbol height and width.

Data is encoded in four types of bars (“states”), each of which is identified by a name and a value. This type of postal symbol is known as “4-state”. Each bar has a “tracker”, or middle section, to which an “ascender” (top section) or “descender” (bottom section) may be added. The 4-state format allows the symbol to contain more information, and makes it easier to decode. 4-state symbols can also be printed easily in a variety of media, including dot matrix, inkjet, and laser.

Definition: If **U.S. Post** and **USPS4CB Status** are both enabled, the reader will decode USPS4CB symbols.

Serial Cmd: <**K460,***postal symbology type*,*POSTNET status,PLANET status,****USPS4CB status***>

Default: **Enabled**

Options: 0 = Disabled

1 = Enabled

Code 39

Usage: **Code 39** is considered the standard for non-retail 1D symbology.

Definition: An alphanumeric symbology with unique start/stop code patterns, composed of 9 black and white elements per character, of which 3 are wide.

Serial Cmd: <**K470,*status***,*check character status,check character output status,large intercharacter gap,fixed symbol length status,fixed symbol length,full ASCII set*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-8 Check Character Status (Code 39)

Serial Cmd: <**K470,***status,**check character status**,check character output status,large intercharacter gap,fixed symbol length status,fixed symbol length,full ASCII set*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-9 Check Character Output Status (Code 39)

Usage: **Check Character Output Status**, added to the symbol, provides additional data security.

Definition: When enabled, the check character character is read and compared along with the symbol data. When disabled, symbol data is sent without the check character.

Note: With **Check Character Output Status** and an **External** or **Serial** trigger option enabled, an invalid check character calculation will cause a No-Read message to be transmitted at the end of the read cycle.

Serial Cmd: <**K470,***status,check character status,**check character output status**,large intercharacter gap,fixed symbol length status,fixed symbol length,full ASCII set*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-10 Large Intercharacter Gap (Code 39)

Usage: **Large Intercharacter Gap** is helpful for reading symbols that are printed out of specification.

Definition: When enabled, the reader can read symbols with gaps between symbol characters that exceed three times (3x) the narrow element width.

Serial Cmd: <**K470,***status,check character status,check character output status,**large intercharacter gap**,fixed symbol length status,fixed symbol length,full ASCII set*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-11 Fixed Symbol Length Status (Code 39)

Definition: When enabled, the reader will check the symbol length against the symbol length field. If disabled, any length will be considered valid.

Serial Cmd: <**K470,***status,check character status,check character output status,large intercharacter gap,**fixed symbol length status**,fixed symbol length,full ASCII set*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-12 Fixed Symbol Length (Code 39)

Usage: **Fixed Symbol Length** helps prevent truncations and increases data integrity by ensuring that only one symbol length will be accepted.

Definition: Specifies the exact number of characters that the reader will recognize (this does not include start and stop and check characters). The reader ignores any symbology that does not match the specified length.

Serial Cmd: <**K470,***status,check character status,check character output status,large intercharacter gap,fixed symbol length status,**fixed symbol length**,full ASCII set*>

Default: **10**

Options: 1 to 64

7-1-13 Full ASCII Set (Code 39)

Usage: Must be enabled when reading characters outside the standard character set (0-9, A-Z, etc.)

The user must know in advance whether or not to use the **Full ASCII Set** option. Since **Full ASCII Set** requires two code words to encode one character, it is less efficient.

Definition: Standard Code 39 encodes 43 characters; zero through nine, capital “A” through capital “Z”, minus symbol, plus symbol, forward slash, space, decimal point, dollar sign, and percent symbol. When **Full ASCII Set** is enabled, the reader can read the full ASCII character set, from 0 to 255.

Serial Cmd: <**K470,***status,check character status,check character output status,large intercharacter gap,fixed symbol length status,fixed symbol length,**full ASCII set***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Codabar

Usage: Used in photo-finishing and library applications. Previously used in medical applications, but not typically used in newer medical applications.

Definition: Codabar is a 16-bit character set (0 through 9, and the characters **$**, **:**, /, **.**, **+**, and **–**) with start/stop codes and at least two distinctly different bar widths.

Serial Cmd: <**K471,*status***,*start/stop match,start/stop output,large intercharacter gap,fixed symbol length status,symbol length,check character type,check character output*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-14 Start/Stop Match (Codabar)

Definition: When disabled, the reader will decode Codabar symbols whether or not the start and stop characters are the same.

When enabled, the reader will not decode Codabar symbols unless the start and stop characters are the same.

Serial Cmd: <**K471,***status*,***start/stop match***,start/stop output,large intercharacter gap,fixed symbol length status,symbol length,check character type,check character output*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-15 Start/Stop Output (Codabar)

Definition: When disabled, the start and stop characters will *not* be present in the data output of the decoded symbol.

When enabled, the start and stop characters *will* be present in the data output of the decoded symbol.

Note: Because the start and stop characters are included as part of the data, the characters must be included as part of the length in a fixed length mode of operation.

Serial Cmd: <**K471,***status,start/stop match,****start/stop output****,large intercharacter gap,fixed symbol length status,symbol length,check character type,check character output*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-16 Large intercharacter Gap (Codabar)

Definition: When disabled, the spaces between characters, or the “intercharacter gap”, are ignored during the decode process.

Note: If the intercharacter space is large enough to be considered a margin, the symbol will not decode, regardless of this parameter’s setting.

Serial Cmd: <**K471,***status,start/stop match,start/stop output,****large intercharacter gap****,fixed symbol length status,symbol length,check character type,check character output*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-17 Fixed Symbol Length Status (Codabar)

Definition: When disabled, the reader will accept any Codabar symbol provided it doesn't exceed the system's maximum capabilities.
When enabled, the reader will reject any Codabar symbol that doesn't match the fixed length.

Serial Cmd: <**K471,***status,start/stop match,start/stop output,large intercharacter gap,****fixed symbol length status****,symbol length,check character type,check character output*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-18 Symbol Length (Codabar)

Definition: This is the value against which all Codabar symbol lengths will be compared.

Serial Cmd: <**K471,***status,start/stop match,start/stop output,large intercharacter gap,fixed symbol length status,****symbol length****,check character type,check character output*>

Default: **10**

Options: 1 to 64

7-1-19 Check Character Type (Codabar)

Definition: When disabled, the reader will not perform any character checking calculations on decoded Codabar symbols.
When set to **Mod 16**, the reader will perform a modulus 16 check character calculation on the symbol. If the symbol does not pass this calculation, it will not be decoded.
When set to **NW7**, The reader will perform an NW7 modulus 11 check character calculation on the symbol. If the symbol does not pass this calculation, it will not be decoded.
When set to **Both**, the reader will perform both the Mod 16 and NW7 modulus 11 check character calculations on the symbol. If the symbol does not pass either calculation, it will not be decoded.

Serial Cmd: <**K471,***status,start/stop match,start/stop output,large intercharacter gap,fixed symbol length status,symbol length,****check character type****,check character output*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Mod 16 2 = NW7 (Mod 11)
3 = Mod 16 and NW7

7-1-20 Check Character Output (Codabar)

Definition: When this field is disabled and a check character calculation is enabled, the reader will strip the verified check character from the symbol data output. This condition must be accounted for if a fixed length is also being used.
When enabled, the reader will output the check character as part of the symbol data. This condition must be accounted for if a fixed length is also being used.

Serial Cmd: <**K471,***status,start/stop match,start/stop output,large intercharacter gap,fixed symbol length status,symbol length,check character type,****check character output****>*

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Interleaved 2 of 5

Usage: I-2/5 has been popular because it is the most dense symbology for printing numeric characters less than 10 characters in length; however, Omron Microscan does not recommend this symbology for any new applications because of inherent problems such as truncation.

Definition: A dense, continuous, self-checking, numeric symbology. Characters are paired together so that each character has five elements, two wide and three narrow, representing numbers 0 through 9, with the bars representing the first character and the interleaved spaces representing the second character. (A check character is highly recommended).

Important: You must set Symbol Length in order to decode I-2/5 symbols, unless **Range Mode** is enabled.

Serial Cmd: <**K472,*status***,*check character status,check character output status,symbol length #1,symbol length #2,guard bar status,range mode status*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-21 Check Character Status (Interleaved 2 of 5)

Usage: This option is not typically used, but it can be enabled for additional security in applications where the host requires redundant check character verification.

Definition: An error correcting routine in which the check character is added.

Serial Cmd: <**K472,***status,**check character status**,check character output status,symbol length #1,symbol length #2,guard bar status,range mode status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-22 Check Output Status (Interleaved 2 of 5)

Definition: When enabled, a check character is sent along with the symbol data for added data security.

Serial Cmd: <**K472,***status,check character status,**check character output status**,symbol length #1,symbol length #2,guard bar status,range mode status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-23 Symbol Length #1 (Interleaved 2 of 5)

Usage: Useful in applications where I 2/5 symbols of a specific length are required.

Definition: The **Symbol Length # 1** field is one of two fields against which the decoded symbol is compared before accepting it as valid or rejecting it.

Serial Cmd: <**K472,***status,check character status,check character output,**symbol length #1**,symbol length #2,guard bar status,range mode status*>

Default: **16**

Options: 0 to 64, even only

Important: If **Range Mode** is disabled, the length of the symbol must match either **Symbol Length # 1** *or* **Symbol Length # 2** to be considered a valid symbol.

If **Range Mode** is enabled, **Symbol Length # 1** and **Symbol Length # 2** form a range into which the length of the symbol must fall to be considered valid.

7-1-24 Symbol Length #2 (Interleaved 2 of 5)

Usage: Useful in applications where I 2/5 symbols of a specific length are required.

Definition: The **Symbol Length # 2** field is one of two fields against which the decoded symbol is compared before accepting it as valid or rejecting it.

Serial Cmd: <**K472,***status,check character status,check character output,symbol length #1,**symbol length #2**,guard bar status,range mode status*>

Default: **6**

Options: 0 to 64, even only

Important: If **Range Mode** is disabled, the length of the symbol must match either **Symbol Length # 2** *or* **Symbol Length # 1** to be considered a valid symbol.

If **Range Mode** is enabled, **Symbol Length # 2** and **Symbol Length # 1** form a range into which the length of the symbol must fall to be considered valid.

7-1-25 Guard Bar Status (Interleaved 2 of 5)

- **Note:** Whenever **Guard Bar** is enabled, the presence of guard bars (also called “bearer bars”) is required for decoding to take place.

Usage: Useful when I-2/5 multisymbols are enabled to prevent false data output. This typically occurs with highly tilted or skewed symbols.

Definition: A guard bar is a heavy bar, at least twice the width of the wide bar, surrounding the printed I-2/5 symbol and helping to prevent false reads.

Serial Cmd: <**K472,***status,check character status,check character output,symbol length #1,symbol length #2,**guard bar status**,range mode status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-26 Range Mode Status (Interleaved 2 of 5)

Usage: Useful in applications where I 2/5 symbols of a specific length are required.

Definition: When **Range Mode** is disabled, the reader checks the value of the symbol length against the values set in **Symbol Length # 1** and **Symbol Length # 2**. If the symbol length does not match either of the preset values, then it is rejected as invalid.

When **Range Mode** is enabled, **Symbol Length # 1** and **Symbol Length # 2** are combined to form a range of valid symbol lengths. Any symbol length that does not fall into this range is rejected as an invalid symbol. Either of the preset symbol length values in the **Symbol Length # 1** and **Symbol Length # 2** fields can form the start or end of the range.

