

# AV500/AV900

## PRODUCT REFERENCE GUIDE



2D CAMERAS

 **DATALOGIC**

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### **Software version**

This manual refers to software version 5.7.

### **Patents**

This product is covered by one or more of the following patents: Utility patents: EP1128315B1, EP1396811B1, EP1413971B1, EP2517148B1, EP2649555B1, FR2909442B1, GB2444409B, IT1404187, JP4435343B2, JP4571258B2, JP5947819B2, US6512218, US6616039, US6808114, US6997385, US7387246, US7433590, US8058600, US8360318, US8368000, US8888003, US8915443, US9230142, US9268982, US9349047, US9430689, US9589165, US9785817, US9798948, US9870498, US10229301, ZL200980163411.X, ZL201080071124.9, ZL201280010789.8

See [www.patents.datalogic.com](http://www.patents.datalogic.com) for patent lists.

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# PREFACE

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## ABOUT THIS MANUAL

This Product Reference Guide (PRG) is provided for users seeking advanced technical information, including connection, programming, maintenance and specifications. The Quick Reference Guide (QRG) and other publications associated with this product can be downloaded free of charge from the website listed on the back cover of this manual.

## Manual Conventions

The following conventions are used in this document:

The symbols listed below are used in the manual to notify the reader of key issues or procedures that must be observed when using the camera.



**NOTE:** This symbol draws attention to details or procedures that may be useful in improving, maintaining, or enhancing the performance of the hardware or software being discussed.



**WARNING:** This symbol identifies a hazard or procedure that, if incorrectly performed, could cause personal injury or result in equipment damage. It is also used to bring the user's attention to details that are considered **IMPORTANT**.



**HIGH VOLTAGE:** This symbol alerts the user they are about to perform an action involving, either a dangerous level of voltage, or to warn against an action that could result in damage to devices or electrical shock.



**LASER CAUTION:** This symbol alerts the user they are about to perform an action involving possible exposure to laser light radiation.




**ESD CAUTION:** This symbol identifies a procedure that requires you take measures to prevent Electrostatic Discharge (ESD) e.g., use an ESD wrist strap. Circuit boards are most at risk. Please follow ESD procedures.

# TECHNICAL SUPPORT

## Support Through The Website

Data logic provides several services as well as technical support through its website. Log on to [www.datalogic.com](http://www.datalogic.com).

For quick access, from the home page click on the search icon , and type in the name of the product you're looking for. This allows you access to download Data Sheets, Manuals, Software & Utilities, and Drawings.

Hover over the Support & Service menu for access to Services and Technical Support.

## Reference Documentation

The documentation related to the AV500/AV900 camera system management is listed below:

- AS1 Series Instruction Manual
- CBX100 Reference Manual
- CBX510 Reference Manual
- CBX800 Reference Manual
- DK503 Installation Guide
- DM3610 Reference Manual
- LCC 75XX Light Curtain Instruction Manual
- PWR-480B Installation Manual

## Warranty

Datalogic warrants that the Products shall be free from defects in materials and workmanship under normal and proper use during the Warranty Period. Products are sold on the basis of specifications applicable at the time of manufacture and Datalogic has no obligation to modify or update Products once sold. The Warranty Period shall be **two years** from the date of shipment by Datalogic, unless otherwise agreed in an applicable writing by Datalogic.

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## END USER LICENSE AGREEMENT



## PATENTS

This product is covered by one or more of the following patents:

Utility patents: EP2212827, EP2517148B1, EP2649555B1, IT1404187, JP5947819B2, US10161742, US10229301, US10699091, US6808114, US7433590, US8360318, US8888003, US8915443, US9230142, US9349047, US9430689, US9589165, US9785817, US9798948, US9870498, ZL200980163411.X, ZL201080071124.9, ZL201280010789.8

## COMPLIANCE

### Laser Safety

This product conforms to the applicable requirements of IEC60825-1 (Ed. 3). and complies with 21 CFR 10 except for deviations pursuant to laser notice N° 56, date January 19, 2018. This product is classified as a Class 2 laser product according to IEC 60825-1 regulations. The targeting lasers are pulsed 416Hz with a 400us on time which results in a 16.67% duty cycle with an angular subtense of 1.5mRad. Average power is less than 1.0mW.

### Electrical Safety

This product conforms to the applicable requirements contained in the European Standard for electrical safety EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 at the date of manufacture.

## Caution

Use of controls or adjustments or performance of procedures other than those specified herein may result in exposure to hazardous visible laser light.

Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to hazardous laser light. The laser beams are intended for initial alignment and positioning.

This equipment is not suitable for use in locations where children are likely to be present.

## LED SAFETY

These camera bar code readers include illumination that uses high powered light emitting diodes (LEDs) that are classified according EN/IEC 62471.

Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to LED light. The LED can be switched on or off through a software command.

Even if the level of photobiological risk is low, it is a good practice to switch off the illumination during the installation or ordinary maintenance of the product by removing the power supply or by the software command.

## White Light Illuminations

WHITE LEDs are RISK GROUP 1. They are RISK GROUP EXEMPT at a distance of 1,3m.

## Red Light Illuminations

RED LEDs are RISK GROUP EXEMPT.

## Power Supply

This product is intended to be installed by **Qualified Personnel** only.

This product is intended to be supplied with a UL listed or CSA Certified LPS Power unit of 24 volt, 2 amp minimum (24 VDC Nominal, +/-20%).

## CE Compliance

CE marking states the compliance of the product with essential requirements listed in the applicable European directive. Since the directives and applicable standards are subject to continuous updates, and since Datalogic promptly adopts these updates, therefore the EU declaration of conformity is a living document. The EU declaration of conformity is available for competent authorities and customers through Datalogic commercial reference contacts. Since April 20th, 2016 the main European directives applicable to Datalogic products require inclusion of an adequate analysis and assessment of the risk(s). This evaluation was carried out in relation to the applicable points of the standards listed in the Declaration of Conformity. Datalogic products are mainly designed for integration purposes into more complex systems. For this reason it is under the responsibility of the system integrator to do a new risk assessment regarding the final installation.

## EAC Compliance

### Customs Union:

The CU Conformity certification has been achieved; this allows the Product to bear the Eurasian Mark of conformity.

## FCC Compliance



Modifications or changes to this equipment without the expressed written approval of Datalogic could void the authority to use the equipment.

This device complies with PART 15 of the FCC Rules. 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 which may cause undesired operation.

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/her own expense.

### UL Listing



### Bureau Of Indian Standards (BIS)

Self Declaration – Conforming to IS 13252 (Part 1):2010, R-41009288

## Laser Safety and Serial Labels



## HANDLING

The AV500/AV900 is designed to be used in an industrial environment and is built to withstand vibration and shock when correctly installed. However, it is also a precision product and must be handled correctly before and during installation to avoid damage.

Do not drop the reader.

# NO!



Do not fine tune positioning of the reader by striking it or its mounting bracket.

# NO!



Do not weld the reader into position, which can cause electrostatic, heat or reading window damage.

**NO!**



Do not spray paint near the reader which can cause damage to the lens and illumination window.

**NO!**



# CHAPTER 1

## INTRODUCTION

---

### ABOUT THE CAMERA

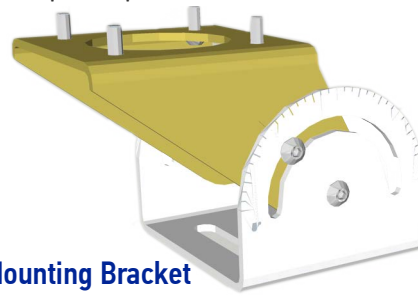
The AV500/AV900 is a high performance camera with an integrated image processing system dedicated to automatic code identification on moving parcels. The AV500 uses a 5 mega pixel sensor and the AV900 a 9 mega pixel sensor.

The Sync-NET reader clustering permits extending the reading area for single-side and multi-side applications. Captured images are stored on-board and optionally transferred to external supports through the integrated Ethernet connectivity. Rugged metal construction, IP65 enclosure rate and operative temperature up to 50°C guarantee a long life cycle even in harsh industrial environments.

The AV500/AV900 camera can be used with WebSentinel PLUS Investigator which is a tool that provides no read classification and bar code grading for each barcode read during normal operations. No Read classification is a valuable tool. By post processing saved images of No Reads, WebSentinel PLUS Investigator sorts these items into categories and helps you determine No Read root causes. Bar code grading is another important feature that helps estimate trends in printing quality and determines decreasing quality before labels can become no reads.



A universal mounting bracket shown below comes with each AV500/AV900 and allows you to mount the unit in its required position with ease.



**Mounting Bracket**

AV500/AV900 has been developed for use in numerous applications:

- Manual Parcel Sorting
- Manual Presentation Scanning
- Loading and Unloading
- Airport Baggage Handling
- Automated Parcel Sorting

Quick, automatic focus, positioning, calibration and code setting of the image can be accomplished using the X-PRESS button and LEDs on top of the reader without the necessity of a PC.

## DYNAMICFOCUS

### Excellent Performance

- 5.0 or 9.0 M Pixels
- Adjustable focus through C-Mount lenses
- Powerful Illumination Lighting Systems
- Outstanding decoding capability on 1D, 2D, Stacked, Postal symbolizes
- Omni-directional reading
- Frame Rate up to 32 frames/sec
- Image Cropping for higher frame rate
- Up to 100 readable codes in a single frame

### Ease of Setup

- e-Genius is a web browser based software to configure the reader parameters via PC Ethernet interface
- User-defined database of Image Acquisition Settings (parameter sets)

### Ease of Use

- X-PRESS interface LEDs provide operational and performance feedback
- Green Spot for immediate Good Read feedback
- Different operating modes to suit various application requirements
- Multi Image Acquisition Settings for higher reader flexibility
- Image saving and storage with buffering capability
- Diagnostic software tools

### Flexible Solution

- Complete set of Accessories like mirrors, connection boxes, cables and photocells
- Ethernet Connectivity with TCP/IP socket for reader parameter configuration, data and image transfer, FTP client, etc.
- Three Ethernet connections, Two serial ports
- General purpose opt-coupled I/Os

**Industrial Strength**

- Industrial compact 2D reader
- Rugged full metal construction
- Sealed circular connectors
- IP65 protection class
- 50 °C max operating temperature
- Supply voltage ranges 24 VDC Nominal, +/-20%

This chapter introduces the basic concepts necessary for camera installation and setup.

**GENERAL VIEW**

1 Serial Number and Warning Labels

2 Bracket Mounting Holes

3 Lens and Green Spot LED

4 Illumination

5 HMI X-Press Interface

6 Power On Connector and LED - stays blue when receiving power

7 Sync Out Connector and LED - flashes orange

8 Sync In Connector and LED - flashes orange

9 Host Net Connector and LED - lashes green and orange, orange if receiving data

10 Image Net Connector and LED - flashes green and orange, orange if receiving data

11 I/O Connector and LED - will light when connected to the CBX box

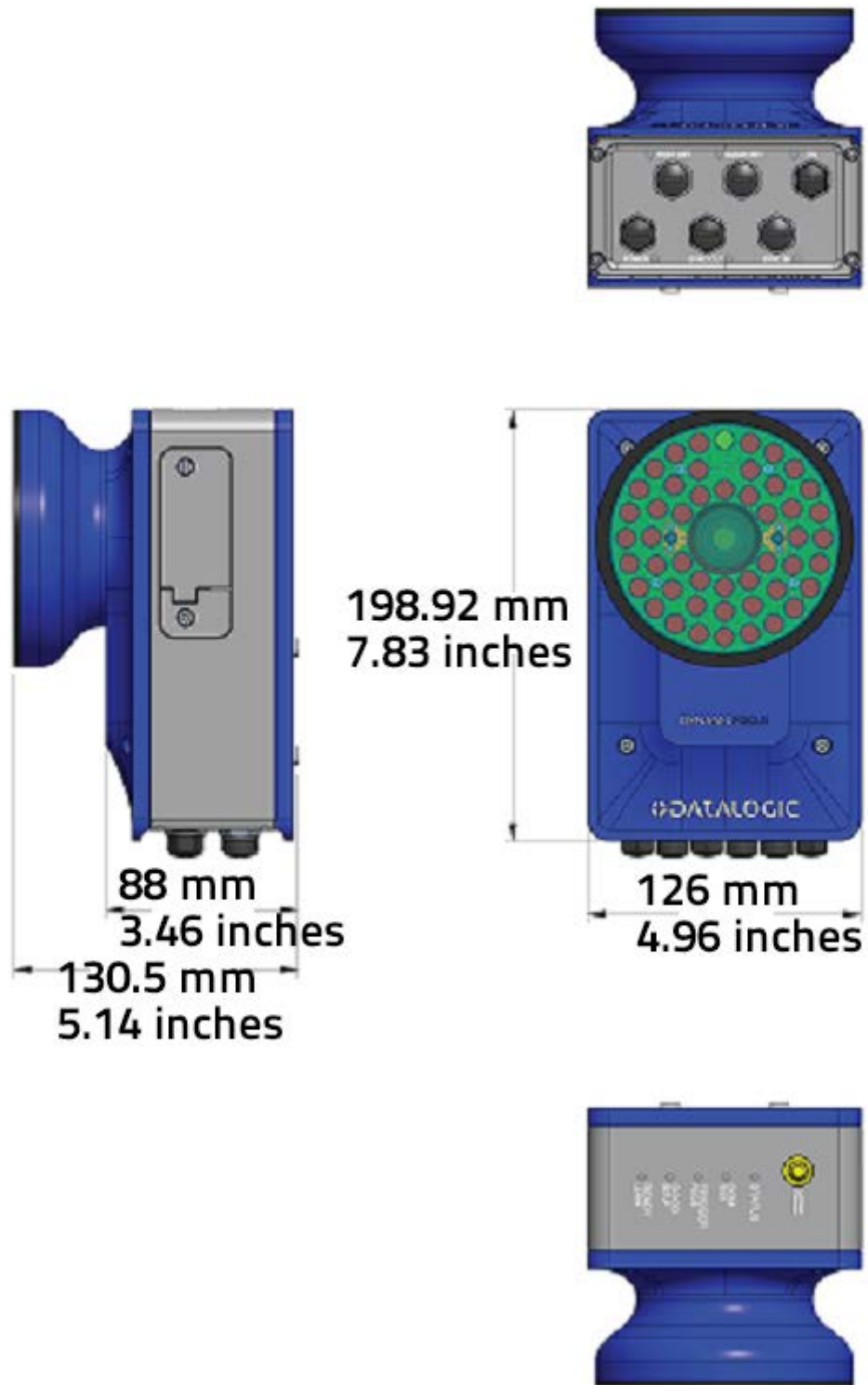


Power and Sync Out LEDs Lit

## LED Indicators

#	LED	DESCRIPTION
1	POWER	Solid Blue – Power LED indicating all internal power supplies are at the correct voltage. Can be out if external power is supplied and an internal supply is out of range.
2	I/O	Solid Green – Indicates CBX box connected has the ID+ to GND jumper and this camera is the controller for the tunnel. The Tachometer/Encoder must be connected to this unit.
4	HOST NET	Green - Host Network Link at Gbit speed Red – Host Network Data activity NOTE: With a Gbit link, Green will always be on and Red will blink, looking like it alternates Green to amber. If connected to 100Mbit network, the LED will only blink Red with activity.
5	IMAGE NET	Green - Image Network Link at Gbit speed Red – Image Network Data activity NOTE: With a Gbit link, Green will always be on and Red will blink, looking like it alternates Green to amber. If connected to 100Mbit network, the LED will only blink Red with activity.
6	SYNC IN	Green - SyncNet Link at 100Mbit speed Red – SyncNet Data activity NOTE: With a 100Mbit link, Green will always be on and Red will blink, looking like it alternates Green to amber. If connected to 100Mbit network, the LED will only blink Red with activity.
9	SYNC OUT	Green - SyncNet Link at 100Mbit speed Red – SyncNet Data activity NOTE: With a 100Mbit link, Green will always be on and Red will blink, looking like it alternates Green to amber. If connected to 100Mbit network, the LED will only blink Red with activity.

# AV500/AV900 DIMENSIONS



## APPLICATIONS OVERVIEW

An AV500/AV900 reading system consists of a reader/camera for acquiring images and reading the codes on a target. Because of the reading area of the AV500/AV900 it is a good choice for stationary presentation scanning systems, as well as systems over moving conveyor.

### Applications

The AV500/AV900 cameras are specifically designed for industrial applications requiring high reading performance such as:

- Low aspect ratio barcodes
- Codes covered by plastic film
- Codes located within a large depth of field
- Codes within a wide field of view
- High resolution codes positioned at far distances from the barcode reader
- Fast moving objects

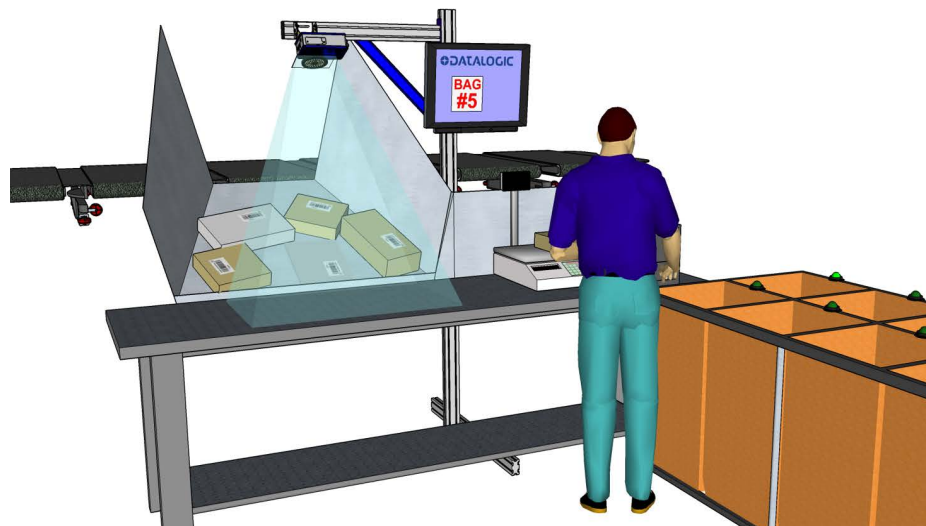
The AV500/AV900 is designed for multi-head arrays, single side or multi side tunnels and hybrid configurations. It can also be used as a stand alone unit.

### Stand Alone Presentation Scanning Manual Presentation Scanning

In Manual Material Handling or Parcel Scanning applications, manual presentation scanning is often the preferred method for item identification. Maximum productivity and **operational efficiency** is maintained, while the stationary overhead reader continuously scans the working area, the operator can easily and quickly handle objects of various dimensions and weights. Since no point-and-shot is required for scanning, no extra tools or infrastructure is necessary in the working area; no extra operations for part identification other than passing the object through the scanning zone. No training is required for users. The large coverage area and fast acquisition rate – by **AV500/AV900** – permits rapidly handling objects in sequence with great tolerance. **White illumination and continuous high power mode** enable top performance with the maximum comfort for operators.



**A controller key is required!**



## Single or Multi-Unit Tunnels and Arrays

Many AV500/AV900 reading system applications will read over a moving conveyor and use a network of multiple devices.

- **Optical Encoder Wheel (Tachometer):** Used underneath a conventional conveyor. The encoder generates a pulse per specified distance (mm [in]) of conveyor travel.
- **Internal Tach:** This is a software-generated pulse mimicking an encoder/tachometer.

A position sensor (DM3610, light curtain or S85 Position Sensor) is often used as a trigger source. When the height or left/right focus data measured by the sensor goes over a certain threshold, a package is entering the image valid start, and when it goes under the threshold, the package is providing the image valid stop. Sometimes this sensor is not sufficiently precise and an additional Presence Sensor input is used. When the codes are located on more than one face of the parcel, more than one reader is necessary (multi-camera reading station). In this case, one of the bar code readers (the Controller) collects the information from all the sensors and distributes it to the other readers using a dedicated Ethernet connection. A CBX connection box is used to simplify the connection of the camera to the other system components.

## Airport Baggage Handling

Baggage handling system airport arrays use multiple scanners and controllers as necessary to properly cover conveyors carrying passenger luggage through an airport baggage handling system. Several cameras, a CBX and an SC5000 Controller are required. Sometimes a Redundant System is required to provide duplicate controller and scanner stations for improved reliability and performance.

## Automated Parcel Sorting

Easy installation, maintenance, superior performance, and longer life-cycle make AV500/AV900 a compelling solution for over-the-belt reading.

5.0/9.0 megapixel image captures where each single shot frames the entire area. One-reader-one-shot obtains maximum reading throughput. Image capture is associated with the data of each sorted item and for any reporting or analysis purposes. Additional devices can be used for scanning applications of large conveyors or multi-sided reading, through Ethernet clustering, multiple readers can be effectively combined to extend the scanning area.



## Image Acquisition

The AV500/AV900 contains both the acquisition device or “imager,” which works in strict real time to acquire the best possible images and the decoding device or “decoder” in one chassis. These parts of the AV500/AV900 interpret the data received.

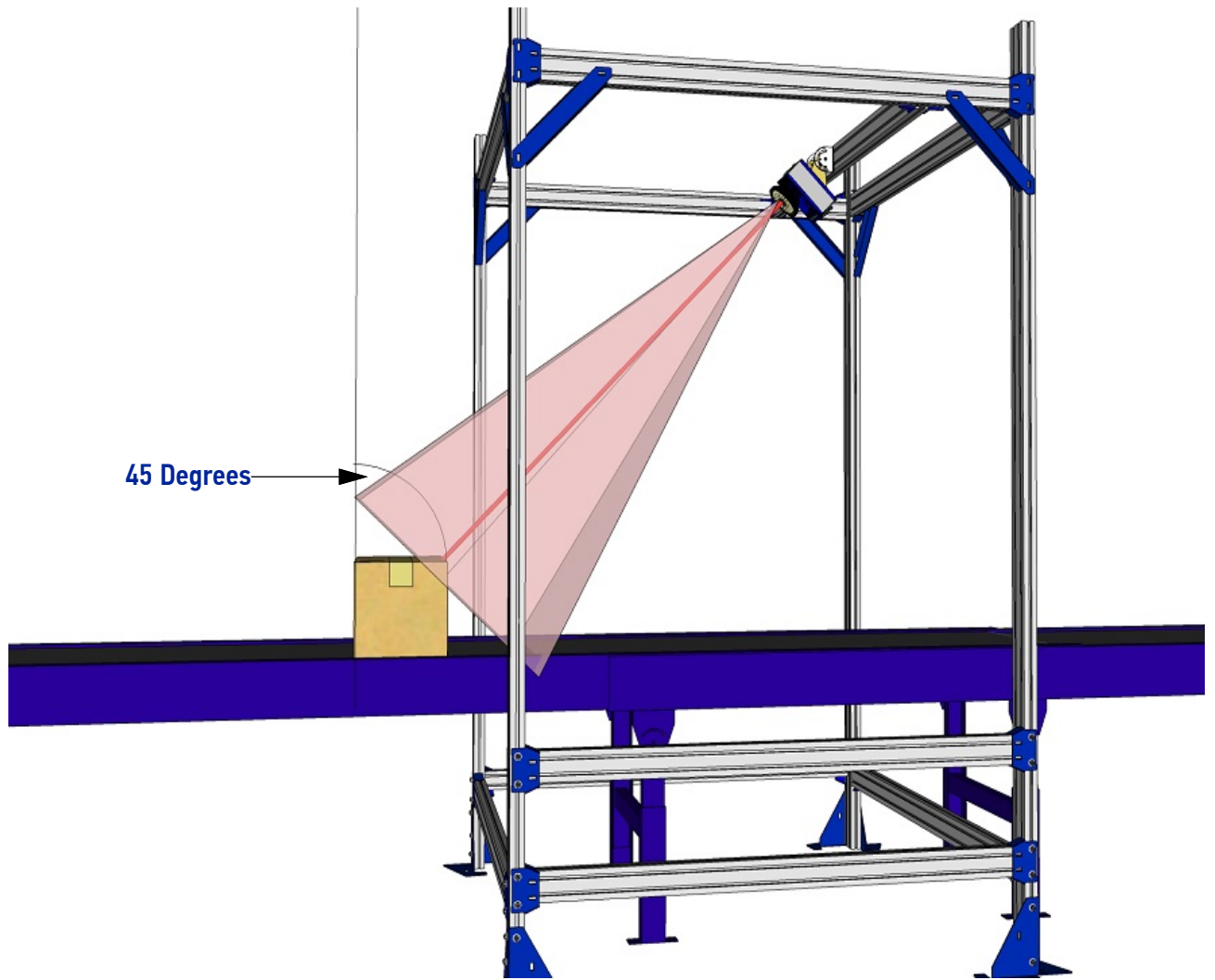
The camera can use several kinds of external sensors:

- **Speed Sensor:** If mounted over moving conveyor, the camera needs to know the speed of the objects to be acquired. The speed sensor is usually an encoder/ tachometer connected to the belt, or an internal software tachometer.
- **Height/Side Position Sensor:** The focusing position is computed by the camera based on the position of the parcel measured by a height sensor. Sensors may be a DM3610 Dimensioner, AREAscan™ DS2 Light Array or S85.
- **Trigger Source:** In multiple camera systems, each package has to be uniquely identified by all the cameras. For this reason, all of the cameras in a reading station share a unique trigger source.

All the sensors are connected to the Controller camera that interprets the information and distributes it to the Client cameras. The start and stop of an acquisition are triggered by a start/stop event generated by the trigger device (position sensor, photo sensor, read now signal). The acquisition of a package doesn't start when the trigger source detects it, but with a certain delay depending on:

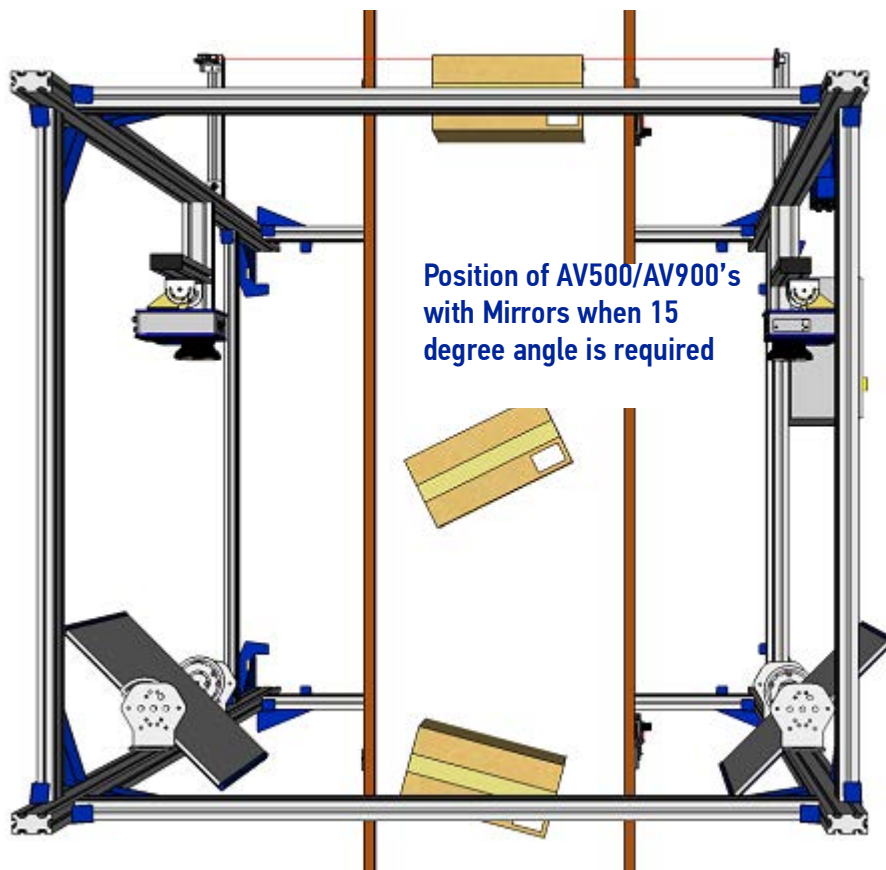
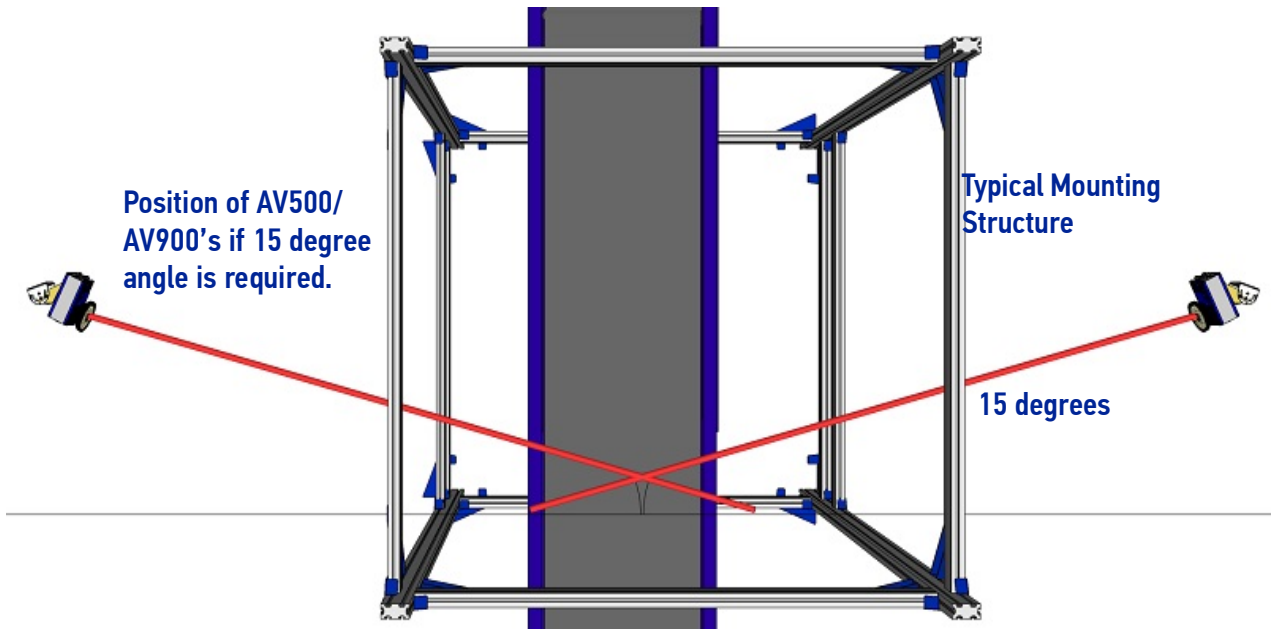
- the distance between the trigger device and the view line at belt level
- the view line angle (alpha) of the camera
- the speed of the object
- the height of the package

Based on the AV500/AV900 mounting position, the unit tries to acquire one (reading angle  $\alpha = 15^\circ$ ) or two faces of the parcel ( $\alpha = +/-45^\circ$ ).



typical reading station may also include:

- **Power Supply Systems:** The AV500/AV900 requires a 24 Vdc power supply. Usually each camera has its own power supply system (i. e. PWR-480B).
- **External Mirrors:** To cover the requested reading field, the cameras must be positioned at a given distance from their targets. In order to create reading stations as small as possible, a deflection mirror is often inserted between the target and the camera. See examples below.



## AV500/AV900 Versions

AV500/AV900 cameras are available in versions that differ depending on the optical resolution (focus range), F-stop and illumination color.

AV500 P/N	Focusing	Lens	F-stop	Illumination Color
938000007	Dynamic Focus	16 mm	F/6	White
938000017	Dynamic Focus	16 mm	F/6	Red
938000005	Dynamic Focus	25 mm	F/7	White
938000015	Dynamic Focus	25 mm	F/7	Red
938000006	Dynamic Focus	25 mm	F/8	White
938000016	Dynamic Focus	25 mm	F/8	Red
938000001	Dynamic Focus	35 mm	F/7	White
930000011	Dynamic Focus	35 mm	F/7	Red
938000002	Dynamic Focus	35 mm	F/8	White
938000012	Dynamic Focus	35 mm	F/8	Red

AV900 P/N	Focusing	Lens	F-stop	Illumination Color
938000105	Dynamic Focus	25 mm	F/7	White
938000115	Dynamic Focus	25 mm	F/7	Red (Coming Soon!)
938000102	Dynamic Focus	35 mm	F/8	White
938000112	Dynamic Focus	35 mm	F/8	Red (Coming Soon!)

## HMI – HUMAN MACHINE INTERFACE

The AV500/AV900 camera includes one external button that can be used to perform specific tasks without the need of connecting to **e-Genius** (AV500/AV900 browser-based user interface).



**Some of these functions may be performed using e-Genius. See Chapter 4.**



## LED Functionality

#	LED	DESCRIPTION
1	STATUS	Solid Red – active error exists
2	COMM	Solid Yellow when transmitting host message (serial or Ethernet)
3	TRIGGER	Lights Yellow when getting a trigger input from either the CBX or message on the Ethernet or serial interface. Always on in continuous mode.
4	GOOD	Lights Green with good read at time host message is transmitted.
5	READY	Solid Green - Good status when camera is running

### The AV500/AV900 LED Boot Sequence

1. All LEDs will turn off after the FPGA is loaded
  2. STATUS, COM, GOOD, and TRIGGER LEDs will turn ON after the RTP boots (READY will turn OFF)
  3. STATUS LED will turn off after the controller camera status is determined
  4. COM, GOOD, and TRIGGER LEDs will blink while the camera is waiting for the controller to start its DHCP server
  5. COM will turn off, GOOD and TRIGGER will turn ON, after the COMe boots
  6. STATUS LED will turn ON if the camera is the active controller
  7. TRIGGER will turn off after the RTP configures its network interface
  8. GOOD LED will blink until the RTP gets an IP address from the controller camera
  9. GOOD LED will turn ON after an IP address is obtained
  10. GOOD LED will turn OFF after the handshake between the RTP and COMe completes
  11. READY LED will turn ON after the RTP gets parameters from the COMe and the STATUS LED will indicate the cameras status and not the controller state.
- The camera is ready for normal operation.

## Green Spot

Green Spot' technology provides visual confirmation of a 'good read', improving the user's experience and increasing the speed of scanning operations, which is especially helpful when working in noisy environments. A green LED will illuminate the object when the camera successfully reads the barcode.

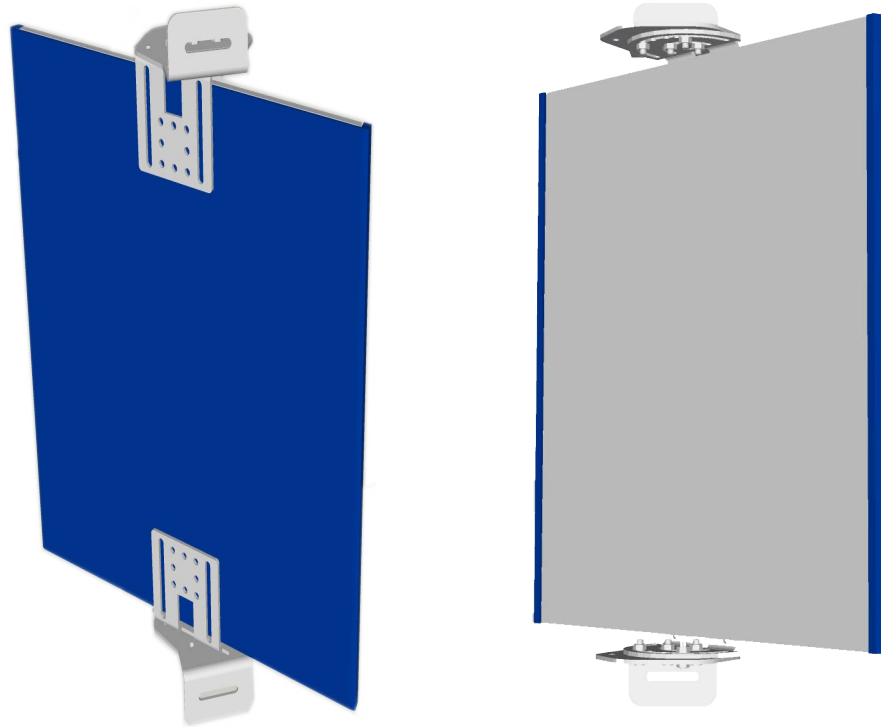


## Accessories

The following accessories are available on request for the AV500/AV900 Camera Imaging System.

### Reflecting Mirror

P/N 93ACC0086 (380mm) or 93ACC0116 (600mm)



**The reflecting mirror is used to reduce the footprint of your system.**

### Ethernet Connection Cable (M12-IP67 to RJ45)

This cable may be connected to the Host or Image port.

P/N: 93A050034 (1m)

P/N: 93A050035 (3m)

P/N: 93A050036 (5m)

P/N: 93A051389 (10m)



**Sync-net Connection Cable (M12 male to M12 female)**

P/N 93A050133 (.75m)

P/N: 93A050079 (3m)

P/N: 93A050080 (5m)

P/N: 93A050081 (10m)

**I/O Cable (M12-IP67 to CBX)**

P/N: 93A050059 (3m)

P/N: 93A050060 (5m)

P/N: 93A051390 (10m)

**Power Supply (Single Camera)**

P/N: 93ACC0058 (US)



P/N: 93ACC0264 (PWR-240B)

P/N: 93ACC0076 (PWR-480B)



Four Port Power Supply (Multiple Cameras)

P/N 93ACC0141 (US)

P/N 93ACC0142 (EU)

#### Power Cable

P/N: 93ACC0149 (3m)

P/N: 93ACC0150 (5m)

**PICTURE NOT AVAILABLE AT THIS TIME!**

#### Controller Key

P/N: 93A200032



## COMMUNICATION PORTS

The following communication ports are available on the AV500/AV900 camera.

Host Network

Image Network

Sync Net

## Discrete I/O

The AV500/AV900 offers one Digital I/O, which stands for Digital Input and Output. This is available for connection to a CBX which provides multiple additional connections. Dig-

ital I/Os allow a micro-controller to detect and output logic states. Each digital I/O can recognize one of the following:

### **Inputs**

Tach  
Trigger  
Dual Zone  
Generic

### **Outputs**

Complete Read  
Partial Read  
Trigger On  
Trigger Off  
Multiple Read  
No Read

## **TRIGGER, FOCUS AND POSITION SENSOR DEVICES**

There are several focusing device options available for the AV500/AV900 Camera, see Chapter Five for details.

## Photoelectric Sensor

The Datalogic Photoelectric Sensor is used in AV500/AV900 camera systems to detect the presence of an item entering the scanning area.

The photoelectric sensor is used in singulated conveyor systems where the packages are separated by an open space between the trailing edge of one package and the leading edge of the next. In irregular package applications, the photoelectric sensor assists in maintaining the package footprint so that the AV500/AV900 camera will only scan and provide data for a specific package.

Depending on the application, these devices may need to be configured differently. While the photoelectric sensor and tachometer work well with belt conveyors, a special configuration is needed for tilt-tray and cross-belt sorter applications.



<b>Photoelectric Sensor</b>	
AS1-HD-HR-010-J D 3M RES 0.5MM H 100MM	958101020
AS1-HD-SR-010-J D 3M RES 5MM H 100MM	958101030

## 0LCC-75xx Kit with DS2 Light Array

The DS2 Light Array (Light Curtain), part of the LCC-75xx kit, is used to detect the presence of products in top mount applications as they enter the scanning area as well as report the focusing data to the top mounted AV500/AV900. The AREAscan™ family of the DS2 series covers controlled heights ranging from 150 to 2500mm, with 5m operating distances for high resolution versions, or 10m for low resolution versions.



<b>Light Curtain Focusing</b>	
LCC-7501 AV7 LIGHT CURTAIN 150MM+CAB 10M	93ACC0170
LCC-7506 AV7 LIGHT CURTAIN 600MM+CAB 10M	93ACC0171
LCC-7509 AV7 LIGHT CURTAIN 900MM+CAB 10M	93ACC0172
LCC-7512 AV7 LIGHT CURTAIN 1200MM+CAB 10M	93ACC0173

## Position Sensor

The DK-503 Distance Kit is part of a vision system used to signal the focus range of packages to be imaged by the AV500/AV900 camera. It includes an S85 Class 2 visible red LASER sensor to measure direct proximity from .2 m to 5 m. It includes PNP or NPN, 4-20 mA analog output and RS 485 serial interface.

**It comes with:**

- Mounting bracket and non-reflective plate
- CVL 2811 Connection cable
- Installation Guide



Distance Sensor	
DK503 Distance Sensor Kit	93ACC0263

## DM3610 Dimensioner

The DM3610 is used to detect the presence of products as they enter the scanning area as well as report the package positions/heights and sequence number to all cameras in the system. The DM3610 can also provide certified (Legal for Trade), side-by-side package detection, or volume measurements for the packages that pass below it.

For complete information about the features and capabilities of the DM3610 Dimensioner, see the dimensioner page on the Datalogic website: [www.datalogic.com](http://www.datalogic.com).