Serial Cmd: <**K472,***status,check character status,check character output,symbol length #1,symbol length #2,guard bar status,**range mode status*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

UPC/EAN

Usage: Used primarily in point-of-sale applications in the retail industry. It is commonly used with the readers in applications in combination with **Matchcode** when there is a need to verify that the right product is being placed in the right packaging.

Definition: **UPC** (Universal Product Code) is a fixed length, numeric, continuous symbology. UPC can have two- or five-digit supplemental bar code data following the normal code. The UPC Version A (UPC, A) symbol is used to encode a 12 digit number. The first digit is the number system character, the next five are the manufacturer number, the next five are the product number, and the last digit is the checksum character.

When enabled, the reader will read UPC Version A and UPC Version E only.

Serial Cmd: <**K473,*UPC status***,*EAN status,supplementals status,separator status, separator character,supplemental type,format UPC-E as UPC-A*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-27 EAN Status

Usage: **EAN** is the European version of the UPC symbology and is used in European market applications.

Note: UPC must be enabled for **EAN** to take effect.

Definition: EAN is a subset of UPC. When enabled, the reader will read UPC Version A, UPC Version E, EAN 13, and EAN 8. It also appends a leading zero to UPC Version A symbol information and transmits 13 digits. If transmitting 13 digits when reading UPC Version A symbols is not desired, disable EAN.

Note: The extra character identifies the country of origin.

Serial Cmd: <**K473,***UPC status,****EAN status***,supplementals status,separator status, separator character,supplemental type,format UPC-E as UPC-A*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-28 Supplemental Status (UPC/EAN)

Usage: Reads **Supplementals** typically used in publications and documentation.

Definition: A supplemental is a 2 to 5 digit symbol appended to the main symbol. When set to **Enabled** or **Required**, the reader reads supplemental code data that has been appended to the standard UPC or EAN codes.

Serial Cmd: <**K473,***UPC status,EAN status,****supplementals status***,separator status, separator character,supplemental type,format UPC-E as UPC-A*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled 2 = Required

Disabled

UPC **Supplementals** will not be decoded.

Enabled

When enabled, the reader will try to decode a main and a supplemental.

Required

When set to **Required**, both the main and the supplemental symbols must be read.

For example, if **Supplementals** is set to **Required**, **Separator** is enabled, and an asterisk is defined as the UPC separator character. Then the data is displayed as:

MAIN * SUPPLEMENTAL.

- **Note:** Under no circumstances will the supplemental symbol data be sent without a main symbol.
- **Note:** If additional symbols—other than the main or supplemental—will be read in the same read cycle, **Number of Symbols** should be set accordingly.

7-1-29 Separator Status (UPC/EAN)

Usage: Allows users to distinguish between the main and **Supplemental** symbols.

Definition: A character can be inserted between the standard UPC or EAN symbology and the supplemental symbology when **Supplementals** is set to **Enabled** or **Required.**

Serial Cmd: <**K473,***UPC status,EAN status,supplementals status,****separator status****, separator character,supplemental type,format UPC-E as UPC-A*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-30 Separator Character (UPC/EAN)

Usage: As required by the application.

Definition: Allows the user to change the separator character from a comma to a new character.

Serial Cmd: <**K473,***UPC status,EAN status,supplementals status,separator status,* ***separator character****,supplemental type,format UPC-E as UPC-A*>

Default: **,** (**comma**)

Options: Any ASCII character.

- **Note:** Whenever **Separator Character** is defined as a comma (**,**) sending a <**K473,s?**> command will return the current settings, including the separator character comma which appears after the separator status comma.

7-1-31 Supplemental Type (UPC/EAN)

Usage: As required by symbology used in application.

Definition: Allows the user to select 2 character or 5 character supplements, or both.

Serial Cmd: <**K473,***UPC status,EAN status,supplementals status,separator status, separator character,****supplemental type****,format UPC-E as UPC-A*>

Default: **Both**

Options: **0 = Both** 1 = 2 characters only 2 = 5 characters only

Both

Either 2 character or 5 character supplementals will be considered valid.

2 Characters Only

Only two character supplementals will be considered valid.

5 Characters Only

Only five character supplementals will be considered valid.

7-1-32 Format UPC-E as UPC-A (UPC/EAN)

Definition: When disabled, the reader will output the version E symbols in their encoded 6-character format.
When enabled, the reader will format the symbol as either a 12-character UPC-A symbol or an EAN-13 symbol, depending on the state of the EAN status parameter. This formatting reverses the zero suppression that is used to generate the symbol in the UPC specification.

Serial Cmd: <**K473,***UPC status,EAN status,supplementals status,separator status, separator character,supplemental type,****format UPC-E as UPC-A***>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

Code 128/EAN 128

Usage: **Code 128** is a smaller symbology useful in applications with tight spots and high security needs.

Definition: A very dense alphanumeric symbology. It encodes all 128 ASCII characters, it is continuous, has variable length, and uses multiple element widths measured edge to edge.

Serial Cmd: <**K474,*status***,*fixed symbol length status,fixed symbol length,EAN 128 status, output format,application record separator status,application record separator character,application record brackets,application record padding*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-33 Fixed Symbol Length Status (Code 128/EAN 128)

Definition: When enabled, the reader will check the symbol length against the symbol length field. If disabled, any length will be considered a valid symbol.

Serial Cmd: <**K474,***status*,***fixed symbol length status***,*fixed symbol length,EAN 128 status, output format,application record separator status,application record separator character,application record brackets,application record padding*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-34 Fixed Symbol Length (Code 128/EAN 128)

Usage: **Fixed Symbol Length** helps prevent truncations and increases data integrity by ensuring that only one symbol length will be accepted.

Definition: This specifies the exact number of characters that the reader will recognize (this does not include start, stop, and check characters). The reader ignores any symbol not having the specified length.

Serial Cmd: <**K474,***status,fixed symbol length status,****fixed symbol length****,EAN 128 status,output format,application record separator status,application record separator character,application record brackets,application record padding*>

Default: **10**

Options: 1 to 64

7-1-35 EAN 128 Status (Code 128/EAN 128)

Definition: When this field is disabled, the reader will not check any Code 128 labels for conformance to EAN requirements, or perform any special formatting.

When enabled, the reader can read symbols with or without a function 1 character in the first position. If a symbol has a function 1 character in the first position, it must conform to EAN format. Symbols that conform to EAN format will also be subject to the special output formatting options available in this command.

If EAN status is required, the reader will only decode symbols that have a function 1 character in the first position and that conform to EAN format. All symbols read will be subject to the special output formatting options available in this command.

Note: Code 128 status must be enabled for EAN status to be active.

Serial Cmd: <**K474,***status,fixed symbol length status,fixed symbol length,****EAN 128 status****, output format,application record separator status,application record separator character,application record brackets,application record padding*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled 2 = Required

7-1-36 Output Format (Code 128/EAN 128)

Definition: In **Standard**, the reader will not apply special EAN output formatting options.
In **Application**, the reader will apply the special EAN output formatting options to decoded EAN-conforming symbols.

Serial Cmd: <**K474,***status,fixed symbol length status,fixed symbol length,EAN 128 status,* ***output format****,application record separator status,application record separator character,application record brackets,application record padding*>

Default: **Standard**

Options: **0 = Standard** 1 = Application

7-1-37 Application Record Separator Status (Code 128/EAN 128)

Definition: When enabled, an EAN separator will be inserted into the output between fields whenever an EAN-conforming symbol is decoded and EAN output formatting applies.

Serial Cmd: <**K474,***status,fixed symbol length status,fixed symbol length,EAN 128 status, output format,****application record separator status****,application record separator character,application record brackets,application record padding*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-38 Application Record Separator Character (Code 128/EAN 128)

Definition: This is an ASCII character that serves as an EAN separator in formatted EAN output.

Serial Cmd: <**K474,***status,fixed symbol length status,fixed symbol length,EAN 128 status, output format,application record separator status,****application record separator character****,application record brackets,application record padding*>

Default: **,**

Options: Any ASCII character (7 bit)

7-1-39 Application Record Brackets (Code 128/EAN 128)

Definition: If an EAN-conforming symbol is decoded and EAN formatting applies, this feature places bracket characters around the application identifiers in the formatted output.

Serial Cmd: <**K474,***status,fixed symbol length status,fixed symbol length,EAN 128 status, output format,application record separator status,application record separator character,****application record brackets****,application record padding*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-40 Application Record Padding (Code 128/EAN 128)

Definition: This feature causes the reader to pad variable-length application fields with leading zeroes. This is not done for the last field of a symbol.

Serial Cmd: <**K474,***status,fixed symbol length status,fixed symbol length,EAN 128 status, output format,application record separator status,application record separator character,application record brackets,****application record padding***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Code 93

Usage: Sometimes used in clinical applications.

Definition: Code 93 is a variable-length, continuous symbology employing four element widths. Each Code 93 character has nine modules that may be either black or white. Each character contains three bars and three spaces.

Serial Cmd: <**K475,*status***,*fixed symbol length status,symbol length*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-41 Fixed Symbol Length Status (Code 93)

Definition: When disabled, the reader will accept any Code 93 symbol provided is doesn't exceed the system's maximum capabilities.
When enabled, the reader will reject any Code 93 symbol that doesn't match the fixed symbol length.

Serial Cmd: <**K475,***status,**fixed symbol length status***,*symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-42 Symbol Length (Code 93)

Definition: This is the symbol length value against which all Code 93 symbols will be compared.

Serial Cmd: <**K475,***status,fixed symbol length status,**symbol length***>

Default: **10**

Options: 1 to 64

PDF417

Usage: Used in applications where a large amount of information (over 32 characters) needs to be encoded within a symbol, typically where the symbol is transported from one facility to another. For example, an automobile assembly line might use a single symbol with multiple fields of information that will be read at several stations along the way, without reference to a database.

Definition: A two-dimensional, multi-row (3 to 90), continuous, variable length symbology that has high data capacity for storing up to 2,700 numeric characters, 1,800 printable ASCII characters, or 1,100 binary characters per symbol. Each symbol character consists of 4 bars and 4 spaces in a 17-module structure.

Serial Cmd: <**K476,*status***,*[unused],fixed symbol length status,fixed symbol length*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

Note: Sending **<a1>** will cause PDF417 data to be prefaced with information consisting of error correction level (ECC Level ***n***), number of rows (***n*** Rows), number of columns (***n*** Columns), number of informative code words (***n*** Info Code Words) and the number of data characters (***n*** Data Characters). This feature can be disabled by re-sending **<a1>**.

7-1-43 Fixed Symbol Length Status (PDF417)

Serial Cmd: <**K476,***status,[unused],**fixed symbol length status**,fixed symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-44 Fixed Symbol Length (PDF417)

Usage: Used to increase data integrity by ensuring that only one symbol length will be accepted.

Definition: When enabled, the PDF symbol must contain the same number of characters as the symbol length setting before it can be considered a good read. The reader will ignore any symbol not having the specified length.

Serial Cmd: <**K476,***status,[unused],fixed symbol length status,**fixed symbol length***>

Default: **10**

Options: 1 to 2710

Note: Fixed Symbol Length Status must be enabled for **Fixed Symbol Length** to take effect.

Pharmacode

Usage: Used mostly with packaging for the pharmaceuticals industry.

Definition: Encodes up to five different numbers, each with its own color, which may be entered in decimal or “binary” format with a 1 represented by a thick bar and a 0 represented by a thin bar. Bar width is independent of height.
In decimal format, each part can be up to 999,999.
In binary format, each input can have up to 19 ones and zeros.
Important: When Pharmacode is enabled, other linear symbologies will not decode properly. Disable Pharmacode before reading other linear symbologies.

Serial Cmd: <**K477,*status***,*fixed symbol length status,fixed symbol length,minimum number of bars,bar width status,direction,fixed threshold value,background color*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-45 Fixed Symbol Length Status (Pharmacode)

Definition: When enabled, the reader will check the symbol length against the symbol length field. If disabled, any length will be considered valid.

Serial Cmd: <**K477,***status,**fixed symbol length status**,fixed symbol length,minimum number of bars,bar width status,direction,fixed threshold value,background color*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-46 Fixed Symbol Length (Pharmacode)

Definition: Specifies the exact number of bars that must be present for the reader to recognize and decode the Pharmacode symbol.

Serial Cmd: <**K477,***status,fixed symbol length status,**fixed symbol length**,minimum number of bars,bar width status,direction,fixed threshold value,background color*>

Default: **5**

Options: 1 to 16

7-1-47 Minimum Number of Bars (Pharmacode)

Definition: Sets the minimum number of bars that a Pharmacode symbol must have to be considered valid.

Serial Cmd: <**K477,***status,fixed symbol length status,fixed symbol length,**minimum number of bars**,bar width status,direction,fixed threshold value,background color*>

Default: **4**

Options: 1 to 16

7-1-48 Bar Width Status (Pharmacode)

Definition: If set to **Mixed**, the reader will autodiscriminate between narrow bars and wide bars. If set to **All Narrow**, all bars will be considered as narrow bars. If set to **All Wide**, all bars will be considered as wide bars. If set to **Fixed Threshold**, it will use the fixed threshold value to determine whether the bars are narrow or wide. The **Bar Width Status** setting will be ignored when the reader is able to tell the difference between the narrow and the wide bars.

Serial Cmd: <**K477,***status,fixed symbol length status,fixed symbol length,minimum number of bars,**bar width status**,direction,fixed threshold value,background color*>

Default: **Mixed**

Options: **0 = Mixed**
1 = All Narrow
2 = All Wide
3 = Fixed Threshold

7-1-49 Direction (Pharmacode)

Definition: Specifies the direction in which a symbol can be read.

Serial Cmd: <**K477,***status,fixed symbol length status,fixed symbol length,minimum number of bars,bar width status,**direction**,fixed threshold value,background color*>

Default: **Forward**

Options: **0 = Forward** 1 = Reverse

7-1-50 Fixed Threshold Value (Pharmacode)

Definition: Used when **Bar Width Status** is set to **Fixed Threshold**. Defines the minimum difference in pixels that will distinguish a narrow bar from a wide bar.

Serial Cmd: <**K477,***status,fixed symbol length status,fixed symbol length,minimum number of bars,bar width status,direction,**fixed threshold value**,background color*>

Default: **10**

Options: 1 to 65535

7-1-51 Background Color (Pharmacode)

Definition: Used when the color of bars is reversed. Sets the background color that a Pharmacode symbol must have to be considered valid.

Serial Cmd: <**K477,***status,fixed symbol length status,fixed symbol length,minimum number of bars,bar width status,direction,fixed threshold value,background color*>

Default: **White**

Options: 0 = Black 1 = White

DMRE (Data Matrix Rectangular Extension)

Usage: Useful where information needs to be packed into a narrow region, and/or where symbols need to be applied directly to the substrate with laser etching, chemical etching, dot peen, or other methods.

Definition: DMRE is a new ISO standard (ISO/IEC 21471) for Data Matrix codes with additional rectangular formats (aspect ratios) beyond what is supported by the standard Data Matrix standard (ISO16022).

7-1-52 DMRE Status

Definition: Enables or disables the DMRE symbology.

Serial Cmd: <**K478,*DMRE status***,*use alignment pattern*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-53 Use Alignment Pattern

Definition: Enables or disables the DMRE alignment pattern.

Serial Cmd: <**K478,***DMRE status*,***use alignment pattern***>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

Data Matrix

Usage: Very useful where information needs to be packed into a small area, and/or where symbols need to be applied directly to the substrate with laser etching, chemical etching, dot peen, or other methods.

Definition: Data Matrix is a type of Matrix symbology and has subsets ECC 000 - ECC 200. ECC 200 symbols have an even number of rows and an even number of columns. Most of the symbols are square with sizes from 10x10 to 144x144. Some symbols, however, are rectangular, with sizes from 8x18 to 16x48. All ECC 200 symbols can be recognized by the upper right corner module being light (binary 0) instead of dark.

7-1-54 ECC 200

Definition: When enabled, will decode ECC 200 Data Matrix symbols.

Serial Cmd: <**K479,*ECC 200 status***,*ECC 000 status,ECC 050 status,ECC 080 status, ECC 100 status,ECC 140 status,ECC 120 status,ECC 130 status*>

Default: **Enabled**

Note: This is the only symbol type enabled by default.

Options: 0 = Disabled **1 = Enabled**

7-1-55 ECC 000

Definition: When enabled, will decode ECC 000 symbols.

Serial Cmd: <**K479,***ECC 200 status,****ECC 000 status***,ECC 050 status,ECC 080 status, ECC 100 status,ECC 140 status,ECC 120 status,ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-56 ECC 050

Definition: When enabled, will decode ECC 050 symbols.

Serial Cmd: <**K479,***ECC 200 status,ECC 000 status,****ECC 050 status***,ECC 080 status, ECC 100 status,ECC 140 status,ECC 120 status,ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-57 ECC 080

Definition: When enabled, will decode ECC 080 symbols.

Serial Cmd: <**K479,***ECC 200 status,ECC 000 status,ECC 050 status,****ECC 080 status***, ECC 100 status,ECC 140 status,ECC 120 status,ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-58 ECC 100

Definition: When enabled, will decode ECC 100 symbols.

Serial Cmd: <**K479,***ECC 200 status,ECC 000 status,ECC 050 status,ECC 080 status,* ***ECC 100 status***,*ECC 140 status,ECC 120 status,ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-59 ECC 140

Definition: When enabled, will decode ECC 140 symbols.

Serial Cmd: <**K479,***ECC 200 status,ECC 000 status,ECC 050 status,ECC 080 status, ECC 100 status,**ECC 140 status**,ECC 120 status,ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-60 ECC 120

Definition: When enabled, will decode ECC 120 symbols.

Serial Cmd: <**K479,***ECC 200 status,ECC 000 status,ECC 050 status,ECC 080 status, ECC 100 status,ECC 140 status,**ECC 120 status**,ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-61 ECC 130

Definition: When enabled, will decode ECC 130 symbols.

Serial Cmd: <**K479,***ECC 200 status,ECC 000 status,ECC 050 status,ECC 080 status, ECC 100 status,ECC 140 status,ECC 120 status,**ECC 130 status*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

QR Code

Usage: Widely implemented in the automotive industry in Japan and throughout their worldwide supply chain.

Definition: QR Code is capable of handling numeric, alphanumeric, and byte data as well as kanji and kana characters. Up to 7,366 characters (numeric data) can be encoded using this symbol. Therefore, less space is required to encode the same amount of data in a QR Code symbol than in a conventional symbol, lowering the cost of labelling.

Three Position Detection Patterns in the symbol make omnidirectional, ultra-fast reading possible.

QR Code has error protection capability. Data can often be restored even if a part of the symbol has become dirty or damaged.

Serial Cmd: <**K480,*status***>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

BC412

Usage: Widely used in semiconductor manufacturing. Particularly useful where speed, accuracy, and ease of printing are required.

Definition: BC412 (Binary Code 412), a proprietary IBM symbology since 1988, is an alphanumeric symbol with a set of 35 characters, each encoded by a set of 4 bars in 12 module positions. All bars have a single width; it is the presence (1) or absence (0) of bars in each of the twelve module positions that make BC412 binary.

This symbology is also bi-directional and self-clocking, with a start character and a stop character.

Serial Cmd: <**K481,*status***,*check character output,fixed symbol length status,fixed symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-62 Check Character Output (BC412)

Usage: **Check Character Output**, added to the symbol, provides additional security.

Definition: When enabled, the check character is read and compared along with the symbol data. When disabled, symbol data is sent without the check character.

Serial Cmd: <**K481,***status*,***check character output***,*fixed symbol length status,fixed symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-63 Fixed Symbol Length Status (BC412)

Definition: When enabled, the reader will check the symbol length against the symbol length field. If disabled, any length will be considered valid.

Serial Cmd: <**K481,***status,check character output,****fixed symbol length status****,fixed symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-64 Fixed Symbol Length (BC412)

Definition: When enabled, the check character is read and compared along with the symbol data. When disabled, symbol data is sent without the check character.

Serial Cmd: <**K481,***status,check character output,fixed symbol length status,****fixed symbol length***>

Default: **10**

Options: 1 to 64

GS1 DataBar

7-1-65 DataBar Expanded

Usage: Used to encode primary and supplementary data in retail point-of-sale and other applications.

Definition: DataBar Expanded is a variable length symbology that can encode supplementary information in addition to the 14-digit EAN item identification number and is capable of encoding up to 74 numeric or 41 alphabetic characters.

Serial Cmd: <**K484,*status,***fixed symbol length status,fixed symbol length*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-66 Fixed Symbol Length Status (DataBar Expanded)

Definition: When enabled, the reader will check the symbol length against the symbol length field, minus the embedded check character. If disabled, any length would be considered valid.

Serial Cmd: <**K484,***status,****fixed symbol length status****,fixed symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-67 Fixed Symbol Length (DataBar Expanded)

Usage: **Fixed Symbol Length** helps prevent truncations and increases data integrity by ensuring that only one symbol length will be accepted.

Definition: Specifies the exact number of characters that the reader will recognize (this does not include start, stop, and check character characters). The reader ignores any symbol not having the specified length.

Serial Cmd: <**K484,***status,fixed symbol length status,****fixed symbol length***>

Default: **14**

Options: 1 to 74

7-1-68 DataBar Limited

Usage: DataBar Limited is designed to be read by laser and CCD readers. It is not recommended for omnidirectional slot scanners.

Definition: Encodes a smaller 14-digit symbol (74 modules wide) that is not omnidirectional.

Serial Cmd: <**K483,*status***>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-69 DataBar-14

Usage: Used in the grocery, retail, and prescription drug industries where 14-digit EAN item identification may be needed.

Definition: DataBar-14 is a fixed symbol length symbology that encodes 14 digits, including a 1-digit indicator. DataBar-14 is 96 modules wide. It can be stacked in two rows, it can read omnidirectionally if printed in full height, or horizontally if height-truncated for small marking.

Serial Cmd: <**K482,*status***>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

MicroPDF417

Usage: Used for labelling small items that need large data capacity.

Definition: A variant of PDF417, a very efficient and compact stacked symbology that can encode up to 250 alphanumeric characters or 366 numeric characters per symbol.

Serial Cmd: <**K485,*status***,*[unused],fixed symbol length status,fixed symbol length*>

Default: **Enabled**

Options: 0 = Disabled **1 = Enabled**

7-1-70 Fixed Symbol Length Status (MicroPDF417)

Serial Cmd: <**K485,***status,[unused],**fixed symbol length status**,fixed symbol length*>

Default: **Disabled**

Options: **0 = Disabled** 1 = Enabled

7-1-71 Fixed Symbol Length (MicroPDF417)

Usage: Used to increase data integrity by ensuring that only one symbol length will be accepted.

Definition: When enabled, the MicroPDF417 symbol must contain the same number of characters as the symbol length setting before it can be considered a good read. The reader will ignore any symbol not having the specified length.