The DM3610 Dimensioner requires the following:

- DM3610
- Power Supply
- Universal Mounting Bracket
- Class 2 EU Adapter (optional)

<b>DM3610</b>	
DM3610-1000 STD NLFT	932702000
DM3610-1100 SING NTEP	932702020
DM3610-1200 SING OIML/MID	932702030
DM3610-1201 SING OIML/MID MOD D	932702031
DM3610-1300 SING MC	932702040

## SPEED SENSORS

### Encoder (Tachometer)

The encoder/tachometer delivers a continuous pulse to the system, which provides feedback on conveyor speed and transmit point, and can be used to help track the package position along the length of the conveyor.



<b>Encoder (Tachometer)</b>	
OEK-2 OPTICAL ENCODER (CAB 10m+SPRING)	93ACC1770
OEK-3 OPTICAL ENCODER HI RES,6M CBL+SPRI	93ACC0056
OEK-3 ENCODER HI RES M139,6M CBL +SPRI (START/STOP ANTI ROLLBACK)	93ACC0104

# INDUSTRIAL CONTROLLERS

## Industrial Connection Boxes

CBX510 Series are industrial connection boxes that can be used to connect the barcode readers to an encoder/tachometer, photoelectric sensor, serial devices, relays, or other peripherals.



CBX Connection Box		
CBX100 CONNECTION BOX COMPACT		93A301067
CBX510 CONNECTION BOX MODULAR		93A301087
CBX800 GATEWAY		93A301077



**Only CBX510 should be used in a system, If additional I/O is needed CBX100 or 800 can be added to other camera systems.**

## SC5000

Used when multiple cameras are required, the SC5000 Controller offers all the necessary functions to make the phases of installation, setup, testing, and maintenance easy and quick.



The SC5000 Controller key functions are:

- Bus Controller: cluster management and Host interface of a multi-sided reading tunnel
- Automatic replacement procedure: automatic procedure for imager, reader, scanner and bus controller replacement;
- Diagnostic indications on the reading station status, simple to be detected without any PC needed. These indications, based on LEDs and display, provide the maintenance staff with all the necessary information;
- Single and Redundant System configurations;
- Integration with Dimensioners and Vision Systems; SC5000's efficiency in hybrid solutions represents a crucial competitive advantage for challenging application requirements.
- Three Inputs (Trigger, Encoder/Tachometer, IN3), three Outputs (OUT1, OUT2, OUT3), one configurable I/O Port (IN4/OUT4).

The SC5000 Controller is divided into two parts:

- The upper part (alloy case) contains the Controller's digital section; here you can find the four Ethernet M12 connectors, the removable SD-Flash memory, the display, the keypad and the LEDs.
- The lower part (plastic case) contains the connection board, the place for the optional Fieldbus modules and the connector panel.

The simple and sturdy mechanical structure makes the SC5000 Controller the ideal solution for industrial environments.

The SC5000 Controller is fully compatible with DS8110 and DX8210 scanners.

The SC5000 Controller allows connection to the Trigger and Encoder/Tach. PNP inputs are available via M12 circular connectors, placed on the lower front panel.

This configuration covers a great part of all the possible user's needs.

# CHAPTER 2

## MECHANICAL INSTALLATION

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### PREPARING FOR MECHANICAL INSTALLATION



**WARNING: Application-specific drawings and documents provided by Datalogic supersede any contradictory content in this manual.**

Before mounting any components, please do the following:

- Read all instructions before beginning your installation.
- Define and confirm the accuracy of your application's requirements and structure position, especially the height of the conveyor from the floor.
- Review all installation-specific drawings provided with your equipment.
- Review and plan the mechanical installation of all devices used in your application. Be sure to allow adequate clearance for maintenance.
- Review and plan the power requirements for your application.
- Check the contents of the shipping cartons against the packing list.
- Record all product serial numbers.

### General Mounting Guidelines



**WARNING: It is important that you follow these general precautions when installing, setting up, operating, maintaining, troubleshooting, or replacing any Datalogic products, parts or related equipment.**

As you plan and install your AV500/AV900 camera imaging system, keep the following guidelines in mind:

- Follow application drawings for structural details and barcode reader placement.
- Determine the proper orientation and position of the barcode reader(s).
- Leave adequate clearances (approximately 300 mm [12 in]) for wiring.
- Route wires carefully to reduce or minimize electrical noise. When power and communication wiring must cross, make their intersection perpendicular. Avoiding sharp wire bends or loops, which can affect performance.
- Proper grounding limits the effects of noise due to Electromagnetic Interference (EMI).

## Mounting Structure Considerations

Your first task is to mount your camera. You can provide your own mounting structure or Datalogic can design one for you. We recommend using a Datalogic mounting structure for standard applications.



**NOTE: The AV500/AV900 cannot be mounted parallel to the conveyor belt. A 15 degree angle or more is required to avoid specular reflection.**



**WARNING: There must be at least 300 mm (12 in) clearance behind the unit for fan air intake!**

Your mounting structure must provide the following capabilities:

- It is adjustable enough for you to move your unit to the optimum position for proper scanning.
- It allows a technician access to the camera while it is mounted.
- It must be as vibration free as possible so as not to affect the scanning accuracy.
- It is constructed of steel or aluminum.



**NOTE: Refer to the Chapter 3 “Preparing for Electrical Installation” on page 42 and Reference Documentation for details on connecting your readers to other devices in the system.**

**When installing several cameras, take care to position them so that no laser beam or LED illumination enters the reading window of other barcode reading devices in the system. This condition could occur more frequently for side mounted applications. If these precautions are not followed, read rate could be negatively affected. To resolve this problem, it is sufficient to slightly change the inclination and/or position of one of the two devices involved.**

## Maintaining Thermal Performance

All electronic devices and circuitry generate excess heat and thus require thermal management to improve reliability and prevent premature failure. The AV500/AV900 is no exception, an internal fan is critical to maintaining AV500/AV900 performance. Also, proper clearance must be provided to the unit. There must be at least 300 mm (12 in) clearance behind the unit for fan air intake and you must use the mounting bracket provided with your unit to help maintain proper clearance and air flow.

The fan of the AV500/AV900 is a field replaceable part. Request spare part number: 8900006713. Instructions are included.

## UNPACKING INSTRUCTIONS

Verify that the AV500/AV900 Camera and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

- Camera
- Installation Guide
- Test Chart
- Mounting Bracket and Hardware



**WARNING:** The AV500/AV900 Camera and accessory packaging is designed to protect the unit(s) during shipment. Do not throw it away. Save all packing material in case you need to transport your unit(s) to Datalogic for any reason.



1. Open the AV500/  
AV900 packaging.



2. Remove the  
foam layer to  
reveal the AV500/  
AV900, its  
mounting  
bracket and  
associated  
hardware.



3. Carefully  
remove the  
AV500/  
AV900 and  
its  
mounting  
bracket.  
from the  
package.



4. Save the box and all of  
the packaging materials in  
case you need to ship the  
unit for service or repairs.

## COMPLETE INSTALLATION SEQUENCE



**NOTE:** Everything should be **MECHANICALLY INSTALLED** before performing any **ELECTRICAL INSTALLATION**. See the Chapter 3 on “Electrical Installation” on page 42 for electrical installation details.

To complete mechanical installation and setup, you must:

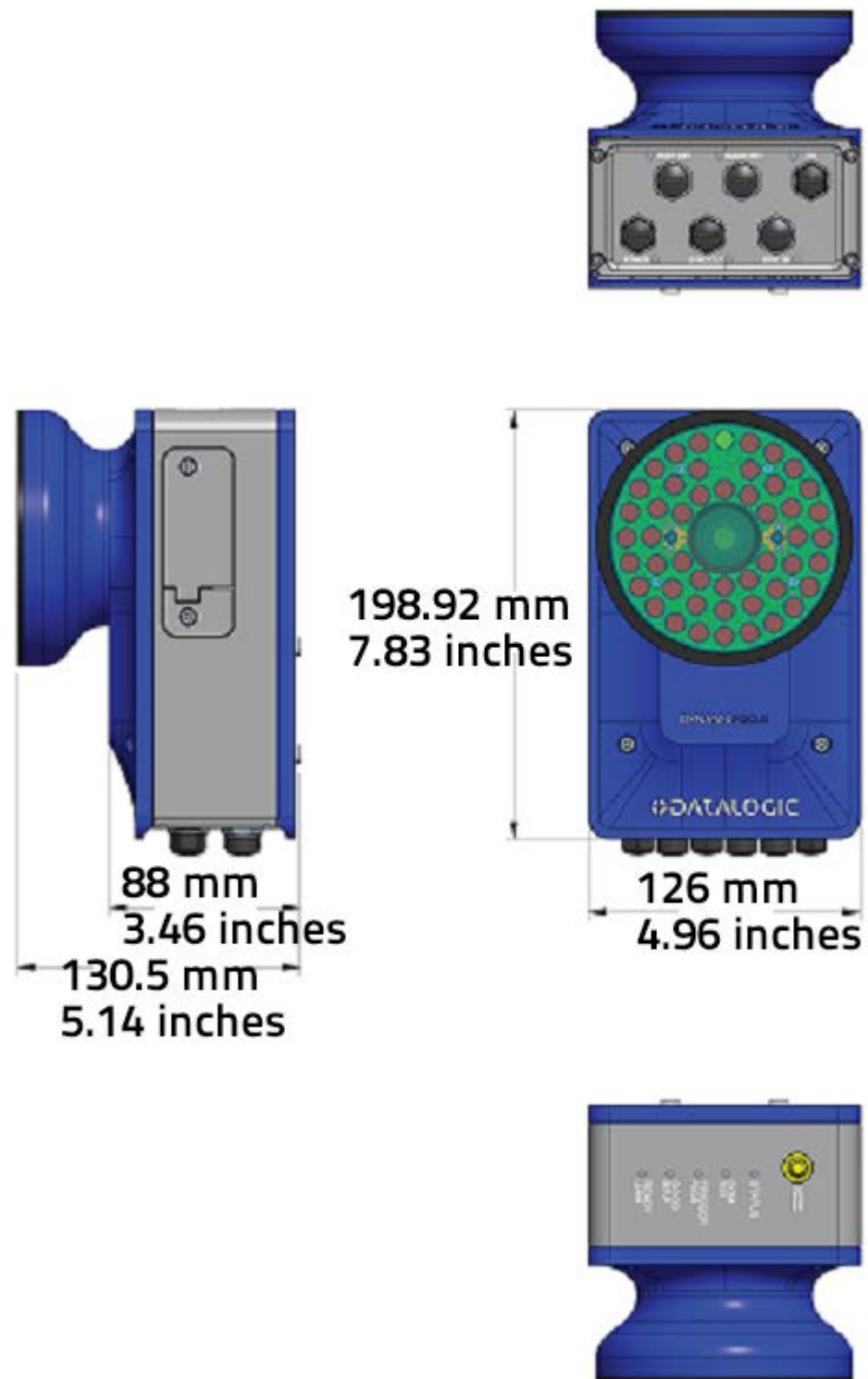
1. Review the details of your application’s requirements
2. Erect mounting structure or other supporting structures
3. Determine and mark the Mounting Bracket locations
4. Mount the AV500/AV900 brackets to the mounting structure
5. Mount the AV500/AV900 to the bracket
6. Mount the brackets for the deflection mirror, if required
7. Mount the deflection mirror to its brackets
8. Mount the sensor(s) (Light Curtain, DM3610 Dimensioner, or S85)
9. Mount the photoelectric sensor to the mounting structure (optional)
10. Mount the tachometer to the mounting structure
11. Mount the CBX connection box to the mounting structure
12. Complete electrical installation (See “Electrical Installation” on page 42)
13. Align the AV500/AV900 for proper operation
14. Align the height sensor for proper operation, if used
15. Configure the AV500/AV900 (See the E-genius On Line Help)
16. Calibrate the AV500/AV900 (See “Static Calibration” on page 95)
17. Check AV500/AV900 operations

## MOUNTING

### Dimensions and Clearances



**WARNING:** The AV500/AV900 is a sealed, ventilated unit. Mounting the unit with 300 mm [12 in] of clearance (front, top, and sides) is recommended for cooling and ease of maintenance.



## Physical Support Requirements

For details on the weight of the cameras, see “Technical Specifications” on page 129. Multiple-head systems may include further details on the physical support requirements with any application-specific documentation provided.

## Vibration Limitations

See “Technical Specifications” on page 129.

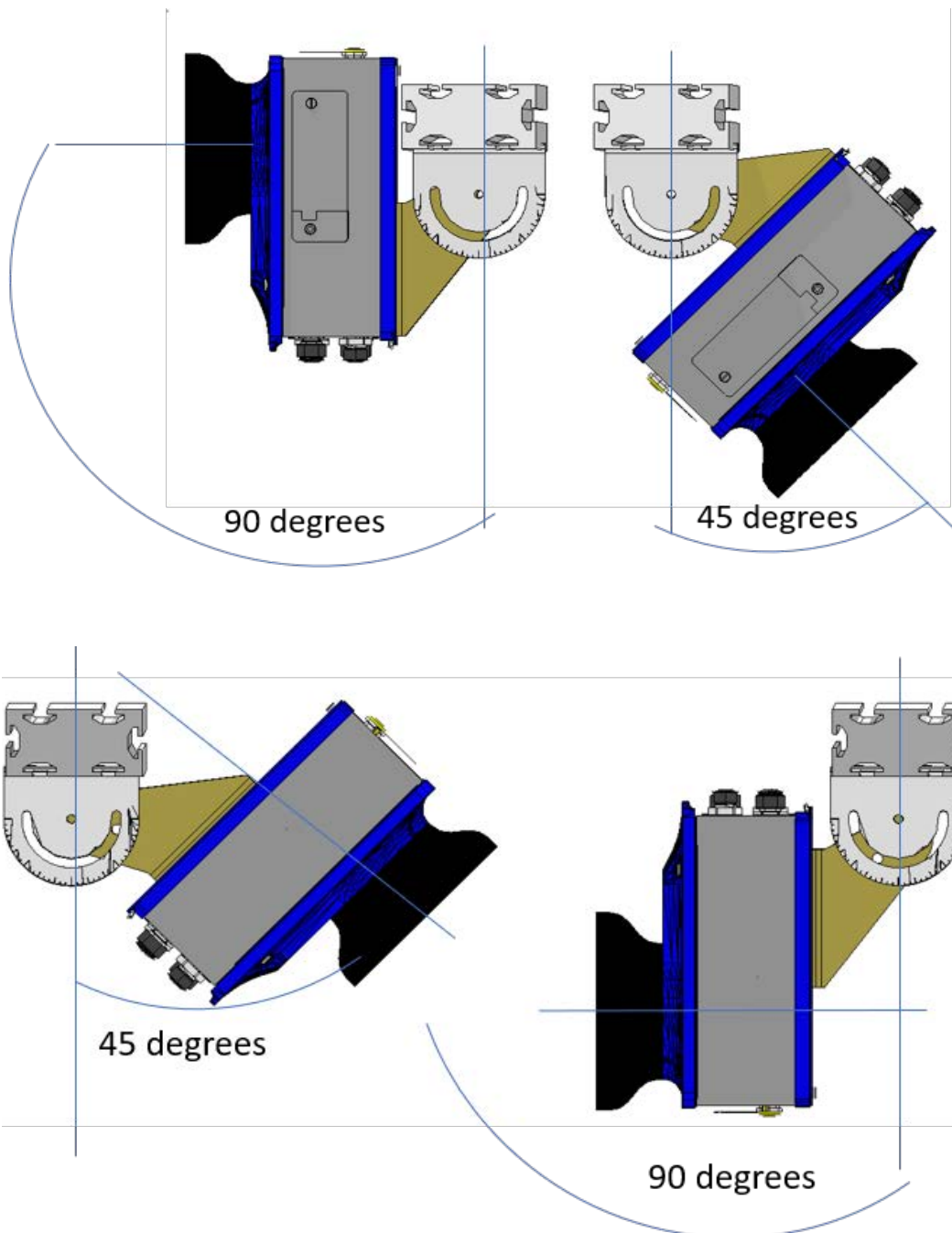
## Mounting and Positioning

The AV500/AV900 system components and in particular the mounting bracket have been designed for installation onto standard Bosch and 80/20 frame profiles (extruded aluminum) and accessories. 60x60 mm profile is recommended for Bosch, although 45x45 mm profiles will work; and standard 1.5" x 3" for 80/20.

The following illustrations show the various typical mounting positions for the AV500/AV900.

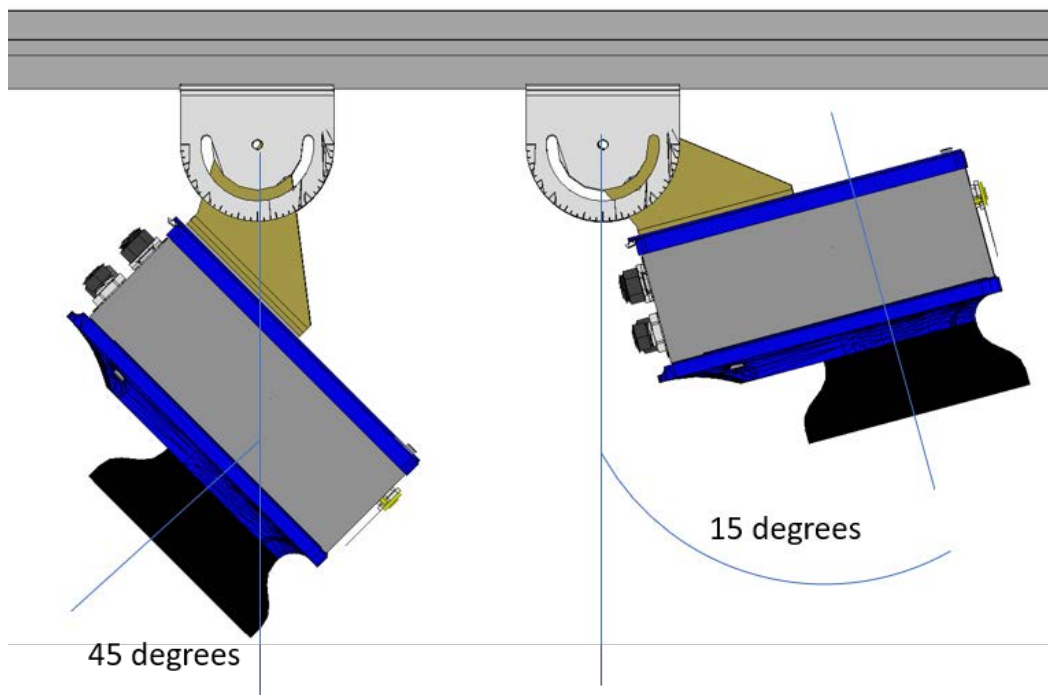
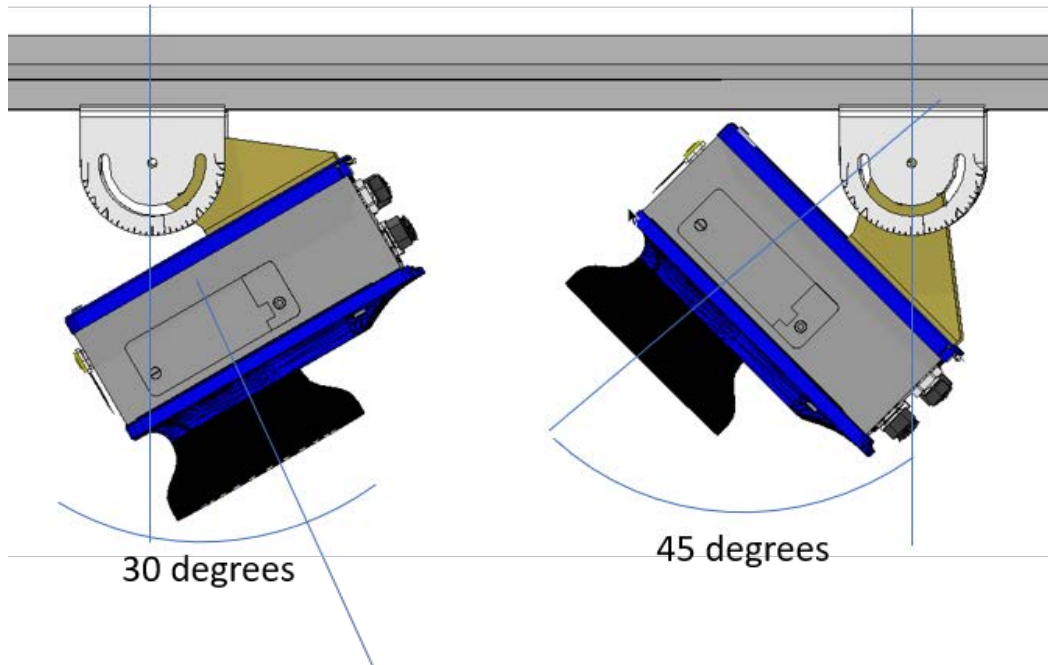


**NOTE: It is important when mounting the camera that the connector panel is facing away from the conveyor so that the wiring does not interfere with product flow.**



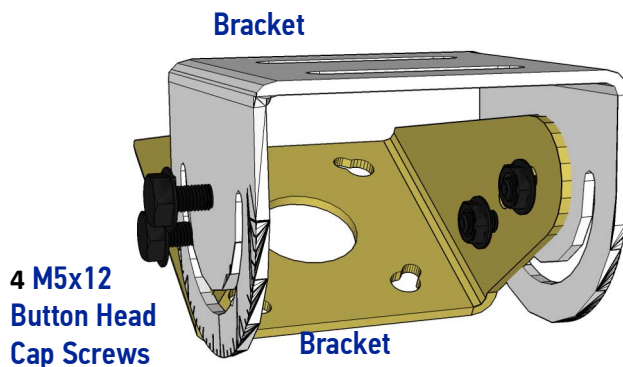


**NOTE:** Cameras will only be mounted at 90 degrees when used with a mirror.

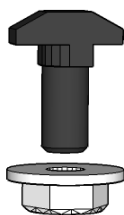


## Mounting Sequence:

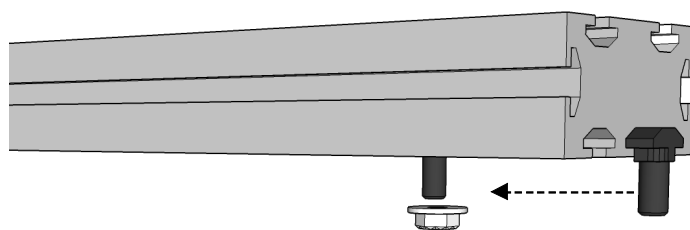
1. The AV500/AV900 mounting bracket has two parts and comes assembled. It is packaged with your camera.



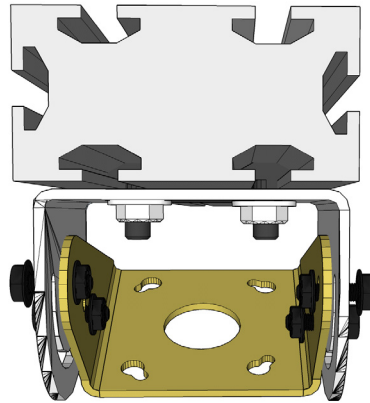
2. In your mounting kit are the required number of T-bolts and nuts used to attached the mounting bracket to the station frame.



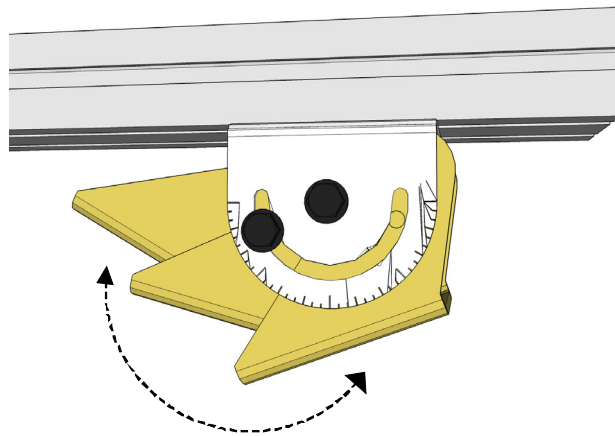
3. Determine where your AV500/AV900 will go on the structure (according to the measurements specified in your customer specific mounting diagram.) Slide the T-bolts into place.



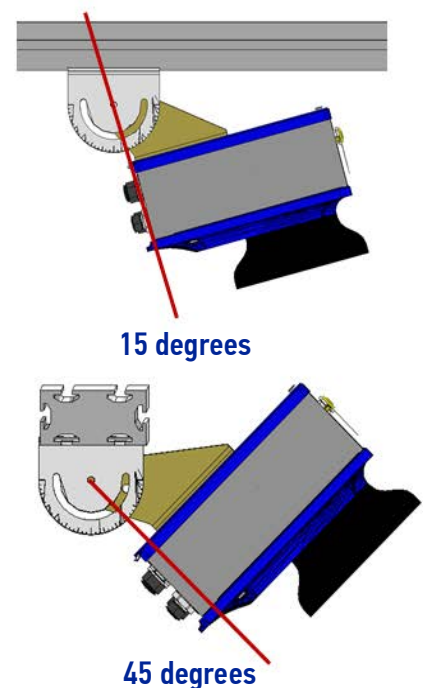
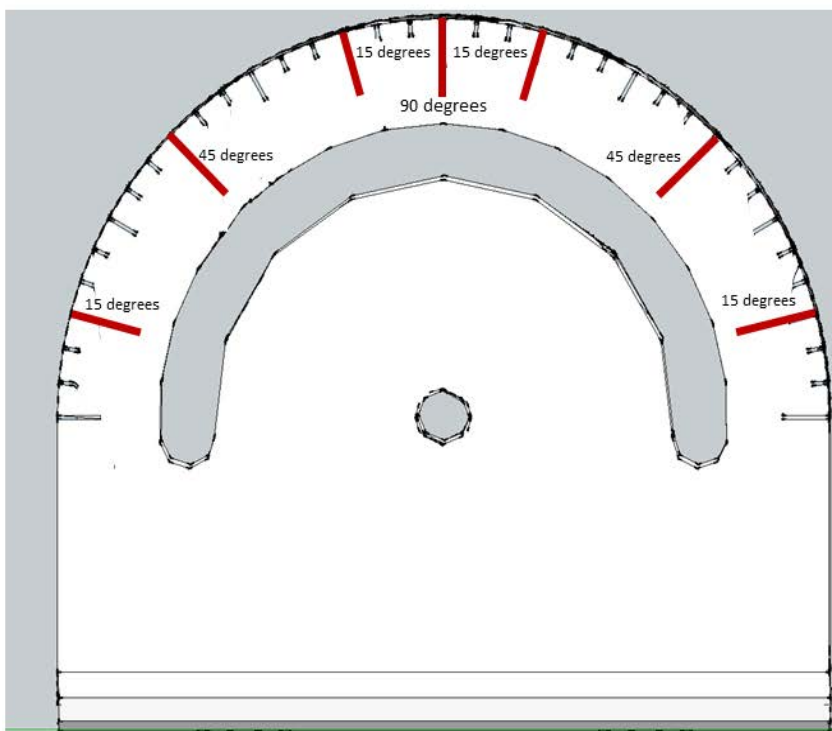
- Set the AV500/AV900 mounting plate in the correct position and tighten the T-bolt nuts.



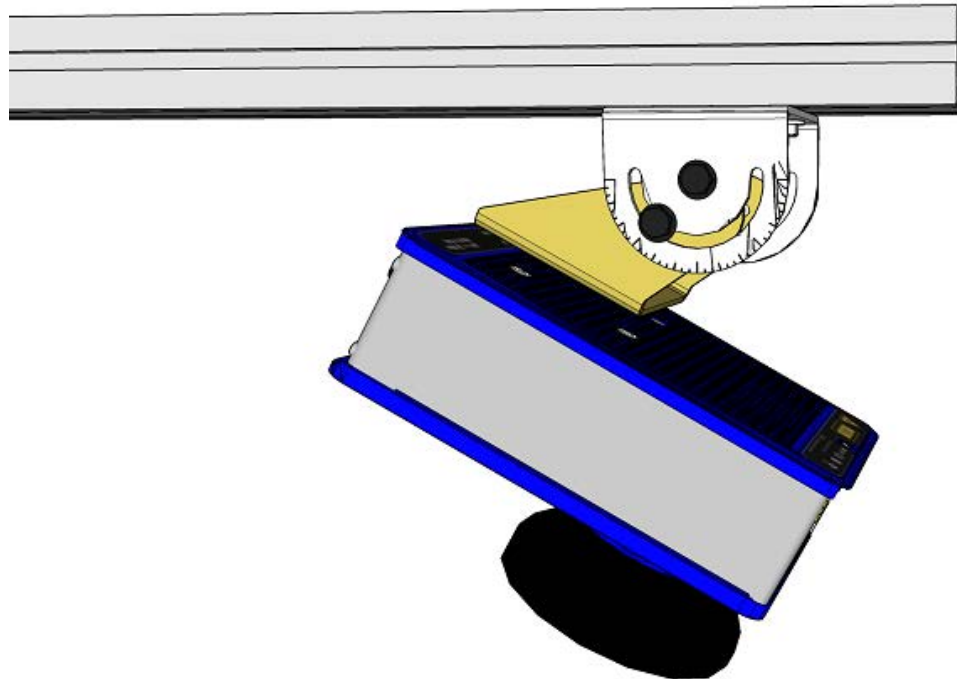
- Make sure the bolts holding bracket parts together are loose enough to allow you to rotate the bracket.



Once the brackets are in the correction position (15, 30, 45 or 90 degrees) tighten the bolts.



7. Attach the nuts to the back of the AV500/AV900.
8. Attach the camera via the four mounting holes by sliding it into place, then tighten the nuts.

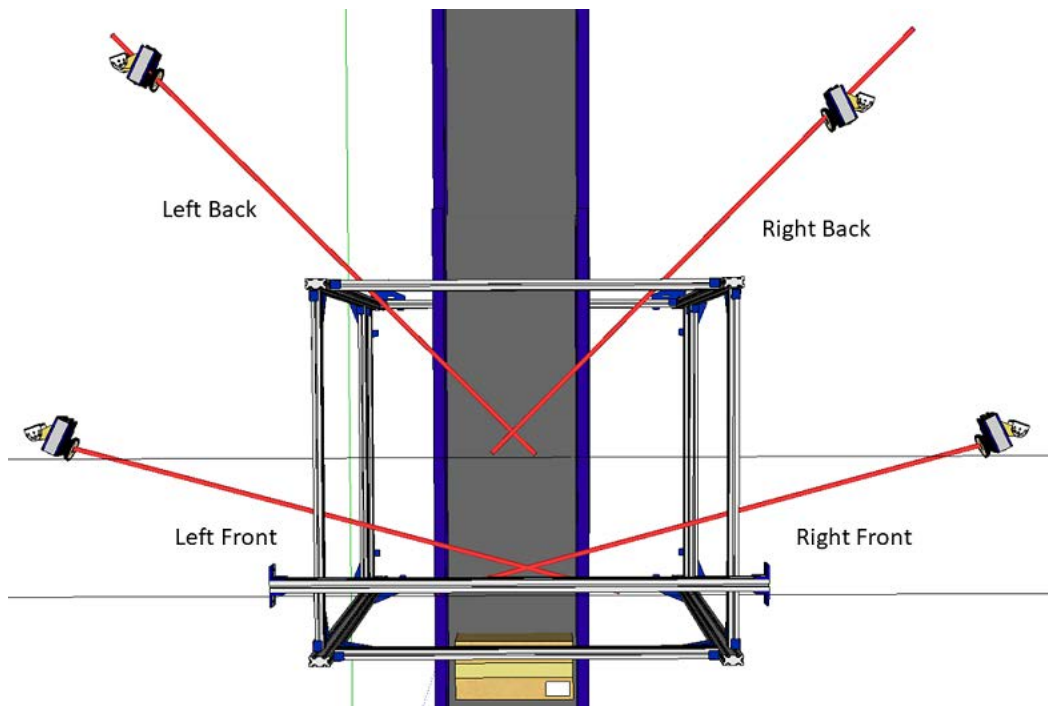


## INSTALLING THE DEFLECTION MIRROR

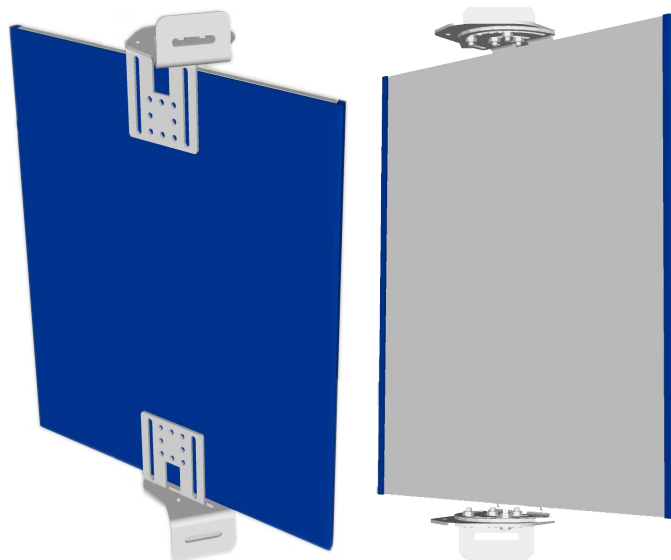
EMK series External Deflection Mirrors are mounted in applications where it is not practical to mount the reader in a position to achieve the full DOF. In these cases a more compact reading station can be constructed using the mirror to fold the camera's view and is particularly useful in side reading applications.



**NOTE: The diagram below is for illustration purposes to show how it is not always practical to mount the reader at the necessary distance to achieve the desired DOF and FOV. Refer to your application specific diagrams for more information.**



**NOTE:** For all of the following mounting examples, the positioning distances are not given since they will depend upon the application specific diagrams. Refer to your application specific diagrams for more information.



### Deflection Mirror Bracket Angles

Standard deflection mirror bracket angles are show below. The bolt indicates the locking position between the Main Bracket (blue) and the Rising Bracket (red). The angles specified are reflective angles not the physical angle of the bracket or mirror.

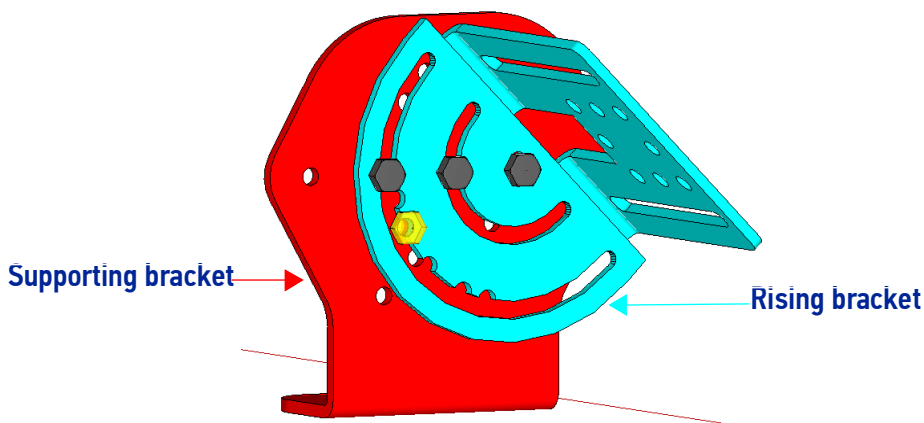
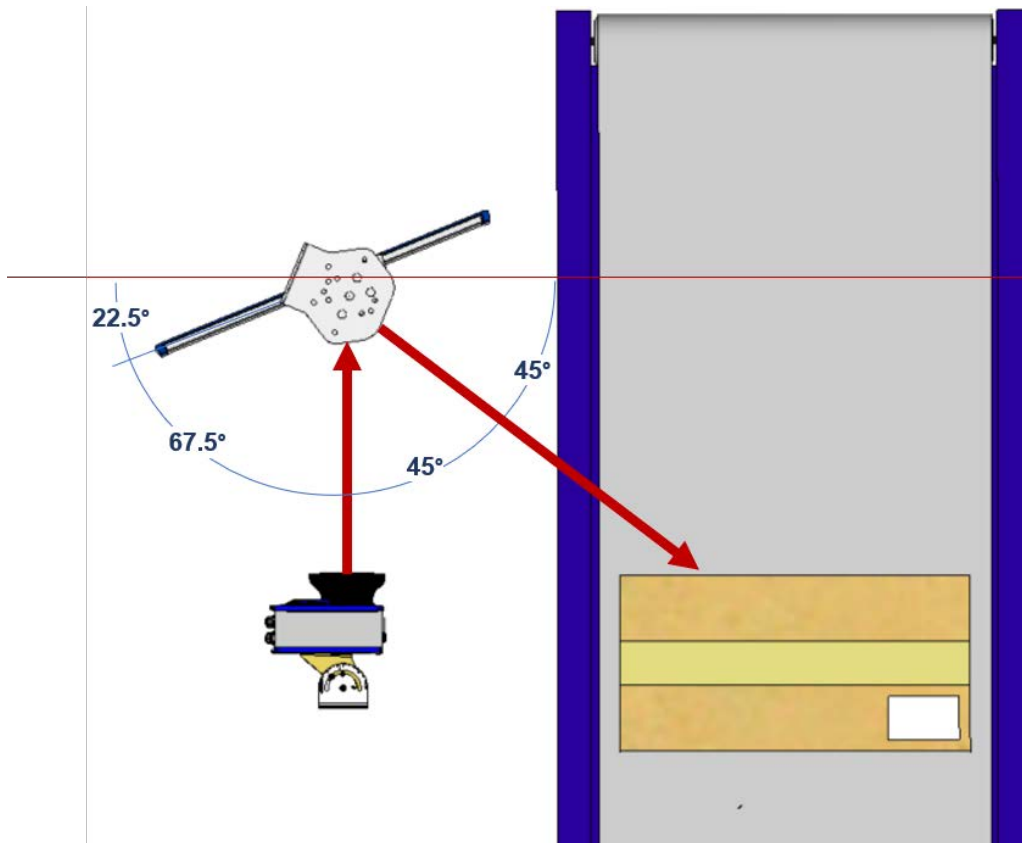
Left Back and Right Back (45 degrees)



**WARNING:** Do not mount the reader so far from the mirror that the reading area extends outside of the mirror surface.

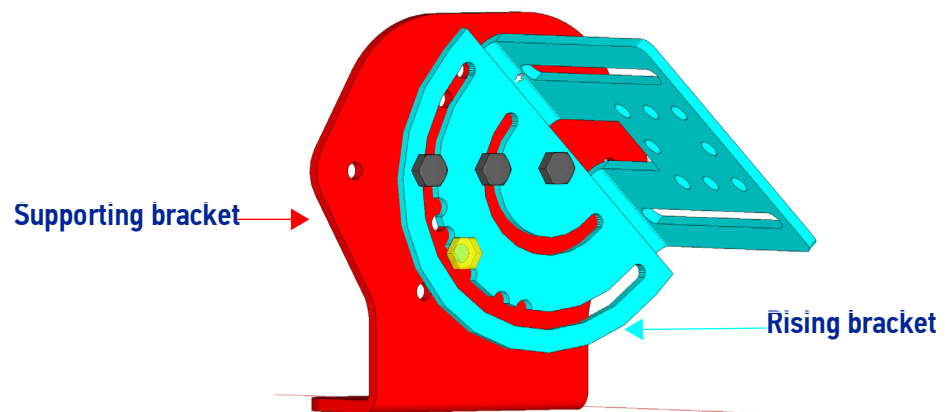
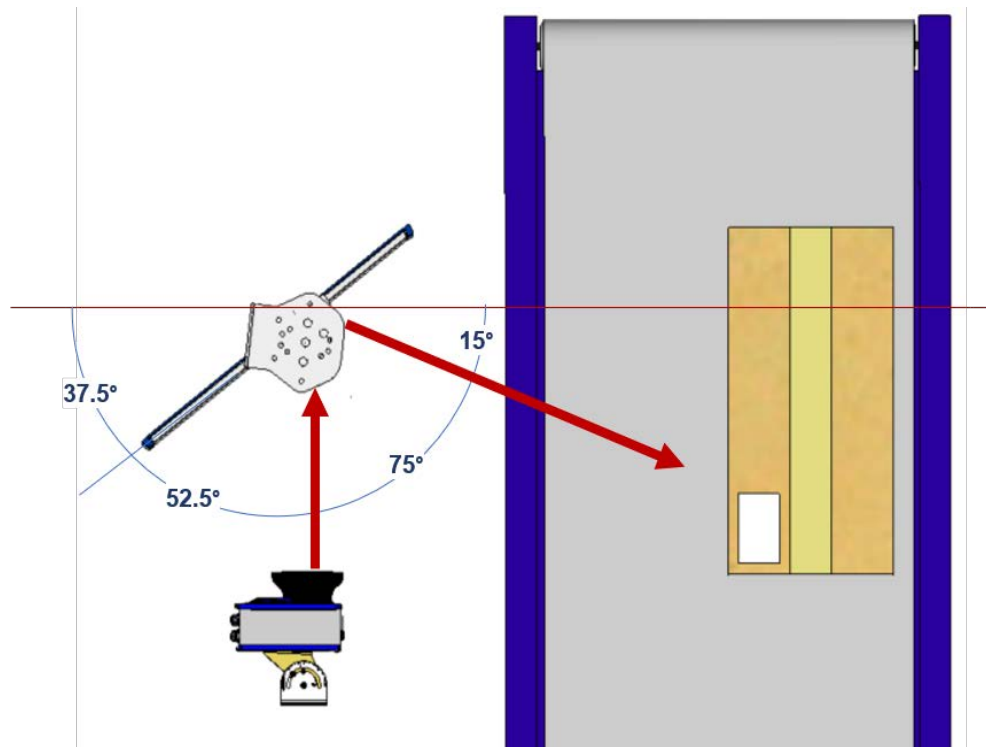
It is critical that the brackets do not stress or flex the mirror, as this will cause focusing and calibration issues.