Serial Cmd: <**K485,***status,[unused],fixed symbol length status,fixed symbol length*>

Default: **10**

Options: 1 to 366

Note: Fixed Symbol Length Status must be enabled for **Fixed Symbol Length** to take effect.

DotCode

Important: When DotCode is enabled, no other symbologies will be decodable. You must disable DotCode to decode symbols of any other type.

See **DotCode** in **Advanced Settings** for details about how to specify row and column dimensions of DotCode symbols.

7-1-72 DotCode Status

Serial Cmd: <**K497,*status***,*rotation mode*>
Default: **0 = Disabled**
Options: **0 = Disabled**
1 = Enabled

Disabled

The reader will not attempt to decode DotCode symbols.

Enabled

The reader will attempt to decode DotCode symbols.

7-1-73 Rotation Mode

Serial Cmd: <**K497,***status*,***rotation mode***>
Default: **0 = No Rotation**
Options: **0 = No Rotation**
1 = Low Rotation
2 = Omnidirectional

No Rotation

The reader will decode horizontal and vertical symbols (**+/–** approximately **3 degrees**).

Low Rotation

The reader will decode **+/–** approximately **10 degrees** from the horizontal or vertical symbols. It is slightly slower than the No Rotation option.

Omnidirectional

The reader supports **360 degree** decoding. It is significantly slower than the other two options.

8

Troubleshooting

This section provides troubleshooting information, including suggestions about how to solve various reader issues. It also answers some common questions about V460-H functionality.

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8-2 Troubleshooting 8-3
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8-1 Beeper and LED Definitions

Event	Sound / Vibration	WebLinkHH*	LEDs	WebLinkHH*
Standard Use				
Successful Power-On	1 Long Beep / Vibration	YES	**Flash**	NO
Decode – Successful (Good Read)	1 Beep / Vibration	YES	**Flash**	NO
Decode – Unsuccessful (No Read)	2 Beeps / Vibrations	YES	**Flash**	NO
Ethernet Not Connected / Connection Error**	4 Beeps / Vibrations	NO	**Blink**	NO
Presentation Mode ON				
Ready	None	NO	**Steady**	NO
Decode – Successful (Good Read)	1 Beep	YES	**Flash**	NO
Barcode Programming				
Programming – Successful (Code OK)	2 Beeps / Vibrations	YES	**Blink**	NO
Maintenance Indications				
Firmware Installation	2 Long Beeps / Vibrations	YES	**Flash**	NO

***WebLinkHH:** Indicates if the feature can be enabled / disabled via WebLinkHH.

****If you connect the reader and then disconnect the Ethernet cable from the PC or PLC, the reader will beep four times every few seconds to signal that the Ethernet cable is disconnected.

8-2 Troubleshooting

Problem	Possible Causes	Possible Solutions
The aiming pattern does not appear.	There is no power to the reader.	Power to the V460-H is provided by a PoE injector (IEEE 802.3af). Ensure that the PoE injector is turned on and the cables are connected properly.
	The V460-H / PoE Injector or PoE Injector / Power cables are loose.	Re-connect cables.
	The aiming pattern is disabled.	Enable the aiming pattern.
The reader's aiming pattern appears, but the reader fails to decode the symbol.	The reader is not configured for the correct code type.	Configure the reader for the correct code type.
	The symbol is unreadable.	Scan test symbols of the same code type to determine if the barcode is damaged.
	The symbol does not fall completely within the aiming pattern.	Move the symbol completely within the aiming pattern. Move the symbol completely within the field of view (aiming pattern does NOT define the FOV). For long barcodes, move the symbol so that it is in the center of the aiming pattern.
	The distance or positioning between the reader and the barcode is incorrect.	Move the reader closer to or further from the barcode. For barcodes and many flat DPM parts, start at approximately 4" (+/- 100 mm) to 6" (+/- 150 mm) and with some tilt (+/- 15 degrees). For shiny, cylindrical, or curved parts, force the close-up mode by moving the part very close – from contact to approximately 0.25" (+/- 6 mm).
The reader decodes the symbol, but does not transmit the symbol data to the host.	The reader is not configured for the correct host type.	Use WebLinkHH to set the appropriate host type.
	The PoE injector-to-host (device) cable is disconnected or loose.	Re-connect the cable.
The host displays decoded data incorrectly.	The reader is not configured to work with the specific host.	Program the correct data output conditions (e.g., UPC-E to UPC-A Conversion).

Note: If the reader still experiences problems after performing these checks, visit your regional Omron website to contact customer support.

8-3 Q & A

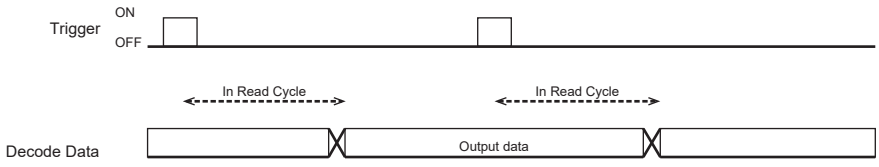
Question	Answer
What is PPE?	PPE stands for Pixels Per Element. For 2D symbols, an element is one cell in a captured image. For 1D symbols (barcodes), an element is the minimum bar width in a captured image. Example: When [PPE=4.0] is displayed in WebLinkHH after decoding a Data Matrix symbol, the Data Matrix cell size is four pixels of the captured image.
Why do images sometimes blur when magnified in WebLinkHH?	In WebLinkHH, compressed images are displayed. Since such images have lower resolution than full-resolution images, they might be blurred when magnified. **Important:** The image will not blur if magnified at 1-to-1. When magnifying a full-resolution image with an actual resolution, use saved images. For the image saving method, refer to **How do I save captured images?**
What should I do if I can't connect to WebLinkHH?	• Turn off the VPN function. When the VPN function is turned back on, local LAN connections other than the VPN are disabled. • Check the IP address using DDU. DDU (Discovery Device Utility) is a tool to search a reader whose IP address is lost. When the search was succeeded, its IP address also can be changed. Download the DDU from your regional Omron website. • Initialize V460-H if the above measures does not help. Related Q&A: How to initialize the settings?
What are the advantages of using WebLinkHH?	The merits of WebLinkHH are that does not require the installation and is easily operated to set with a Web browser. Use WebLinkHH. All functions are available and configurable. WebLinkHH Advantages: • No installation software (Web browser) • Multiple languages supported: English, Japanese, German, Chinese (Simplified and Traditional), Spanish, Korean, French, Portuguese, Italian. • Visually easy to understand UI • No need to check that you have the same version of setup software as the firmware installed on the reader.
Can the position of a code be included in output data?	Enable Advanced - I/O - Output Object Info - Output Coordinates. Following the captured string, every four vertexes of the code are output. • Output example: When a code of 123456 was captured 123456,(0032,0040)(0287,0056)(0287,0279)(0048,0271)
Can serial commands calibrate brightness or focus?	It is possible to adjust with a serial command <@CAL> executing the calibration. When executing the <@CAL> command, V460-H outputs numeric values indicating trial results in some rows and then Calibration PASSED. When failed, Calibration FAILED is output. Example of a response when <@CAL> was succeeded.: Prog| Exposure Gain Brightness 2 | 5764 33 24 100 | 6011 33 37 Calibration PASSED.
How do I input a trigger in serial communications?	The following describes a serial command to input a trigger in default. • Serial Trigger command ASCII character notation< > Hex notation3C 20 3E Although space is a default in the center (Hex notation: 20), it can be changed to any ASCII character from the menu below. WebLinkHH - Gear icon - Advanced - Read Cycle - Serial Trigger - Serial Trigger Character (Delimited) Additionally, from the menu below, any ASCII character can be set up to two characters for Start Trigger Character/Stop Trigger Character that do not need < >. WebLinkHH - Gear icon - Advanced - Read Cycle - Serial Trigger - Start Trigger Character (Non-Delimited)/Stop Trigger Character (Non-Delimted)
How do I access a RAM drive from a PC?	A PC can access a RAM drive using the FTP client tool. The initial values of V460-H are as follows. **Settings** / **Value** IP address / 192.168.188.2 Path / imagesd0/images/ Account / target Password / password Example: When using your preferred web browser to access. 1. If the IP address is the default, enter ftp://192.168.188.2/sd0:0/User/Images in the address bar to connect. 2. Enter your account and password. 3. Download the file saved in the RAM drive to your PC.

<table>
<tr><td>Why can't I see Read Rate Counts on the right panel in WebLinkHH?</td><td>Read Rate of Counts on the right panel is sometimes not available depending on the setting of Read Cycle.
<table><tr><th>Read Cycle</th><th>Read Rate</th></tr><tr><td>Presentation</td><td>Unavailable</td></tr><tr><td>Triggered</td><td>Available</td></tr><tr><td>Start/Stop</td><td>Available</td></tr></table></td></tr>
<tr><td>What should I do if I can only save one image?</td><td>When Save Image Until is set to New Read Cycle, only last one image is saved.
When saving multiple images, set WebLinkHH - Gear icon - Advanced - Image Storage - Save Image Until to System Reset.
Additionally, when Image Storage Location was set to FTP, images might not be saved due to the shorter read interval if Transfer Optimization is set to Speed (Lossy).
When you want to prioritize the image storage over the read, set WebLinkHH - Gear icon - Advanced - Image Storage - Transfer Optimization to Accuracy (Lossless).</td></tr>
<tr><td>How do I acquire or change settings from outside of the WebLinkHH interface?</td><td>With the serial communications, it is possible to do so using a serial command so called K command.
For each command, refer to Section 5 or later.
Example: Set the exposure time to 1,000 [µs].
Command: <K541,1000>
Response: None
As adding "?" to a K command, the setting value will be returned.
Example: Acquire the current exposure time and gain.
Command: <K541?>
Response: <K541,1000,30>
Presently, the exposure time is set to 1,000 [µs] and the gain is set to 30 [%].</td></tr>
<tr><td>How do I read multiple codes in the field of view?</td><td>When the string of codes are different from each other, multiple codes in the field of view can be read.
• Settings
To enable multiple reads, change the value of default Look for 1 Symbols in Read Cycle at the left on the setup screen.
Or, change the settings below.
WebLinkHH - Gear icon - Advanced - Read Cycle - Multisymbol - Number of Symbols
• Output order
The output order is practically random because of the order of completed read.
Using the Configuration Database and the Format Output options, up to 20 ordered outputs can be controlled (when symbols satisfy the output conditions).
• Cautions
Multiple reads are not available on codes with the same string and the same symbology.</td></tr>
<tr><td>Is it possible to specify the output range in an output string?</td><td>Turn on Output Format at the left on the WebLinkHH setup screen.
With clicking format strings, Output Formatting Editor screen opens.
With enabling Parse Symbol, the output range can be specified.</td></tr>
<tr><td>How do I output a code only once in Continuous Read?</td><td>To output the same code only once in the Continuous Read state with V460-H, set the following.
• Gear icon - Advanced - Read Cycle - Trigger - Mode: Continuous Read 1 Output
• Gear icon - Advanced - Read Cycle - End of Read Cycle - Mode: New Trigger
With the above setting, V460-H in Constant Read state reads the same code only once and only output it when a code different from the previous code is read.
When you want to set V460-H so that it can read the same code again after some time passed, set End of Read Cycle Mode to Timeout and adjust Read Cycle Timeout.</td></tr>
<tr><td>How do I initialize reader settings?</td><td>Initialization methods:
• Initialization by operating the menu in WebLinkHH.
1. Click the Gear icon at the right of WebLinkHH.
2. Click the Restore Default Settings button.
*This performs an initialization processing as same as a serial command <Zrd>.</td></tr>
<tr><td>How do I save captured images?</td><td>The read images are possible to save with the following procedures.
• Save images on WebLinkHH.
Click Save Current Image button at the right end on the Image Control Toolbar at the upper right on the image area to save the read image to your PC. The file is download to a destination you set with a browser.
• Save images to the RAM drive.
Images read according to Read Cycle can be saved in the RAM drive on V460-H. Click Gear icon at the upper right - Image Storage to open Image Save Options, and set the conditions to save images. Click the Advanced button to set other parameters such as Save Image Until. Such saved images can be saved in a PC via FTP. Regarding the method to save images via FTP, refer to "How to access a RAM drive from a PC?". Regarding No. of images savable to the RAM drive, refer to "How many sheets of images can be saved in the RAM drive?". It is initialized when turning off the power because of RAM drive.
• Save images to a FTP server.
Images read according to Read Cycle can be saved to an FTP server on the network. Click Gear icon at the upper right - Image Storage to open Image Save Options, and set the conditions to save images. Select FTP for the Image Storage Location. By setting the FTP address of the FTP server after that, images can be saved in it.
* Re-reading is not available by using the saved images.</td></tr>
<tr><td>How do I verify that specific characters have been decoded?</td><td>When checking character strings, turn on Matchcode at the left panel on WebLinkHH.
Click Mode of Matchcode and register character strings you want to check to Match String Database.
Up to 30 strings are registrable to Match String Database.</td></tr>
<tr><td>What is the smallest readable 2D code?</td><td>A 2D code with 2x2 pixels or more in the cell size on an image is readable.
This figure is a theoretical value. See Section 1-3-2 Code Readability Tables for more detailed information.</td></tr>
</table>

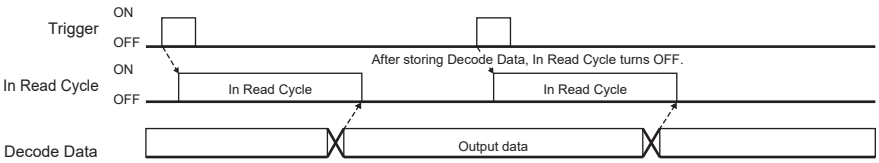
<table>
<tr><td>What is the smallest readable 1D barcode?</td><td>In ideal, a barcode with the size below is readable.
Barcode width: 1 pixel or more
Barcode height:16 pixels or more
These figures are theoretical values. See Section 1-3-2 Code Readability Tables for more detailed information.</td></tr>
<tr><td>What is the maximum number of readable characters?</td><td>The V460-H can read up to the maximum numbers defined each code standard.
For example, although up to 7,089 characters can be input to QR code based on the standard, the V460-H can read the code.</td></tr>
<tr><td>What is the ideal reader-to-symbol distance for the best possible decode performance?</td><td>That of V460-H depends on the cell size (bar width) of a target code too.
The reference values are described in sections 1-3-1 and 1-3-2.
The read range is described, which was possible to read with typical cell size examples for the design readable focal distance per format.
* For barcode, a half size of the bar width for readable values of 2D code cell size is a guide.</td></tr>
<tr><td>How can I minimize decode time?</td><td>Please refer to Section 3-1 – V460-H Scanning for information about how to shorten read time.</td></tr>
<tr><td>What parameters need to be adjusted when the reader fails to decode a symbol?</td><td>Adjust the following parameters.
<table>
<tr><th>Symbol state</th><th>Adjustment</th></tr>
<tr><td>An image is dark.</td><td>Adjust Exposure or Gain to bright the image.</td></tr>
<tr><td>Out of focus.</td><td>Adjust Focus to make the symbol in focus.</td></tr>
<tr><td>A cell size is small.</td><td>Reduce the distance between the symbol and the V460-H.</td></tr>
<tr><td>Noisy background</td><td>Remove noise with the Morphological Preprocessing.</td></tr>
<tr><td>The read time takes much time.</td><td>In Advanced Settings (WebLinkHH), optimize decode performance. For example, enable the Pixel Binning option (Camera Setup), enable only the symbol types (Symbologies) that will be used, etc.</td></tr>
<tr><td>The lighting is reflected.</td><td>Tilt the lighting by approx. 15 degrees to reduce the reflection.</td></tr>
</table></td></tr>
<tr><td>What is the maximum number of characters supported by Match String Database?</td><td>It is 3,000 characters.
It is divided by the number of registrations, so it varies depending on the number of registrations.
When the number of registrations is one, it can register up to 3,000 characters.
When the number of registrations is ten, each registration can register up to 300 characters.
Related Q&A: What is the number of the maximum readable characters?</td></tr>
<tr><td>How do I change Match String from outside of the WebLinkHH interface?</td><td>Use <K231> command.
Command format: <K231, index, master symbol data>
Example:
When setting ABC to the first Match String Database:
<K231, 1, ABC></td></tr>
<tr><td>How do I confirm Good Read / No Read results over EtherNet/IP?</td><td>The method differs according to the selected input assembly.
• When using a Small (100) assembly;
First determine whether the Output String (DECODE DATA STRING) is NOREAD (default).
• When using a Big (101) assembly;
There is a way to verify the External Output Status OUTPUT bit.
Please note that the External Output Status is dependent on the Output condition setting for the Parallel I/O OUTPUT signal. The default setting is ON when there is a Read Fail.
• When an assembly after MXL/SLC (102) is selected;
You can verify the Read Cycle Pass, Read Cycle Fail bit status in Device Status. The Read Cycle Pass, Read Cycle Fail bit is OFF during a READ cycle and is updated when Data Is Ready is ON.</td></tr>
</table>

How does the timing of EtherNet/IP data output work?	The timing signal indicating when the output data is stored in PLC memory varies depending on the selected assembly. • When using the Small (100) assembly, there is no applicable data output timing signal. • When using the Big (101) assembly, the timing of data output is when the Device Status - In Read Cycle bit changes from ON to OFF. • When MXL/SLC (102) or a later assembly is selected, Output is at the timing when the Data Status Ready bit of Device Status turns ON.

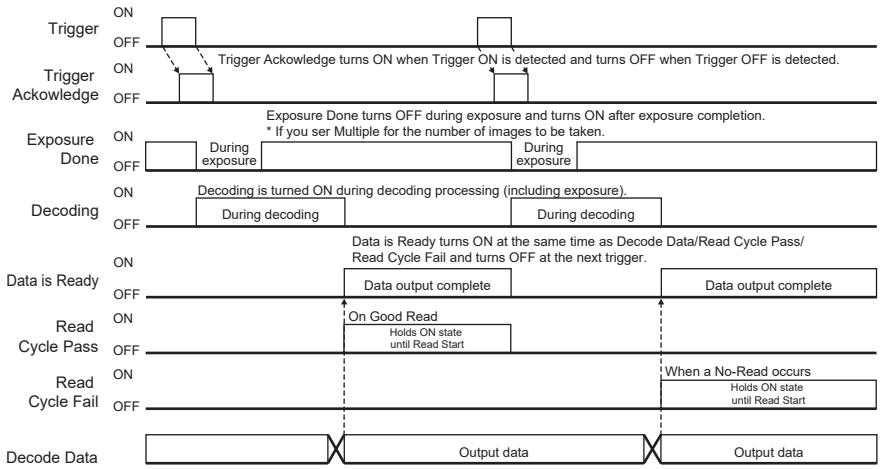
· When using the Small (100) assembly, there is no applicable data output timing signal.



· When using the Big (101) assembly, the timing of data output is when **Device Status - In Read Cycle** bit changes from ON to OFF.



· When MXL/SLC (102) or later assembly is selected. Output is at the timing when the **Data Status Ready** bit of **Device Status** turns ON.



9

Service and Maintenance

This section contains maintenance recommendations for the V460-H. Following these recommendations ensures high reading performance and a long life for the V460-H.

9-1 Service 9-2
9-2 Maintenance 9-3

9-1 Service

If you have difficulty using the equipment, contact your facility's technical or systems support. If there is a problem with the equipment, you can contact customer service at: **www.ia.omron.com**.

When contacting support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Omron Microscan responds to calls by e-mail, telephone, or fax within the time limits set forth in service agreements.

If your problem cannot be solved by support, you may need to return your equipment for servicing and will be given specific directions. Omron Microscan is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

If you purchased your product from an Omron Microscan business partner, please contact that partner for support.

9-2 Maintenance

Known Harmful Ingredients

The following chemicals are known to damage the plastics on Omron Microscan products and should not come in contact with the device:

- Acetone
- Ammonia solutions
- Aqueous or alcoholic alkaline solutions
- Aromatic and chlorinated hydrocarbons
- Benzene
- Undiluted Bleach
- Carbolic acid
- Compounds of amines or ammonia
- Ethanolamine
- Ethers
- Ketones
- TB-lysoform
- Toluene
- Trichloroethylene

Tolerable Industrial Fluids and Chemicals

Not all fluid variants and brands have been tested.

The industrial fluids and chemicals listed below were evaluated and deemed tolerable for the housing of the V460-H. These industrial fluids and chemicals should not come in contact with the V460-H reader window, which uses technology much like a digital camera. Marks, oil, or debris on the window will interfere with image captures. Leaving the following industrial fluids on the window will result in suboptimal decode performance. See **Cleaning the Reader** for detailed cleaning instructions.

- Motor/Engine Oil
- Automatic Transmission Fluid (ATF)
- Continuously Variable Transmission (CVT) Fluid
- Industrial De-Greaser (Engine Brite Heavy Duty)
- Brake Fluid (DOT4)

If the reader comes in frequent contact with the fluids and chemicals listed above, Omron Microscan recommends that you clean the outside of the reader daily with the approved cleaning agent listed below.

Approved General Cleaning Agents

The following cleaning agents are approved for general cleaning of Omron Microscan products, including the V460-H.

- Isopropyl alcohol 70%

Cleaning the Reader

Routinely cleaning the exit window is required. A dirty window may affect scanning accuracy. Do not allow any abrasive material to touch the window.

To clean the reader:

1. Dampen a soft cloth with one of the approved cleaning agents listed above or use pre-moistened wipes.
2. Gently wipe all surfaces, including the front, back, sides, top and bottom. Never apply liquid directly to the reader. Be careful not to let liquid pool around the reader window, trigger, cable connector or any other area on the device.
3. Be sure to clean the trigger and in between the trigger and the housing (use a cotton-tipped applicator to reach tight or inaccessible areas).
4. Do not spray water or other cleaning liquids directly into the exit window.
5. Wipe the reader exit window with a lens tissue or other material suitable for cleaning optical material such as eyeglasses.
6. Immediately dry the reader window after cleaning with a soft non-abrasive cloth to prevent streaking.
7. Allow the reader to air dry before use.
8. Reader connectors:
   (1) Dip the cotton portion of a cotton-tipped applicator in isopropyl alcohol.
   (2) Rub the cotton portion of the cotton-tipped applicator back-and-forth across the connector on the reader at least 3 times. Do not leave any cotton residue on the connector.
   (3) Use the cotton-tipped applicator dipped in alcohol to remove any grease and dirt near the connector area.
   (4) Use a dry cotton tipped applicator and rub the cotton portion of the cotton-tipped applicator back-and-forth across the connectors at least 3 times. Do not leave any cotton residue on the connectors.