From the parallel position, rotate the mirror 22.5 degrees as shown.



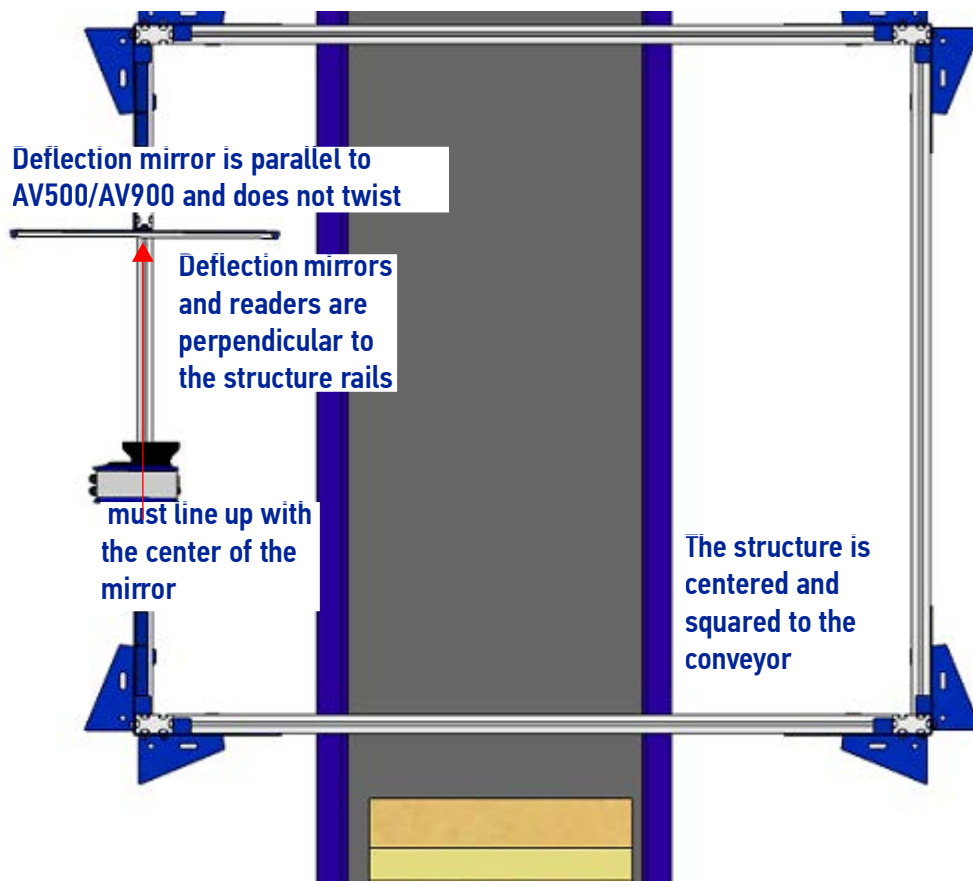
## Left Front and Right Front (15 degrees)

From the parallel position, rotate the mirror 37.5 degrees as shown.



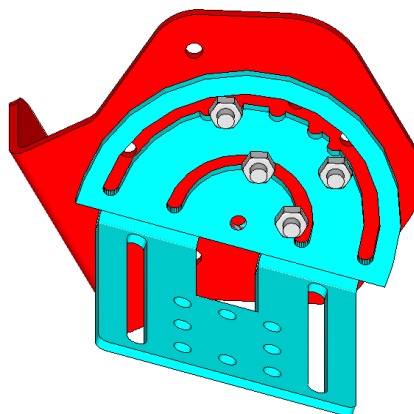
## Aligning the AV500/AV900 with Deflection Mirrors

When using deflection mirrors with the AV500/AV900 reader, which is typical, the mirrors must be mounted parallel to the reader and at the correct distance to allow for proper focus and the highest read rate. Reference the system's application drawing for distances.

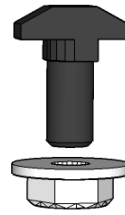


## EMK-380 Mounting

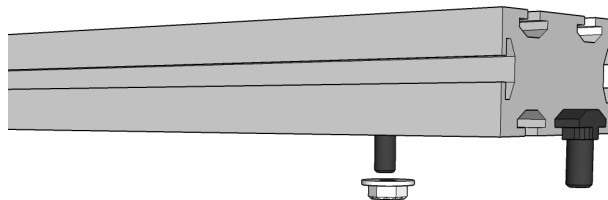
The EMK mirror mounting bracket has two parts and comes assembled, but not set to the proper angle. It is packaged with your EMK mirror. Whether mounting in a top or side position, mount the mirror as follows:



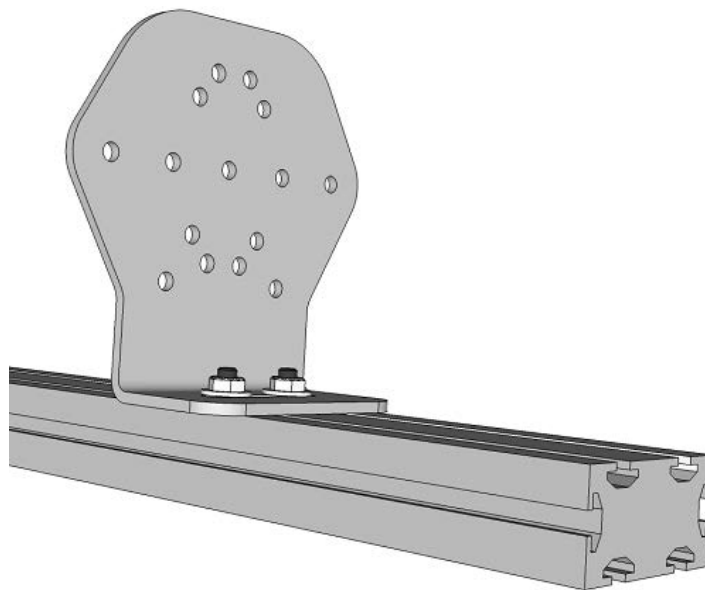
1. Included in your separate mounting kit are T-bolts and nuts. These will be used to attach the bracket to your mounting structure (typically Bosch or 80/20).



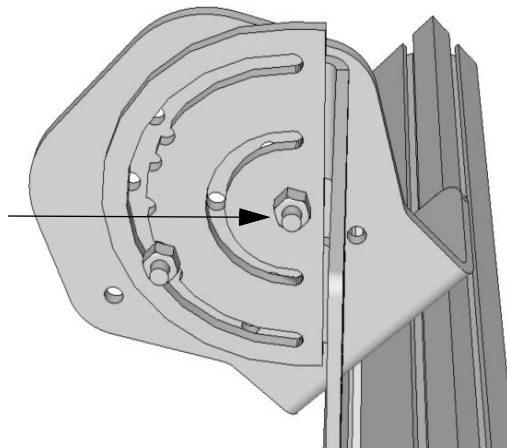
2. Determine where your mirror mounting bracket will go on the structure and slide the T-bolts into place. (2 or 4). Move the mirror assembly to the correct distance from the reader according to your application.



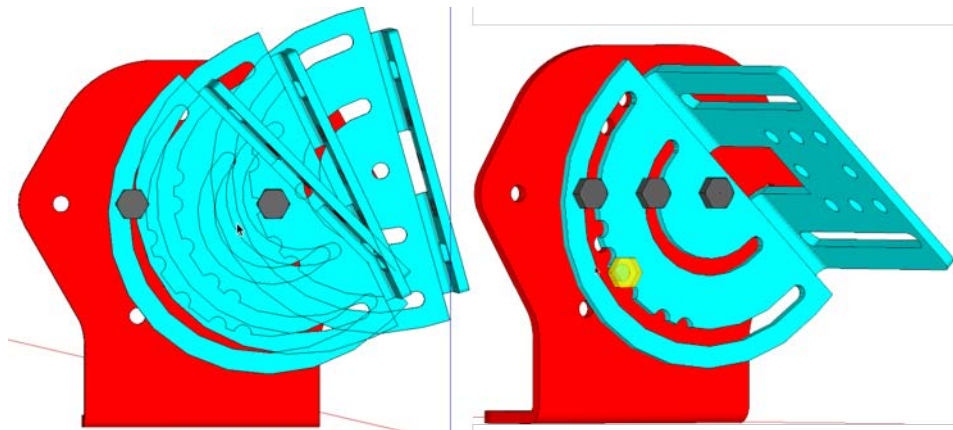
3. Once your bracket is in position, tighten nuts on T-bolts.



4. Mount the mirror rising bracket to the supporting bracket with one bolt in the center position and one bolt in the outer ring.



5. Rotate the mirror brackets so that the correct skew angle slot as shown on the bracket (15 or 45 degrees).

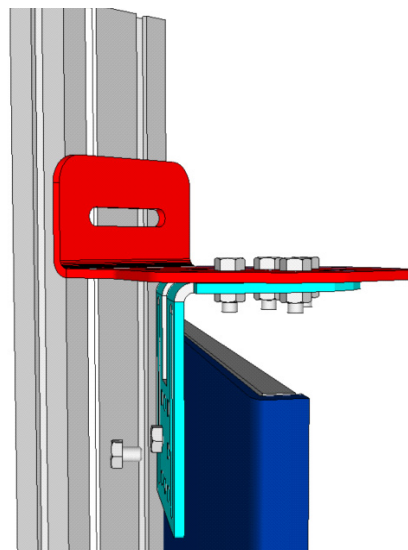


6. When in position, tighten center and outer ring nuts and attach two additional bolts and nuts in place and tighten as shown in previous diagrams.



**To prevent mirror bowing or flexing, leave enough play with the rising bracket so if top and bottom (or left and right) brackets are not aligned you do not damage the mirror.**

7. Now mount the mirror to the bracket.



## TRIGGER AND FOCUSING DEVICE MOUNTING

When required, an external device can be used to measure the position of parcels as they enter the field of view of the AV500/AV900 Camera. This information can be used by the camera to determine the correct position for optimal focusing. Proper mounting of these devices is critical to accurately determining the parcel positions. The Datalogic focusing devices may be one of the following:

- AS1AreaScan
- DK503 - S-85 Position Sensor Kit
- DM3610 Dimensioner
- LCC 75XX Light Curtain
- S-60 Photocell

Follow the instructions for correct mounting and positioning of the focusing devices found in each devices reference manual.

Software setup of these devices is explained in “Trigger, Positioning and Focusing Device Setup” on page 76.

# CHAPTER 3

## ELECTRICAL INSTALLATION

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**WARNING:** Electrical Installation must be performed by Qualified Service Technicians Only! Procedures may involve exposure to high-voltage. A trained and authorized technician must perform these procedures. Do not attempt to perform any electrical installation procedures unless you are a trained technician.



**NOTE:** The AV500/AV900 contain electronics that may be affected by electrostatic discharge (ESD). To prevent personal injury or damage to the unit, please follow the safety precautions and warnings found in the References section at the beginning of this manual. Failure to follow these precautions may void your warranty.

### PREPARING FOR ELECTRICAL INSTALLATION

Before mounting any components, please do the following:

- Read all instructions before beginning your installation.
- Observe all electrical safety requirements discussed in the Introduction to this manual.
- Define and confirm the accuracy of your application's requirements.
- Review all installation-specific drawings.
- Review and plan the power requirements for your application.
- Review and plan the communications requirements for your application.



**WARNING:** The content of this manual may be superseded by any customer-specific documentation provided by Datalogic. Before proceeding with any installation procedures, be sure to review ALL documentation, especially content that contains details specific to your installation.



**NOTE:** Everything should be **MECHANICALLY INSTALLED** before performing any **ELECTRICAL INSTALLATION**. See Chapter 2 for mechanical installation details.

Most AV500/AV900 applications are shipped with the CBX connection box and all the necessary cabling required to electrically install the system. If your system requires custom-length cables or other special wiring, documentation specific to these requirements has been provided in your shipment. This special documentation supersedes any contradictory content in this manual.

To reduce the possibility of damage to the unit, check all cabling between the AV500/AV900 camera and other devices for accuracy.

## CONNECTING AN AV500/AV900 CAMERA

To install a camera, follow this sequence:

1. Complete mechanical installation (See “Mechanical Installation” on page 25.)
2. Complete electrical installation.
3. Observe all electrical safety requirements outlined in this chapter.
4. Ground the mounting structure to protective earth (PE) ground.
5. If used, wire the photoelectric sensor (or other trigger).
6. Wire the tachometer to the CBX connection box, (see “Encoder/Tachometer Wiring to CBX510” on page 54).
7. Connect the M12 end of the Ethernet cable to the camera’s HOST NET port.
8. Connect to Ethernet device.
9. Connect the AV500/AV900 to its power supply.



**WARNING: To turn off your camera, use a power switch or box. Do not disconnect the 5 pin power connection from the unit.**

**If you attach the power supply to the AV500/AV900 and it is already attached to power, it may cause the AV500/AV900 to not boot correctly. Recycle power by unplugging the AC cord from the power supply and plugging it back in.**

10. Connect the sync cables if multiple cameras are used.
11. Connect the power supply to the power source.
12. Setup / check camera operations (See “Trigger, Positioning and Focusing Device Setup” on page 76.)



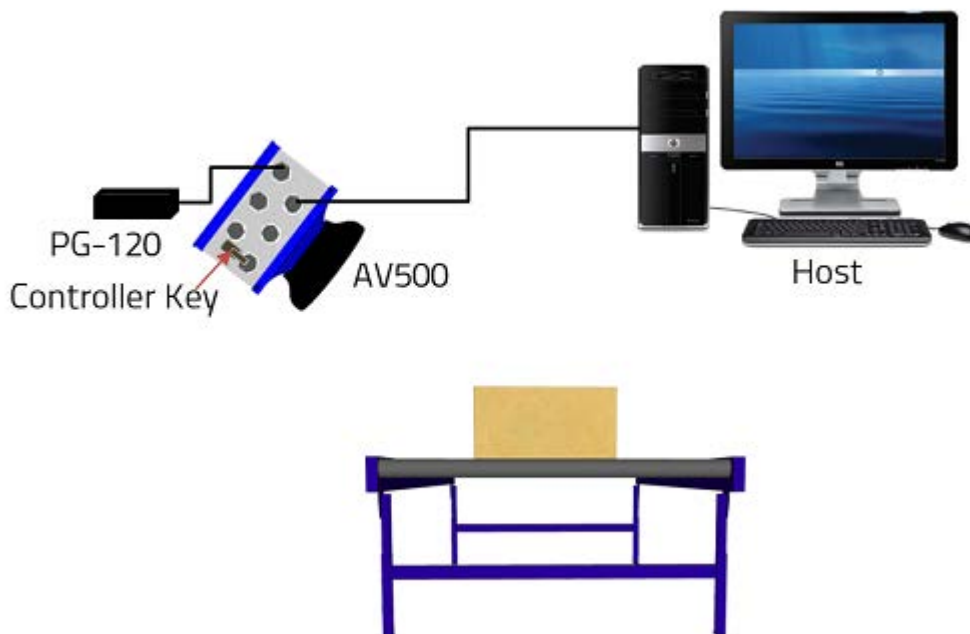
**WARNING: M12 connectors MUST be terminated with a cable or a protective cap in order to maintain IP65 standard**



## TYPICAL CONNECTION BLOCK DIAGRAMS

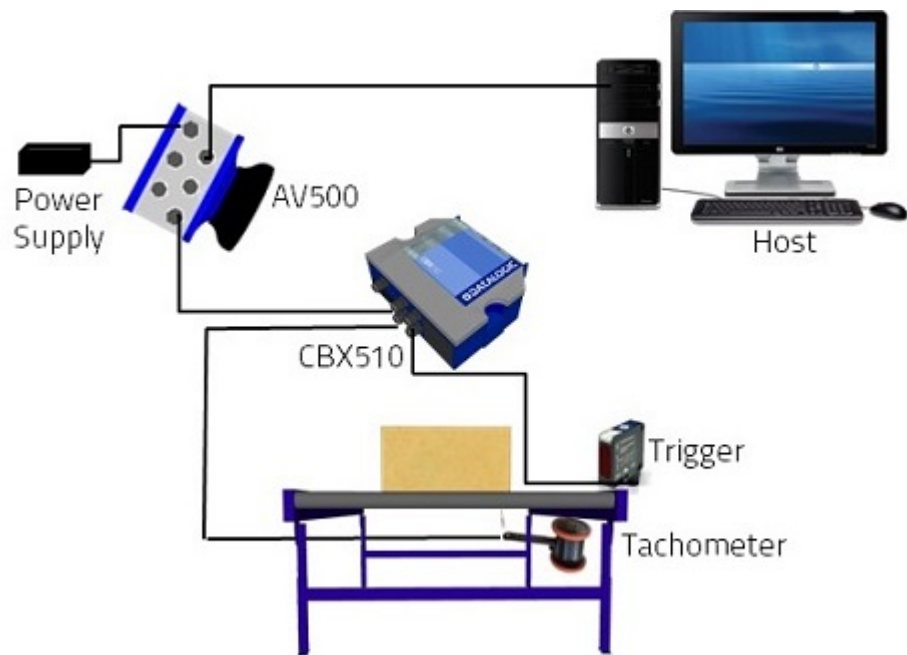
See “Standard Interconnection Diagrams” on page 165 for more details.

### Single Head Stand Alone AV500/AV900



**NOTE: A Controller Key must be connected to I/O port.**

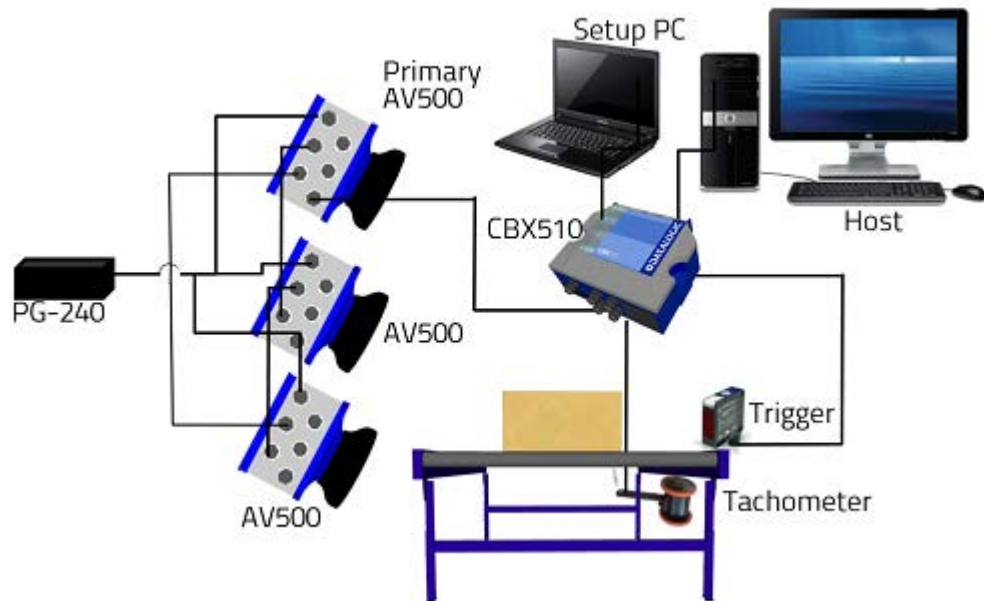
## Single Head AV500/AV900 with Tachometer and Photoeye



## Multiple Cameras Connected via SyncNet in Primary/Secondary Controller Configuration



**NOTE:** SyncNet is used in large tunnels where you must have a completed loop. Cables should be as short as possible for proper communication.



## GENERAL ELECTRICAL INSTALLATION GUIDELINES

It is important that you follow these general precautions when installing, setting up, operating, maintaining, troubleshooting or replacing any Datalogic products, parts or related equipment.

As you plan and install your barcode reader(s), be sure to keep the following guidelines in mind:

- Determine the camera is in the proper location as outlined in Chapter 2.
- Leave adequate clearances (approximately 300mm [12 in]) for wiring.
- Route wires carefully to reduce or minimize electrical noise.
- When extraneous power and communication wiring must cross, make their intersection perpendicular. Avoid running power and data wiring parallel to each other. If possible, maintain one of the following separations between the power and data wiring:
  - 300 mm [12 in] gap
  - Use conduit and 25 mm [1 in] gap



**WARNING:** When planning your installation wiring, remember all power connections must be quick-disconnect. For **PERMANENTLY CONNECTED EQUIPMENT** a readily accessible disconnect device must be incorporated in the building installation wiring. For **PLUGGABLE EQUIPMENT** the socket-outlet must be installed near the equipment and must be easily accessible.

To assure no ESD damage will occur, be sure to observe the precautions outlined in the Introduction to this manual.

Ground the mounting structure to safety ground (protective earth ground (PE)). See section “Grounding” on page 74 for wiring recommendations for safety ground.

## CONNECTOR PANEL



**WARNING: M12 connectors MUST be terminated with a cable or a protective cap in order to maintain IP65 standard**

After completing mechanical installation, use this section to properly wire your cameras for optimal performance in your application. AV500/AV900 wiring connections are made to the connector panel and through the CBX connection box (via the AV500/AV900 I/O port). In most applications, the cable connections to the barcode reader will include:

1. **HOST NET** – Barcode data to Host
2. **IMAGE NET** – Configuration, Remote Monitor application or image export
3. **POWER** – Power connected to AV500/AV900 power connector
4. **I/O** – Provides connection to CBX Connection Box
5. **SYNC OUT** – AV500/AV900 internal data, device network
6. **SYNC IN** – AV500/AV900 internal data, device network



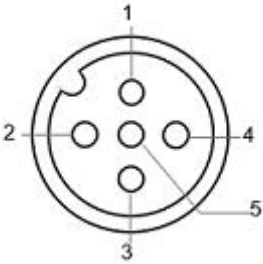
Route wiring from the barcode reader’s connector panel through the wiring channels (if available) on the Datalogic mounting structure when interconnecting cables to other devices.

## CONNECTING A PC TO THE AV500/AV900

During initial setup, a PC (laptop) may be connected to the AV500/AV900 with an RJ45 cable. Connect an Ethernet cable from the **HOST NET** or **IMAGE NET** port of the AV500/AV900 to the Ethernet port of your PC. For information on connecting to e-Genius, see *e-Genius Online help*.

## POWER CONNECTOR PIN-OUT TABLE (CUSTOM POWER SUPPLY)

A recommended power supply and cabling is available for the AV500/AV900 Camera. However, if your installation requires custom power supply wiring, the pin-outs of the AV500/AV900 camera power connector are provided below.

24 - 2.5A MAX	POWER INPUT	
5 PIN M12 Type Male	Unit Connector (shown)	
	5 PIN M12 Type Male	
	Pin	Function
	1	+24 VDC
	2	+24 VDC
	3	dc return
	4	dc return
5	Protective Earth Chassis	



**NOTE:** When using an AV500/AV900 camera, no power supply is required for the CBX510 connection box. All power and some communication options are fed to the CBX510 through the scanner’s 17-pin I/O connector to the CBX510 25-pin connector using the cable provided.

In cases where the AS-I cabling is not used, the alternative CAB-LP-05 cable can be used to connect the power supply to the scanner. Connect the Brown/White pair to +24 Vdc and the Blue/Black pair to dc return.

## SELECTING THE CORRECT CBX CONNECTION BOX FOR YOUR APPLICATION

As shown in section “**Standard Interconnection Diagrams**” on page 165, typical applications require a single CBX connection box to connect the trigger and encoder inputs to the master camera. The camera sources power to these devices. Other possible CBX connections are for digital outputs or a serial host.

- **CBX100** - used for slave cameras (and as an alternative for master cameras). It provides general access to digital input/output signals.
- **CBX510** - used for typical standalone or master cameras (cannot be used for slave cameras). It provides general access to digital input/output signals. It doesn't require special jumpers to set operation or power sourcing.
- **CBX800** - used for Fieldbus communication between standalone or master cameras and a Host. Various Fieldbus modules can be installed in the CBX800. The master camera communicates through its main serial interface to the CBX800 which must be programmed for the specific Fieldbus communication to the Host. It also provides general access to digital input/output signals. The table below indicates the available options for each recommended CBX Connection Box.

### OPTIONS

DEVICE	Tach Input	Trigger Input	General Purpose Input	General Purpose Output 1	General Purpose Output 2	Works as Slave	Works as Master
CBX100	X	X		X	X	X *	w/ jumper (Ref to ID+)
CBX510	X	X	X	X	X		X
CBX800	X	X	X	X	X	X	w/ jumper (Ref to ID+)

\* When working with a slave the jumper is not installed.



**WARNING:** Although multiple AV500/AV900 cameras can have a CBX box, only one of the CBX boxes in the system can have the Jumper to make it the Master.

## CBX510 CONNECTION BOX

Complete installation information for the connection box is available in the **CBX510 Installation Manual** available at [www.datalogic.com](http://www.datalogic.com). The interior of the box is shown below.



**WARNING:** If you are terminating more than one wire in a single terminal, cut off any tinned ends and twist the wires together before inserting them into the terminal.

### Sync In/Sync Out

If connecting several cameras together, they must be connected via the Sync In and Sync Out ports.



**NOTE:** Syncnet in large AV tunnels must have a completed loop. Sync cables must be kept as short as possible. Failure to follow these guidelines may cause tachometer errors in the tunnel.

## Host Net/Image Net

During initial setup, a PC (laptop) may be connected to the AV500/AV900 with an M12 cable. Connect an Ethernet cable from the **HOST NET** or **IMAGE NET** port of the AV500/AV900 to the Ethernet port of your PC. For information on connecting to e-Genius, see *Chapter 4*.



**NOTE: The default IP Address for Host Net and Image Net are as follows:**

**Host Net: 192.168.3.10**

**Image Net: 10.0.40.20**

## Photoelectric Sensor Connections to CBX510

Barcode scanning applications may use a Datalogic photoelectric sensor as a trigger device. The photoelectric sensor is wired directly into the CBX510 terminal block.

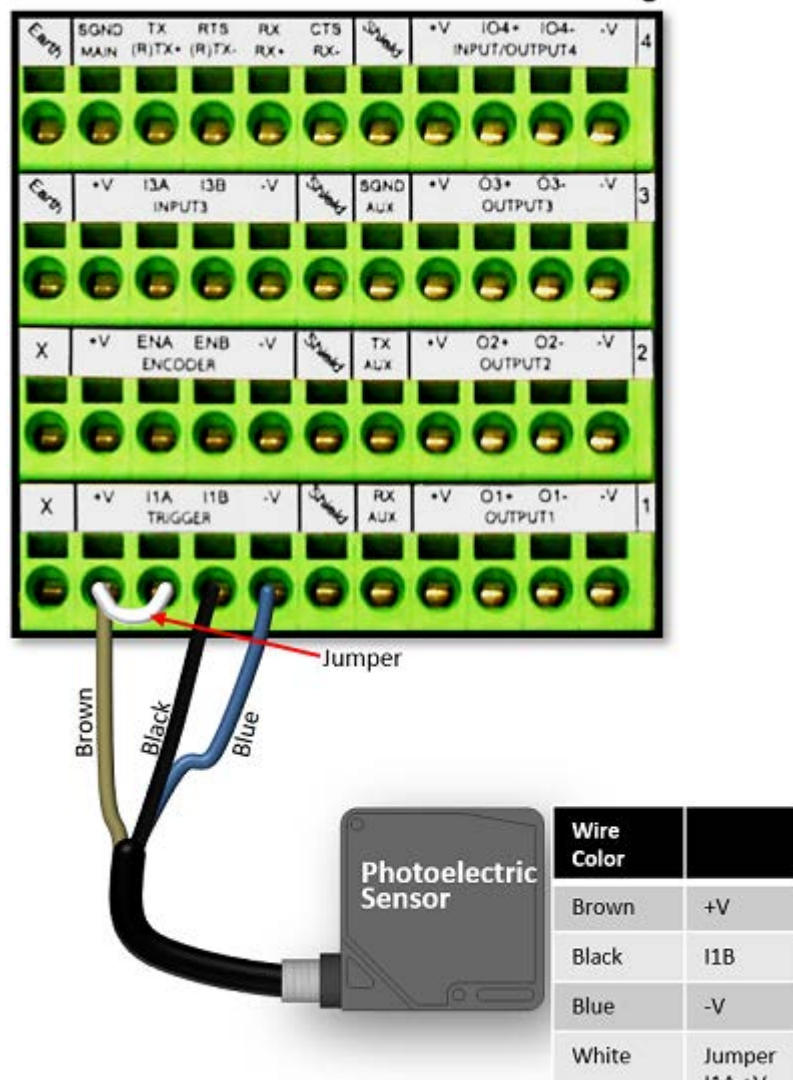
If your application uses a trigger other than the one specified by Datalogic, follow the appropriate wiring diagram to assure proper wiring.



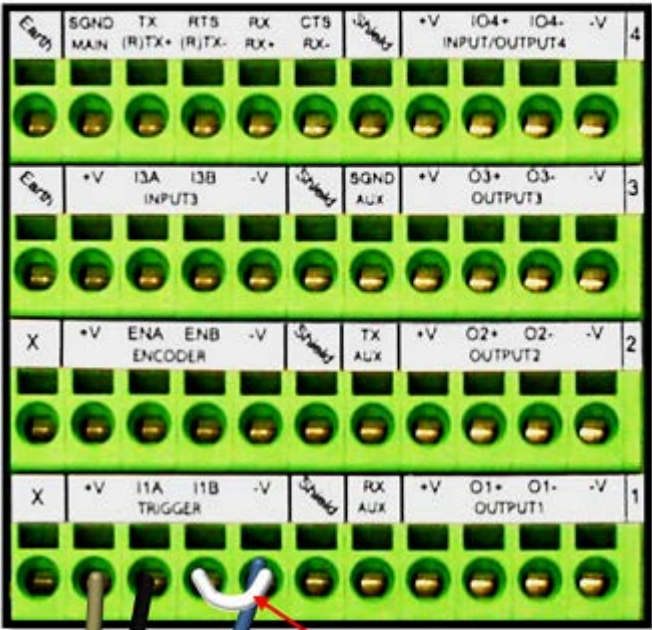
**NOTE: To confirm the photoelectric sensor is functioning properly, watch the TRIGGER LED first in the CBX and then on the camera while the photoelectric sensor's beam is blocked. The Datalogic photoelectric sensor also includes a status LED.**

The following diagrams illustrate standard recommended wiring of the Photoelectric Sensor to the CBX510 terminal block.

## Photoelectric Sensor to CBX510 (NPN)



### Photoelectric Sensor to CBX510 (PNP)



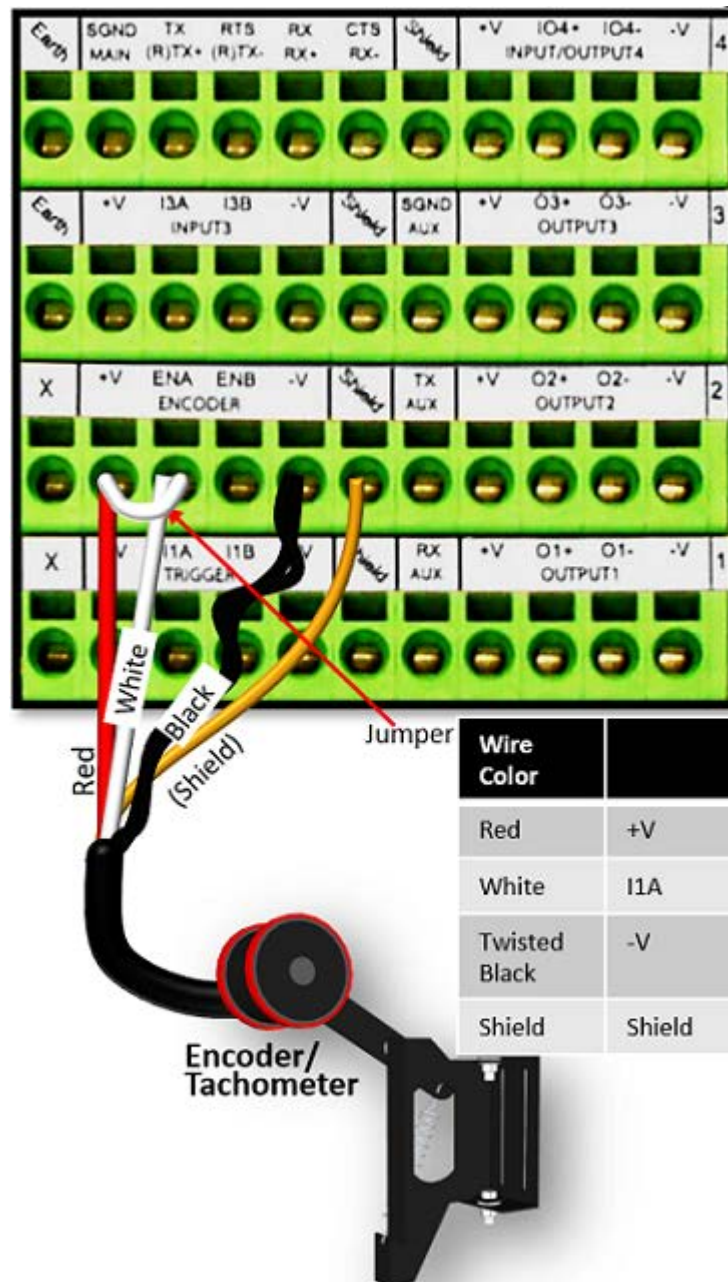
Brown  
Black  
Blue  
Jumper



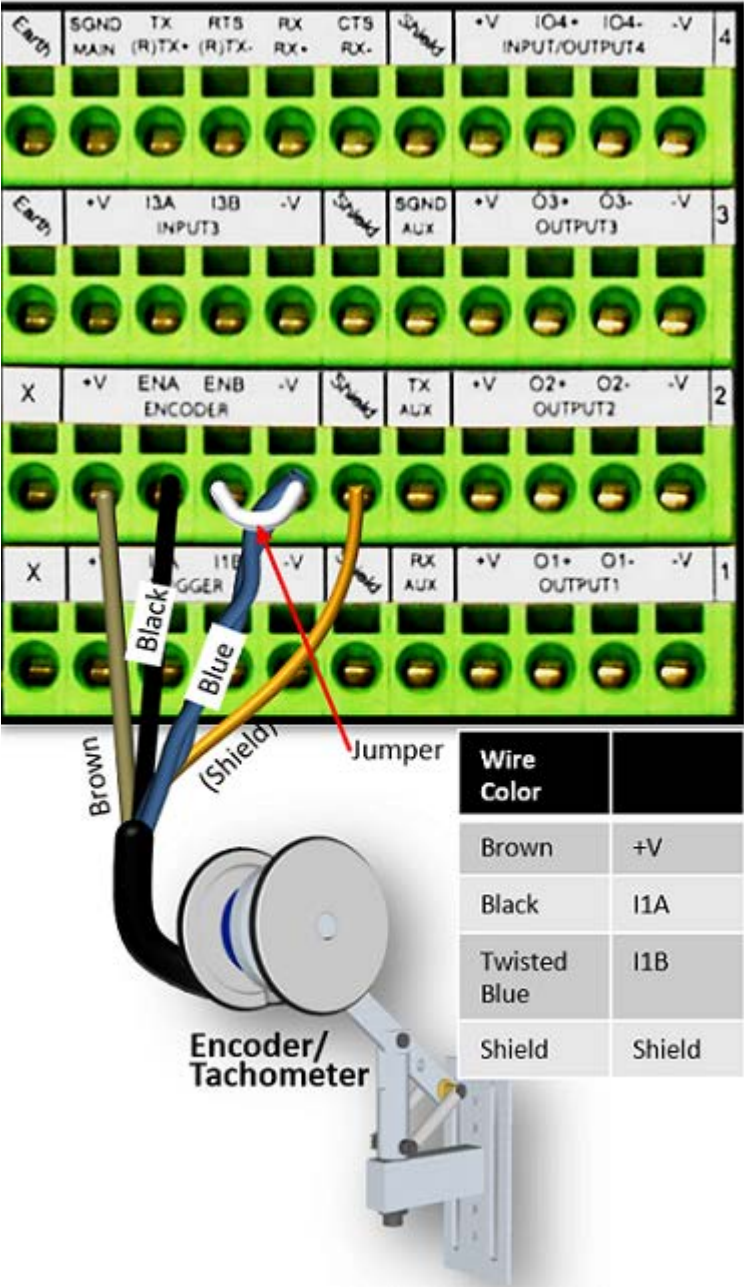
Wire Color	
Brown	+V
Black	I1A
Blue	-V
White	Jumper I1B -V

# Encoder/Tachometer Wiring to CBX510

## Encoder/Tachometer Wiring for NPN Output to CBX510



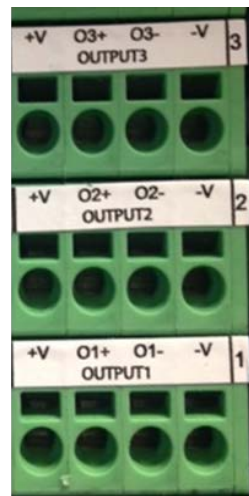
### Encoder/Tachometer Wiring for PNP Output to CBX510



## Digital Output Configuration from CBX510

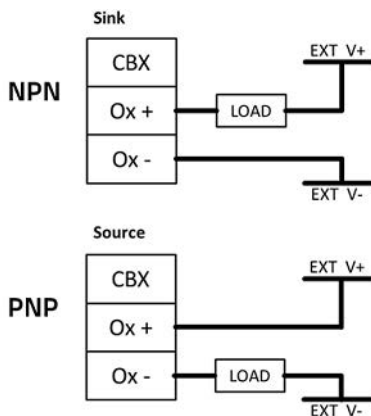
The CBX510 includes an OUTPUT block for wiring relays as needed for external accessories.

**Outputs 1 – 3**  
 Maximum Voltage 30V  
 Collector Current (pulse) 130 mA Max.  
 Collector Current (continuous) 40 mA Max.  
 Saturation Voltage (VCE) 1 V at 10 mA Max.  
 Max. Power Dissipation 90 mW at 50 degrees C  
 Ambient Temperature.

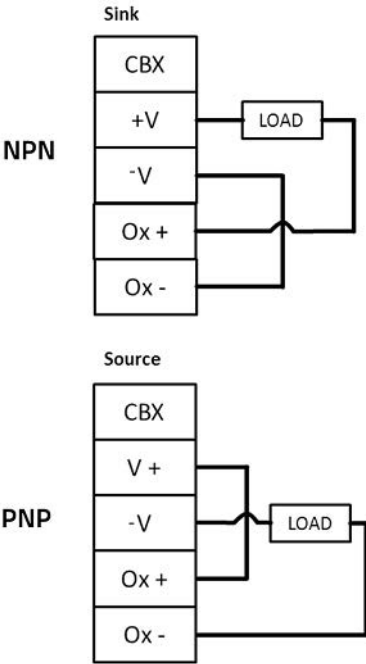


Schematics for Isolated and Non-Isolated digital outputs are provided below.

### Unpowered Outputs



# Powered Outputs



## TRIGGER AND FOCUSING DEVICE WIRING

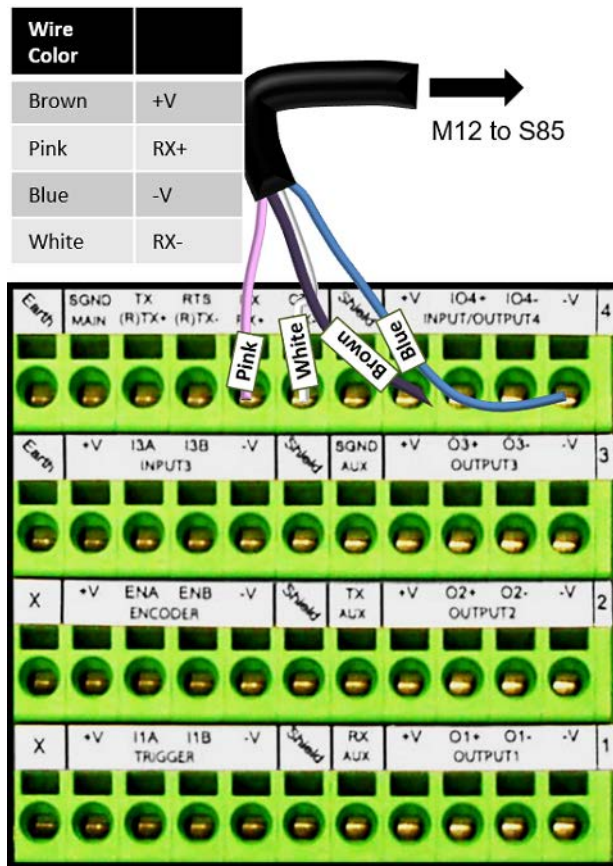
An external device can be used to measure the position of parcels as they enter the Field of view of the AV500/AV900 Camera. This information is used by the camera to determine the correct position for optimal focusing. The Datalogic focusing devices may be one of the following:

- AS1
- DK503 - S-85 Position Sensor Kit
- LCC 75XX Light Curtain
- DM3610 Dimensioner



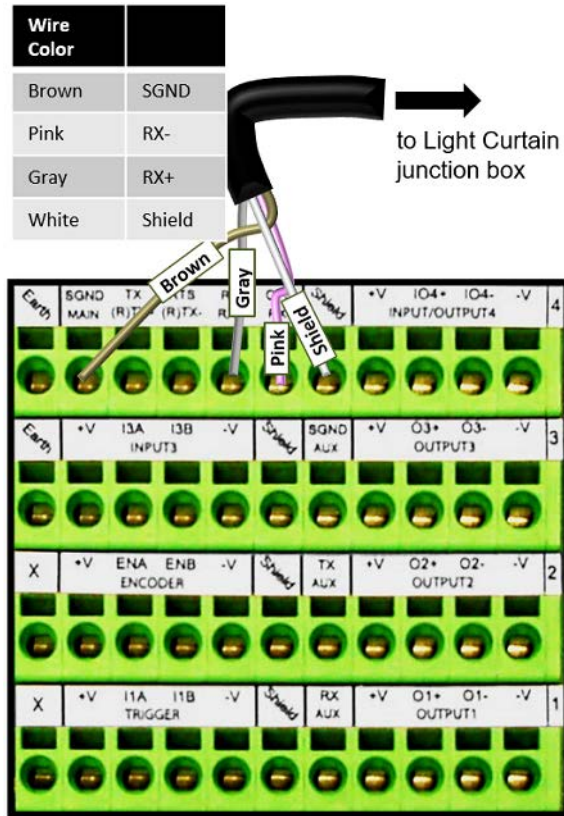
## DK503 - S-85 Position Sensor

When using the S-85 for focusing, it must be wired to the CBX510 connected to the AV500/AV900 using the cable included in the kit (95ACC1620).



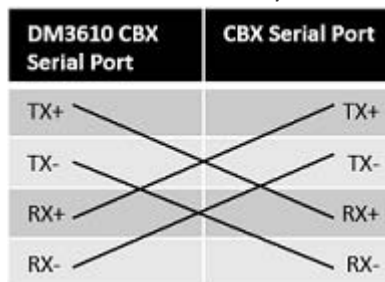
## LCC 75XX Light Curtain

When using the Datalogic Light Curtain for focusing, it must be wired to the CBX510 connected to the AV500/AV900 using the M12 cable that is part of the cable assembly in the kit. (FOCUS CONTROL SMT CABLE) (93A201203). Cut off the M12 5-pin B-code connector and strip back the wires to go into the CBX box as follows:



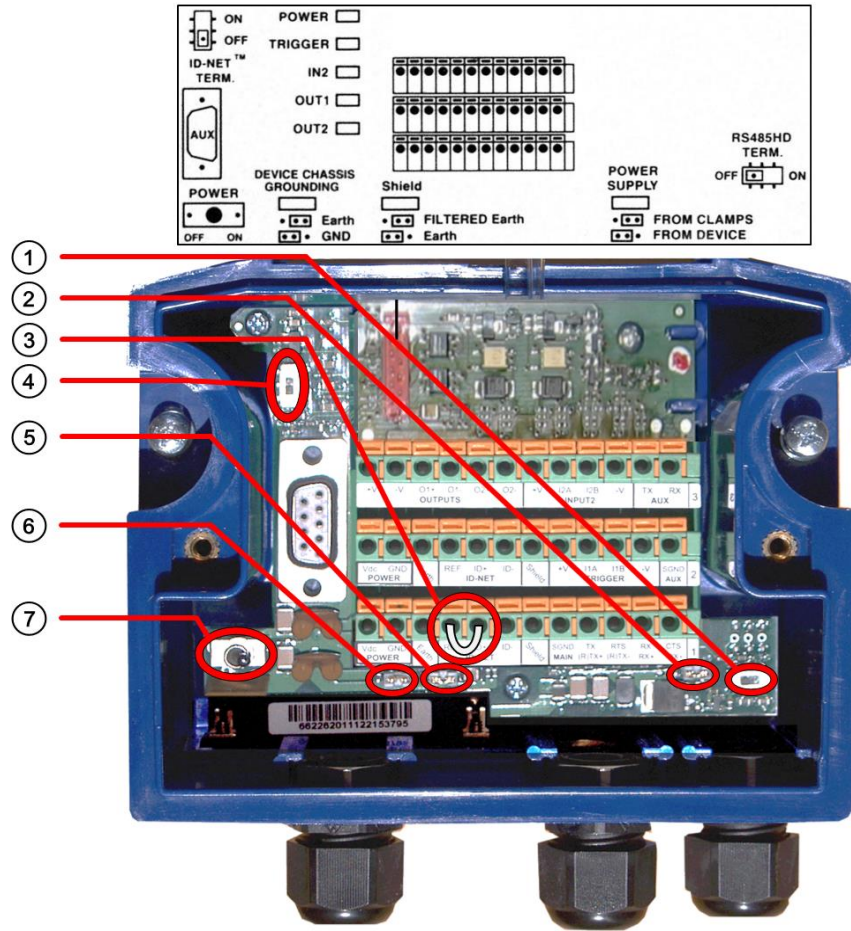
## Wiring from DM3610 CBX to AV500/AV900 CBX

When using a DM3610 dimensioner for focusing, the DM3610's CBX box must be wired to the CBX box connected to the camera. Since each of the different CBX boxes may be used, we will just show the connections necessary as follows:



# CBX100

Please verify that the CBX100 connection box is configured for the AV500/AV900 application as follows:



Reference the image and diagram above:

1. Set RS422HD TERM switch to OFF.
2. Set POWER SUPPLY jumper to FROM DEVICE.
3. Insert jumper wire in pin block from REF to ID+ (one jumper in either block is sufficient).



**NOTE:** In order for a standalone or Master AV500/AV900 to initialize properly, it must be connected to a CBX100. On power-up the AV500/AV900 looks for the jumper (item number 3 in the image above) and will assume the responsibility of the provided SYNC Network IP addresses. Slave units in an array/tunnel will receive their SYNC Network IP addresses from the Master.

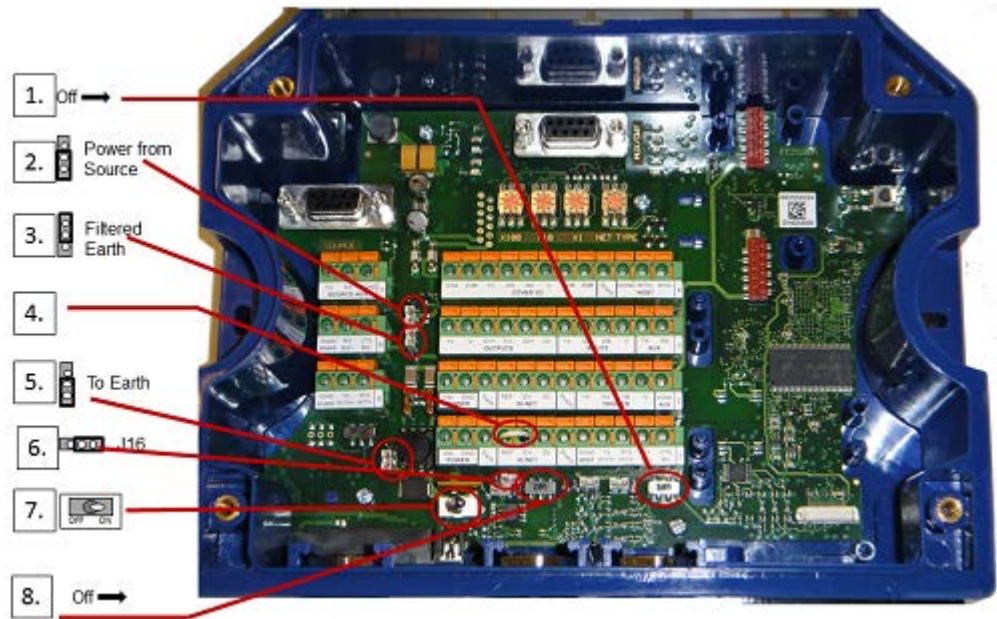


**WARNING:** Although multiple AV500/AV900 cameras can have a CBX box, only one of the CBX boxes in a multi-camera system can have the jumper to make it the Master.

4. Set ID-NET TERM switch to OFF.
5. Set Shield jumper to FILTERED Earth.
6. Set DEVICE CHASSIS GROUNDING to Earth.
7. Set POWER Switch to ON.

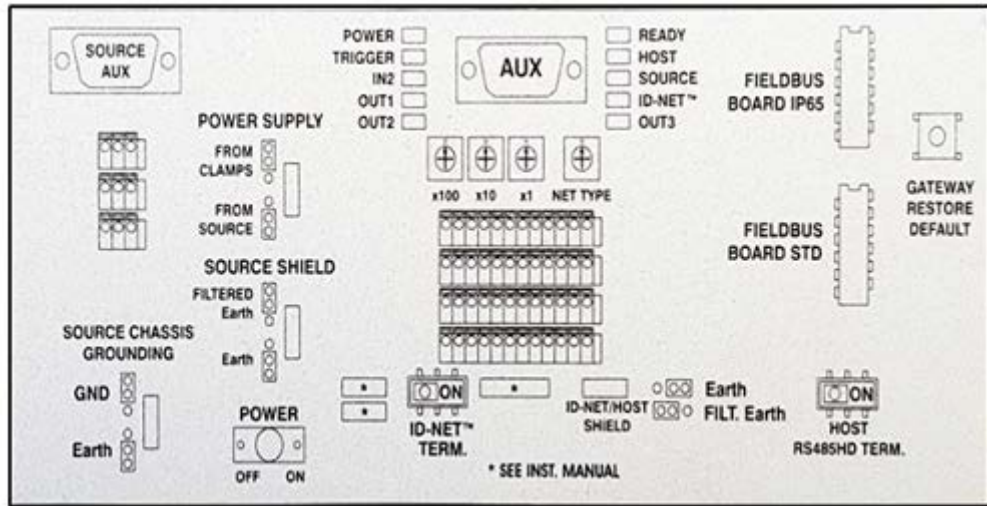
## CBX800

Please verify that the CBX800 connection box is configured for the AV500/AV900 application as follows.



1. Set HOST RS485HD TERM switch to OFF.
2. Set Power Source Selector jumper to FROM SOURCE.
3. Set Shield jumper to FILTERED Earth.
4. Insert jumper wire in pin block from REF to ID+ (one jumper in either block is sufficient).
5. Set DEVICE CHASSIS GROUNDING to Earth.
6. Set J16 Jumper 16 to right position.
7. Set POWER switch to ON.
8. Set ID-NET TERM switch to OFF.

### Box Interior Diagram



## Photoelectric Sensor Connections to CBX100/800

Barcode scanning applications may use a Datalogic photoelectric sensor as a trigger device. The photoelectric sensor is wired directly into the CBX100/800 terminal block.

If your application uses a trigger other than the one specified by Datalogic, follow the appropriate wiring diagram to assure proper wiring.



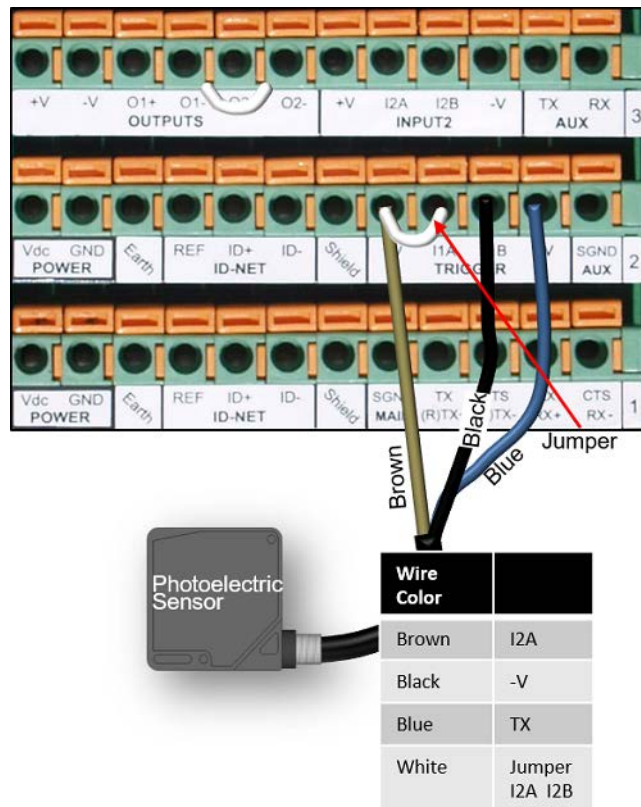
**WARNING:** You must use shielded interface cables with this product. To maintain FCC compliance, the cable shield must make a 360-degree connection to the shielded mating connector.



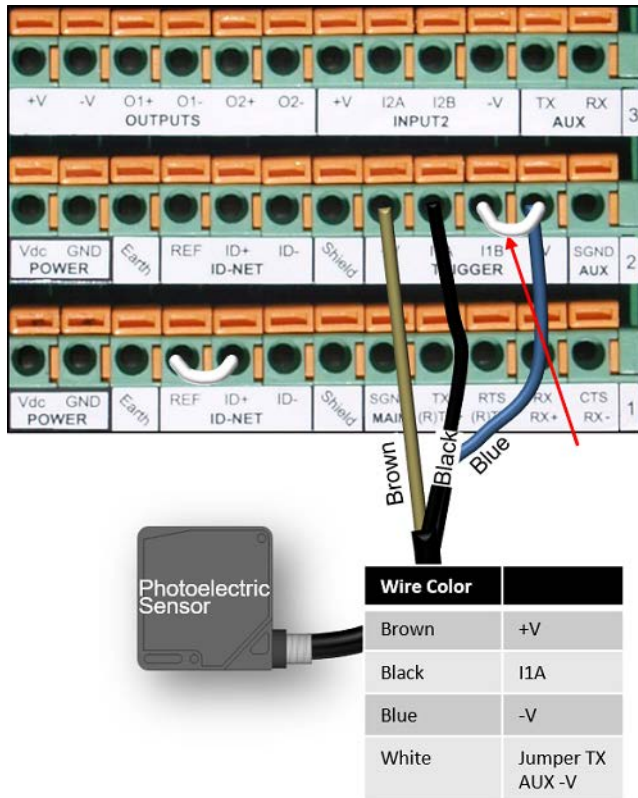
**NOTE:** To confirm the photoelectric sensor is functioning properly, watch the TRIGGER LED first in the CBX and also on the camera while the photoelectric sensor's beam is blocked. The Datalogic photoelectric sensor also includes a status LED.

The following diagrams illustrate standard recommended wiring of the Photoelectric Sensor to the CBX100/800 terminal block.

## Photoelectric Sensor to CBX100 and CBX800 (NPN)

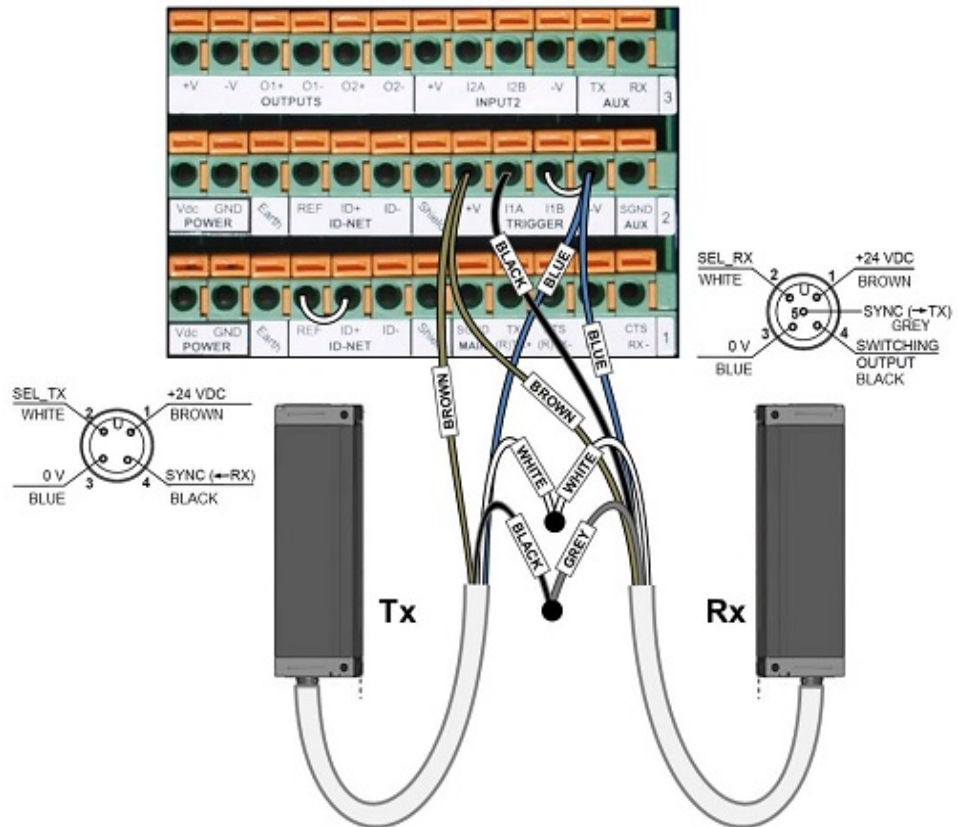


## Photoelectric Sensor to CBX100/CBX800 (PNP)



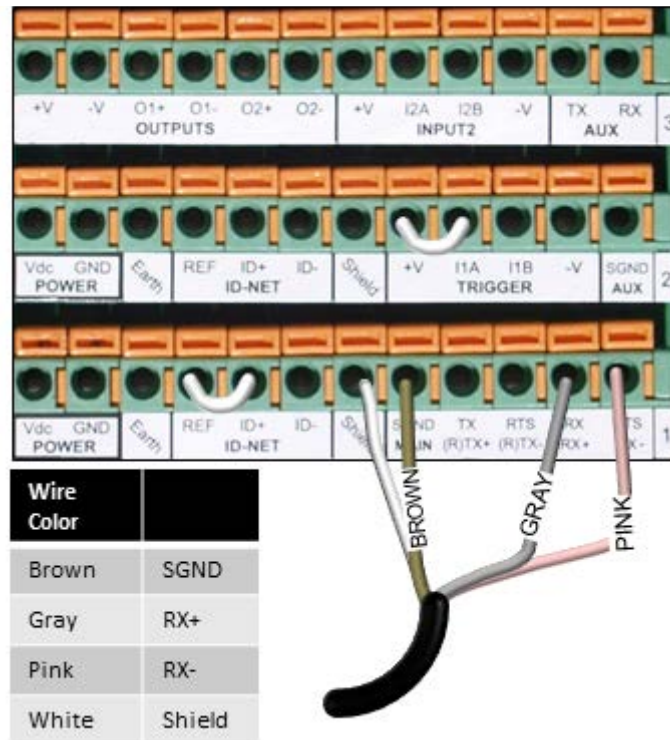
## AS1 Area Sensor to CBX100/CBX800 Connections

The **AS1** area sensors can detect and provide trigger for very small or irregularly shaped objects. PNP Output.



## Light Curtain to CBX100/CBX800 Connections

The Light Curtain may be connected to the CBX100/CX800 if there is more than one AV500/AV900.



## Encoder/Tachometer Wiring to CBX100/CBX800

### Encoder/Tachometer Wiring for NPN Output to CBX100/CBX800

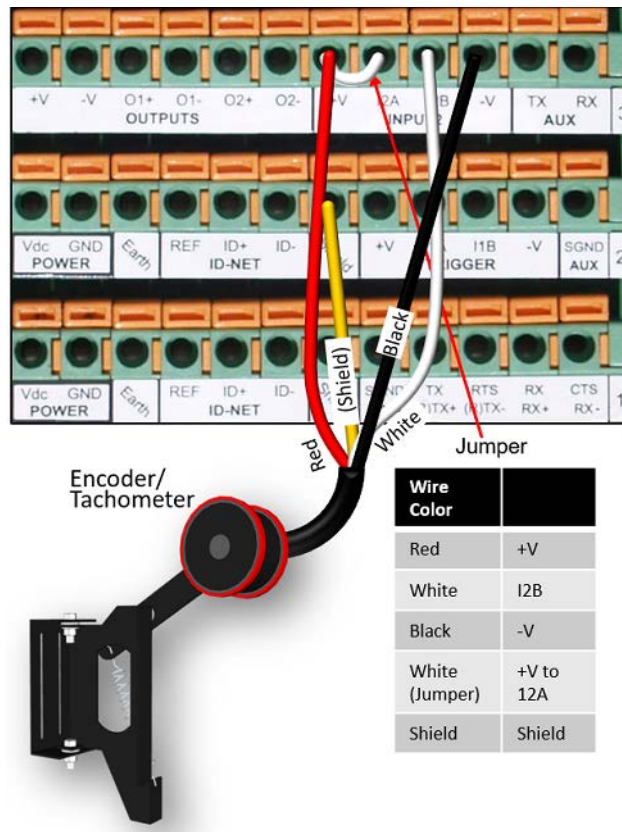


**NOTE:** Some Photcraft tachometers may have a different color coding:

**(+V)** Red or White/Orange

**(Signal)** White or White/Blue

**(Ground)** Black or Orange/White



### Encoder/Tachometer Wiring for PNP Output to CBX100/CBX800

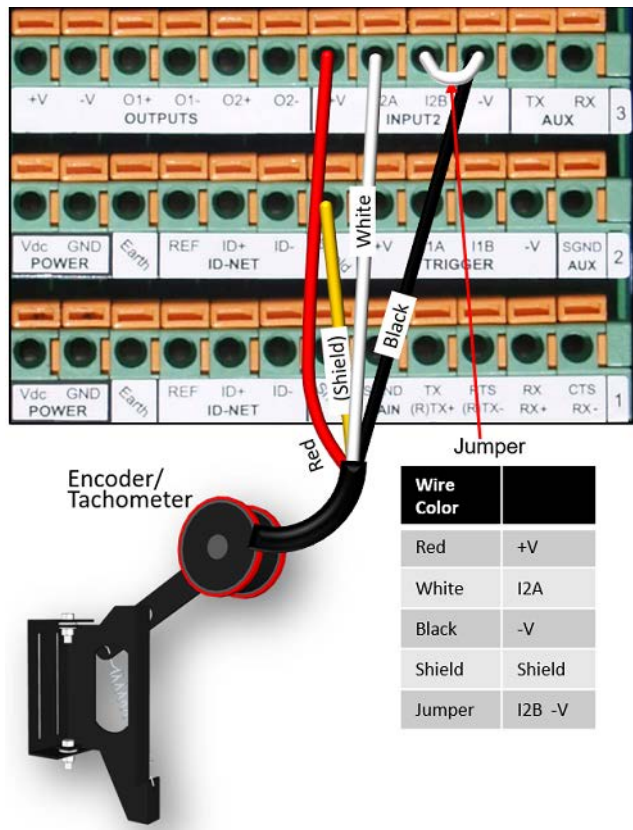


**Some Photcraft tachometers may have a different color coding:**

**(+V)** Red or White/Orange

**(Signal)** White or White/Blue

**(Ground)** Black or Orange/White



## Serial Communication Wiring to CBX100/CBX800

The AV500/AV900 provides serial RS232/RS422 communications to other devices through the CBX100/CBX800.

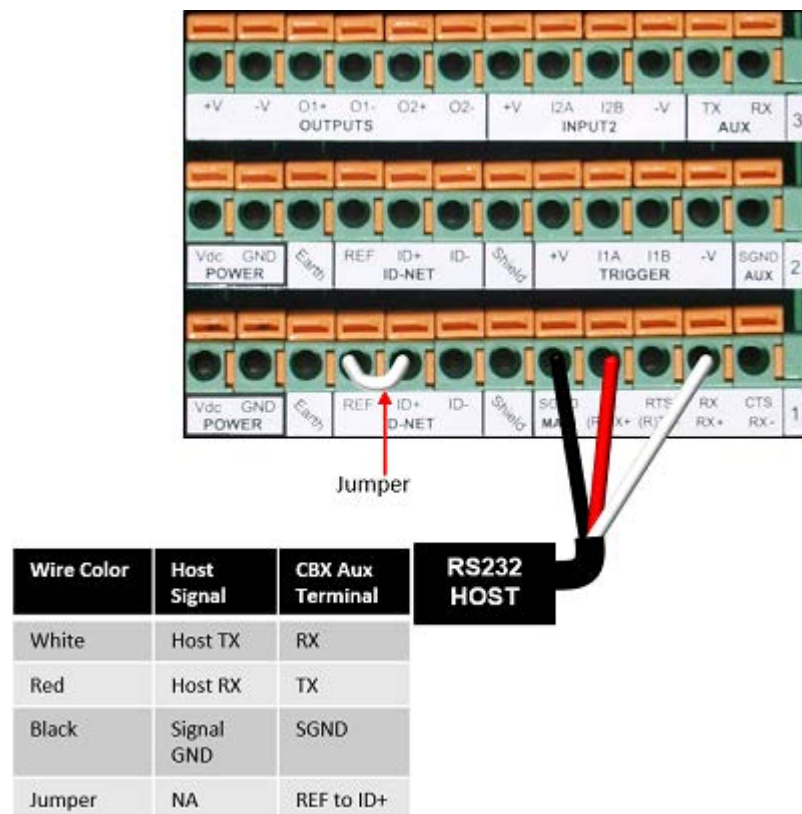
- RS232 provides point-to-point communications at distances up to 15 M [50 ft].
- RS422 provides point-to-point communications at distances up to 1200 M [3940 ft]

The following wiring diagrams illustrate the different types of serial communications available via the CBX100 pin block. It is very important that you make the proper pin connections.

### RS232 with No Handshaking

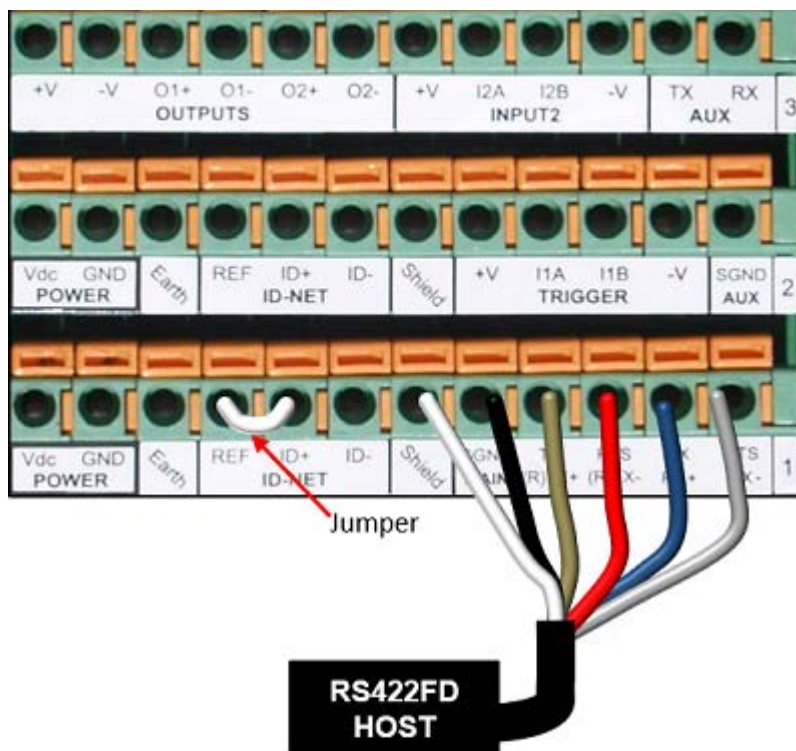
Use RS232 for a direct connection to a controller, personal computer, or other device. RS232 provides point-to-point communications at distances up to 15 M [50 ft]. If longer cable lengths are needed, use RS422.

Use the following illustration as a guide when you want to connect your system to a device using RS232 communication with no handshaking.



## RS422FD HOST (Full Duplex)

Use RS422 for a direct connection to a controller, personal computer, or other device. RS422 provides point-to-point communications at distances up to 1200 M [3940 ft]. Full duplex wiring supports a four wire, double twisted pair RxD/TxD. The Signal GND and shield cables are also required as shown.

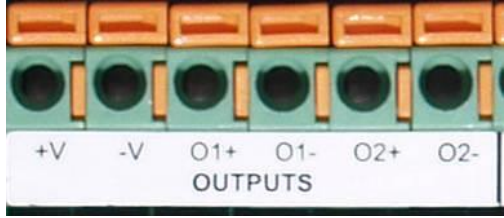


Wire Color	Host Signal	CBX Main Terminal
White	Cable Shield	Shield
Black	Signal GND	SGND
Brown	Host RX+	TX+
Red	Host RX-	TX-
Blue	Host TX+	RX+
Gray	Host TX-	RX-
Jumper	NA	REF to ID+

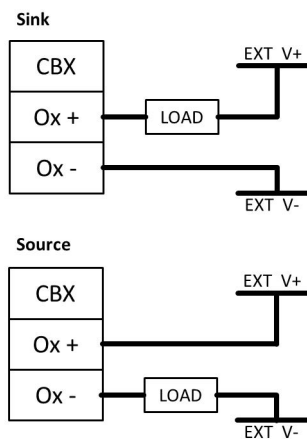
## Relay Configuration for CBX100/800

The CBX100/CBX500 includes an OUTPUTS block for wiring relays as needed for external accessories. e-Genius Modify | Relays window includes options for outputs 1 and 2 including Life Light, Trigger Output, Error Light, Ready Light, Good Dim, and No Dim.

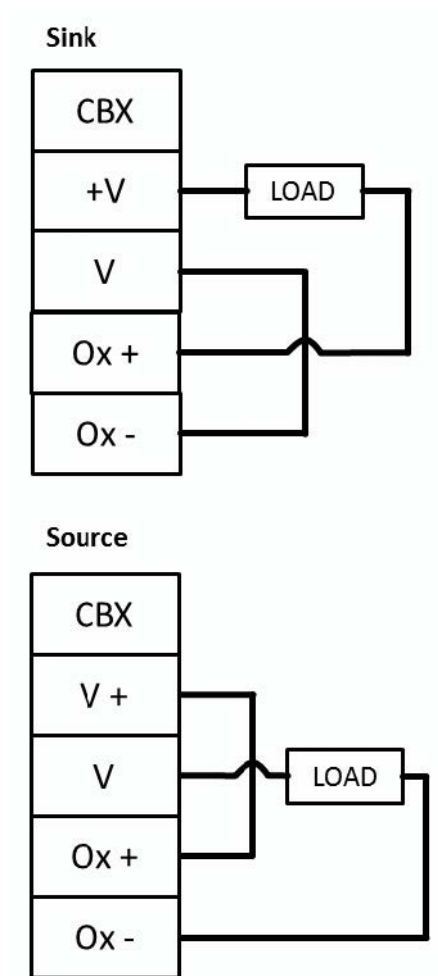
Schematics for Isolated and Non-Isolated relays are provided below.

Outputs 1 and 2	
Maximum Voltage 30V	
Collector Current (pulse) 130 mA Max.	
Collector Current (continuous) 40 mA Max.	
Saturation Voltage (VCE) 1 V at 10 mA Max.	
Max Power Dissipation 90 mW at 50 degrees C (Ambient temperature)	

### Unpowered Outputs



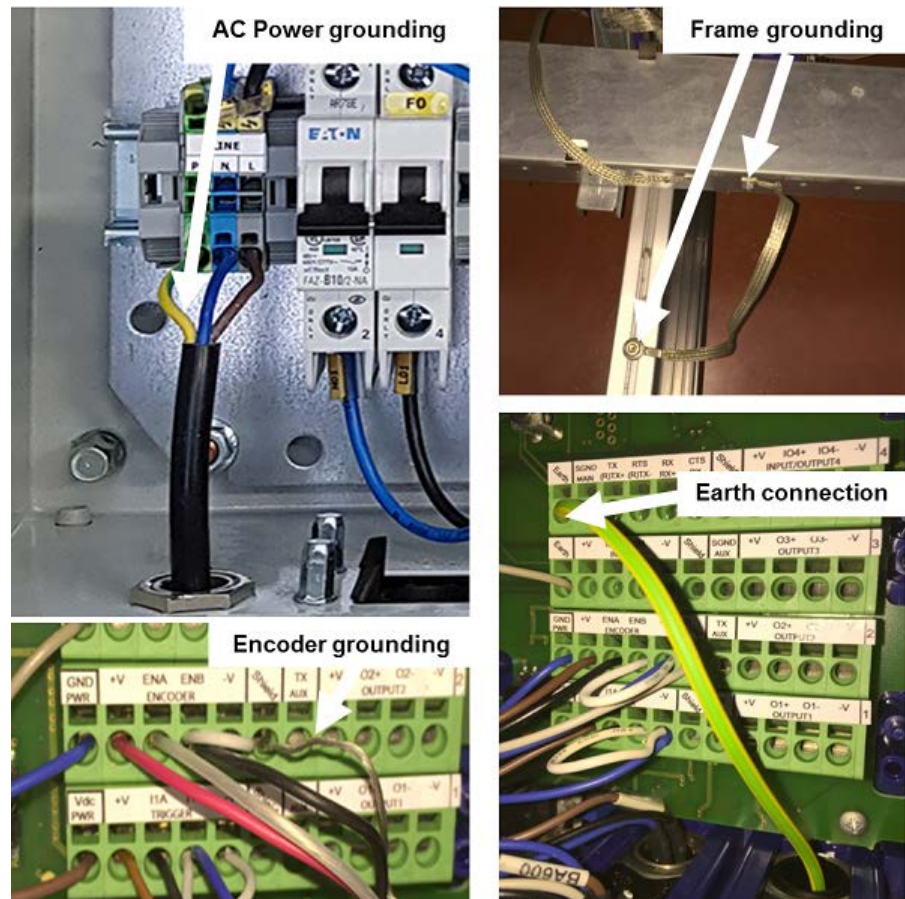
## Powered Outputs



## Grounding

To avoid any problems with electrical noise that could negatively affect system function, make sure that:

1. The AC power cable coming into the PWR box is always provided with a Ground and connected to the proper connector (Protective Earth - PE).
2. The structure where the readers, controllers, encoders/tachometers, and photoelectric sensors are mounted is grounded to the conveyor or to the PE terminal inside the PWR.
3. The Shield wires from the Encoder/Tachometer and photoelectric sensor cables are connected to the proper *Shield* terminal in the CBX box.
4. Normally, steps 1 through 3 will guarantee proper function. In case of problems such as transmission of strange or wrong characters, devices stop working without any reason, or other unexpected behavior, try connecting the CBX or Controller Earth terminal to the PE terminal inside the PWR box.



## Check AV500/AV900 Installation

After completing the installation, confirm that the AV500/AV900 reader(s) and CBX connection box have been properly installed mechanically and electrically. Use the Installation Sequence at the beginning of this chapter and your application specifications to check your installation.

# CHAPTER 5

## TRIGGER, POSITIONING AND FOCUSING DEVICE SETUP

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The AV500/AV900 trigger and focusing position is computed by the camera based on the position of the package measured by a trigger and/or focusing device. These Data-logic devices may be one or more of the following:

- S-60 Photocell
- AS1
- AREAscan™
- DLA Light Curtain
- DM3610 Dimensioner
- (LCC-75xx AV7 Light Curtain)
- STI Light Curtain
- S-85 Positioning Sensor

This section provides detailed procedures on setup and calibration of your AV500/AV900 Camera and the necessary focusing devices installed for your system.



**WARNING:** The procedures outlined in this chapter should only be performed by a Data-logic trained technician. For further information on training, contact us through the Data-logic website at [www.datalogic.com](http://www.datalogic.com).

### WHAT YOU WILL NEED



Items listed below are not required for every focusing option.

- Application Drawing (for structure, camera, mirror, sensor and focusing device positioning, and *Far Working Distance* for focusing)
- Application Specifications
- Laptop PC
- Tape Measure
- Sync Ethernet Cable Adapter
- Installation Kit (Test Boxes) (included with camera)
- CH-3 Autofocus Test Chart (included with camera)

- Dynamic Focus Target (included with camera)
- Picket Fence/Step Ladder Test Chart
- Inventory All Equipment and Structure Parts

## FIRST-TIME STARTUP

On initial power-up, the AV500/AV900 performs a series of self-diagnostic and LED tests. When the **STATUS** LED turns a steady green the power-up sequence is complete, and the camera is operational.

The AV500/AV900 cameras are shipped from the factory with these defaults:

- **Default User ID:** setup (case sensitive)
- **Default Password:** DLaset (case sensitive)
- Control Panel Buttons Enabled
- IP address - **192.168.0.145 (setup/sync controller)**, 192.168.3.10 (Host), and 10.0.40.20 (Image)

## UNDERSTANDING DATALOGIC FOCUSING OPTIONS

There are several Datalogic focusing options available for the AV500/AV900. Each option serves a different purpose in AV500/AV900 systems. They can be used alone or in combination with one another. Below is a list of the available options and an explanation of their purpose. The following sections detail how to focus each device when used in an AV500/AV900 system.

### S-60 Photocell

The standard S-60 Photoelectric sensor is used in AV500/AV900 Camera Fixed Focus systems to detect the presence of an item entering the scanning area. This device works best in systems where packages are separated by an open space between the trailing edge of one package and the leading edge of the next.

### AS1 AREAscan™

The **AS1** area sensors represent the ideal solution for the detection of very small objects, even when passing in different positions inside the controlled height and width. They can also help avoid multiple triggers on irregular shaped packages.

### DL Light Curtain (LCC-75xx AV7 Light Curtain)

This device is used to detect the presence of objects as they enter the scanning area, as well as report the package heights ranging from 150 to 2500mm to the camera.

### S-85 Positioning Sensor

The S85 distance sensor with laser emission provides time of flight measurement between the S85 and an object located between the S85 and the calibrated far distance.

## DM3610 Dimensioner

The DM3610 can be used to detect the presence of products as they enter the scanning area as well as report the package positions/heights and sequence number to all cameras in the system used in dimensioning are calibrated to have an accuracy of 2.5 mm [0.1 in], 5 mm [0.2 in] or 13 mm [0.5 in].

## SETTING UP THE S-60 PHOTOCCELL

Reference the **S-60 Installation Guide** (included with your S-60 kit) for complete information on connecting and aligning the Photocell. Make the following selections in the AV500/AV900 e-Genius application Operating Mode.

Trigger Source	
Trigger Source	Photo Sensor
Trigger Source to Position Sensor (Primary Controller)	0 mm
Trigger Active State	Active High
Trigger Debounce	20 mm
Extend Leading Edge of Photo Sensor	10 mm
Extend Trailing Edge of Photo Sensor	10 mm

Position Sensor Settings (Primary Controller)	
Position Sensor Type	No Position Sensor

Transmit Point Settings	
Transmit Point Reference Edge	Trailing Edge
Distance to Transmit Point	700 mm
Transmit Point Advance	0 mm

Update   Reset

## SETTING UP THE AS1 AREASCAN

Reference the **AS1 Series Instruction Manual** (included with your AS1 kit) for complete information on connecting and aligning the ASI. Make the following selections in the AV500/AV900 e-Genius application Operating Mode.

Trigger Source	
Trigger Source	Photo Sensor
Trigger Source to Position Sensor (Primary Controller)	0 mm
Trigger Active State	Active High
Trigger Debounce	20 mm
Extend Leading Edge of Photo Sensor	10 mm
Extend Trailing Edge of Photo Sensor	10 mm
Crossbelt Sorter Mode	Disabled

## SETTING UP THE DS2 LIGHT CURTAIN

Reference the DS2 Instruction Manual available at [www.datalogic.com](http://www.datalogic.com) for complete information on connecting and aligning the Light Curtain. Make the following selections in the AV500/AV900 e-Genius application Operating Mode.

The screenshot shows the following configuration:

- Trigger Source:** Position Sensor
- Position Sensor Settings (Primary Controller):**
  - Position Sensor Type: DL Light Curtain
  - Position Sensor Height Offset: 0 mm
  - Position Sensor Transmit Delay: 0 mm
- DL Light Curtain Settings:**
  - Connected to: Camera\_1
  - Multicast LC Focus Data: Disable



**NOTE:** Make sure to connect the correct Light Curtain is connected to the correct camera.

## SETTING UP THE S85 PHOTOSENSOR

Reference the DK503 Instruction Manual available at [www.datalogic.com](http://www.datalogic.com) for complete information on connecting and aligning the S85 Position Sensor. There may be more than one S85 used in the system. Normally for a side read camera two S85's may be used, one for each side read camera. Make the following selections in the AV500/AV900 e-Genius application Operating Mode.

You must first temporarily change the camera connected to the S85 to internal tach mode. This allows you to see the S85 input coming into the serial port of the camera when the conveyor belt is not moving.

**To do this follow these steps:**

1. In the menu tree under **Modify Settings**, click **Operating Mode**. The **Operating Mode** window opens.
2. Under **Encoder Settings**, click **Disabled** at the **Physical Encoder** drop-down.