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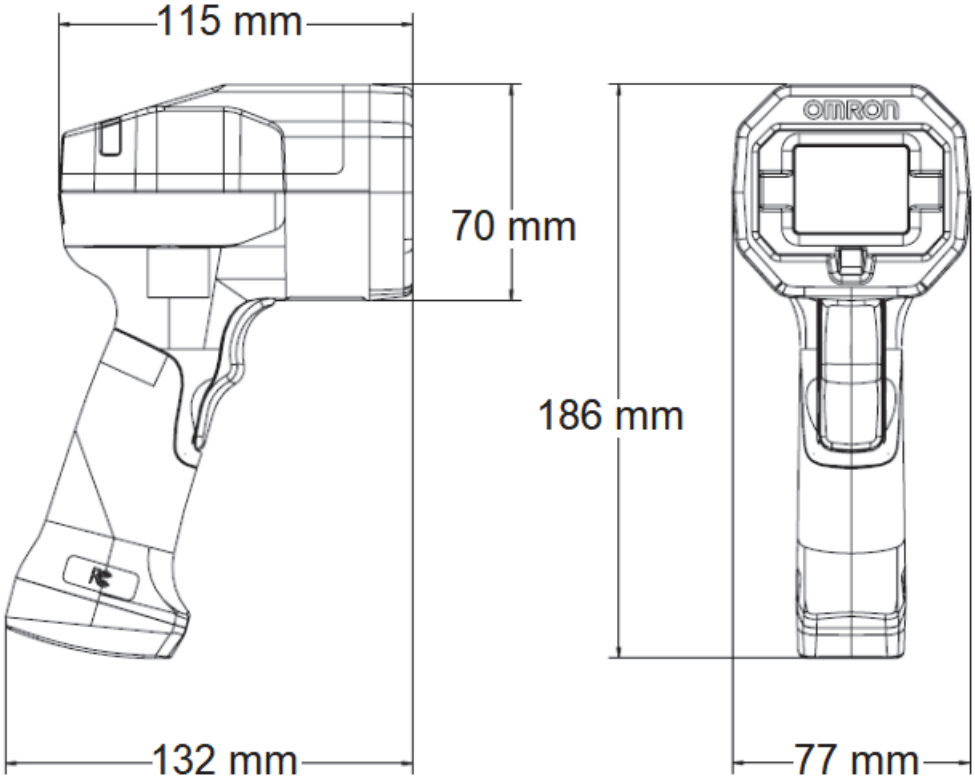
Appendices

This section provides the reader's physical dimensions, information about the cables and accessories that are currently available for the reader, programming codes that allow you to program the reader, and examples of different code types.

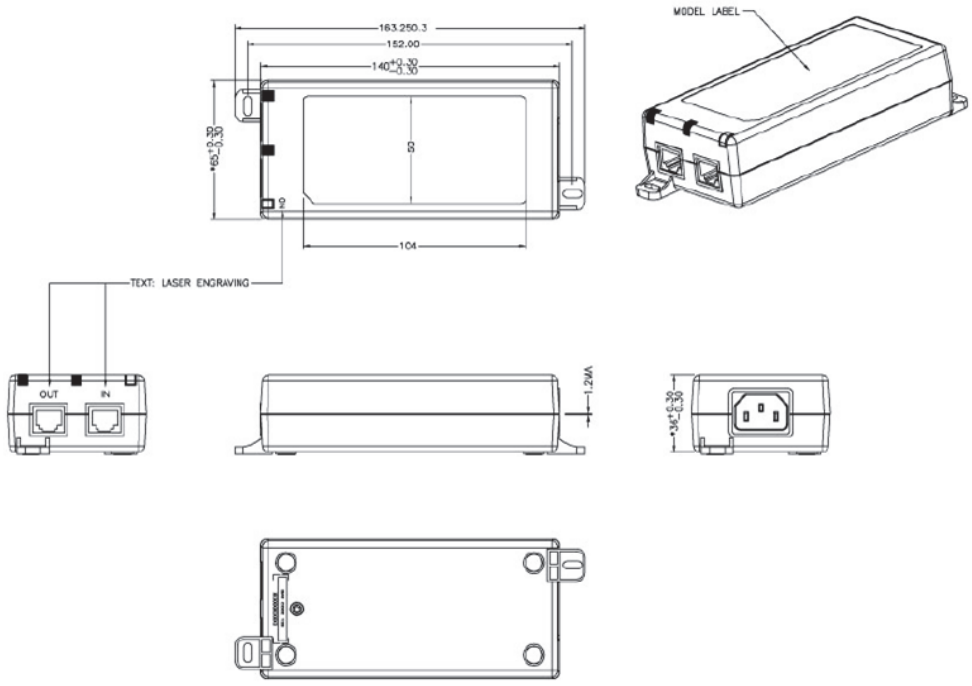
A-1 Dimensions, Cables, and Accessories A-2
A-2 Programming Codes A-4
A-3 Sample Symbols A-30

A-1 Dimensions, Cables, and Accessories

A-1-1 Dimensions



V460-H Industrial Handheld DPM Reader



PoE Injector (98-9000311-01)

A-1-2 Cables

Appearance	Type	Length	Part Number
	Ethernet Communication Cables – Straight Connectors M12 Plug on Reader to RJ45 Connector	1 Meter	V430-WE-1M
		3 Meters	V430-WE-3M
		5 Meters	V430-WE-5M
	Standard Ethernet Cables, In-Cabinet Use Standard RJ45 Connectors on Both Ends Green	1 Meter	XS6W-5PUR8SS100CM-G
		3 Meters	XS6W-5PUR8SS300CM-G
		5 Meters	XS6W-5PUR8SS500CM-G
		10 Meters	XS6W-5PUR8SS1000CM-G
		15 Meters	XS6W-5PUR8SS1500CM-G

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A-1-3 PoE Injector and RAM® Mount Accessories

Note: Omron recommends **RAM® Mount** brackets and mounts for hands-free operation in **Presentation** mode.

Appearance	Type	
	Single Port PoE Injector, 30W, IEEE802.3at Compliant, 2 x RJ45 Connector, 90 to 264VAC* (suggested for standalone PC use) *ATTENTION: Power cord NOT included (C13 connector required)	98-9000311-01
	RAM® Holders and Components – **C Size**	
	RAM® Power-Grip™ XL Universal Scanner Gun Holder (**RAP-450U**)	
	RAM® Tough-Claw™ Large Clamp Ball Base (**RAP-401U**)	
	RAM® Double Socket Arm with Round Ball Plate - C Size, Medium (**RAM-103U**)	
	RAM® Double Socket Arm with Round Ball Plate - C Size, Long (**RAM-103U-D**)	
	RAM® Double Ball Mount with Two Round Plates - C Size, Medium (**RAM-101U**)	

A-2 Programming Codes

Programming Codes allow you to program the V460-H by reading Data Matrix symbols encoded with configuration commands. The reader's configuration can be changed by reading the predefined Data Matrix symbols, without using WebLink.

This section presents some of the most common and useful Programming Codes. Additional Programming Codes can be generated in WebLink with **Barcode Programming**.

IMPORTANT:

1. Some Programming Codes will only take effect if the corresponding symbology or feature is also enabled. If the corresponding symbology or feature is not enabled, the Programming Code will not take effect. Such Programming Codes are identified by the ◯ mark.

2. Some Programming Codes will not take effect if the handheld is currently using **Configuration Database**, which is included in the **Torch Lighting** and **Close-Up Lighting** "recipes" available in **Assisted Setup**. Such Programming Codes are identified by the ☒ mark.

The three symbols below identify the different types of Programming Codes.

☐ The command will take effect in all situations.
◯ The command will take effect only when the corresponding symbology or feature is enabled.
☒ The command will not take effect when Configuration Database is being used.

☐ A-2-1 Restore Defaults



Restore Defaults

☐ A-2-2 Software Reset



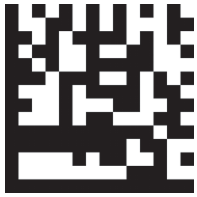
Save Current Settings for Power-On



Save Current Settings as Customer Default Parameters



Recall Customer Default Parameters and Save for Power-On



Recall Omron Microscan Default Parameters Except Communication and Custom Unit Name Parameters and Save for Power-On



Recall Omron Microscan Default Parameters Including Communication and Custom Unit Name Parameters and Save for Power-On

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

A-2-3 Assisted Setup Options



Auto Lighting Mode



Torch Lighting Mode



Close-Up Lighting Mode

A-2-4 Configuration Database (K252)



Active Indexes = 0



Active Indexes = 1



Active Indexes = 2



Active Indexes = 3



Active Indexes = 4



Active Indexes = 5



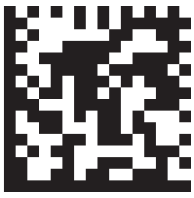
Active Indexes = 6



Active Indexes = 8



Active Indexes = 8



Active Indexes = 9



Active Indexes = 10

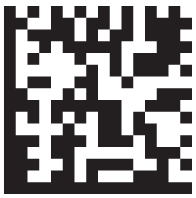


Active Indexes = 11



Active Indexes = 12

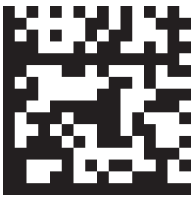
☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.



Active Indexes = 13



Active Indexes = 14



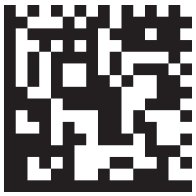
Active Indexes = 15



Active Indexes = 16



Active Indexes = 17



Active Indexes = 18



Active Indexes = 19



Active Indexes = 20

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-5 Save Current Settings to Configuration Database (K255)



Save to Database 1



Save to Database 2



Save to Database 3



Save to Database 4



Save to Database 5



Save to Database 6



Save to Database 7



Save to Database 8



Save to Database 9



Save to Database 10



Save to Database 11



Save to Database 12



Save to Database 13



Save to Database 14



Save to Database 15



Save to Database 16



Save to Database 17



Save to Database 18



Save to Database 19



Save to Database 20

A

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-6 Load Current Settings from Configuration Database (K255)



Load from Database 1



Load from Database 2



Load from Database 3



Load from Database 4



Load from Database 5



Load from Database 6



Load from Database 7



Load from Database 8



Load from Database 9



Load from Database 10



Load from Database 11



Load from Database 12



Load from Database 13



Load from Database 14



Load from Database 15



Load from Database 16



Load from Database 17



Load from Database 18



Load from Database 19



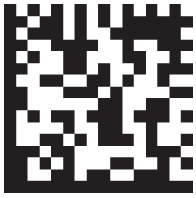
Load from Database 20

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

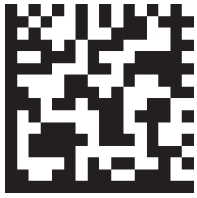
A-2-7 Search and Configure Mode (K128)



Disabled



Enabled



Timed Window

A-2-8 Preamble (K141)



Disabled



Enabled, Comma (,)



Enabled, <CR>



Enabled, <LF>



Enabled, <CR><LF>



Enabled, <LF><CR>



Enabled, <SP>



Enabled, <TAB>

A-2-9 Postamble (K142)



Disabled



Enabled, Comma (,)



Enabled, <CR>



Enabled, <LF>



Enabled, <CR><LF>



Enabled, <LF><CR>



Enabled, <SP>



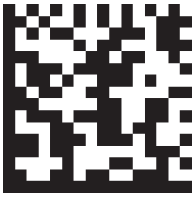
Enabled, <TAB>

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-10 EtherNet/IP (K129)