**Operating Mode**  
 Operating Mode Selection: PackTrack  
 PackTrack Offset (direction of travel)\*\*: 0 mm

**Encoder Settings**  
 Physical Encoder: Enabled  
 Encoder Step: 1 mm/pulse  
 Encoder Resolution: 20 PPI  
 Conveyor Speed (max. constant): 1 m/sec

**Advanced Encoder Settings**  
 Direct Encoder: Disabled

**Frame Rate**  
 Tunnel Frame Rate\*\*: 32 frames per second  
 Camera Frame Rate  
 Camera\_2\_AV500: 32 frames per second

**Conveyor Width**  
 Conveyor Width: 900 mm

**Trigger Source**  
 Trigger Source: Trigger Message  
 Trigger Source to Position Sensor: 0 mm  
 Trigger Controller: Camera\_1\_AV7000

**Position Sensor Type**  
 Position Sensor Type: Dimensioner  
 Position Sensor Height Offset: 0 mm  
 Position Sensor Transmit Delay: 165 mm

**Dimensioner Settings**  
 Serial Focus Connected to: Active Controller  
 Side by Side Verification: Enabled

**Dimensioner Results Tracking**  
 Place Results from: Single DM System Connected  
 Place Results Based on Tach:   
 Transmit Point Distance: 0 mm  
 Transmit Point Reference Edge: Leading Edge

**Transmit Point Settings**  
 Transmit Point Reference Edge: Leading Edge  
 Distance to Transmit Point: 4000 mm  
 Transmit Point Advance: 40 mm

**Green Spot Settings**  
 Green Spot Mode\*\*: Good Read - Immediate  
 Green Spot On Time\*\*: 250 ms

**X-Press Button Settings**  
 X-Press Functionality\*\*: Enabled

**Redundant Controller Settings**  
 Use GPIN to Indicate Active Controller:   
 Disable Error Detection Switchover:   
 Controller Mode: Camera\_1\_AV7000: Primary Controller  
 Controller Mode: Camera\_2\_AV500: Secondary Controller  
 Tracking Offsets Enable:

**Switchover Parameters**  
 Consecutive Package Lost Enable: Enabled  
 Consecutive Package Lost Threshold: 5  
 Percentage Package Lost Enable: Enabled  
 Percentage Package Lost Threshold: 15 %  
 Tachometer Lost Enable: Enabled  
 Tachometer Package Lost Threshold: 5

**Tunnel Software Update**  
 Allow automatic software updates:

Update Reset

\* AV7000 Only  
 \*\* AV500/AV900 Only

3. In the menu tree under **Device Settings**, click **Serial > Focus/Host Port**. The **Focus/Host Port** window opens.

- Set the **Focus/Host Port** parameters as shown below:. This will need to be done for each camera an S85 is connected to.

Use Serial Port for: Focus Input

Use Global Configuration:

**Global Serial Port Settings**

Baud Rate: 115200

Data Bits: 8

Parity: None

Stop Bits: 1

Serial Communication Type: RS422 Full Duplex

Update Reset

- Click **Update** to save your changes.
- In the menu tree under **Diagnostics**, click **Serial Comm Status**. The **Serial Communications Status** window opens. Follow the steps described below.

Camera 1 Start Stop

Serial Port	Incoming Data (NOTE: Focus = last 16 decimal bytes)
Focus	
Host	

Enable Trigger Source to Position Sensor Calculator

**S85 Focus Data**

Focus Value (mm)	=	Far Distance (mm)	-	Raw Value (mm)	-	Far Distance Offset (mm)
1593	=	1983	-	0	-	390

Tach Value: 0

Raw Value (mm) : actual value received from the S85  
 Focus Value (mm): actual value used to focus the camera  
 - Set Far Distance (mm)  
 - Place a package on the far side of the conveyor  
 - Adjust Far Distance Offset (mm) until Focus Value (mm) is equal to the package width in mm

Diagram: S85 sensor on the left, conveyor moving upwards. Distance A is the Far Distance (mm) from the sensor to the conveyor. Distance B is the Far Distance Offset (mm) from the conveyor to the package.

- Once you have determined the appropriate **Far Distance Offset**, go back to the **Operating Mode** window and enter it.
- Re-enable your S85 and Click **Update** to save your changes.

## Setup and Calibration



**NOTE: Make sure to connect the correct S85 to the correct camera.**

To calibrate the S85 Distance Sensors, follow these steps:

1. In e-Genius under Modify Settings, navigate to **Global Settings / Operating Mode**. The Operating Mode window opens.

The screenshot shows the 'Operating Mode Selection' window with the following settings:

- Operating Mode Selection: PackTrack
- PackTrack Offset (direction of travel): 0 mm
- Encoder Settings**
  - Physical Encoder: Enabled
  - Encoder Step: 1.27 mm/pulse
  - Encoder Resolution: 20 PPI
  - Conveyor Speed (max/constant): 3 m/sec
  - Advanced Encoder Settings**
    - Direct Encoder: Disabled
- Frame Rate**
  - Frame Rate: 32 frames per second
- Conveyor Width**
  - Conveyor Width: 1041 mm
- Trigger Source**
  - Trigger Source: Photo Sensor
- Position Sensor Settings**
  - Position Sensor Type: S85
  - Position Sensor Transmit Delay: 127 mm
  - S85 Configuration**
    - Number of S85's: 1
    - S85 #1 Settings**
      - Connected to: Not Assigned
      - S85 Mounting Position: Left
      - Far Distance: 100 mm
      - Far Distance Offset: 0 mm
      - Trigger Source to S85: 0 mm
- Transmit Point Settings**
  - Transmit Point Reference Edge: Trailing Edge
  - Distance to Transmit Point: 4500 mm
  - Transmit Point Advance: 40 mm
- Green Spot Settings**
  - Green Spot Mode: Good Read - Immediate
  - Green Spot On Time: 250 ms

2. Select the **Photo Sensor** as **Trigger Source** from the drop-down.
3. Select the **Position Sensor Type** from the drop-down. Select S85 or S85 with DL Light Curtain.

The close-up screenshot shows the 'S85 Configuration' section with the following settings:

- Number of S85's: 1
- S85 #1 Settings**
  - Connected to: Not Assigned
  - S85 Mounting Position: Left
  - Far Distance: 100 mm
  - Far Distance Offset: 0 mm
  - Trigger Source to S85: 0 mm

4. Enter the **Position Sensor Transmit Delay** as 127mm. This is required because the tach controller camera (with or without an S85 connected) tracks the connected S85's and DL light curtain to a point that is 127mm past the S85/LC that's located the furthest downstream from the PE (and closet to the first camera scanline).
5. Select None or 1 from the **Number of S85's** drop-down.
6. For each S85 used, select the correct camera from the **Connected to** drop-down.

**Position Sensor Settings (Primary Controller)**

Position Sensor Type: S80

Position Sensor Transmit Delay: 0 mm

**S80 Configuration**

Number of S80's: 2

**S80 #1 Settings**

Connected to: Not Assigned

Far Distance: mm

Far Distance Offset: mm

Trigger Source to S80: mm

Multicast S80 Focus Data: mm

Options for Connected to: Not Assigned, Right\_Front, Bottom, Top, Right\_Back, Left\_Back, Left\_Front

7. If the S85 is required to share its focus information with other cameras on the same side of the conveyor, select **Enable** from the **Multicast S85 Focus Data** drop-down.
8. Once Multicast is enabled, **Camera's Receiving Multicast Focus Data from an S85** options appear.

**Camera's Receiving Multicast Focus Data from an S80**

Bottom: Not using S80

Top: Not using S80

Right\_Back: S80 #2

Left\_Back: S80 #1

9. Select from the Multicast Focus Data drop-downs which cameras will use data from which S85.
10. Measure the distance from the trigger source to the first S85.
11. Enter this value into the **Trigger Source to S85** field. In this example 170 has been entered.

**S80 Configuration**

Number of S80's: 2

**S80 #1 Settings**

Connected to: Left\_Front

Far Distance: 100 mm

Far Distance Offset: 0 mm

Trigger Source to S80: 170 mm

Multicast S80 Focus Data: Disable

12. Click **Update** to save your changes.
13. In **e-Genius** under Diagnostics, navigate to **Serial Comm Status**. The Serial Communications Status window opens.
14. Determine the Far Distance (A).
15. Enter the displayed distance in the **Operating Mode > Far Distance** field. Click **Update** to save your changes.

16. Remove all objects from the conveyor belt and click the **Start** button.
17. Place an object of known width on the far edge of the conveyor and adjust the Far Distance Offset (B) until the focus value equals the object width.
18. To adjust the distance, press enter each time you make an adjustment.
19. Enter this displayed value in the **Operating Mode > Far Distance Offset** field.
20. Click **Update** to save your changes.

## SETTING UP THE DM3610 DIMENSIONER

This focus setup is used to calibrate Dimensioner system focus data for AV500/AV900 Camera systems. DM3610 Dimensioners provide focus data for Datalogic cameras, including the camera, NVS9000, and AV6010.

Refer to the DM3610 Dimensioner Reference Manual (or Two-Head Dimensioner Reference Manual) for complete information on installation and calibration of the DM3610. It is available for download from [www.datalogic.com](http://www.datalogic.com).



**NOTE: For single Dimensioner applications, the DM3610 must be running software version 1.8.11 or greater. For multi-head applications, the DM3610's must be running 1.8.1 and the DC3000 must be version 1.3.60 or greater.**

**The Dimensioner scan line must be installed at least 500 mm [20 in] upstream from the nearest camera scan line.**

**The examples used in this guide use Imperial units i.e. inches. AV500/AV900 If the system is configured for metric, the unit of measure will be in mm.**

**Remember to reset these parameters to the application specifications after the calibration is complete.**

Also see **e-Genius Online help**.

## Preparation



Before beginning the DM3610 focusing process, a few preliminary settings are required.

**NOTE: When working with a multi-head Dimensioning system, the focus setup steps apply to the unit designated as the “Tach Master” by the DC3000.**

1. In the DM3610 e-Genius under **Modify Settings**, navigate to **Serial | Main** or **Aux** depending on the port wired to the AV500/AV900 (typically **Main**, consult your application interconnect diagrams for details). The **Serial | Main** window opens.

Modify Settings | Serial | Main



<b>Baud Rate</b> <input type="radio"/> 600 <input type="radio"/> 19200 <input type="radio"/> 1200 <input type="radio"/> 38400 <input type="radio"/> 2400 <input type="radio"/> 57600 <input type="radio"/> 4800 <input checked="" type="radio"/> 115200 <input type="radio"/> 9600	<b>Data Bits</b> <input type="radio"/> 7 Bits <input checked="" type="radio"/> 8 Bits	<b>Stop Bits</b> <input checked="" type="radio"/> 1 Bits <input type="radio"/> 2 Bits
<b>Mode</b> <input type="radio"/> RS-232 <input checked="" type="radio"/> RS-422	<b>Parity</b> <input checked="" type="radio"/> None <input type="radio"/> Even <input type="radio"/> Odd	<b>Message Format</b> Focus messages for Datalogic cameras Camera Focus ▼ Model AV7000/AV6010 ▼ Focus Transmit Point (in) 5.1 Focus Transmit Interval (ms) 5
<input type="button" value="Update"/> <input type="button" value="Reset"/>		

2. Make sure the selected **Baud Rate** matches that of the AV500/AV900 (uses the main port, RS485 (RS422), at 115200).
3. Under **Message Format**, select **Camera Focus** from the **Focus messages for Datalogic cameras** drop-down list.
4. Select the **Model** of camera for which you are focusing.
5. Enter the **Focus Transmit Point**. This is the distance the DM3610 waits until after the AV500/AV900 scan line has read, to transmit the message. This value correlates to a value in the AV500/AV900 settings. Default is 8 inches.
6. **Leave at the default unless otherwise instructed!** Enter the **Focus Transmit Interval**. This is the amount of milliseconds between data transmissions. It defines the frequency of the data transmissions from the DM3610(s).
7. Click **Update** to save the changes.
8. The distance between the far working distances of the cameras is considered the “Conveyor Width” and must also be entered in the **Conveyor Width** field in AV500/AV900 **Global Settings | Operating Mode**.

## Understanding DM3610 Focusing and AV500/AV900 System Orientation

The goal of this focusing process is to correlate the DM3610 zero reference points to the far working distances of the cameras.

The DM3610 Left and Right Offsets will focus the DM3610 at the **Far Working Distances (Left and Right)** of the side AV500/AV900 cameras. These values are not necessarily the same. AV500/AV900 Reference the system application drawings for the exact prescribed Far Working Distances of each camera.

1. Navigate to **Diagnostics | Focus Setup**. The **Focus Setup** window opens,



**NOTE: If you navigate away from the Focus Setup page, the Constant Tach setting will automatically reset to Hardware Tach. AV500/AV900 Reset it, to continue the focus setup process.**

Connect Disconnect Pos: (0) Height: 0, Left: 0, Right: 0

Tachometer Constant ▾ Connector Position Right ▾  
 Left Offset (in) 0 Right Offset (in) 0  
 Height Offset (in) 0

Update Reset

2. From the **Tachometer** drop-down list, select **Constant**.
3. Verify that the values displayed for **Left Offset**, **Right Offset**, and **Height Offset** are all set to 0.
4. Referencing the direction of conveyor travel, view the Dimensioner from an upstream position. Determine if the connectors located on the side of the unit face left or right, see the image below.

Connector  
Position  
Right



Connector  
Position  
Left



5. From the **Connector Position** drop-down, select **Left** or **Right**.
6. Click **Update** to save the changes.



**WARNING:** When working with a DC3000 multi-head system, you must select a focus data source on the DC3000 Tach/Trigger/Transmit page. In applications involving side read cameras, select Head 1 and Head 2. For top read only applications, selecting a single head will suffice.

## Adjusting DM3610 Left Focus Offset

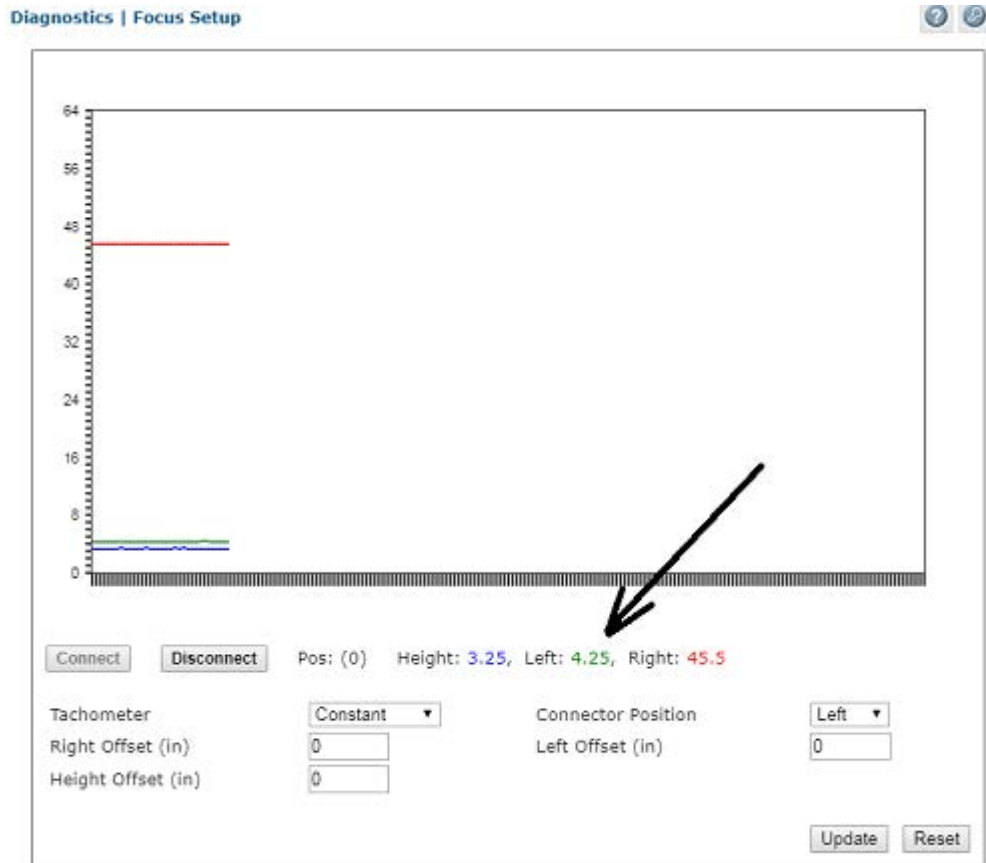
1. Position a test box with a known width in the dimensioner line(s) so the side of the box is at the RIGHT side AV500/AV900 far working distance as specified by the application's installation drawing. In this example we will be using a box with a 3" width.



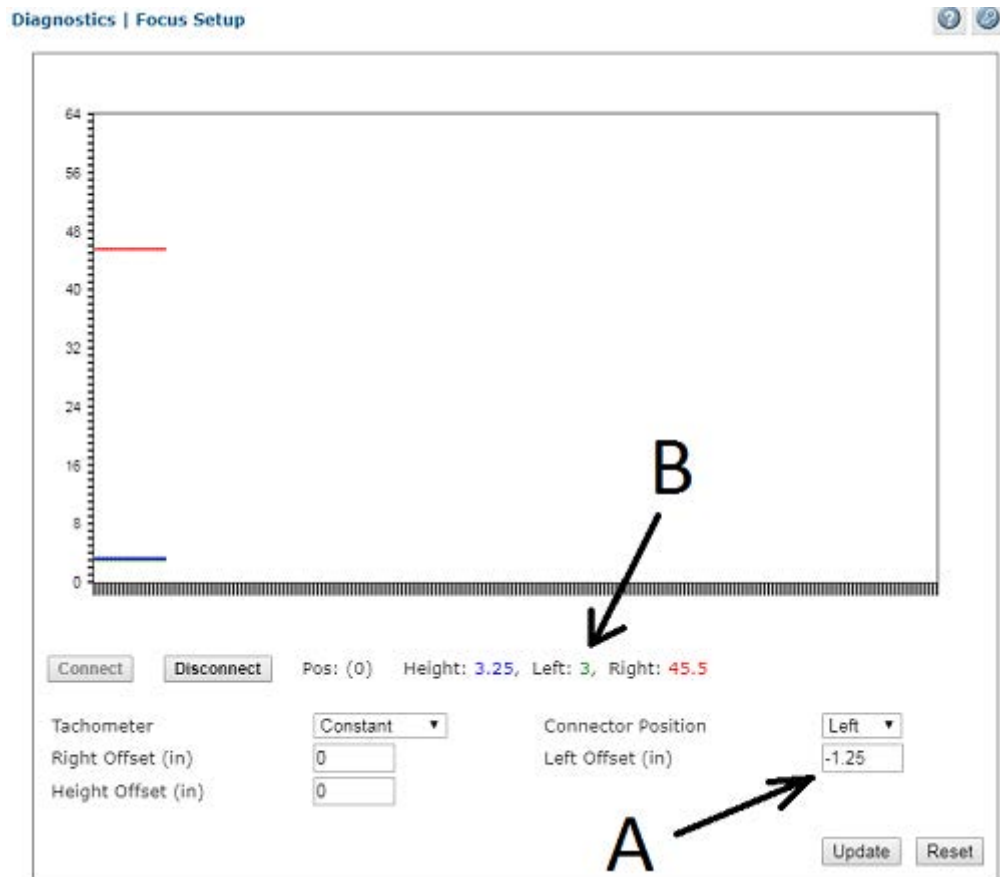
**WARNING:** When working with a DC3000 multi-head system, the text box must intercept all dimensioning lines

**NOTE:** When working with a DC3000 based Dimensioning system, please allow time for the constant tach signal to synchronize between the Master and Slave units.

2. In the menu tree under **Diagnostics**, click **Focus Setup**. The **Focus Setup** Windows opens.



3. View the displayed data and determine what the left value is. In the displayed example above, the value is 4.25".
4. Subtract the width of the test box, in our example it is 3", from the value displayed for Left.
 
$$4.25 - 3 = 1.25$$
5. Enter the result as a NEGATIVE value in the Left Offset field. In this case you will enter -1.25.



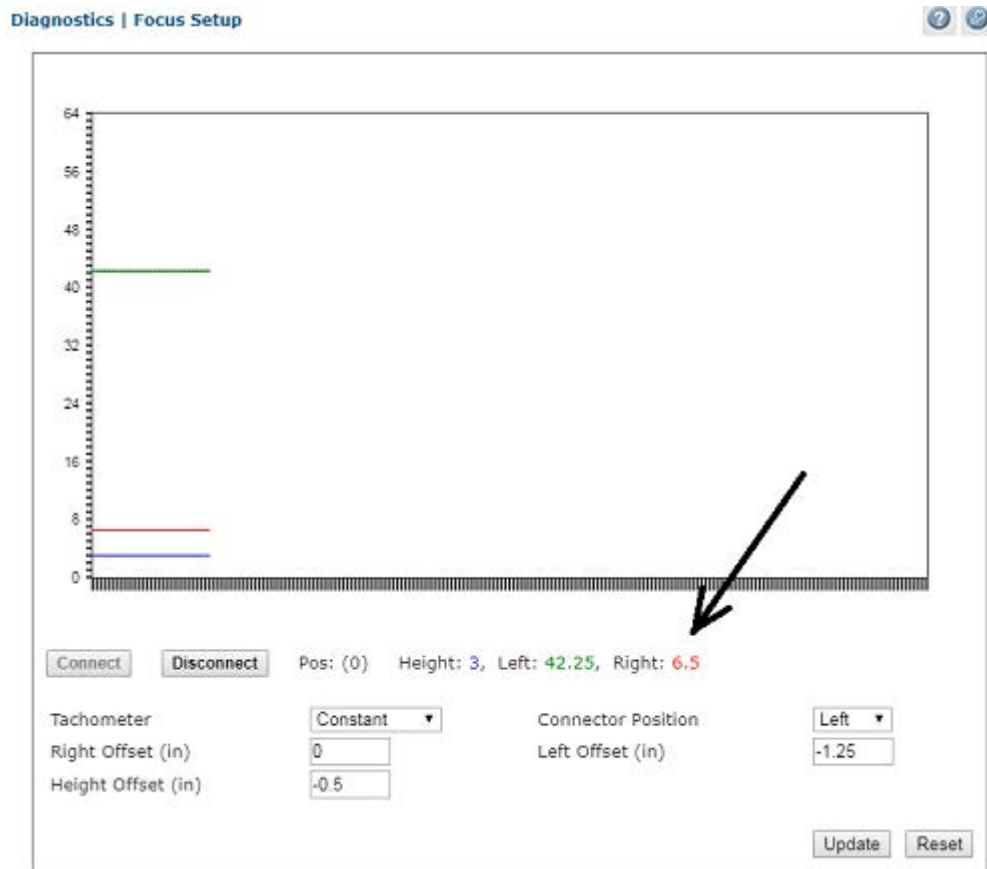
6. The position value displayed for the Left is now 3.
7. Click **Update** to save your changes.

## Adjusting Right Focus Offset



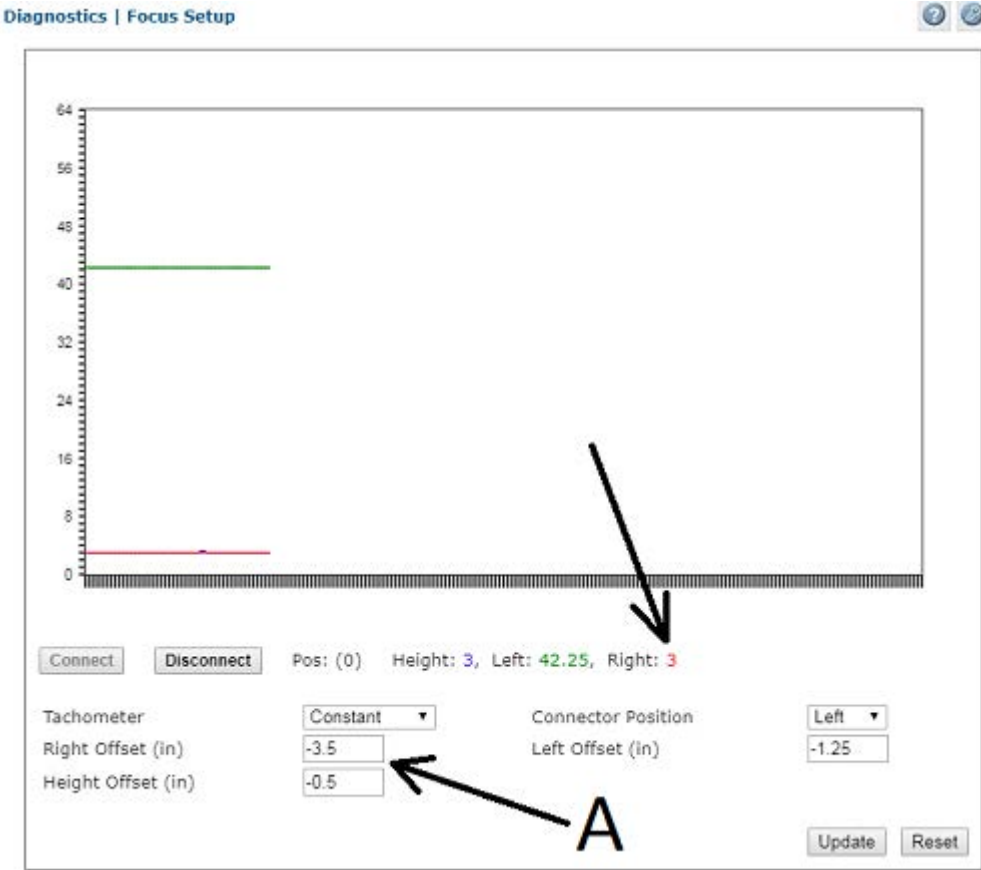
**NOTE: When working with a DC3000 multi-head based Dimensioning system, the text box must intercept all dimensioning lines.**

1. Position the test box with a known width in the dimensioning line so the LEFT side of the box is at the RIGHT far working distance as specified by the application installation drawing.
2. View the displayed data and determine what the **RIGHT** value is. In our example the value is 6.5”.



3. Subtract the width of the test box from the value displayed for RIGHT.  

$$6.5 - 3 = 3.5$$
4. Enter the result into the RIGHT OFFSET field as a negative value, in our example it is -3.5.
5. Note the position value displayed for RIGHT is now 3.



6. Click **Update** to save the changes.
7. Test the system by inducting a series of application objects and bar codes. Use the AV500/AV900 imaging utility to verify that the cameras are focusing properly over the width and height of the conveyor.
8. Under **Tachometer**, select **Hardware/External** from the **Tach Source** drop-down list.
9. Click **Update**.

### Adjusting Height Offset



**NOTE: When working with a DC3000 multi-head based Dimensioning system, the text box must intercept all dimensioning lines.**

1. Place the same test box in the center of the dimensioning line so the known distance side is facing up.
2. Determine the Height value as displayed by the DM3610. In the image below the 3” test box displays a height of 3.5.

# CHAPTER 6

## CALIBRATION

---

The AV500/AV900 Camera can be set up as a single unit or with multiple units in a scanning array (tunnel). The AV500/AV900 camera system is a high-precision imaging system, and requires careful and accurate setup and calibration to function at its full potential.

### REVIEW MOUNTING DRAWING AND APPLICATION SPECIFICATIONS

Make sure all equipment is mounted correctly based on the application drawings and specifications.

- **Deflection Mirror Alignment** - Reference the application drawing and section for deflection mirror placement and mounting.
- **Photoelectric Sensor, Trigger (if applicable)** - Mount the photoelectric sensor according to the application drawing, and with the following recommendations:
  - Make sure the Photoelectric Sensor (PS) is square to the conveyor
  - Make sure the PS is high enough off of the conveyor surface that it will not get false triggers from any part of the conveyor
  - Make sure the PS is aligned properly to the reflector. (In a sender receiver application, make sure the two components are aligned correctly)
  - Make sure the PS is positioned correctly upstream from the scan line (if applicable). See .
  - If using any one of the additional focusing devices, see “Trigger, Positioning and Focusing Device Setup” on page 76 .

## SOFTWARE UPDATE

If necessary, a Datalogic technician will update the AV500/AV900 CPU with the latest software. This must only be done by, or under the guidance of, a trained Datalogic technician.



**NOTE: DO NOT use a parameter file from any previous AV500/AV900 installations.**

You will need to connect a laptop to the AV500/AV900 in order to perform static and dynamic calibration, You may use any of the three Ethernet ports; Image, Host or Sync:

- Sync IP: 192.168.0.145
- Host default IP: 192.168.3.10
- Image default IP: 10.0.40.20
- Sync Controller IP (the sync adapter cable must be used):



**NOTE: Your PC's IP address needs to match the camera system's IP Address range, See e-Genius Online help for information on connecting a laptop to the system. The Host and Image port IP addresses may have been changed for your application. Contact your system administrator for changes.**

## e-Genius Calibration Presets

Before physical calibration is begun, a few settings need to be confirmed or modified in e-Genius. Your PC's IP address needs to match the camera system's IP Address range, see for information on connecting a laptop to the cameras.

System Info: Bring Each Camera into the Network

When power is applied to the cameras for the first time each camera will need to be brought into the sync network using e-Genius.

1. From the menu tree, navigate to the **Modify Settings | System Info**. The **System Info** Page opens.
2. From the **Action** drop-down list, select the **Add to Cluster as new**.
3. Click **Update** to add the camera to the **This Cluster** table.
4. Once each AV500/AV900 has been added under **This Cluster**, its mounting positions will need to be identified. Click **Blink** in a camera's row in the table. That camera's illumination will light.
5. Once the camera has been identified, select its mounting position from the **Camera Position** drop-down list.
6. Click **Update** to save the configuration.

## PackTrack Calibration

The following procedure is for PackTrack Mode.

## Operating Mode

In the menu tree under Modify Settings, navigate to Global Settings | Operating Mode. The Operating Mode window opens. See *section* for an explanation of the Operating Mode options.

The following parameters must be set to match the application:

1. Encoder Settings - **Encoder Step Settings: Modify Settings | Global Settings | Operating Mode > Encoder Step. Conveyor speed:** Enter the conveyor speed (Formula: Max conveyor speed x 1.05). This is needed so the AV500/AV900 sets the exposure time parameter during calibration.
2. **Trigger Source:** Make sure the Trigger Active State is set correctly, To test this, navigate to **Diagnostics | Device Tracking**. Run two boxes through the system. Confirm that the start and end trigger corresponds to the correct **Seq Number**.
3. Transmit Point Settings
4. Other Important Application Dependent Parameters:
  - **Modify Settings | Global Settings | Object Detection**
  - **Modify Settings | Global Settings | Barcode Settings**
  - **Modify Settings | Global Settings | Communications**
  - **Modify Settings | Global Settings | Output Format**
  - **Modify Settings | Global Settings | Image Saving**

## Device Settings

In the menu tree under Modify Settings, navigate to Device Settings. Since each camera is mounted separately, each AV500/AV900 camera in a system must be calibrated separately.

There will be a different Device Settings branch in the menu tree for each camera in an array. See *section* for an explanation of the Device Settings options.

1. In the menu tree, navigate to **Modify Settings | Device Settings | Camera N | Device Info**. The **Device Info** window opens.
2. Enter a unique name for the camera; such as top left, front right, etc. The new name will appear in the **Name** column on the **System Info** window, and also in the menu tree under **Device Settings**.

The screenshot displays the 'Device Settings for Camera\_1' interface. It is divided into two main sections: 'Device Information' and 'Ethernet Ports'.  
 - Under 'Device Information', there are two fields: 'Camera Name' with the value 'Camera\_1' and a lock icon, and 'Serial Number' with the value 'A14A00099'.  
 - Under 'Ethernet Ports', there are four fields: 'SyncNet MAC Address' (00:0E:13:06:01:AB), 'SyncNet IP Address' (192.168.0.145), 'Image Port MAC Address' (00:13:95:2A:22:23), and 'Host Port MAC Address' (00:0E:13:06:01:AC).  
 At the bottom of the window, there are two buttons: 'Update' and 'Reset'.

3. Click **Update** to save the new name. Repeat this for each camera in the system.



**NOTE:** If there are several cameras in your array, you may want to label them appropriately.

## Static Calibration

Static calibration is used to set up and calibrate the camera while the conveyor is sitting still.

1. Navigate to **Modify Settings | Device Settings | Camera N | Mounting**. The **Mounting** window opens.

**Mounting for Camera\_2\_AV500**

**Camera Orientation**

Mounting Position  ▼

Vertical Inversion  ▼

Horizontal Inversion  ▼

Left/Right Offset  mm

**PackTrack Calibration**

Near Calibration Complete

Near Calibration Height  mm

Far Calibration Complete

Far Calibration Height  mm

**PackTrack Parameters**

Use Position Sensor Data for Label Placement  ▼

**Position Sensor Placement Window**

Height Placement Window  mm

Width Placement Window  mm

Front Placement Window  mm

Back Placement Window  mm

**Focusing Parameters**

View Angle  degrees

Distance to Trigger Source  mm

Far Working Distance  mm

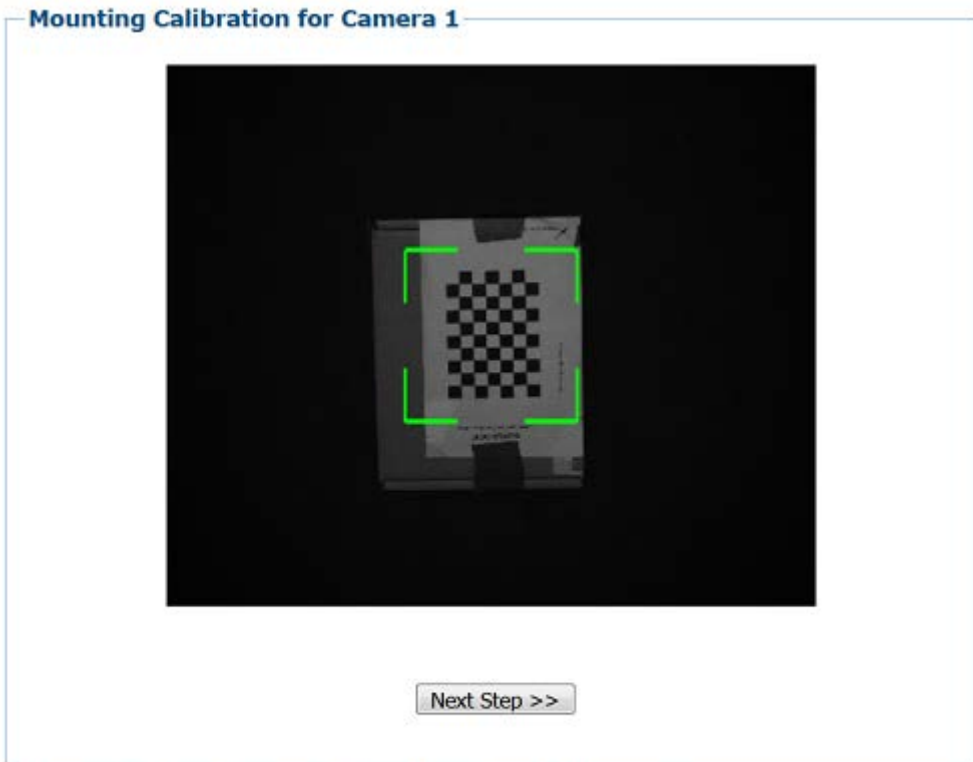
**Backup/Restore Mounting Calibration for this device**

Download the current Mounting Calibration here... [Download](#)

No file chosen

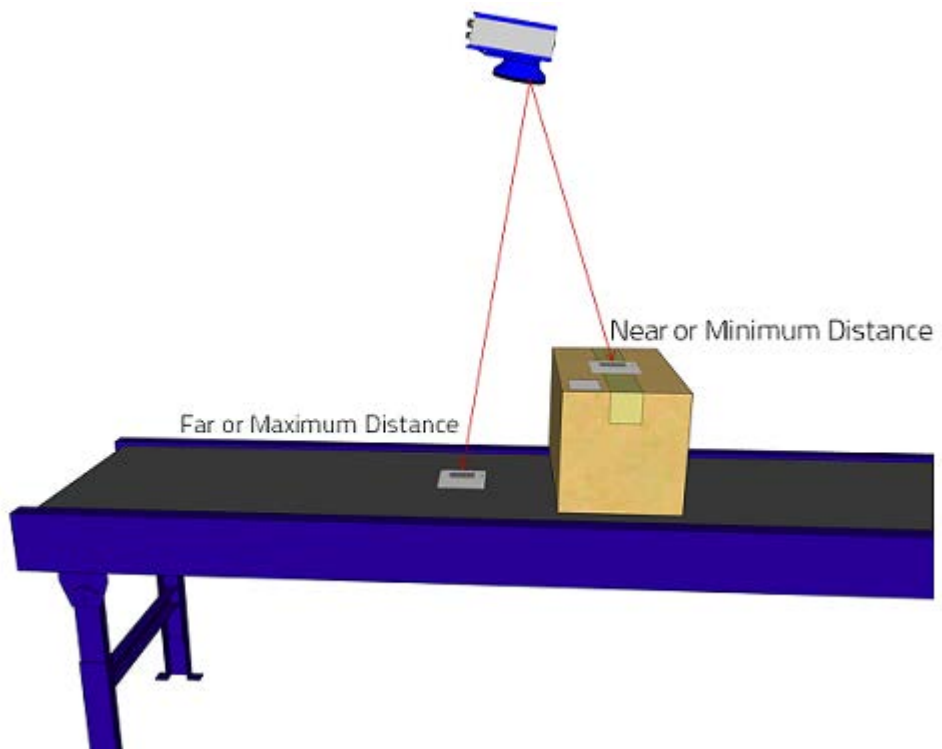
Upload Mounting Calibration to this Device

2. Click **PackTrack Calibration Wizard** button and Mounting Calibration for Camera n and **Step 1/5: Far Distance Calibration Target Alignment** appears.

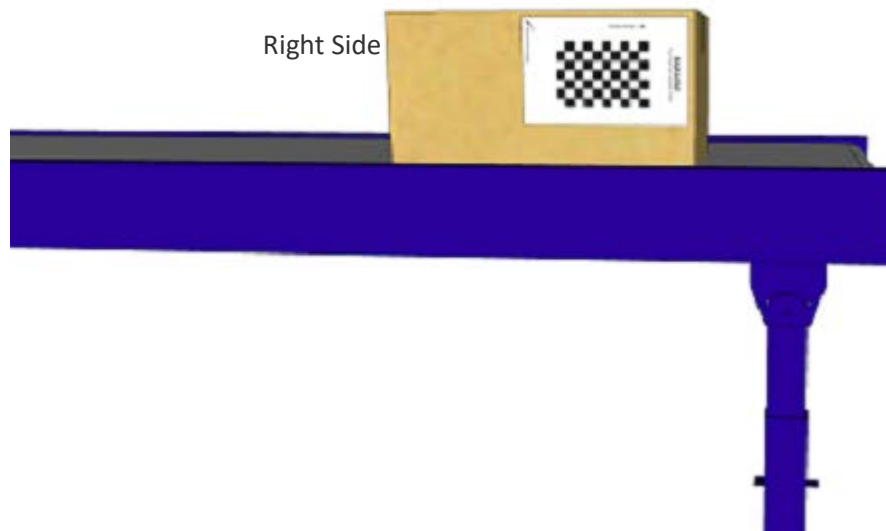
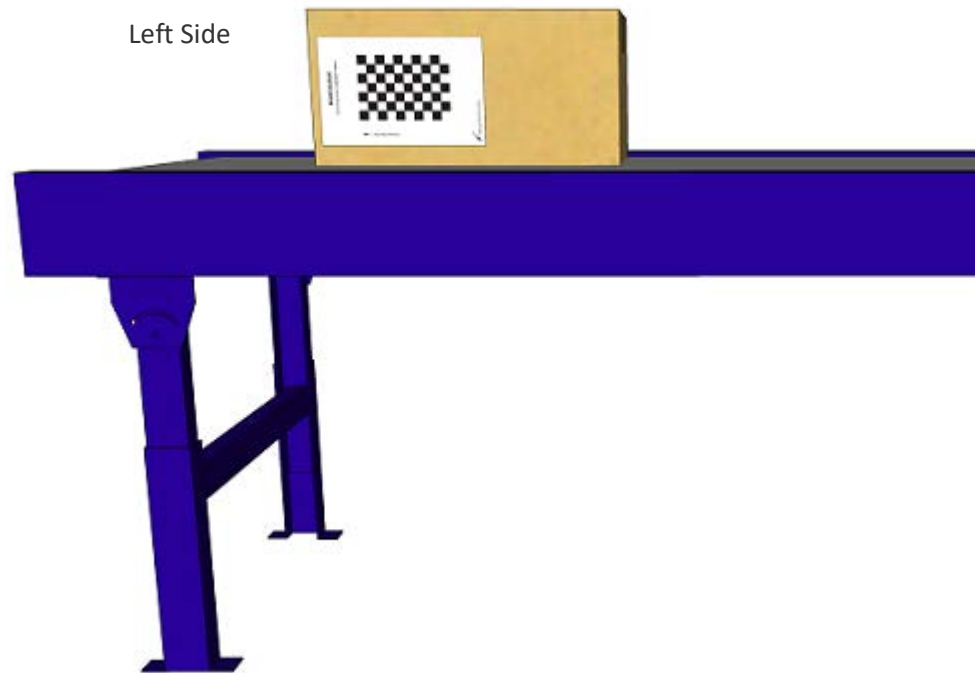


**Step 1/5: Far Distance Calibration Target Alignment**

Place a Calibration Target at the maximum distance from the camera. Make sure the checker board grid is centered in the green alignment area and the 'Conveyor Direction' arrow is pointing in the direction the conveyor travels. Leave the target under the camera and press 'Next Step'.



If you are calibrating side read cameras place your calibration target as show in the diagrams below.



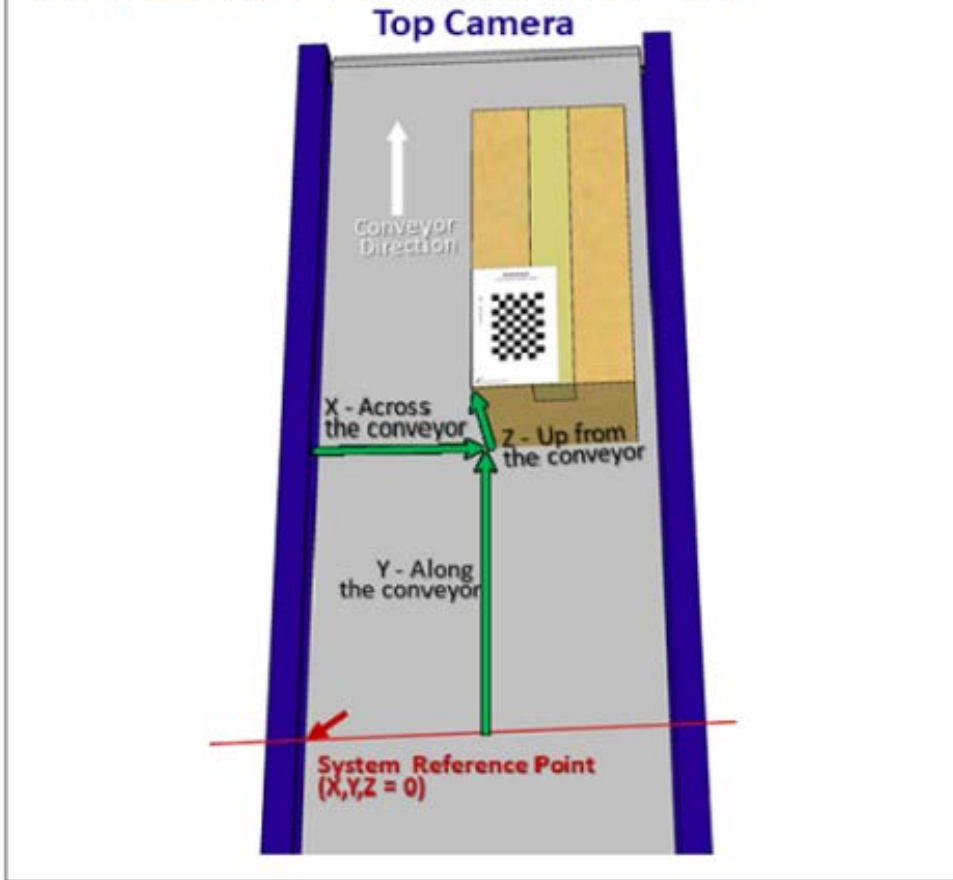
3. Place a calibration target at the maximum distance from the camera. Make sure the checker board grid is centered within the green alignment area. Make sure the Conveyor Direction arrow is pointing in the direction in which the conveyor is traveling. Leave the target under the camera and press **Next Step >>**.
4. Step 2/5: **Mounting Calibration Measurements at the Far Distance** appears:

— Step 2/5: Mounting Calibration Measurements at the Far Distance

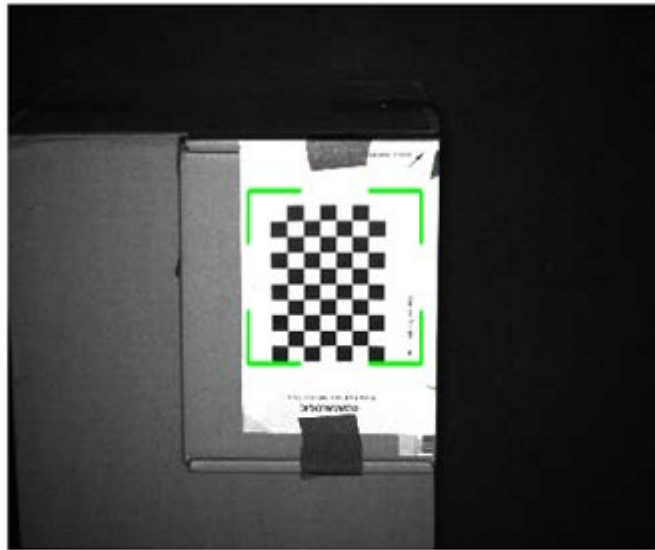
FAR Measurements	
X	<input type="text" value="267"/> mm
Y	<input type="text" value="362"/> mm
Z	<input type="text" value="40"/> mm

Measure the X, Y and Z references in relation to the 'Measure from this Corner' arrow on the Calibration Target.

- System Reference Point is either the Photo Sensor or Position Sensor, whichever is closer to the camera.
- X is the distance from the left side of the belt.
- Y is the distance from the Photo Sensor or Position Sensor, whichever is closer to the camera.
- Z is the distance from the conveyor surface to the Calibration Target.



5. Measure the distance from the side of the belt to the Calibration Target.
6. Measure the distance from the Photo Sensor or Position Sensor, whichever is closer to the camera, to the Calibration Target.
7. Measure the distance from the conveyor surface to the Calibration Target. Z=0
8. Enter those measurements into the Far Measurements fields.
9. Click **Next Steps >>**.
10. Step 3/5: Near Distance Calibration Target Alignment appears:

**Mounting Calibration for Camera 1**

&lt;&lt; Prev Step

Next Step &gt;&gt;

**Step 3/5: Near Distance Calibration Target Alignment**

Place a Calibration Target at the minimum distance (near) from the camera. Make sure the checker board grid is centered in the green alignment area and the 'Conveyor Direction' arrow is pointing in the direction the conveyor travels. Leave the target under the camera and press 'Next Step'.

11. Place a target at the minimum distance and measure X, Y, and Z references
  - X is the distance from the side of the belt to the Calibration Target.
  - Y is the distance from the Photo Sensor or Position Sensor, which ever is closer to the camera, to the Calibration Target.
  - Z is the distance from the conveyor surface to the Calibration Target.
12. Enter those measurements into the Near Measurements fields.
13. Click **Next Steps >>**.

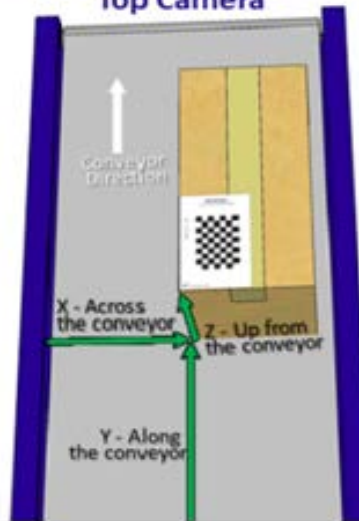
**Step 4/5: Mounting Calibration Measurements at the Near Distance**

**NEAR Measurements**

X	<input type="text" value="280"/>	mm
Y	<input type="text" value="331"/>	mm
Z	<input type="text" value="355"/>	mm

- Measure the X, Y and Z references in relation to the 'Measure from this Corner' arrow on the Calibration Target.
- System Reference Point is either the Photo Sensor or Position Sensor, which ever is closer to the camera.
  - X is the distance from the left side of the belt.
  - Y is the distance from the Photo Sensor or Position Sensor, which ever is closer to the camera.
  - Z is the distance from the conveyor surface to the Calibration Target.

**Top Camera**



**Step 5/5: Verify measured values and save**

Please check the following values. Press 'Save and Exit' to finish.

View Angle	12.49	degrees
Distance to Trigger Source (X)	502	mm
Far Working Distance (Z)	2147	mm

**Mounting Calibration Results**

```

DeviceIndex: 0
Cal Height: N:355 F:40
X/Y Mirrored for Cal: 1/1
Rotation for Cal: 180

Near Homography Matrix:  -0.043   -0.011   683.695
                        0.000    0.183   220.846
                        -0.000   -0.000    1.000
Far Homography Matrix:  -0.053   -0.006   751.915
                        -0.000    0.222   239.480
                        -0.000   -0.000    1.000

Near Corners:  492.200/ 186.505/ 355.000
               489.037/ 455.274/ 355.000
               178.678/ 413.499/ 355.000
               208.279/ 176.769/ 355.000

Far Corners:   633.116/ 243.595/ 0.000
               662.897/ 759.188/ 0.000
               37.764/ 788.192/ 0.000
               46.674/ 251.609/ 0.000

X Camera Angle: -1.1
Y Camera Angle: -12.5
Far Center Coordinates X/Y/Z: 350.6/ 502.0/ 0.0
Far DPI: 102
Min Separation: 374.00 mm 14.72 inch
FWD: 2147mm [25.00,102,3.45]
Distance to Scanline: 502mm
Mounting Angle: 12.49 degrees

```

<< Prev Step    Save and Exit

14. Check the values for far distance and near distance.
15. Click **Save and Exit** button.
16. Verify!

## Online Calibration

The following procedure is for Online Mode.

### Operating Mode

In the menu tree under Modify Settings, navigate to Global Settings | Operating Mode. The Operating Mode window opens. See *section* for an explanation of the Operating Mode options.

The following parameters must be set to match the application:

1. **Set to Online Mode in Modify Settings | Global Settings | Operating Mode**
2. Trigger Source: Make sure the Trigger Source and Transmit Point Settings are correct.

3. Check other Important Application Dependent Parameters:
  - **Modify Settings | Global Settings | Object Detection**
  - **Modify Settings | Global Settings | Barcode Settings**
  - **Modify Settings | Global Settings | Communications**
  - **Modify Settings | Global Settings | Output Format**
  - **Modify Settings | Global Settings | Image Saving**

## Set Camera Focusing

Set the camera focusing parameters to match the application:

1. **Go to Device Settings | Camera n Imaging** and Select Fixed, Dynamic, Dual or Sequential focusing.
2. Then click **Imaging Calibration Wizard** and follow the instructions.

**Imaging for Camera 1**

**Focusing**

Focus Mode: Fixed

**Focus Settings**

Imaging Calibration Wizard

Fixed Focus Range: 1002 mm

**Gain**

Gain Mode: Profile

**Gain Settings**

Sensitivity Table Offset Factor: 1

Exposure Offset (-/+): 0 us

Current Exposure Value: 220 us

Calibrated Max Exposure Value: 220 us

**Illumination**

Illumination Stay-On Time: 10 sec

**Binary**

Binary Mode: Disabled

**Subregion**

Subregion Wizard

Subregion: Enabled

Left: 1084 pixel

Right: 2184 pixel

Top: 732 pixel

Bottom: 1564 pixel

Update Reset

3. Place a target at the desired focusing distance and click **>>Next Step**. The camera will begin to find the correct focusing distance as shown below.

**Step 2/2: Fixed Focus Calibration Results**

Please check the following values. Press 'Save and Exit' to finish.

Fixed Focus Range	1432
Fixed Sensitivity (1-1024)	320

<< Prev Step    Save and Exit

- When the camera has completed this step it will show the Fixed Focus Range and Fixed Sensitivity values.
- Click **Save and Exit** to complete the calibration process and the values will be transferred to the Imaging window.

**Imaging for Camera\_1**

**Focusing**

Focus Mode: Fixed

**Focus Settings**

Imaging Calibration Wizard

Fixed Focus Range: 1432 mm

**Gain**

Gain Mode: Profile

**Gain Settings**

Sensitivity Table Offset Factor: 1

Exposure Offset (-/+): 0 us

Current Exposure Value: 220 us

Calibrated Max Exposure Value: 220 us

**Illumination**

Illumination Stay-On Time: 10 sec

**Binary**

Binary Mode: Disabled

**Subregion**

Subregion Wizard

Subregion: Enabled

Left: 1084 pixel

Right: 2184 pixel

Top: 732 pixel

Bottom: 1564 pixel

Update    Reset

- Click **Update** to complete the process.

## Other Camera Checks

### Perform these additional camera checks:

1. Confirm communication with host.
  - **Serial** (if applicable)
  - **Ethernet** (if applicable)
  - **Confirm Protocol Index** (if applicable)
2. Observe the System in Action.
3. Confirm that all cameras are reading the barcode correctly and that the scan point is communicating to the host.

## SETTING THE AV500/AV900 TO COMMUNICATE WITH WEBSENTINEL PLUS

Follow the steps below to set up your camera to communicate with WebSentinel PLUS:

1. Set-up your Image Destination
2. Set-up the Image Saving Options
3. Define Transport Settings



**NOTE: Set the parameters for you camera in the order specified here!**

### Set Up Your Image Destination

The camera saves image files to an FTP Server, CIFS network file share, or in volatile on-board storage inside the camera. The preferred network for transferring images is the Image network interface FTP. The Image network interface supports a 1 Gb connection speed for the operation of the AV500/AV900.

This process explains how to save images to the FTP Server. If you wish to save images to CIFS network file share or in volatile on-board storage.



**NOTE: These settings pertain to connecting to the Datalogic WebSentinel PLUS server. The Destination Directory - raid/images is the file location used by the Datalogic Web-Sentinal server. If the WebSentinal software is mounted on a customers server the destination directory may be different.**

One of the greatest advantages of using WebSentinel PLUS with the AV500 is the ability to save all of your camera images.

1. In the e-Genius menu under **Modify Settings**, select **Global Settings > Image Saving > Destination Settings**, the **Image Destination Settings** window opens.

**Image Destination Settings**

**Image Destination List**

Enable Image Dest 1	<input checked="" type="checkbox"/>
Enable Image Dest 2	<input type="checkbox"/>
Enable Image Dest 3	<input type="checkbox"/>
Enable Image Dest 4	<input type="checkbox"/>
Enable Image Dest 5	<input type="checkbox"/>
Enable Image Dest 6	<input type="checkbox"/>
Enable Image Dest 7	<input type="checkbox"/>
Enable Image Dest 8	<input type="checkbox"/>
Enable Image Dest 9	<input type="checkbox"/>
Enable Image Dest 10	<input type="checkbox"/>
Enable Image Dest 11	<input type="checkbox"/>
Enable Image Dest 12	<input type="checkbox"/>

**Image Index 1 Destination Settings**

Destination Type:

**Server Settings**

IP Address:

Port Number:

Use Global Username:

Username:

Password:

PassiveMode:

File Transfer Timeout:  sec

Destination Directory:

2. Enable Image Destination 1 or the next available.
3. Select the destination type **FTP Server** from the drop-down.
4. Enter the **IP Address**, **Port Number**, **Username**, **Password** and **File Transfer Timeout** as indicated above.
5. Enter your Destination Directory as **raidimages**.
6. Click **Update** to save the changes.

## Set Up the Image Saving Options

1. In the menu tree under **Modify Settings**, select **Global Settings >Image Saving > Image Settings**. The **Image Saving Settings** window opens.
2. Set the **Image Saving** options as shown below.

### Image Saving Settings

#### Image Settings List

Index	File Type
<input checked="" type="radio"/> 1	JPEG 80
<input type="radio"/> 2	Disabled
<input type="radio"/> 3	Disabled

#### Image Index 1 Settings

Enable

#### Image Saving Options

File Type	JPEG
Downsample	2
JPEG Quality	80
Cropping Mode	Disabled
Metadata	Disabled

#### Assign a Destination for each Device

Top_Camera's Destination Index	1
Front's Destination Index	1
Top_Right's Destination Index	1
Back's Destination Index	1

#### Image Saving Criteria Options

Save Criterion	All
Minimum Height of Object to Save	0 mm

#### Image Frame Saving Options

Frame Save Criterion	All Frames
----------------------	------------

#### Image Name

Image Specific String	
Top_Camera Specific String	Top
Front Specific String	Front
Top_Right Specific String	TopR
Back Specific String	Back
Number of Items in Filename	4

#### Image Name Item 1

Item Type	Parcel ID
-----------	-----------

#### Image Name Item 2


Item Type	Date
-----------	------

#### Image Name Item 3

Item Type	Time
-----------	------

#### Image Name Item 4

Item Type	Frame Index
-----------	-------------

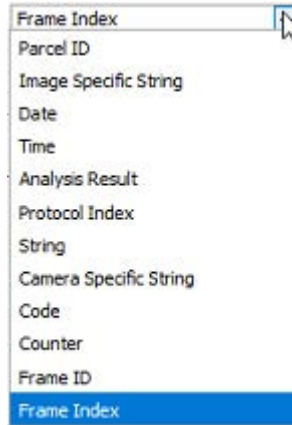
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**NOTE:** This information is an example only. Your application may require different parameters.

One of your Image Name Item > Item Types must be set to **Frame Index** as show above. This is required so that each frame is saved as a unique image with a unique filename, therefore assuring that frames are not saved over-top of one another.



3. Click **Update** to save the changes.

## Define Transport Settings

1. In the menu tree under **Modify Settings**, select **Global Settings > Communications > Transports**. The **Transport List Settings** window opens.
2. Set the **Transport List** options as shown below.
3. **The Extended Parcel check-box must be selected**, if you are to receive image and dimension information.

### Transport List

Idx	Type
<input type="radio"/> 1	Serial (Main)
<input checked="" type="radio"/> 2	Socket
<input type="radio"/> 3	Disabled
<input type="radio"/> 4	Disabled

### Transport 2 Settings

Enable

Transport Type Socket

#### Socket Settings

Socket Type TCP Server

Server Port 3002

Max Clients 1

Protocol Web Sentinel

#### Web Sentinel Settings

Extended Parcel

Image Saving Index Number 1

#### Monitor Settings

Conveyor Speed Check Type Percent

Max Conveyor Speed Percent Error 5 %

4. Click **Update** to save the changes.

# CHAPTER 7

## MAINTENANCE

---

### OVERVIEW

This chapter provides instructions for maintaining optimum performance and life for your AV500/AV900 cameras. It provides specific information on:

- Maintenance Procedures
- Exterior Cleaning
- Mounting Hardware Checks
- Wiring Connection Checks

Item	Description
Soft-bristle brush	For cleaning the unit's exterior
Clean, soft cloths	For cleaning the unit's exterior
Cleaning solutions	Mild detergent solution for cleaning the unit's exterior. 70% denatured alcohol, 30% de-ionized water solution for cleaning exit window
Soft cotton swabs or	Use to clean illumination exit window



**WARNING:** Due to the complex and application-specific nature of these installations, AV500/AV900 camera systems must be setup and serviced by authorized technicians trained by Datalogic.

Maintenance procedures in this chapter may be performed by an end user technician. Training is recommended if the end user intends to do more than the maintenance procedures provided in this chapter.

**DO NOT OPEN THE UNIT. OPENING THE AV500/AV900 MAY VOID ITS WARRANTY.**

**CAUTION:** Proceeding with any setup, calibration, or service procedures without proper training may void the warranty.

For further information on training, contact us through our website at [www.datalogic.com](http://www.datalogic.com).

## RECOMMENDED MAINTENANCE FREQUENCY

The AV500/AV900 Camera System is designed for industrial environments. The recommended frequency for performing these maintenance tasks will depend on the application's environment. In general, these procedures are recommended only if it is noticed that the environment is dirty enough that deposits are appearing on the equipment or when performance is degraded by accumulation of dust or dirt on the exit windows or deflection mirrors. By monitoring normal operations and performing weekly visual checks, you can establish a maintenance schedule that fits your application.

## MAINTENANCE TASKS

Perform the maintenance tasks on an "as needed" basis to assure proper operation of the camera.

Task schedule frequency depends upon the application environment conditions. Harsh environments that expose the equipment to more heat, dust, and dirt will require these procedures be performed more frequently.

It only requires a few minutes to complete each maintenance task.

## Exterior Cleaning



**WARNING: Do not use any chemical on the camera that is unsafe for plastics, such as benzene, acetone, or similar products. Before performing this maintenance task, be sure to shut down the unit.**

The exterior cleaning procedure may be performed without removing the camera from the mounting structure.

1. Switch off the conveyor.
2. Switch off the camera system by disconnecting the power source.
3. Clean the exterior (except the windows) with a clean, soft-bristle brush. Be sure not to brush any dust, dirt, or debris onto the windows.
4. Carefully remove any dirt or debris in or around the connector panel.
5. Wipe the exterior with a clean, soft cloth dampened slightly with a mild detergent solution.

## Cleaning the Illumination / Camera Window



**WARNING: Shut down the camera system before performing this maintenance task. Do not stare into the camera's window at the LED light. Avoid direct eye exposure. The LED light level does not constitute a health hazard, however staring at the LED light for prolonged periods could result in eye damage.**

**Never apply cleaning solution directly to the camera window. Always apply the solution to a cloth, and then the cloth to the window. Do not use any chemical on the camera that is unsafe for plastics, such as benzene, acetone, or similar products.**

This procedure is recommended only if it is noticed that the environment is dirty enough that deposits are appearing on the deflection mirrors. The window cleaning procedure should be performed without removing the camera from the mounting structure.

1. Switch off the conveyor.
2. Switch off the camera system.
3. Follow the exterior cleaning procedure before cleaning the window.
4. Check the window surface for any dust, dirt, or smudges. If the window needs to be cleaned, proceed to Step 5.
5. Make a solution of seven parts denatured alcohol and three parts water. (Many over-the-counter solutions will leave deposits/smudges that can affect performance.)
6. Apply the cleaning solution to a lint-free cotton cloth.
7. Apply the cloth with cleaning solution to the camera and illumination window.
8. Remove any streaks or remaining moisture from the window with a dry, soft, lint-free cloth or lens paper.
9. Verify camera operation.

## Cleaning the Deflection Mirror



**WARNING:** Shut down the camera system before performing this maintenance task. Do not stare into the camera's window at the LED light. Avoid direct eye exposure. The LED light level does not constitute a health hazard, however staring at the LED light for prolonged periods could result in eye damage.

**Use care when cleaning the deflection mirror to assure that the alignment with the camera is not altered. Never apply cleaning solution directly to the mirror. Always apply the solution to a cloth, and then the cloth to the mirror. It is a good habit to pre-mark the mirror position, so if it does move it can be returned to the original position.**

This procedure is recommended only if it is noticed that the environment is dirty enough that HEAVY deposits are appearing on the deflection mirrors. The cleaning procedure should be performed without removing the mirror from the mounting structure.

1. Switch off the conveyor.
2. Switch off the camera system.
3. Review the exterior cleaning procedure before cleaning the deflection mirror.
4. Check the deflection mirror for any dust, dirt, or smudges. If the deflection mirror needs to be cleaned, proceed to **Step 5**.
5. Use a dry, soft, lint-free cloth to remove accumulated dust.
6. If the deflection mirror is particularly dirty or smudged, make a solution of seven parts denatured alcohol and three parts water. (Many over-the-counter solutions will leave deposits/smudges that can affect performance.)

7. Apply the cleaning solution to a lint-free cloth.
8. Apply the cloth with the cleaning solution to the mirror.
9. Remove any streaks or remaining moisture from the mirror with a dry, soft, lint-free cloth or lens paper.
10. Verify camera operation.

## Cleaning the Photoelectric Sensor

If your application uses the photoelectric sensor option as a hardware trigger, be sure to clean the photoelectric sensor periodically as outlined below.

1. Switch off the conveyor.
2. Switch off the camera system.
3. Clean the photoelectric sensor's lens using the denatured alcohol solution and a cotton swab or lens paper.
4. Clean the reflector using the denatured alcohol solution and a cotton swab or lens paper.
5. Verify photoelectric sensor operation.

## Cleaning the Tachometer

If your application uses the tachometer option for tracking purposes, be sure to clean the tachometer wheels periodically as outlined below.

1. Turn off the product transport.
2. Turn off the barcode reader by disconnecting the power source.
3. Using a clean, soft cloth, wipe the wheels of the tachometer clean using a mild detergent solution.
4. Before restarting the system, be sure the tachometer is making good contact with the product transport.
5. Verify tachometer operation.



## Tighten Mounting Hardware

1. Check all cameras, Deflection Mirrors, CBX connection boxes, and power supply mounting hardware as applicable. Tighten as necessary. Do not over-tighten. Be sure not to disturb the equipment's alignment as it relates to the product transport.
2. Check the mounting hardware of the Photoelectric Sensor (if this option is being used). Tighten as necessary. Do not over-tighten.
3. Check the mounting hardware of the tachometer (if this option is being used). Tighten as necessary. Do not over-tighten.

## Checking Camera System Connections

This is a safety check recommended for harsh environments where vibration may be a problem. (See "Electrical Installation" on page 42)

1. Check all wiring connections to the camera and illumination connector panels. Tighten any loose connections as necessary. Do not over-tighten.
2. Check all wiring connections to the CBX connection box. Tighten any loose connections as necessary. Do not over-tighten.
3. Check all cabling/conduit for signs of wear/damage. Repair/replace any damaged cable connections as necessary.

## Verify Camera Operation

If after performing maintenance, the imaging system continues to perform below the normal operations experienced with the system under normal daily conditions, contact Datalogic through our website at [www.datalogic.com](http://www.datalogic.com).

## Verify Photoelectric Sensor Operation

1. Block the Photoelectric Sensor emitter beam to confirm it is aligned properly with the reflector.
2. Verify that the TRIGGER LED on camera lights when photoelectric sensor beam is blocked.
3. If the photoelectric sensor's LED does not change status, adjust the photoelectric sensor so that it is properly aligned with the reflector.
4. If the TRIGGER LED on the barcode reader does not light when the photoelectric sensor's beam is blocked, check the cabling between the photoelectric sensor and CBX connection box for damage.

## Verify Tachometer Operation

1. Rotate the tachometer wheel slowly.
2. The **TACH** LED on camera's connector panel should flash indicating the tachometer is operational.

## Replacing the Fan

The fan of the AV500/AV900 is a field replaceable part. Request spare part number: 8900006713. Instructions are included.



**WARNING:** the AV500/900 fan should be replaced only when the product is out of warranty. If the product is still under warranty it should be sent in for repairs. Please refer to ([support.it@datalogic.com](mailto:support.it@datalogic.com)) for details.

# CHAPTER 8

## TROUBLESHOOTING

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**WARNING:** Due to the complex and application-specific nature of these installations, operational deficiencies of the barcode reader must be diagnosed and serviced by a trained and authorized Datalogic technician.

There are no user serviceable components or field replaceable units (FRUs) inside the barcode reader.

For further information on training, contact us through the Datalogic website at [www.datalogic.com](http://www.datalogic.com).

When contacting Datalogic for help with an AV500/AV900 camera, please be ready to share the unit serial number with the Datalogic technician. The unit's serial number tag is located on the bottom of the device, as shown below. Help desk contact information is available at [www.datalogic.com](http://www.datalogic.com).

Serial Number



Data  
Matrix

AV500-357W  
MAY 2018  
S/N 123456789

24V --- 2A Max  
Made in Italy

# ERROR CODES AND RESOLUTIONS

## Decoder Errors

Alphabetical by type: Information / Error / Warning.

Description	Type	Explanation	Possible Cause	Solution
Application failed to shutdown	Info	The application was in a state where it could not shut down properly.	If software was recently loaded, an error occurred during the load.	Power cycle the unit. If software was recently loaded, try to reload the new software. If the error persists, contact Datalogic Support.
Decoder load warning	Info	Decode engine CPU usage is high	Background is noisy. Multiple 2D codes are enabled. Camera gain is too low or too high or the camera is out of focus.	Make sure gain and focus are set properly. Otherwise this error will not cause any problems
Decoder overload error	Info	Decode engine is being killed before the package is complete	Background is noisy. Multiple 2D codes are enabled. Camera gain is too low or too high or the camera is out of focus. Transmit point distance is too close	Make sure gain and focus are set properly. Increase the transmit point distance if possible.
Driver returned an error	Info	PCIe driver returned an error	HW issue with the PCIe bus or the FPGA	Contact Datalogic Support if this error persists
Configuration not synchronized with cluster	Info	XML does not match the XML in other cameras.	XML from a custom version of software was loaded into a camera running STD software.	Default the camera and reboot, which will force the camera to load the appropriate XML.
Decoder load exceeds 200%	Info			
Decoder load exceeds 80%	Info	PCIe driver returned an error.	HW issue with the PCIe bus or the FPGA.	Contact Datalogic Support if this error persists.
Dimensioner IP address not valid for Sync Network	Info	In some applications the Dimmer will connect directly to the AV. In that situation the AV will identify the dimmer is connected and process the data accordingly. If the application doesn't require the Dimmer to be connected directly to the AV, the AV will still monitor the connection and post this message.	Dimmer is not connected directly to the AV.	This is just an Information message and requires no action
Dimensioner is not Online	Info	Once the Dimmer is connected the AV will monitor the connection and post this message if the dimmer connection is missing	This will only be an issue if the Dimmer is intended to be connected. Dimmer is disconnected or failed.	Check to see that the Dimmer is still connected and functioning.
Bad scanline data detected	Error	Raw data from the image buffer is corrupt.	RAM is corrupt or bad.	Contact Datalogic Support.

Description	Type	Explanation	Possible Cause	Solution
Camera status not understood	Error	Received camera status was not understood.	Make sure all of the cameras in the tunnel contain the same software.	Load the same software into all of the cameras in the tunnel.
Camera with different SW version detected	Error	The camera will compare it's version of software to the other cameras in the Cluster. This message is posted when there is a conflict	Often this is caused when a spare camera is installed, but does not have the same software as the other cameras in the cluster.	Install the correct software version
Configuration not synchronized with cluster	Error	XML does not match the XML in other cameras	XML from a custom version of software was loaded into a camera running STD software.	Default the camera and reboot. That will force the camera to load the appropriate XML
Could Not Save JPEG - Compression Failed	Error	JPEG compression failed.	Image was too big or too small. Compression was interrupted.	Contact Datalogic Support if this error persists.
Could Not Save JPEG - Job Queue is Full	Error	Internal JPEG queue is full.	JPEG compression is taking too long.	Contact Datalogic Support if this error persists.
Could Not Save JPEG - Queue is Full	Error	Internal JPEG queue is full.	JPEG compression is taking too long.	Contact Datalogic Support if this error persists.
Could Not Save JPEG - Waiting for FPGA	Error	Attempt to compress a JPEG while another compression is taking place.	JPEG compression is taking too long.	Contact Datalogic Support if this error persists.
Decoder CPU over temperature	Error	The AV camera will monitor the internal temperature. If the temperature goes above a preset value this error will appear.	Internal Fan failure Faulty CPU processor	Replace Camera
Dimensioner Beacon not understood	Error	Status received from the Dimensioner was not understood.	The dimensioner is not running a version of software that is compatible with the camera.	Load the correct software into the dimensioner.
Error Configuring the Decode Engine	Error	Parameter settings used to configure the decode engine were rejected	A decode engine parameter is out of range	Make sure all decode engine settings are correct. Contact Datalogic Support
Expected Camera is Offline	Error	A camera in the tunnel configuration is not online.	The offline camera has lost power or restarted. The offline camera failed to start properly. The SyncNet cables are not connected properly to the camera listed offline.	Verify the offline camera has power. Verify the SyncNet cables are connected properly between the offline camera and the next camera. Cycle the unit's power. If the error persists, replace the camera and/or contact Datalogic Support.
Expected External Device is Offline	Error	All AV cameras communicate through the Sync network. When one of the cameras stops communicating the other cameras in the system will post this message.	Camera failure	Replace failed camera
Factory Reset Performed. Power Cycle Required	Error	If the cameras are set to factory default they must be power cycled in order for all the internal applications to run correctly.	Cameras were factory defaulted	Reboot the cameras

Description	Type	Explanation	Possible Cause	Solution
Failed to set space notification	Error	Camera could not set a delayed encoder/ tachometer event.	Encoder/tachometer resolution is set too high.	Check the encoder/tachometer resolution. Contact Datalogic Support, if the encoder/ tachometer resolution is set properly.
Failed to Allocate Memory for Image Transfer	Error	Requested image could not be loaded into memory.	RAM is bad or corrupt .	Contact Datalogic Support.
Failed to Login to FTP Server	Error	The camera was unable to log into the specified FTP server to save images.	The log in credentials are incorrect. The external FTP server is offline. The camera Image port is not connected to the network to get to the FTP server.	Verify the login credentials are correct. Verify the external FTP server is up and running. Verify the camera image port is correctly connected to the appropriate network.
Failed to Read Image from Ramdisk	Error	Requested Image no longer available in Ramdisk.	Parameter updated performed while sorting packages. Image transfer taking too long.	Check the network connection speed.
Failed to Write Image to File System	Error	The camera was unable to save the image file to the specified File System Location.	The file system location is incorrect or full.	Verify that the Image saving settings for the file system are correct. Verify the location is not full or set up the file maintenance to remove old files automatically.
Failed to Write Image to FTP Server	Error	The camera was unable to write the image to the FTP server.	The external FTP server is offline. The camera Image port is not connected to the network to get to the FTP server.	Verify the external FTP server is up and running. Verify the camera image port is connected to the appropriate network correctly.
Failed to Write Image to Offline Viewer	Error	The camera was unable to send an image to the external viewer.	External viewer is not running or it's not a version meant for the Parameters required to send images to the external viewer are not set properly.	Make sure the external viewer is running. Make sure the external viewer was downloaded from the camera. Make sure the external viewer network parameters on the Modify Settings   Global Settings   Image Saving Destination Settings window are properly set
Far Working Distance Out of Range	Error	The far working distance is set to a distance beyond the focus range of the camera.	The far working distance is set incorrectly. The camera being used is incorrect for the application.	Verify the camera model is correct for the application. Re-run the calibration wizard on this camera.
Fixed Focus Value Out of Range	Error	The fixed focus setting is set to a distance beyond the focus range of the camera.	The fixed focus value is set incorrectly. The camera being used is incorrect for the application.	Verify the fixed focus value is correct. Verify the camera model is correct for the application.
Image Transfer Falling Behind. Check Connection Speed	Error	The volume of images to be saved is exceeding the hardware capabilities of the Image port connection.	The ethernet hardware connected to the camera Image port (cables, switches, etc.) is not Gigabit capable.	Verify the switches are Gigabit capable and the cables are at least Cat5e. Verify the LED's of the camera Image port is indicating a Gigabit connection. Verify the ethernet cables are not routed with AC wiring and are not excessively long.
Image Saving Queue is Full. Check Connection Speed	Error	Requested package is no longer available to save.	Image transfer is taking too long, resulting in lost packages.	Check the network connection speed.

Description	Type	Explanation	Possible Cause	Solution
IV Monitor failed to get an image buffer	Error	Camera could not find the raw image buffer	RAM is corrupt or bad.	Contact Datalogic Support
LogManager can't open a log file	Error	Log Manager was unable to open the log file on the media device.	Log file media device is unavailable or full.	Verify logging options.
LogManager can't write to the log file	Error	Log Manager was unable to write to the log file on the media device.	Log file media device is unavailable or full.	Verify logging options.
Maximum Application restarts	Error	An application was restarted multiple times due to an error	If software was recently loaded, an error occurred during the load. An internal hardware failure exists.	Power cycle the unit. If software was recently loaded, try to reload the new software. If the error persists, contact Datalogic Support.
Maximum system resets in one day	Error	The system became unresponsive multiple times within a 24 hour period and was reset.	If software was recently loaded, an error occurred during the load. An internal hardware failure exists.	Power cycle the unit. If software was recently loaded, try to reload the new software. If the error persists, replace the camera and/or contact Datalogic Support.
More than one camera setup to multicast LC data	Error	There should only be one camera transmitting the focusing data from the Light Curtain.	Camera is not configured correctly.	Change configuration
No ACK from Range-finder after Parameter Update	Error	RangeFinder did not Ack the last parameter update.	Communication with the RangeFinder is compromised.	Check the Ethernet connection with the RangeFinder.
Not Saving Image. Request Too Late	Error	Requested package is no longer available to save.	Image transfer is taking too long, resulting in lost packages.	Check the network connection speed.
Primary Controller Photo Sensor Issue Detected	Error	The cameras can be set in a redundant configuration. When configured as such, there is a Primary and Secondary controller. This message is posted by the Secondary controller and indicates that there is a problem with the Primary's Photo Sensors signal.	Photo Sensor malfunction Primary unit failure	Determine if the problem is associated with either the Photo Sensor or the Primary unit
Primary Controller Tachometer Issue Detected	Error	The cameras can be set in a redundant configuration. When configured as such there is a Primary and Secondary controller. This message is posted by the Secondary controller and indicates that there is a problem with the Primary's Tachometer's signal.	Tachometer malfunction Primary unit failure	Determine if the problem is associated with either the Tachometer or the Primary unit

Description	Type	Explanation	Possible Cause	Solution
RangeFinder is not Online	Error	The RangeFinder is selected as the position sensor but is not detected as being online.	The RangeFinder is powered off or not connected. The Rangefinder is not the position sensor being used.	If the RangeFinder is not the position sensor being used, select the appropriate position sensor. Verify the RangeFinder has power. Verify the network port of the RangeFinder is connected to the Focus Eth port of one of the cameras. Power cycle the RangeFinder. If the error persists, replace the RangeFinder and/or contact Datalogic Support.
RangeFinder status not understood	Error	The status message received from the RangeFinder was not understood by the camera	The RangeFinder software is too old	Load the appropriate SW into the RangeFinder
Real-Time Processor has Errors	Error	The Real-Time Processor is reporting an error.	Check the Real-Time Processor section of the System Info > Device Details window for detailed error information.	Check the Real-Time Processor section of the status page for detailed error information. Refer to the Real-Time Processor error list for more information.
Real-Time Processor is not Online	Error	The Real-Time Processor is unable to communicate with the Decoder.	Real-Time Processor has stopped functioning. Internal hardware failure.	Cycle the unit's power. If the error persists, replace the camera and/or contact Datalogic Support.
Real-Time Processor status not understood	Error	Status received from the Real-Time Processor was not understood.	Make sure the Real-Time Processor software version is compatible with the Application software.	Load a compatible version of Real-Time Processor software.
Reboot Required to finish configuring redundancy	Error	In the redundant configuration the units need to be rebooted in order to complete the configuration	Redundant configuration has been completed and units need to be rebooted	Reboot units
Secondary Controller PhotoSensor Issue Detected	Error	The cameras can be set in a redundant configuration. When configured as such there is a Primary and Secondary controller. This message is posted by the Secondary controller and indicates that there is a problem with the Primary's Photo Sensor's signal	Photo Sensor malfunction Primary unit failure	Determine if the problem is associated with either the Photo Sensor or the Primary unit
Secondary Controller Tachometer Issue Detected	Error	The cameras can be set in a redundant configuration. When configured as such there is a Primary and Secondary controller. This message is posted by the Secondary controller and indicates that there is a problem with the Primary's Tachometer's signal	Tachometer malfunction Primary unit failure	Determine if the problem is associated with either the Tachometer or the Primary unit
Software upgrade failed	Error	An attempt to load upgraded software failed.	There is a type mismatch with the existing software and the new software being loaded. An error occurred while loading software.	Verify the software type being loaded matches that of the existing software. If you are intentionally changing the software type, check the box to skip software type compatibility check when loading the new software file. Cycle the unit's power, and re-attempt to load software.

Description	Type	Explanation	Possible Cause	Solution
Application failed to start	Error	One of the applications failed to properly start and is not functioning.	The application was unable to initialize its interfaces properly and failed. If software was recently loaded, an error occurred during the load.	Cycle the unit's power. If software was recently loaded, try to reload the new software. If the error persists, contact Datalogic Support.
Unable to read Combo Angle Sensor Temp	Error	A request to the Angle Temp sensor for the current temperature did not respond.	Internal Communication error	Reboot the Camera. If the error persists, contact Datalogic or send unit for repair.
Unable to read Combo LED Temperature	Error	A request to the LED Temp sensor for the current temperature did not respond.	Internal Communication error	Reboot the Camera. If the error persists, contact Datalogic or send unit for repair.
Bottom Camera Distance to Scanline too Small	Warning	The distance from the position sensor scan line to the bottom camera scan line is too small.	The position sensor is mounted incorrectly, too close to the camera. The bottom camera is mounted incorrectly.	Verify and move the position sensor further upstream if needed. Verify and move the camera further downstream if needed.
Could Not Save JPEG - Image Too Large	Warning	Requested image is too large to compress	Photo sensor or Position sensor obstructed or a package jam resulting in an extremely long package	Eliminate package jams. Make sure the photo sensor and/or position sensor are not obstructed
Could Not Save JPEG - Image Too Small	Warning	Requested image is too small to compress	Junk on the conveyor	Check for junk on the conveyor resulting in extremely small packages
Decoder board over temperature	Warning	The Decoder board exceeding the maximum temperature	Ambient temperature has exceeded the maximum 50 degrees C operating temperature. There is a fan failure or airflow blockage.	Verify the ambient temperature is less than or equal to 50 C. Check the fan operation and for any airflow obstructions. Replace fans if necessary.
Decoder CPU over temperature	Warning	The Decoder CPU exceeding the maximum temperature	Ambient temperature has exceeded the maximum 50 degrees C operating temperature. There is a fan failure or airflow blockage.	Verify the ambient temperature is less than or equal to 50 C. Check the fan operation and for any airflow obstructions. Replace fans if necessary.
Distance to Scanline too small	Warning	The distance from the position sensor scan line to the closest point of the camera line of sight is too small.	The position sensor is mounted incorrectly, too close to the camera. The camera is mounted incorrectly or the angle is wrong.	Verify and move the position sensor further upstream if needed. Verify and move the camera further downstream if needed. Verify and correct the camera angle if needed.
IV State Not Sent - Pkg Not Found	Warning	A trigger message for a package was received but the package was never found in the image data	This can occur during boot up if packages are running through the tunnel or if a package is completely shadowed	Contact Datalogic Support if this error persists
RangeFinder is not Expected	Warning	A RangeFinder is detected in the system but is not selected as the position sensor.	Wrong position sensor is selected in the configuration.	Select the RangeFinder as the position sensor in the configuration.