Disabled

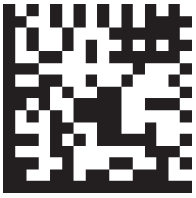


Enabled

○ A-2-11 EtherNet/IP Byte Swap (K163)

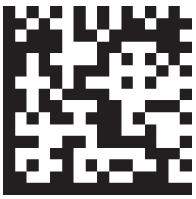


Disabled

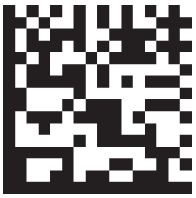


Enabled

☐ A-2-12 PROFINET (K164)

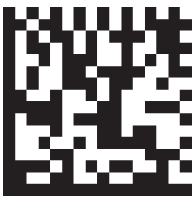


Disabled



Enabled

○ A-2-13 PROFINET Byte Swap (K165)



Disabled



Enabled

☐ A-2-14 Trigger Mode (K200)



Start/Stop



Triggered



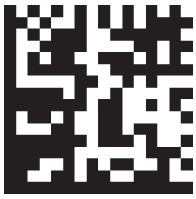
Presentation

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

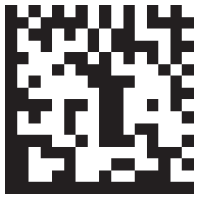
☐ A-2-15 Decodes Before Output (K221)



1 Decode

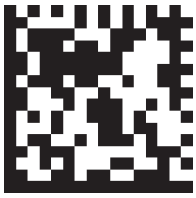


2 Decodes



3 Decodes

☐ A-2-16 Multisymbol, Number of Symbols (K222)



1 Symbol



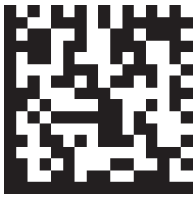
2 Symbols



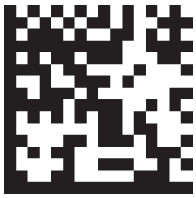
3 Symbols



4 Symbols



5 Symbols



10 Symbols

○ A-2-17 Multisymbol Separator (K222)



Comma (,)



<SP>

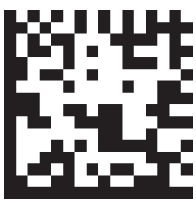


<TAB>



Vertical Bar (|)

○ A-2-18 Symbology, Composite (K453)



Disabled



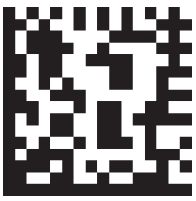
Enabled



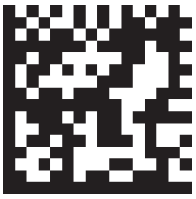
Required

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-19 Symbology, Aztec Code (K458)



Disabled

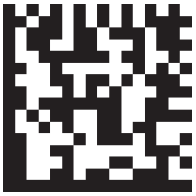


Enabled

☒ A-2-20 Symbology, Micro QR Code (K459)

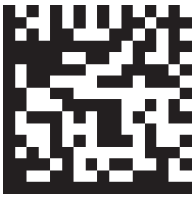


Disabled

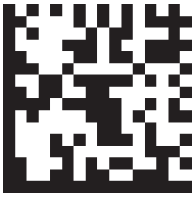


Enabled

☒ A-2-21 Symbology, Postal Symbologies (K460)



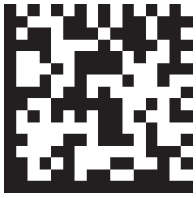
Disabled



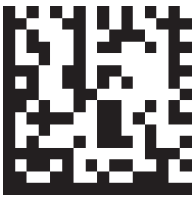
Australia Post



Japan Post



KIX



Royal Mail



UPU



U.S. Postal

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

○ A-2-22 Symbology, Postal Symbology Configuration (K460)



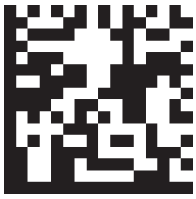
PLANET Status Disabled



PLANET Status Enabled



POSTNET Status Disabled



POSTNET Status Enabled

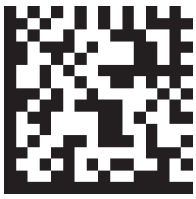


USPS4CB Status Disabled

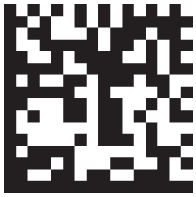


USPS4CB Status Enabled

☒ A-2-23 Symbology, Code 39 (K470)



Disabled



Enabled

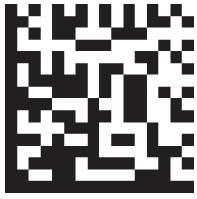
○ A-2-24 Symbology, Code 39 Configuration (K470)



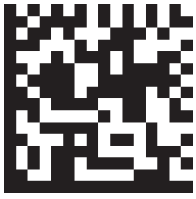
Full ASCII Set Disabled



Full ASCII Set Enabled

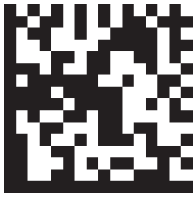


Check Character Status Disabled

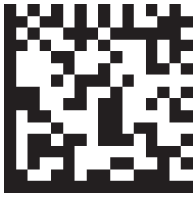


Check Character Status Enabled

☒ A-2-25 Symbology, Codabar (K471)



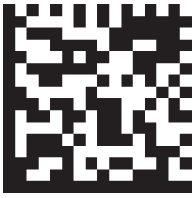
Disabled



Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-26 Symbology, Interleaved 2 of 5 (K472)



Disabled



Enabled

○ A-2-27 Symbology, Interleaved 2 of 5 Configuration (K472)



Check Character Status Disabled



Check Character Status Enabled

☒ A-2-28 Symbology, UPC-EAN (K473)



Disabled



Enabled

○ A-2-29 Symbology, UPC-EAN Configuration (K473)



EAN Status Disabled



EAN Status Enabled



Format UPC-E as UPC-A Disabled



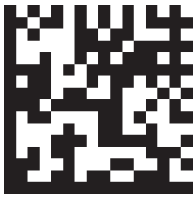
Format UPC-E as UPC-A Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-30 Symbology, Code 128 (K474)



Disabled

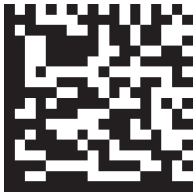


Enabled

○ A-2-31 Symbology, Code 128 Configuration (K474)



EAN Status Disabled



EAN Status Enabled



EAN Status Required

☒ A-2-32 Symbology, Code 93 (K475)



Disabled

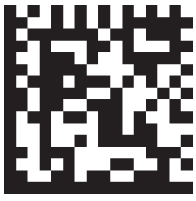


Enabled

☒ A-2-33 Symbology, PDF417 (K476)



Disabled



Enabled

A

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-34 Symbology, Pharmacode (K477)



Restore Defaults



Disabled



Enabled



Direction Forward



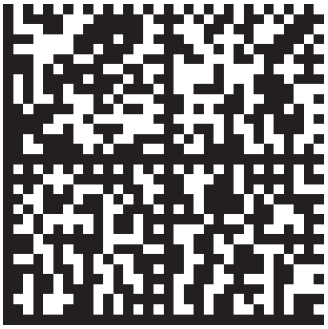
Direction Reverse



Background Color White

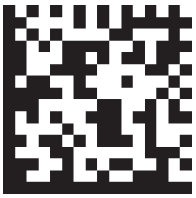


Background Color Black

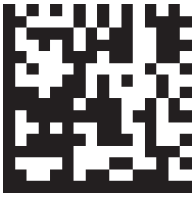


Enable Only Pharmacode
(Disable All Other 1D Symbologies that are Enabled by Default)

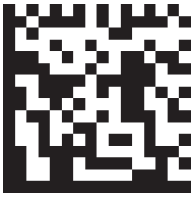
○ A-2-35 Symbology, DMRE (K478)



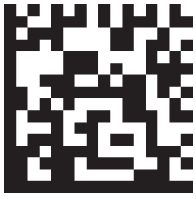
Disabled



Enabled



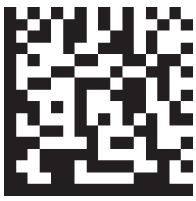
Use Alignment Pattern Disabled



Use Alignment Pattern Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

○ A-2-36 Symbology, Data Matrix ECC Levels (K479)



ECC 000 Disabled



ECC 000 Enabled



ECC 050 Disabled



ECC 050 Enabled



ECC 080 Disabled



ECC 080 Enabled



ECC 100 Disabled



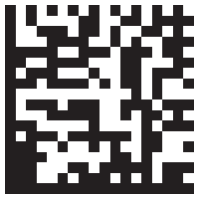
ECC 100 Enabled



ECC 120 Disabled



ECC 120 Enabled



ECC 130 Disabled



ECC 130 Enabled



ECC 140 Disabled



ECC 140 Enabled

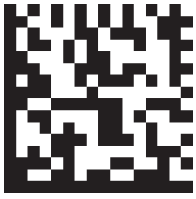


All ECC Levels Enabled

☒ A-2-37 Symbology, QR Code (K480)



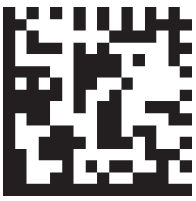
Disabled



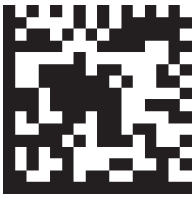
Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-38 Symbology, BC412 (K481)



Disabled



Enabled

☒ A-2-39 Symbology, DataBar Omnidirectional (K482)

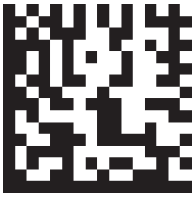


Disabled

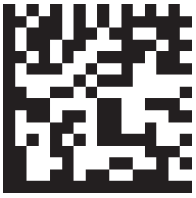


Enabled

☒ A-2-40 Symbology, DataBar Limited (K483)

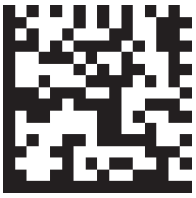


Disabled

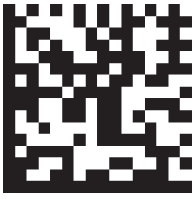


Enabled

☒ A-2-41 Symbology, DataBar Expanded (K484)



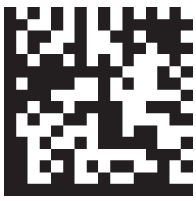
Disabled



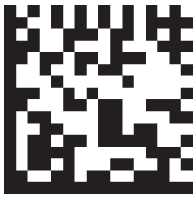
Enabled

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-42 Symbology, MicroPDF417 (K485)



Disabled



Enabled

☒ A-2-43 Symbology, DotCode (K497)

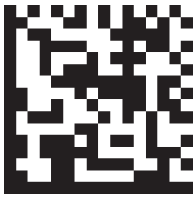


Disabled

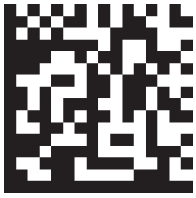


Enabled

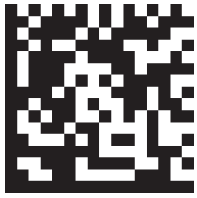
○ A-2-44 Symbology, DotCode Configuration (K497)



Rotation Mode, No Rotation



Rotation Mode, Low Rotation

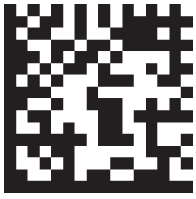


Rotation Mode, Omnidirectional

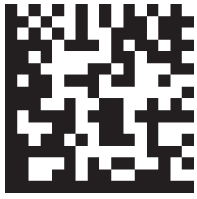
☒ A-2-45 Lighting, Dome (K508)