Description	Type	Explanation	Possible Cause	Solution
RangeFinder is not OK	Warning	The RangeFinder is online but reporting an error.	Check the RangeFinder GUI page for error details.	Check the RangeFinder GUI page for error details. Refer the RangeFinder error list for more information.
Real-time Processor has Warnings	Warning	The Real-Time Processor is reporting at least one warning.	Check the Real-Time Processor section of the status page for detailed warning information.	Check the Real-Time Processor section of the status page for detailed warning information. Refer to the Real-Time Processor warning list for more information.
Software upgrade in progress	Warning	The camera is in the process of updating software.	A software update was loaded on this camera or one of the cameras in the tunnel and auto-update is enabled.	Wait for the update to complete.
Bottom Camera Distance to Scanline too Small	Warning	The distance from the position sensor scan line to the bottom camera scan line is too small.	The position sensor is mounted incorrectly, too close to the camera. The bottom camera is mounted incorrectly.	Verify and move the position sensor further upstream if needed. Verify and move the camera further downstream if needed.
Camera calibration has not been completed	Warning			
Could Not Save JPEG - Image Too Large	Warning	Requested image is too large to compress.	Photo sensor or Position sensor obstructed or a package jam resulting in an extremely long package.	Eliminate package jams. Make sure the photo sensor and/or position sensor are not obstructed.
Could Not Save JPEG - Image Too Small	Warning	Requested image is too small to compress.	Debris on the conveyor.	Check for junk on the conveyor resulting in extremely small packages.
Decoder frame(s) discarded	Warning			
Decoder board over temperature	Warning	The Decoder board has exceeded the maximum temperature.	Ambient temperature has exceeded the maximum 50 degrees C operating temperature. There is a fan failure or airflow blockage.	Verify the ambient temperature is less than or equal to 50 C. Check the fan operation and for any airflow obstructions. Replace fans if necessary.
Distance to Scanline too small	Warning	The distance from the position sensor scan line to the closest point of the camera line of sight is too small.	The position sensor is mounted incorrectly, too close to the camera. The camera is mounted incorrectly or the angle is wrong.	Verify and move the position sensor further upstream if needed. Verify and move the camera further downstream if needed. Verify and correct the camera angle if needed.
IV State Not Sent - Pkg Not Found	Warning	A trigger message for a package was received but the package was never found in the image data.	This can occur during boot up if packages are running through the tunnel or if a package is completely shadowed.	Contact Datalogic Support if this error persists.
RangeFinder is not Expected	Warning	A RangeFinder is detected in the system but is not selected as the position sensor.	A different Position Sensors is selected in the Operating Mode other than the RangeFinder	Select the RangeFinder as the position sensor in the configuration.
RangeFinder is not OK	Warning	A RangeFinder is selected but has an error	A component within the RangeFinder has failed	Replace RangeFinder

Description	Type	Explanation	Possible Cause	Solution
Real-time Processor has Warnings	Warning	The Real-Time Processor is reporting at least one warning.	Check the Real-Time Processor section of the Modify Settings   System Info > Device Details window for detailed warning information (See section	
Software upgrade in progress	Warning	The AV is in the process of upgrading the software.	The AV camera is in the process of upgrading its software. It will inform the user and not do any other activity until this process is complete	Wait until the software upgrade is complete. The AV will reboot itself once this process is complete.
Unable to mount SMB/CIFS file share for image saving	Warning	The camera was unable to mount the SMB/CIFS file share on the external device	File System parameters on the Destination Settings page are not correct. External device is not available. The Server Path is set to a path local to the camera	Make sure the File System parameters on the Destination Settings page are setting properly. Make sure the Server Path is not local to the camera
Unexpected Camera is Online	Warning	A camera is detected in the tunnel that was not part of the tunnel configuration.	A new camera was added to the tunnel or an existing camera was replaced.	Add the camera to the configuration and proceed with the set up if it is a new camera. If an existing camera was replaced, there should be an offline camera. From the Modify Settings   System Info, replace the offline camera with one listed outside the cluster
Unexpected External Device is Online	Warning	The AV will identify any device that is set for DHCP. The controller camera will give the device an IP address. If the device is not an AV camera it will post this message.	Another device set to DHCP is connected to the AV Sync network	Disconnect the device.
Controller Camera is Offline	Warning	This message is posted by the Clients in the cluster. Since the Controller Camera provides the tach and trigger to the other cameras the cluster will not trigger	Controller camera failed	Determine that the camera is in fact not working and there are no other conditions as a cable unplugged. If the issue is a failed camera then replace the Controller camera

## BYPASSING AN AV500/AV900 IN AN ARRAY (TUNNEL)

If for any reason, an AV500/AV900 needs to be removed from an array (tunnel), it can be bypassed to allow the array to continue functioning in a redundant loop, minimizing down time. To bypass a non-working , Disconnect the Sync In and Sync Out cables of the non-working unit and connect them to one another.

## OTHER CAMERA CHECKS

Confirm communication with host

- Serial (if applicable)
- Ethernet (if applicable)
- Confirm Protocol Index (if applicable)

Observe the System in Action

Confirm that all cameras are reading the barcode correctly and that the scan point is communicating to the host.

## REPLACING AN AV500/AV900 CAMERA

Use the following procedures to replace an AV500/AV900 Camera, either a stand-alone unit, a Master in a tunnel/array, or a Slave unit in a tunnel/array.



**ESD WARNING: Observe precautions to prevent Electrostatic Discharge (ESD). Use an ESD grounding wrist strap and avoid direct contact with circuit boards, which could be damaged by ESD.**

1. Disconnect the power source from the camera.
2. Locate the memory card inside the camera and remove it. See.
3. Insert the memory card firmly into the card slot in the replacement camera.
4. Reattach the back access panels and secure it with the retaining screws.
5. Screw the mounting bolts in place to secure the camera
6. Reattach the cables to the camera in their original locations.
7. Apply power to the AV500/AV900 Camera.
8. Connect the Controller Key (tach dongle) to the I/O port of the camera.
9. With the unit powered up, hold down buttons 1 and 2 at the same time. The STATUS LED (located to the right of button #2) will blink GREEN and then RED to indicate that the unit has been defaulted.
10. Disconnect the power connection from the camera assembly.
11. Remove the CONTROLLER KEY from the I/O port of the camera.
12. Re-attach all of the cables to the camera in their original locations.
13. Apply power to the AV500/AV900 Camera.

14. Connect the browser to any AV500/AV900 in the tunnel EXCEPT the unit being replaced.
15. Navigate to the System Info page.
16. In the “This Cluster” section of the page the failed camera will show up with the “Delete” option in the Action column. Note the MAC address of this camera.
17. The replacement AV500/AV900 will be found in the “Cameras not in the Cluster” portion of the page.
18. Under the “Action” section select Replace (The MAC address of the failed camera).

## **RECOMMENDED AV500/AV900 SETUP SEQUENCE**

### **Confirm Tunnel is Ready for Calibration Process**

1. Confirm that equipment is mounted according to the application mounting drawing and app specs – Reference section 2 of the AV500/AV900 manual for devices used in the application.
2. Confirm that all electrical equipment is installed properly – Reference section 3 of AV500/AV900 manual for the devices in conjunction with the interconnect drawing for application.
3. Confirm that the AV500/AV900 mirrors are aligned – Reference section 2 of the AV500/AV900 manual.
4. Verify that the mirror and camera brackets are assembled per the manual Section 2.
5. Verify that the Photoeye (if used) is mounted and aligned.

### **“Static Calibration” on page 95**

### **Establish a connection, login to the system, and verify software version installed.**

1. Connect to SYNC network using the Datalogic Sync In and Sync Out cables and connections.



2. Establish a connection.
3. Use the Ignore connecting through Host Net or Image Net as we are using the Sync net for this process.
4. Navigate to the **Diagnostics|System Status** screen and follow see **Diagnostics > System Status in e-Genius Online help** to determine the software version of each camera.
5. If the correct software is already loaded in the cameras (based on application specs), skip over the next step and proceed to System Configuration.

## Load Software

1. Before putting all the cameras into the network, click on each IP Address and open in a separate tab.
2. Reference Utilities > Software Upgrade in e-Genius Online help.
3. Software Loading order:
  - Patches
  - RTP software
  - Application software
4. Prepare each camera to load the software, but don't execute until ALL cameras are prepared, this will assure that all the cameras will complete the upgrade about the same time and that the software gets distributed without any interruption.
5. Load the software in the clients first until they are completed, next load the software in the controller last.
6. Default each AV500/AV900 after software load.



**NOTE: Please do not use a parameter file from any previous installations.**

## NAME AND CLUSTER CONFIGURATION

1. Assign system name and positions of each camera in the system cluster.
2. Only bring one camera into the cluster at a time.

# CHAPTER 9

## TECHNICAL FEATURES

---

This chapter provides detailed specifications for the AV500/AV900 Camera Systems. It provides specific information on:

- Electrical Features
- Optical Features
- Reading Features
- Human Machine Interface
- Software Features
- Environmental Features
- Physical Features

# TECHNICAL SPECIFICATIONS

<b>OPTICAL FEATURES</b>	
Frame Rate	Up to 32 frames/sec
Sensor Type	CMOS, 5.0 or 9.0 M Pixels
Optical Lens	16mm, 25mm, 35mm C-Mount Lens
Focus	Fixed, adjustable, dual zone and dynamic
Illumination	Integrated Red or White
<b>SCAN ENGINE</b>	
	2D Ultra slim area imager (supports 1D/2D codes): Datalogic's Green Spot for good-read feedback
Depth of Field:	8.5 to 50 cm / 3.3 to 19.7 in. depending on bar code density and type
Resolution:	5 Mp - 2448 x 2048 pixels 9 Mp - 4096 x 2160 pixels
Field of View:	Three FOV's for the 5 Mp and two FOV's for the 9 Mp
<b>DECODING CAPABILITY</b>	
1D and Stacked Codes	Code 128 (GS1-128); Code 39 (Standard and Full ASCII); Code 32 · MSI; Standard 2 of 5; Matrix 2 of 5; Interleaved 2 of 5; Codabar; Code 93 · Pharmacode; EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5); GS1 DataBar Family; PDF417 (Standard and Micro PDF417)
2D Codes	Data Matrix ECC 200 (Standard,GS1 and Direct Marking); QR Code (Standard and Direct Marking); MicroQR Code; Maxicode
Postal Codes	Aztec Code Postal; Australia Post; Royal Mail 4 State Customer; Kix Code; Japan Post; PLANET; POSTNET; POSTNET (+BB); Intelligent Mail; Swedish Post
<b>SYSTEM</b>	
Memory	System RAM: 8 GB; eMMC Flash; 32 GB
Microprocessor	Intel Pentium Quad-core
Operating System	Linux
Real-time clock	Time and date stamping under software control or can be synchronized with time server
<b>COMMUNICATIONS INTERFACE</b>	
Communication Interfaces	2 Ethernet TCP/IP, 2 serial communication interfaces
Internal Communication System	SyncNet Technology
Connectivity Modes	Master/Slave, Ethernet Point to Point
Programming Method	e-GENIUS multi-language browser-based, on board HTML web server interface
<b>ELECTRICAL FEATURES</b>	

## TECHNICAL FEATURES

Supply Voltage	24 VDC +/- 20%
Power Consumption	2A
<b>PHYSICAL CHARACTERISTICS</b>	
Dimensions	20.0 x 12.6 x 13.0 cm / 7.8 x 4.9 x 5.1 in
Weight	2,900 g / 6.4 pounds
Chassis Material	A380 Die Cast Aluminum
<b>ENVIRONMENTAL FEATURES</b>	
Humidity	95% non condensing
Protection Class	IP65
Vibration Resistance	SINE vibration as per EN60068-2-6 10-50 Hz: 0.4mm / 50-500 Hz: 2g 2h on all axis
Shock Resistance	As per EN60068-2-27, 15g / 11ms / 3 times up and 3 times down on the primary axis.
Fan Life	L10 @ 40°C : 50000h
Temperature	Operating: 0° to 50° C [32° to 122° F] Storage: -20° to 70° C [-4° to 158° F]
<b>HUMAN MACHINE INTERFACE</b>	
Keypad	Single button, Test, Focus, Setup and Learn
LED Indicators	Status, Com, Trigger, Good, Ready
<b>SAFETY &amp; REGULATORY</b>	
Agency Approvals	The product meets necessary safety and regulatory approvals for its intended use.
Environmental Compliance	Complies to EU RoHS
Regulatory	EN55032 Emissions for Class A digital device; EN61000-6-2 Electromagnetic Compatibility; FCC part 15 for Class A digital device; cULus listed product for Canada and U.S.; CE
Laser Safety	Class 2 laser product as per IEC60825-1:2014 Complies with 21 CFR 1040
LED Safety	LED Safety (Risk Group 0) as per IEC62471
<b>WARRANTY</b>	
Warranty	2-Year Factory Warranty

# AV500 READING FEATURES

## FOV Calculation

Use the data in the following tables to calculate the FOV for your application. AV500 Range is measured from the back of the unit. AV500 FOV =  $2 * [(D-X) * \tan(a/2)]$



**NOTE: Range is measured from the back of the unit 15 degree angle, 16mm., 1.1 PPM**

All measurements in table are in millimeters.

16 MM	0.2MM, 8 MIL		0.25MM, 10 MIL		0.3MM, 12 MIL		0.33MM, 13 MIL		0.38MM, 15 MIL		0.5MM, 20 MIL	
	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)
Far	932	204	1142	261	1350	317	1476	350	1686	405	2000	489
Near	525	91	525	91	525	91	525	91	525	91	525	91

16 MM	0.2MM, 8 MIL		0.25MM, 10 MIL		0.3MM, 12 MIL		0.33MM, 13 MIL		0.38MM, 15 MIL		0.5MM, 20 MIL	
	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)
Near	525		525		525		525		525		525	
Near FOV	182		182		182		182		182		182	
Far	932		1142		1350		1476		1686		2000	
Far FOV	408		522		634		700		810		978	

25 MM	0.2MM, 8 MIL		0.25MM, 10 MIL		0.3MM, 12 MIL		0.33MM, 13 MIL		0.38MM, 15 MIL		0.5MM, 20 MIL	
	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)
Far	1402	214	1730	268	2056	322	2252	354	2580	408	2600	411
Near	660	92	660	92	660	92	660	92	660	92	660	92

25 MM	0.2MM, 8 MIL		0.25MM, 10 MIL		0.3MM, 12 MIL		0.33MM, 13 MIL		0.38MM, 15 MIL		0.5MM, 20 MIL	
	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)
Near	660		660		660		660		660		660	
Near FOV	184		184		184		184		184		184	
Far	1402		1730		2056		2252		2580		2600	
Far FOV	428		536		644		708		816		822	

35 MM	0.2MM, 8 MIL		0.25MM, 10 MIL		0.3MM, 12 MIL		0.33MM, 13 MIL		0.38MM, 15 MIL		0.5MM, 20 MIL	
	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)
Near	900		900		900		900		900		900	
Near FOV	182		182		182		182		182		182	
Far	1956		2416		2600							
Far FOV	430		536		580							

35 MM	0.2MM, 8 MIL		0.25MM, 10 MIL		0.3MM, 12 MIL		0.33MM, 13 MIL		0.38MM, 15 MIL		0.5MM, 20 MIL	
	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)	Range (x)	FOV (Y)
Far	1956	215	2416	268	2600	290	0	0	0	0	0	0
Near	900	91	900	91	900	91	900	91	900	91	900	91

## (AV500) 5 MEGAPIXEL READING DIAGRAMS

The following reading diagrams are to be considered as references and are given for typical performance at 25°C using high quality grade A symbols: Code 128 (1D code) and Data Matrix ECC 200 (2D code) from the Test Charts provided with the reader.

- Testing should be performed with the actual AV500/AV900 using application codes in order to evaluate whether maximizing application performance requires adjustments to the HW/SW configuration with respect to the Reference Conditions given under each diagram.
- The focus distance and reading distance ranges are measured from the surface of the mounting screws on the back of the unit.
- When defining a HW/SW configuration for the AV500/AV900 for conditions different from those of the reference diagrams, it is suggested to keep in mind the following rules:

Changes in the diaphragm aperture influence the depth of field (reading distance range) and the luminosity of the image. Increasing the diaphragm aperture by one stop (i.e. from F/8 to F/5.6 or from F/11 to F/8) doubles the luminosity of the image, but can cause significant reduction in the reading distance range.

Changes in *Exposure Time* act directly proportional to the luminosity of the image and inversely proportional to the maximum code reading movement speed. Consequently, reducing the *Exposure Time* by half, reduces the luminosity of the image by half but doubles the theoretical code reading movement speed.

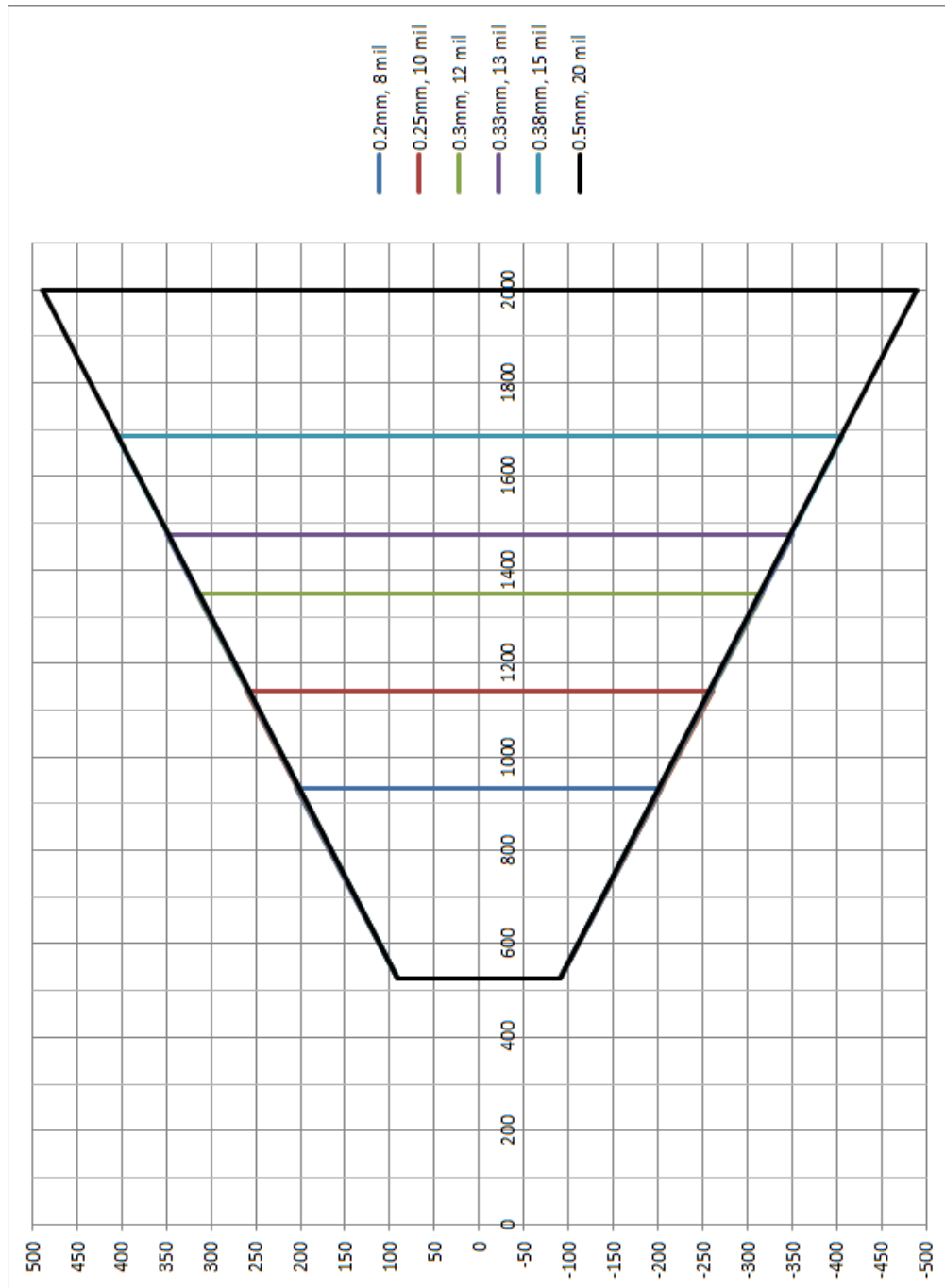
Changes in *Gain* act directly proportional to the luminosity of the image. Increasing the *Gain* value however, can reduce the quality of the acquired image. For example, for the purpose of only changing the luminosity of the image, the following three adjustments are equivalent: increase the diaphragm aperture by one stop; double the *Exposure Time*; double the *Gain*.

## White Illumination 16 mm

Range is measured from the back of the unit

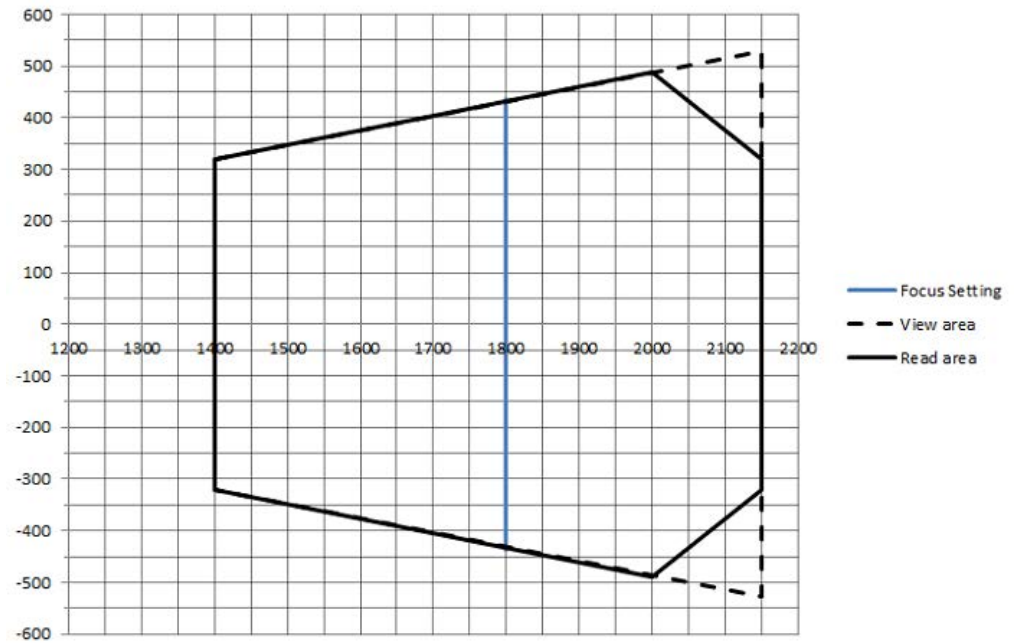
Camera mounted at a 15 degree angle

Read area is for 1D codes at a minimum 1.1 Pixel per element



## 16mm F6 Application Example

20 mill code 128  
640mm FOV  
750mm DOF  
Focus set to 1800mm  
Belt speed 1 m/s

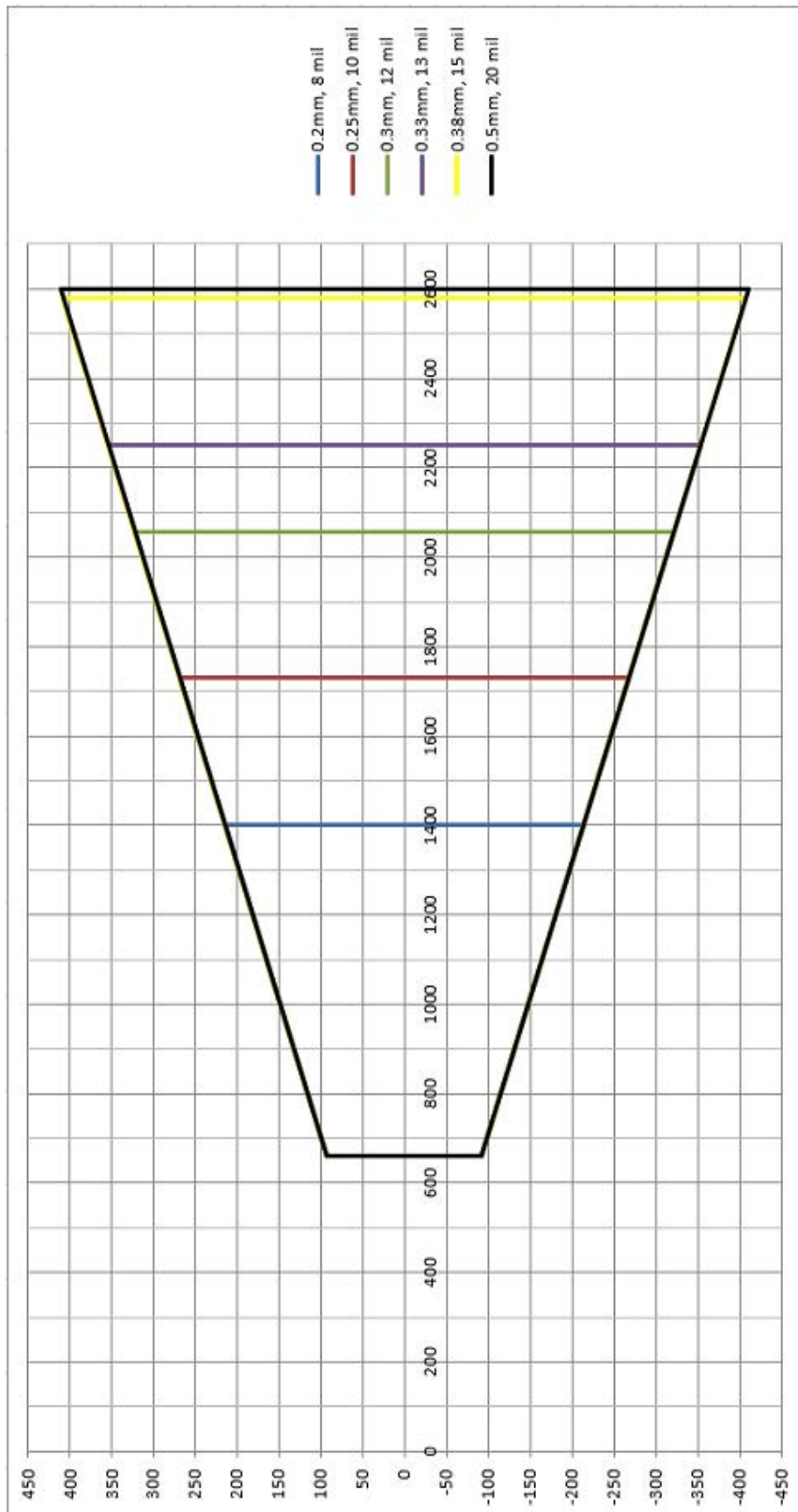


## White Illumination 25 mm

Range is measured from the back of the unit

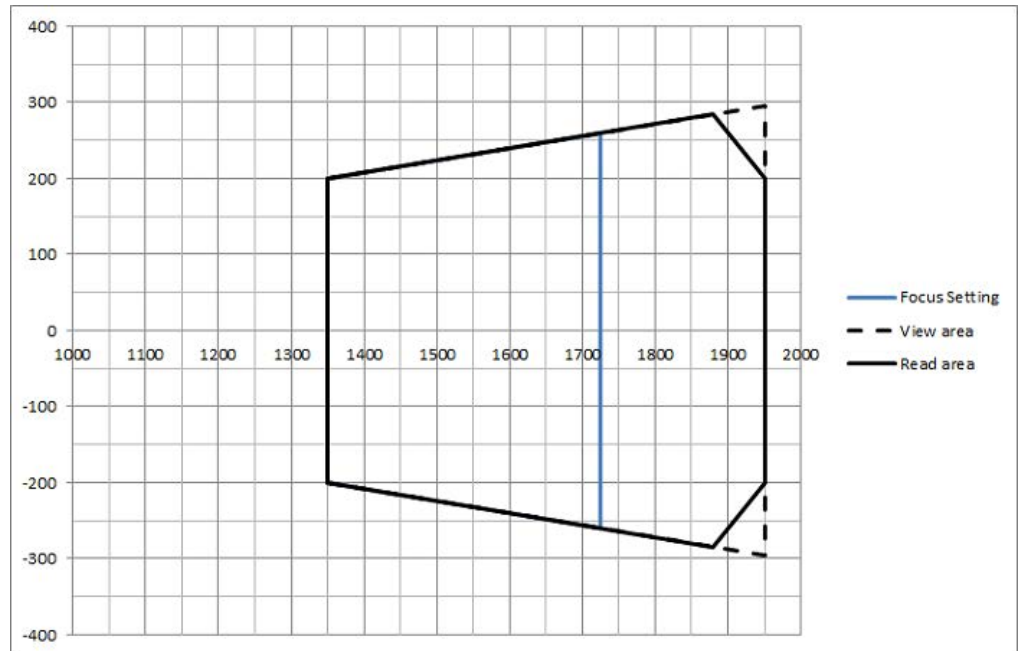
Camera mounted at a 15 degree angle

Read area is for 1D codes at a minimum 1.1 Pixel per element



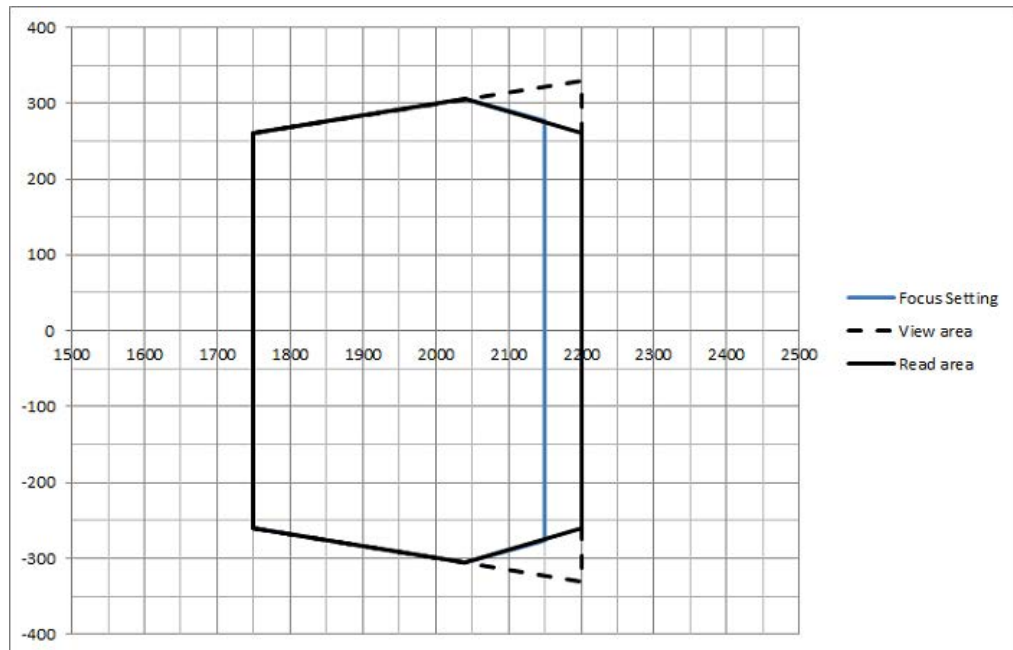
## 25mm F8 Application Example

12 mill code 128  
400mm FOV  
600mm DOF  
Focus set to  
1725mm  
Belt speed 1 m/s



## 25mm F7 Application Example

13 mill code 128  
 520mm FOV  
 450mm DOF  
 Focus set to 2150mm  
 Exposure offset -  
 140us  
 Belt speed 2.5 m/s

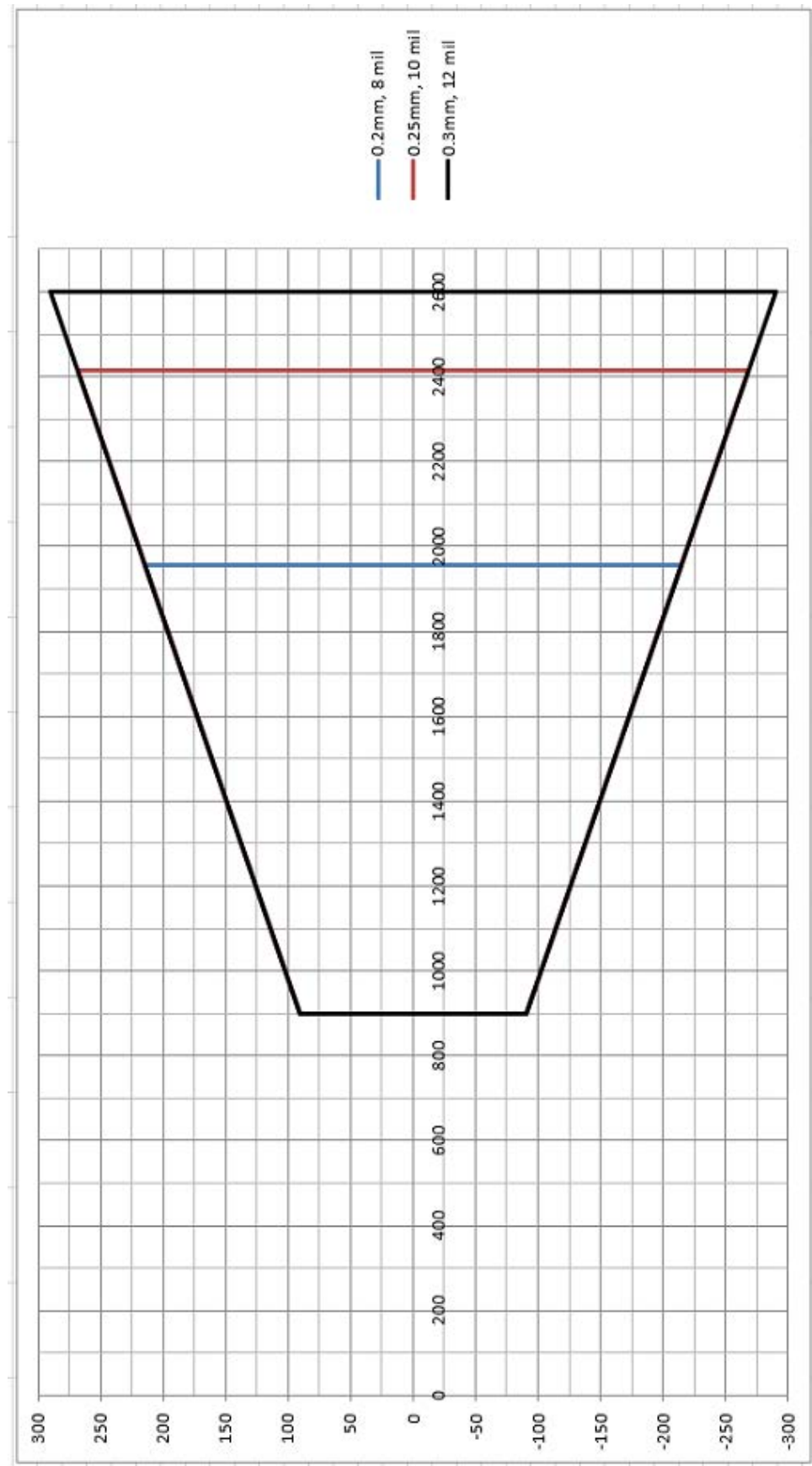


## White Illumination 35 mm

Range is measured from the back of the unit

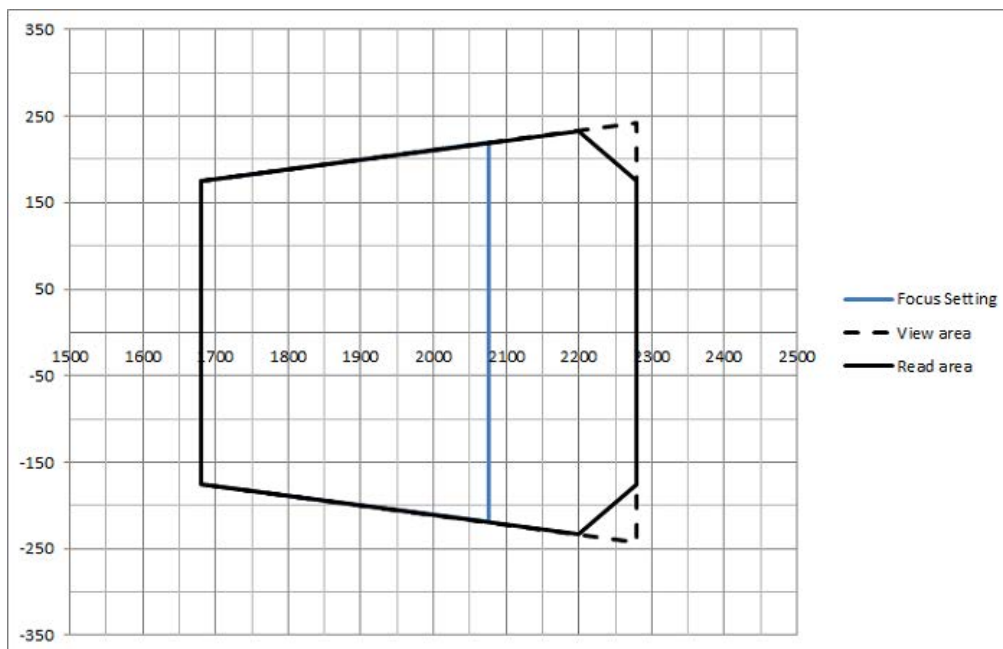
Camera mounted at a 15 degree angle

Read area is for 1D codes at a minimum 1.1 Pixel per element



## 35mm F8 Application Example

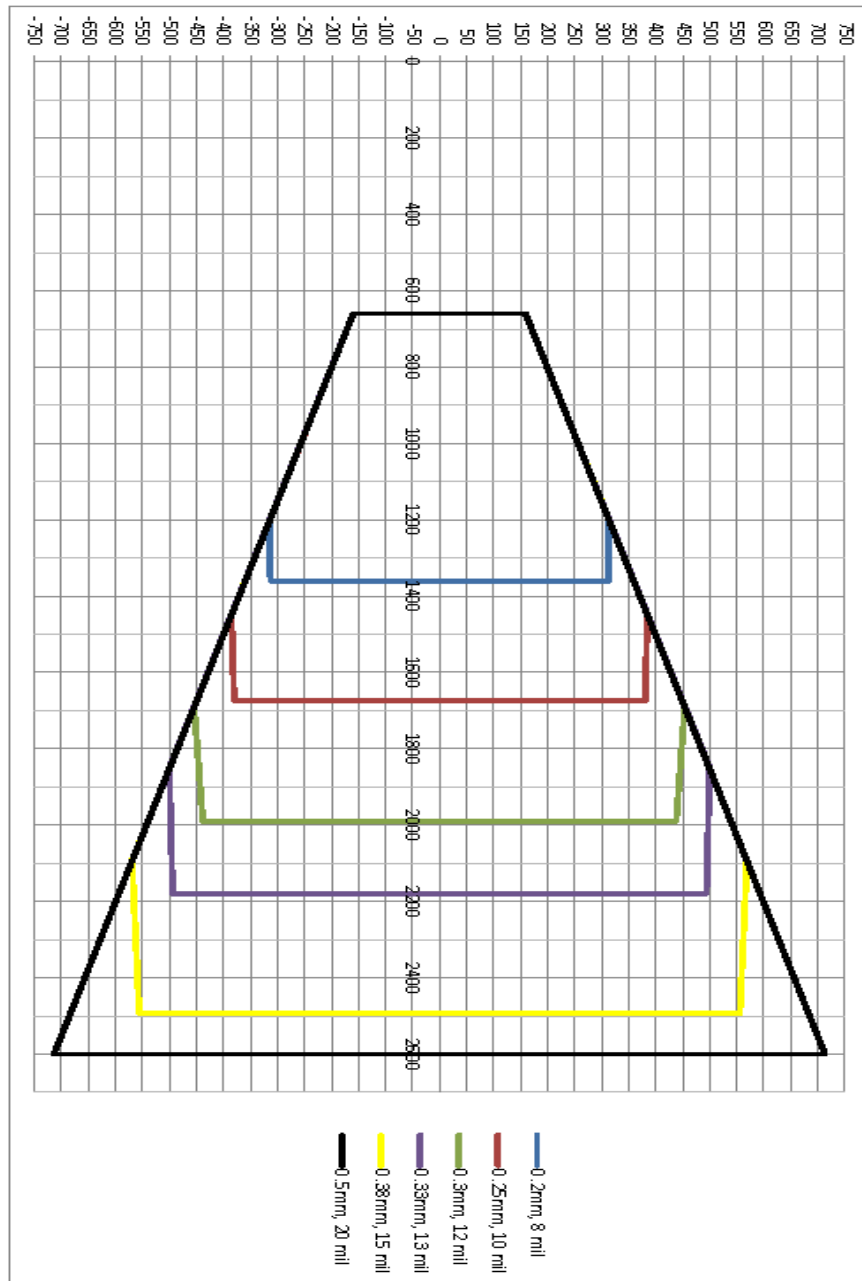
10 mill code 128  
350mm FOV  
600mm DOF  
Focus set to 2075mm  
Belt speed 1 m/s