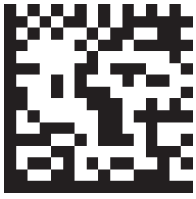
Disabled



Red



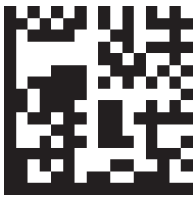
Green



Blue



Yellow (Red + Green)



Magenta (Red + Blue)



Cyan (Green + Blue)



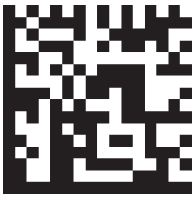
White (Red + Green + Blue)

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-46 Lighting, Low Angle (K508)



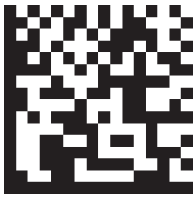
Disabled



North



South



North + South

☒ A-2-47 Lighting, Torch Lighting (K508)



Disabled

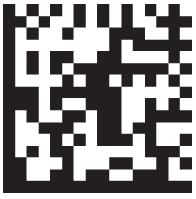


Enabled

☐ A-2-48 Time of Flight (ToF) (K509)



Disabled

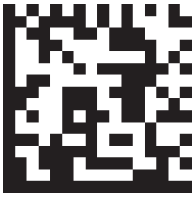


Enabled

☐ A-2-49 Auto Lighting (K510)



Disabled



Enabled

☐ A-2-50 Auto Exposure and Gain (K510)



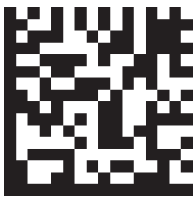
Disabled



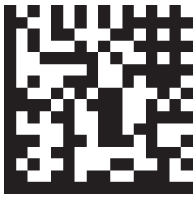
Enabled

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

○ A-2-51 Damaged Symbol, 1D (K519)



Disabled

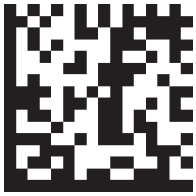


Enabled

☒ A-2-52 Pixel Binning (K542)



Disabled

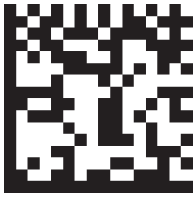


Enabled

☐ A-2-53 Morphological Pre-Processing (K550)

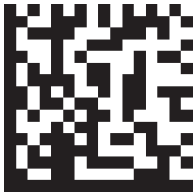


Disabled



Enabled

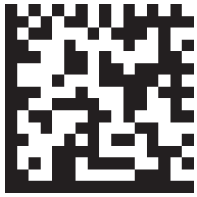
☒ A-2-54 Morphological Operation (K551)



Grow Dark



Shrink Dark



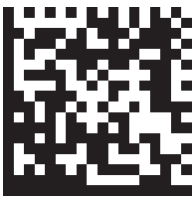
Connect Dark



Separate Dark

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☒ A-2-55 Morphological Operation, Size (K551)



Small

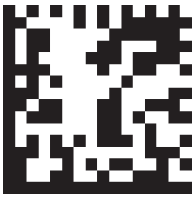


Medium

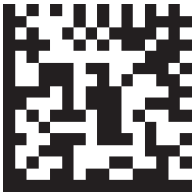


Large

○ A-2-56 Linear Security Level (K560)



Aggressive

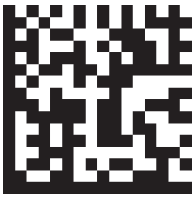


Normal

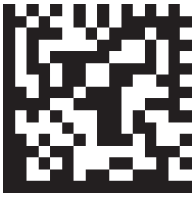


Secure

○ A-2-57 Fast Linear Mode (K562)



Disabled

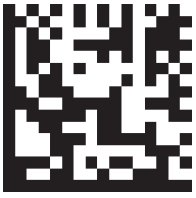


Horizontal

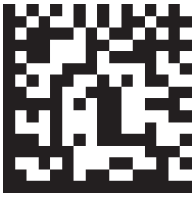


Vertical

○ A-2-58 Curved 2D (K563)



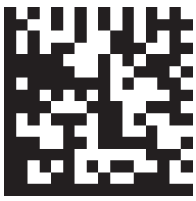
Disabled



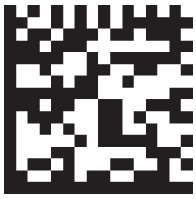
Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

○ A-2-59 Convert Shift-JIS to UTF-8 (K564)

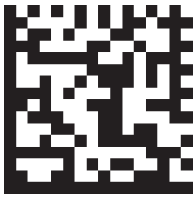


Disabled



Enabled

□ A-2-60 Linear Quiet Zone Violation (K565)



Disabled

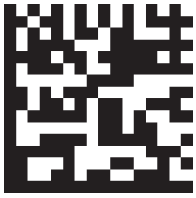


Enabled

□ A-2-61 Scale Image Re-Process (K566)



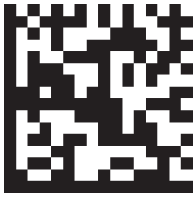
Disabled



Up



Down

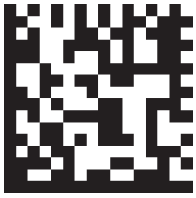


Both Up and Down

○ A-2-62 2D Damaged Mode (K567)



Disabled



Enabled

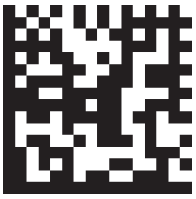
A

□ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-63 Morphology Re-Process (K568)



Disabled



Enabled

☐ A-2-64 Beeper Feedback Status (K702)



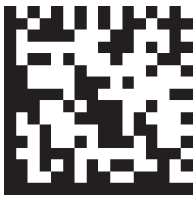
Disabled



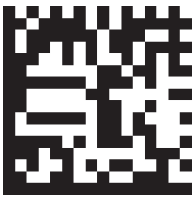
Boot and Program



Good Read



No Read



All

○ A-2-65 Beeper Feedback, Volume (K702)



Low



Medium

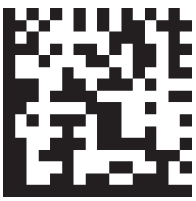


High

☐ A-2-66 Haptic Feedback Status (K703)



Disabled



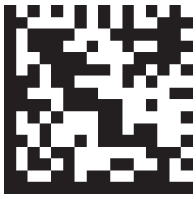
Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

A-2-67 Symbol Data Output (K705)



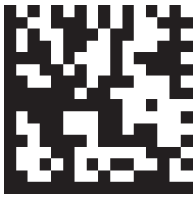
Disabled



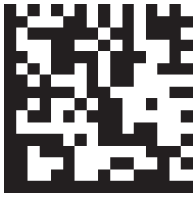
Match



Mismatch



Only If All Good Read



Any Good Read

A-2-68 Symbology Identifier Status (K705)

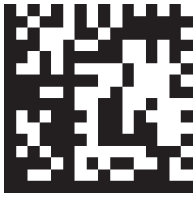


Disabled

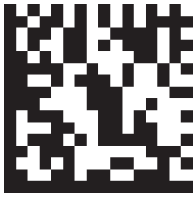


Enabled

A-2-69 Read Duration Output (K706)



Disabled



Enabled

A-2-70 Cycle ID Output (K707)



Disabled



Enabled



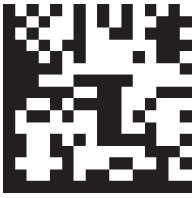
Full Cycle Report

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-71 No-Read Message (K714)



Disabled



Enabled

☐ A-2-72 Output Object Info, Coordinates (K734)



Disabled



Enabled

☐ A-2-73 Output Object Info, Frame Number (K734)



Disabled



Enabled

☐ = Can be used in all situations. ◯ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-74 Matchcode (K223)



Disabled



New Master



Enabled – Standard



Enabled – Wildcard

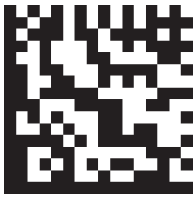


Enabled – Sequential Increment

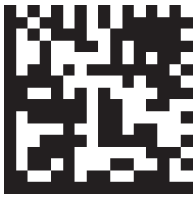


Enabled – Sequential Decrement

○ A-2-75 Match Replacement Status (K735)

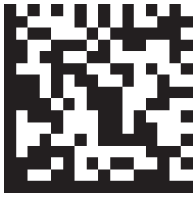


Disabled



Enabled

○ A-2-76 Mismatch Replacement Status (K736)



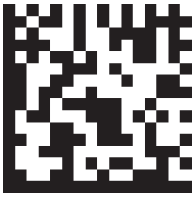
Disabled



Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-77 Green Flash Mode (K750)



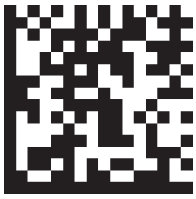
Disabled



Match



Mismatch



Static Presentation



Good Read

○ A-2-78 Green Flash Duration (K750)



100 ms



250 ms



500 ms



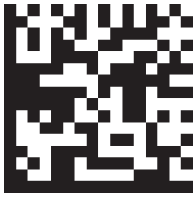
750 ms



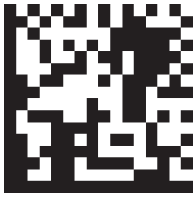
1000 ms

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

☐ A-2-79 Target Pattern (K750)



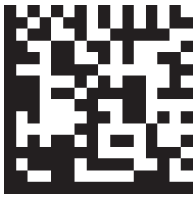
Always OFF



Always ON



ON Only When in Read Cycle



ON Only When Not in Read Cycle



Auto-On

☐ A-2-80 Database Identifier Output (K759)



Disabled

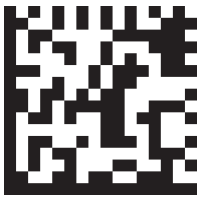


Enabled

☐ A-2-81 PHY Link LED Status (K168)



Disabled



Enabled

☐ = Can be used in all situations. ○ = Can be used when corresponding symbology or feature is enabled. ☒ = Can be used unless Config. Database is currently being used.

A-3 Sample Symbols

A-3-1 Aztec



1234567890

A-3-2 Codabar

1234567890



A-3-3 Code 39



1234567890

A-3-4 Code 39 Extended

1234567890@Abc



A-3-5 Code 93



1234567890

A-3-6 Code 128

1234567890



A-3-7 Data Matrix



1234567890

A-3-8 Data Matrix Rectangular (Not DMRE)

1234567890



A-3-9 DMRE



1234567890

A-3-10 DataBar Expanded

1234567890



A-3-11 DataBar Limited



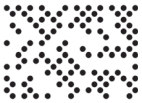
(01)00001234567895

A-3-12 DataBar Stacked Omnidirectional

(01)00001234567895



A-3-13 DotCode



12345678901234567890

A-3-14 EAN-13

1234567890005



A-3-15 Interleaved 2 of 5



1234567890

A-3-16 MicroPDF417

1234567890



A-3-17 PDF417



1234567890

A-3-18 Pharmacode

123456 

A-3-19 Postal Code – Australia Post



1134567890

A-3-20 Postal Code – Japan Post

1234567 

A-3-21 Postal Code – Royal Mail



1234567OCR

A-3-22 Postal Code – U.S. Postal

12345678901234567890



A-3-23 QR Code



1234567890

A-3-24 Micro QR Code

1234567890



A-3-25 UPC-A



123456789012

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