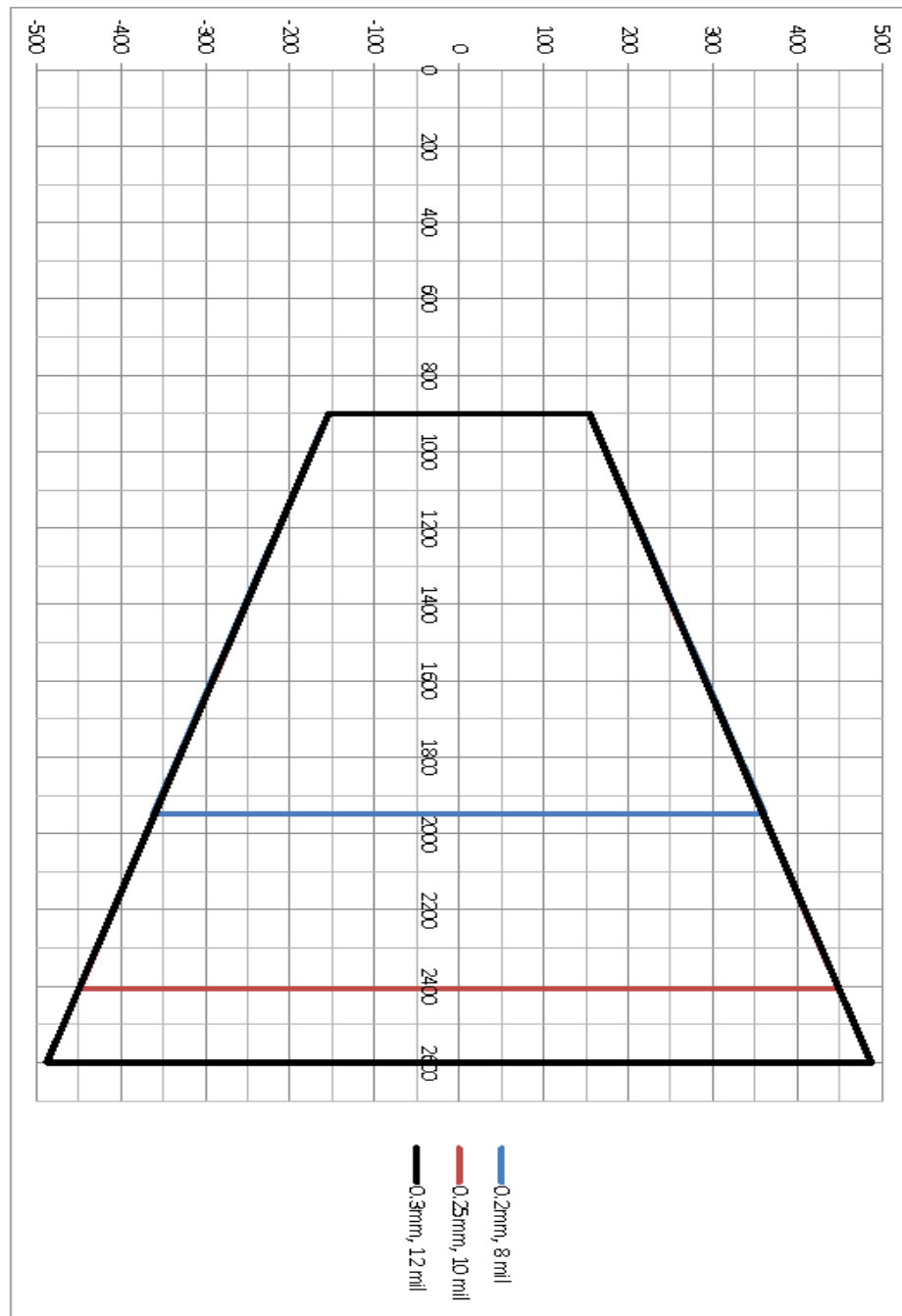
# AV900 9 MEGA PIXEL READ CHARTS

Range is measured from the back of the unit, horizontal view  
 Camera mounted at a 15 degree angle  
 Read area is for 1D codes at a minimum 1.1 Pixel per element  
 Objects are conveyed

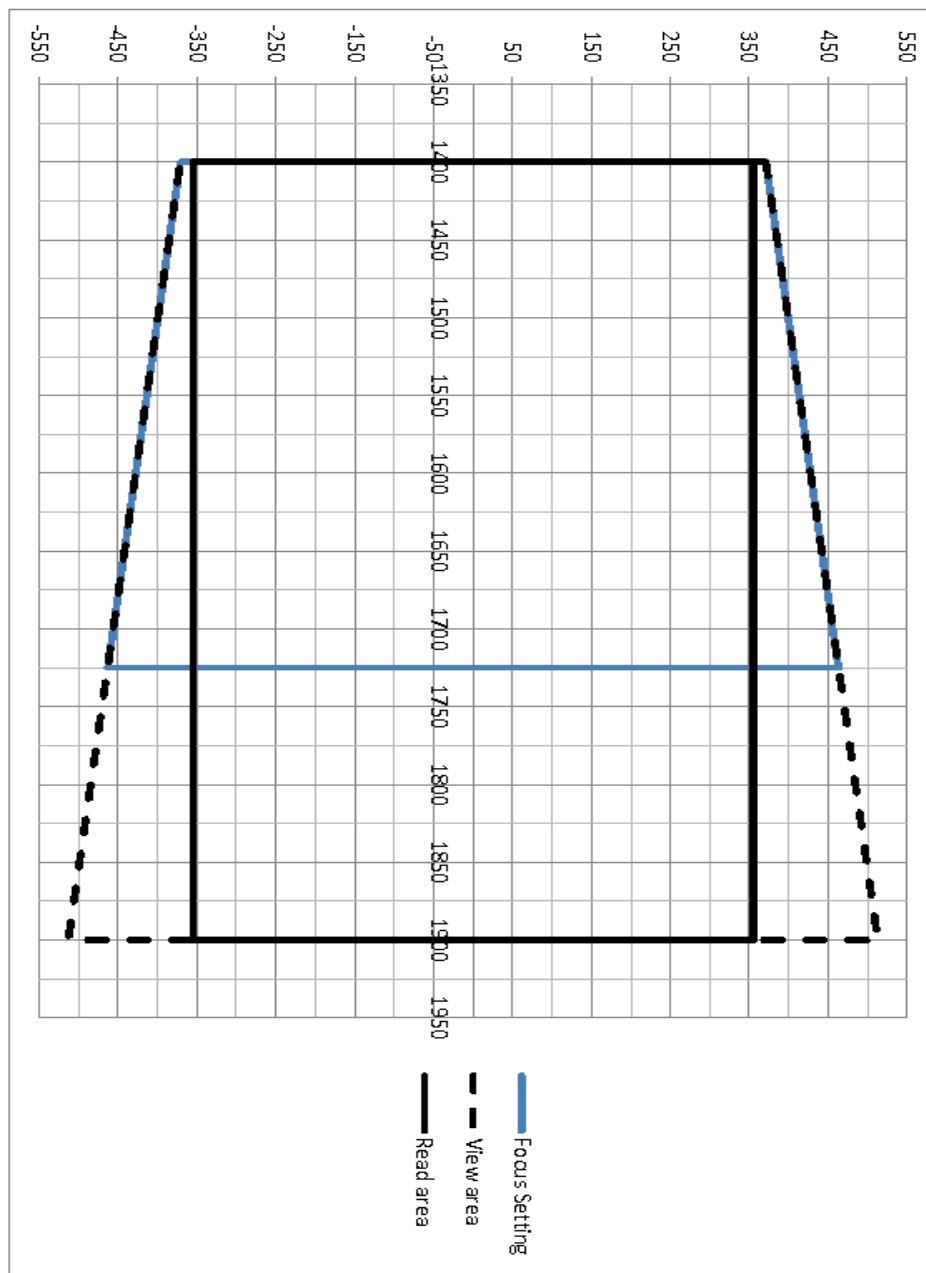
## 25 mm 1.1 PPE



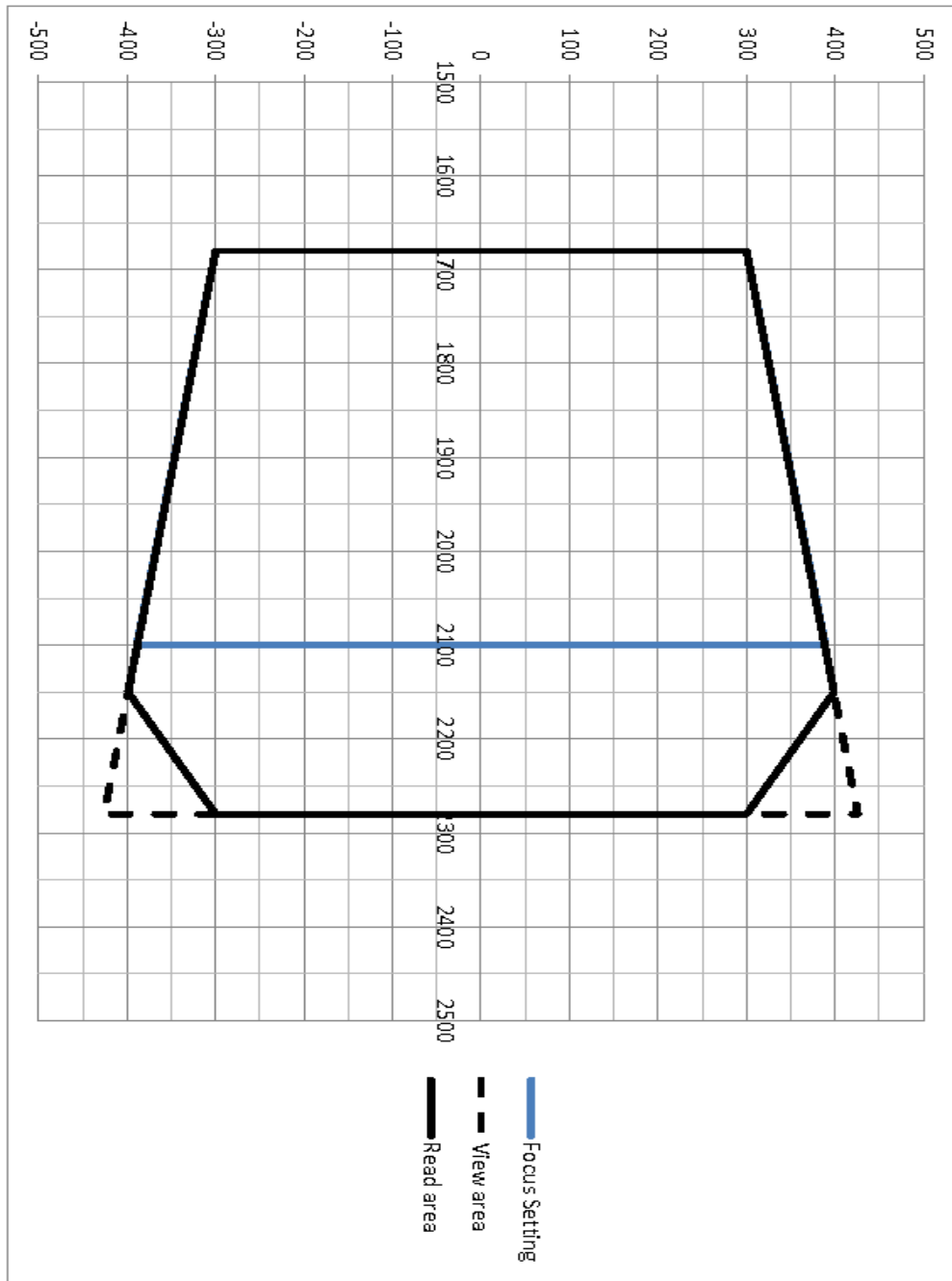
## 35 mm 1.1 PPE



## 25 mm App Example 1



# 35 mm App Example 1



# APPENDIX A

## ETHERNET IP

---

### ETHERNET IP INTRODUCTION

The AV500/900 camera supports the EtherNet/IP™ Industrial Networking protocol which we will refer to as EIP. EIP simplifies the communication of barcode and Input/Output data with other EIP enabled devices, such as a programmable logic controller (PLC).

Software release 1.4.0.0 and higher for the AV500/900 product line supports the legacy ASI EtherNet/IP™ Object. This mode allows the installation of AV500/900 cameras in systems using PLC programs developed for Axiom, Axiom X, and AL5010 scanners and can also be useful if ControlLogix On-Demand Messaging is desired for an application.

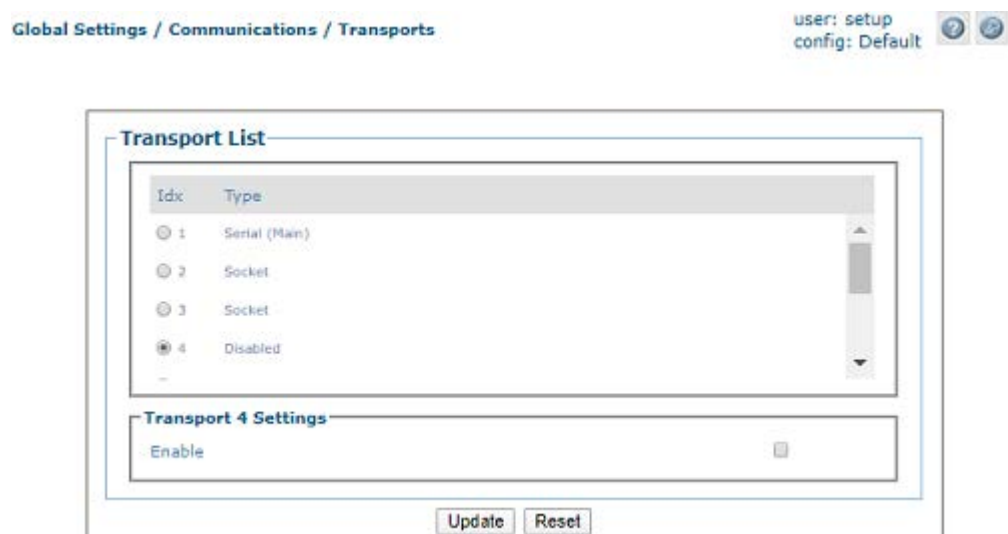
The ASI Object supports all configuration options available on the Axiom, Axiom X, and AL5010 with the exception of the 8 Reader Outputs.

### ETHERNET/IP CONFIGURATION IN READER

EIP is not enabled by default in the camera.

**To enable Ethernet IP follow these steps:**

1. In the menu under **Modify Settings / Global Settings / Communications**, click **Transports**. The Transports List window opens.



2. Select the socket for which to **Enable Ethernet/IP**.

The screenshot shows a web-based configuration interface. At the top is a 'Transport List' table with the following data:

Idx	Type
2	Socket
3	Socket
4	Socket
5	Disabled
6	Disabled

Below the table is the 'Transport 4 Settings' section. It includes an 'Enable' checkbox which is checked. Under 'Socket Settings', there are three fields: 'Socket Type' (set to 'TCP Server'), 'Server Port' (set to '51230'), and 'Max Clients' (set to '1'). Below this is a 'Protocol' dropdown set to 'Trigger Message'. Under 'Trigger Message Settings', there are four fields: 'Header' (set to '<STX>'), 'Terminator' (set to '<ETX>'), 'Start Trigger Message' (set to 'S'), and 'End Trigger Message' (set to 'E'). At the bottom of the settings section are 'Update' and 'Reset' buttons.

3. Click the **Socket Type** drop-down and select **Ethernet/IP**, various Ethernet options will appear.

**Transport 4 Settings**

Enable

Type

**Socket Settings**

Socket Type

Device Select

**Camera\_1 Enable Settings**

Enable Client

Protocol

**Ethernet/IP Settings (Global)**

Ethernet/IP Object Selection

Enable ControlLogix On-Demand

**Message Options**

Message Format

ASCII Message Byte Swap

**Digital Output Lines**

Allow PLC to Control Output 1

Allow PLC to Control Output 2

- Click the check-box to **Enable Client**. Once enabled, EIP allows the camera to communicate with other Ethernet/IP enabled devices. This can be done using **Explicit Messaging, I/O Messaging** and a special protocol for ControlLogix Controllers called **On-Demand Messaging**. The EIP, ASI Object definitions follow.

**I/O messaging** can be used to monitor and set the cameras I/O bits, and to obtain bar code data from the camera. The disadvantage is that the I/O messages are always sent at a scheduled interval creating a lot of network traffic.

**Ethernet/IP Settings (Global)**

Ethernet/IP Object Selection

Enable ControlLogix On-Demand

**Message Options**

Message Format

ASCII Message Byte Swap

**Digital Output Lines**

Allow PLC to Control Output 1

Allow PLC to Control Output 2

By contrast, **On-Demand Messaging** (which only works with a ControlLogix Controller) allows bar code data to be sent to the Controller only when a bar code is read.

**Ethernet/IP Settings (Global)**

Ethernet/IP Object Selection

Enable ControlLogix On-Demand

**On-Demand Options**

PLC IP Address

Tag Name

PLC Slot Number

**Message Options**

Message Format

ASCII Message Byte Swap

**Digital Output Lines**

Allow PLC to Control Output 1

Allow PLC to Control Output 2

Select the check-box **Enable ControlLogix On-Demand**. This is described in more detail later in this document.

The **Message Format** parameters allow you to manipulate the format of the bar code data. Most notable if your barcodes only contain numeric digits, you can configure the reader to convert the bar codes to a numeric value instead of transmitting them as ASCII text.

The **Digital Output Lines** parameter can be used to relinquish control of the internal relays (2 relays for AV500/900). When this has been done, these relays are controlled by bits within the Output Word.

### Digital IO for Camera\_1\_900\_R-B

#### Aiming Lasers

Mode: Disabled

#### Input 1 (trigger)

Name: Trigger

Mode: Disabled

Leading Offset: 0 mm

Trailing Offset: 0 mm

Debounce: 10 mm

Active State: Active High

#### Input 2 (use this for an encoder)

Name: NOT\_SET

Mode: Reserved for Encoder

Leading Offset: 0 mm

Trailing Offset: 0 mm

Debounce: 0 mm

Active State: Active Low

#### Input 3 (other)

Name: NOT\_SET

Mode: Disabled

Leading Offset: 0 mm

Trailing Offset: 0 mm

Debounce: 0 mm

Active State: Active Low

#### Output 1

Name: NOT\_SET

Mode: Ethernet/IP Out1

Active State: Active Low

Deactivation Event: None

#### Output 2

Name: NOT\_SET

Mode: Software Controlled

Active State: Active Low

Deactivation Event: None

Lastly, When EIP is enabled, the option **Start Input From Bus** becomes available on the Operating Mode page of e-Genius.

When this is enabled, the camera trigger input is ignored and the reader will be triggered solely by manipulating the Trigger Bit in the Output Word (contained in the reader Assembly and Output Objects).

### Operating Mode

Operating Mode Selection PackTrack ▾

PackTrack Offset (direction of travel) 0 mm

#### Encoder Settings

Physical Encoder Enabled ▾

Encoder Step 1.27 mm/pulse

Encoder Resolution 20 PPI

Conveyor Speed (max/constant) 3 m/sec

#### Advanced Encoder Settings

Direct Encoder Disabled ▾

#### Frame Rate

Frame Rate 16 frames per second ▾

#### Conveyor Width

Conveyor Width 900 mm

#### Trigger Source

Trigger Source Ethernet/IP ▾

#### Position Sensor Settings

Position Sensor Type No Position Sensor ▾

#### Transmit Point Settings

Transmit Point Reference Edge Leading Edge ▾

Distance to Transmit Point 1000 mm

Transmit Point Advance 40 mm

## I/O CONTROLLOGIX MESSAGING EXAMPLE

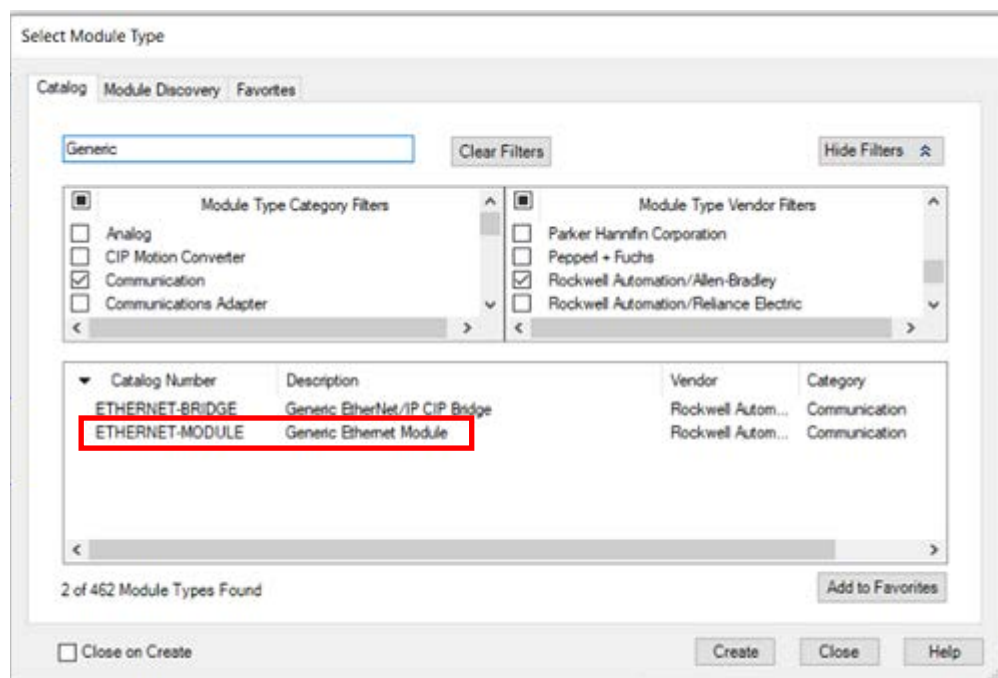
The following example illustrates how a camera can be configured to communicate with a ControlLogix processor using I/O messaging. Using this information along with the Reader Object definitions later in this document, it should be possible to adapt these directions for other EtherNet/IP network master devices.

When EtherNet/IP is enabled on the camera, EIP I/O Messaging is automatically enabled. No further configuration on the Datalogic device is needed to setup I/O messaging. Since the ControlLogix processor now treats the camera as an I/O device, to setup an EIP I/O message transfer between a camera and a ControlLogix processor, you need to configure your camera as a **Generic Ethernet Module** in the ControlLogix I/O tree.

### Follow these steps to add a module:

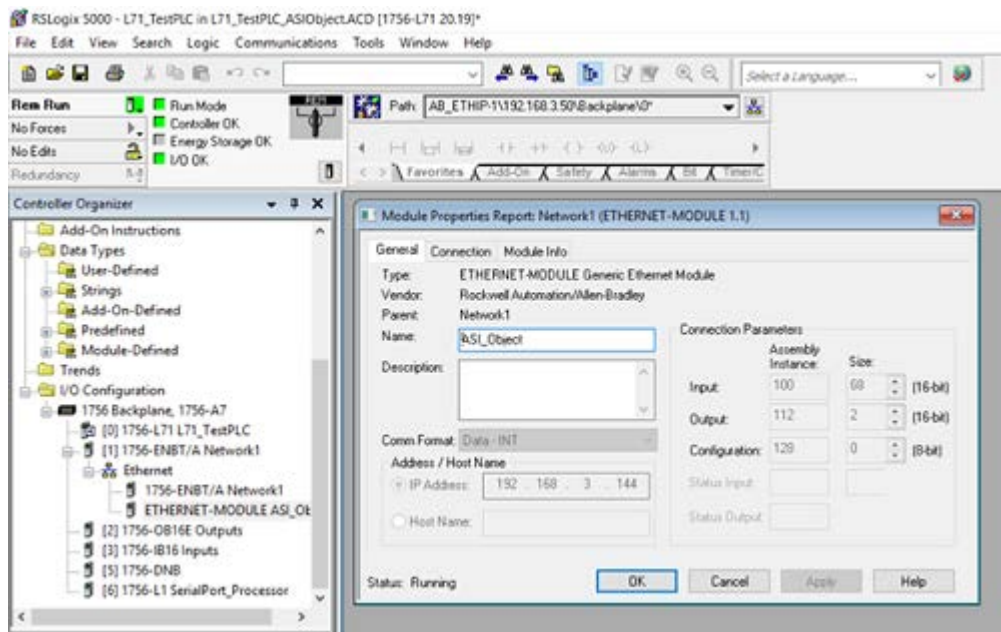
Right click and select **New Module** on the entry for your Ethernet module under the I/O Configuration Tree. A list of options similar to what is shown below will appear.

1. From this list select **ETHERNET-MODULE** for the Generic Ethernet Module.

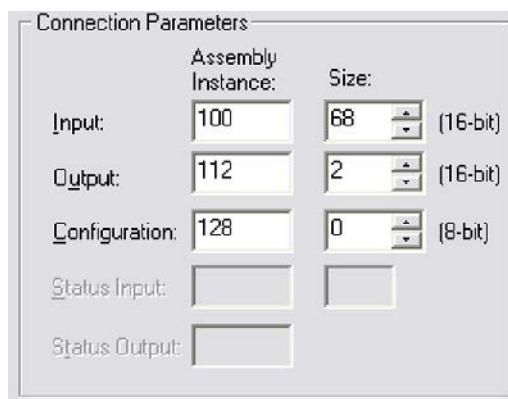


2. Click **OK**.

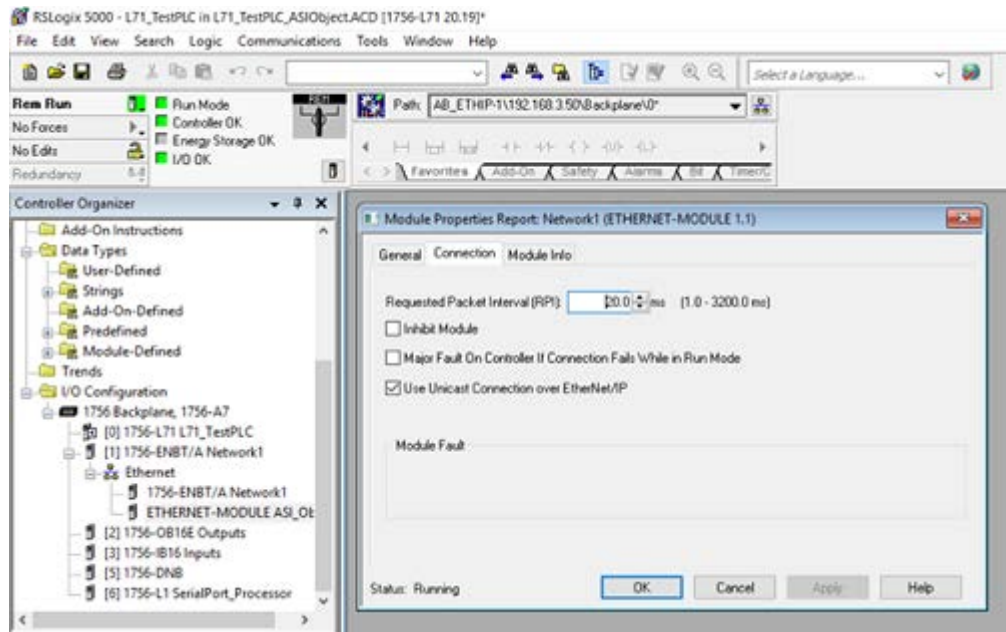
- Specify the Properties for your camera. First set the Comm Format to Data-INT. **This must be done first as it cannot be changed later.**



- Specify the Name, Description and IP address of the camera.
- Next enter the **Connection Parameters**.



- You can only “schedule” I/O message transfers to the camera at a fixed interval. Click the **Connection Tab** and specify this interval. The camera will handle intervals down to 20 milliseconds.



7. Click **OK**.
8. After the module definition for the camera has been completed, tags will be created in the controller based on the name you specified on the properties page for the module. These tags will consist of the name followed either by the letter **“Reader:C Configuration Data”** on page 153 the **“Reader:O Output Data”** on page 154 or the **“Reader:I Input Data”** on page 153. These tags are based on the reader assembly objects.

## Reader:C Configuration Data

This data is not used.

## Reader:I Input Data

Tag Name	Value	Description
Reader:I.Data[0]	Discrete Input Word	See bit definitions.
Reader:I.Data[1]	Bar Code Sequence Number	This field is updated every time the bar code data is updated. However, the bar code data will only be updated when the “Last Bar Code Sequence Number” (see Output Data) is set equal to this value.
Reader:I.Data[2]	Bar Code Status	Not currently used.
Reader:I.Data[3]	Bar Code Size (words)	Number of words which contain the barcode data
Reader:I.Data[4-67]	Bar Code Data	

## Discrete Input Word

Bit	
0	Unused
1	Unused
2	Unused
3	Unused
4	Unused
5	Unused
6	Unused
7	Unused
8-15	Unused

## Reader:0 Output Data

Tag Name	Value	Description
Reader:0.Data[0]	Discrete Output Word	See bit definitions.
Reader:0.Data[1]	Last Barcode Sequence Number Received	This field must be updated to match the Bar Code Sequence Number each time the bar code data has been processed.

## Discrete Output Word

Bit	Bit = 0	Bit = 1
0*	Trigger Off	Trigger On
1 – 7	Unused	Unused
8*	Reader Relay #1 Off	Reader Relay #1 On
9*	Reader Relay #2 Off	Reader Relay #2 On
10*	Reader Relay #3 Off	Reader Relay #3 On
11*	Reader Relay #4 Off	Reader Relay #4 On
12-15	Unused	Unused

## I/O MESSAGING LADDER LOGIC EXAMPLE

The rung of ladder logic below shows an example of how to update the Output data register “Last Barcode Sequence Number Received” after new barcode data is present.



If this logic is not implemented correctly the Input data registers “Bar Code Data” will contain the data from the first read cycle after the reader boots. The **Not Equal To** instruction check for new data to bar code data must be available. When new data is available (output register is not equal to input) the rung is executed.

The **Copy File** instruction copies the bar code data to a program tag. Note that in this example the instruction moves a fixed 10 registers (10 registers will contain 20 ASCII characters).

The **Move** instruction moves the sequence number from the input registers to the output register. This lets the reader know the PLC is ready for the data from the next read cycle.

## ON-DEMAND MESSAGING (CONTROLLOGIX)

On-Demand messaging provides another option for transferring bar code data to your ControlLogix processor. With on-demand messaging, the data transfer occurs as soon as the bar code data is available, not as the result of constant messaging at a scheduled interval.

The screenshot shows two configuration windows:

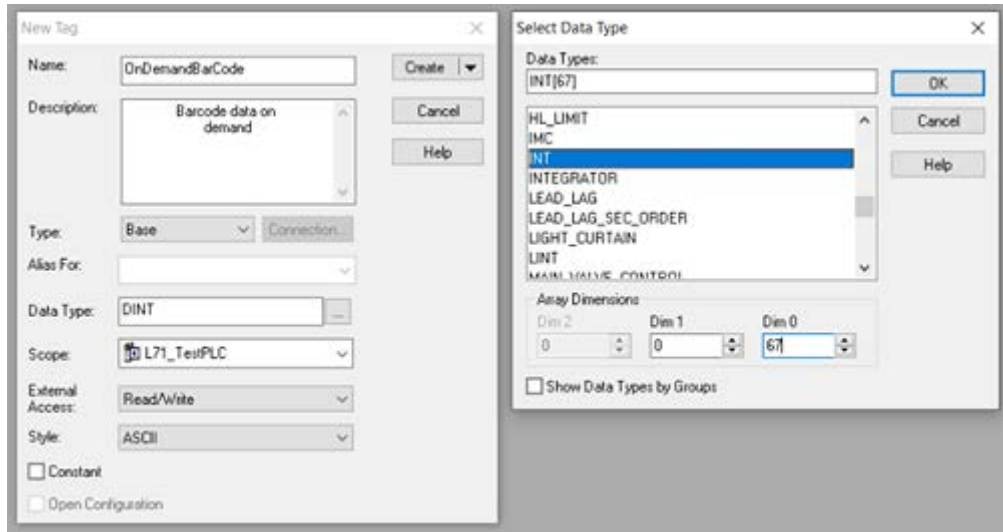
- Transport 4 Settings:**
  - Enable:
  - Type: Socket
  - Socket Settings:
    - Socket Type: Ethernet/IP
    - Device Select: Camera\_1
    - Camera\_1 Enable Settings:
      - Enable Client:
  - Protocol: Standard
- Ethernet/IP Settings (Global):**
  - Ethernet/IP Object Selection: ASI Object
  - Enable ControlLogix On-Demand:
  - On-Demand Options:
    - PLC IP Address: 192.168.3.50
    - Tag Name: OnDemandBarCode
    - PLC Slot Number: 0

For On-Demand messaging follow these steps:

1. To enable the camera, select the check-box **Enable ControlLogix On-Demand Messaging** from the Ethernet/IP page within e-Genius.

2. Specify the IP address and slot for the ControlLogix processor.
3. Name of the Tag to contain the bar code data.

Once this is complete, you need to define a new Tag in the ControlLogix processor. The new tag must have a type of INT and a dimension of 67 words. The name must match the name specified in the camera Tag Name.



Once this has been completed, these tags will be updated every time a bar code is read.

### On-Demand Tag

Tag Name	Value	Description
ReaderTag.Data[0]	Bar Code Sequence Number	This field is incremented every time the bar code data is updated.
ReaderTag.Data[1]	Bar Code Status	Not currently used.
ReaderTag.Data[2]	Bar Code Size (words)	Number of words which contain the barcode data
ReaderTag.Data[3-66]	Bar Code Data	

## ETHERNET/IP OBJECT MODELS

This is a description of the different data types that are used in the documentation of the object model. These are standard definitions of the Open DeviceNet Vendor Association (ODVA).

### Summary of Objects

The following standard objects are supported. More details can be found in the EtherNet/IP™ Specification available from the Open DeviceNet Vendors Association (ODVA).

- Identity Object (01<sub>HEX</sub>)
- Message Router Object (02<sub>HEX</sub>)
- Assembly Object (04<sub>HEX</sub>)

Connection Manager Object (06<sub>HEX</sub>)

TCP Object (F5<sub>HEX</sub>)

Ethernet Link Object (F6<sub>HEX</sub>)

**The following Vendor Specific Objects have been defined to support the Reader Bar Code Reader:**

- Barcode Data Object (70<sub>HEX</sub>)
- Discrete Input Data Object (71<sub>HEX</sub>)
- Discrete Output Data Object (72<sub>HEX</sub>)

### Definitions

The following table has a description of all of the data types used.

USINT	Unsigned Short Integer (8-bit)
UINT	Unsigned Integer (16-bit)
UDINT	Unsigned Double Integer (32-bit)
STRING	Character String (1 byte per character)
BYTE	Bit String (8-bits)
WORD	Bit String (16-bits)
DWORD	Bit String (32-bits)

## STANDARD OBJECTS

### Identity Object (01HEX - 1 Instance)

#### Class Attributes

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

#### Instance Attributes

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Vendor Number	UINT	25DEC	Get
2	Device Type 0x00 – Generic	UINT	00HEX	Get
3	Product Code Number	UINT	01	Get
4	Product Major Revision	USINT	03	Get
	Product Minor Revision	USINT	01	
5	Status Word (see below for definition)	WORD	See Below	Get
6	Product Serial Number	UDINT	Unique 32 Bit Value	Get
	Product Name		15	
7	Structure of: Product Name Size	UINT USINT[0-32]	“Bar Code Reader”	Get
	Product Name String			

#### Status Word

Bit	Bit = 0	Bit = 1
0	No I/O Connection	I/O Connection Allocated
1 – 15	Unused	Unused

#### Common Services

Service Code	Implemented for	Service Name
Class Level	Instance Level	
0EHEX	Yes	Get_Attribute_Single
05HEX	No	Reset

#### Reset Service Code

Service Code	Class	Instance	Attribute	Description
05HEX	1	1	0	Force software reset
05HEX	1	1	1	Reload factory settings and reset

## Message Router Object (02HEX)

This object has no supported attributes.

## ASSEMBLY OBJECT (04HEX – 4 INSTANCES)

### Class Attributes

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get
2	Max Instance	UINT	81	Get

### Instance 0x64 Attributes (Input Instance 1)

Attribute ID	Name	Data Type	Default Data Value	Access Rule
	Input Data			
	Structure of:			
	Discrete Input Word (see below)	UINT	0	
		UINT	0	
3	Barcode Sequence Number	UINT	0	Get
		UINT	0	
	Barcode Status (reserved)	UINT [ ] varies (up to 64)	0	
	Barcode Size Word			
	Barcode Data [UINT]			

### Discrete Input Word

#### Bit

0	Reader Programmable Output #1
1	Reader Programmable Output #2
2	Reader Programmable Output #3
3	Reader Programmable Output #4
4	Reader Programmable Output #5
5	Reader Programmable Output #6
6	Reader Programmable Output #7
7	Reader Programmable Output #8
8-15	Unused

### Instance 0x70 Attributes (Output Instance 1)

Attribute ID	Name	Data Type	Default Data Value	Access Rule
	Output Data			
	Structure of:			
3	Discrete Output Word (see below)	UINT	0	Get / Set
		UINT	0	
	Last Barcode Seq. Num Received			

## Discrete Output Word

Bit	Bit = 0	Bit = 1
0*	Trigger Off	Trigger On
1 – 7	Unused	Unused
8*	Reader Relay #1 Off	Reader Relay #1 On
9*	Reader Relay #2 Off	Reader Relay #2 On
10*	Reader Relay #3 Off	Reader Relay #3 On
11*	Reader Relay #4 Off	Reader Relay #4 On
12-15	Unused	Unused

## Instance 0x80 Attributes (Configuration Instance)

Most I/O clients include a Configuration path when opening an I/O connection to a server. There is no Configuration data needed.

## Instance 0x81 Attributes (Heartbeat Instance – Input Only)

This instance allows clients to monitor input data without providing output data.

### Common Services

Service Code	Implemented for	Service Name	
Class Level		Instance Level	
0EHEX	Yes	Yes	Get_Attribute_Single
10HEX	No	Yes	Set_Attribute_Single

## Connection Manager Object (06<sub>HEX</sub>)

This object has no attributes.

## TCP Object (F5<sub>HEX</sub> - 1 Instance)

### Class Attributes

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

### Instance Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
1	Status	DWORD	1	Get
2	Configuration Capability	DWORD	0	Get
3	Configuration Control	DWORD	0	Get
4	Physical Link Object			
	Structure of:	UINT	2	Get
	Path Size	Array Of WORD	0x20F6 0x2401	
	Path			
	Interface Configuration			
	Structure of:	UDINT	0	
	IP Address	UDINT	0	
	Network Mask	UDINT	0	
	Gateway Address	UDINT	0	
	Name Server	UDINT	0	
Name Server 2	UINT	0		
5	Domain Name Size	STRING	0	Get
	Domain Name			
	Host Name			
	Structure of:	UINT	0	
	Host Name Size	STRING	0	
6	Host Name			Get

### Common Services

Service Code	Implemented for	Service Name
Class Level	Instance Level	
0EHEX	Yes	Get_Attribute_Single

## Ethernet Link Object (F6<sub>HEX</sub> - 1 Instance)

### Class Attributes

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

## Instance Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
1	Interface Speed	UDINT	100	Get
2	Interface Flags	DWORD	3	Get
3	Physical Address	USINT Array[6]	0	Get

## Common Services

Service Code	Implemented for	Service Name
Class Level	Instance Level	
0EHEX	Yes	Get_Attribute_Single

## VENDOR SPECIFIC OBJECTS

### Barcode Data Object (70<sub>HEX</sub> - 1 Instance)

#### Class Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
1	Revision	UINT	1	Get

#### Instance Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
1	Barcode Sequence Number	UINT	0	Get
2	Barcode Status (reserved)	UINT	0	Get
3	Barcode Data Size	UINT	0	Get
4	Barcode Data	UINT[] varies (up to 64)	0	Get
5	Last Barcode Seq. Num Received	UINT	0	Get / Set

## Common Services

Service Code	Implemented for		Service Name
Class Level		Instance Level	
0EHEX	Yes	Yes	Get Attribute Single
10HEX	No	Yes	Set Attribute Single

## Discrete Input Data Object (71<sub>HEX</sub> - 1 Instance)

### Class Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
1	Revision	UINT	1	Get

### Instance Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
3	Discrete Input Word	UINT	0	Get

## Discrete Input Word

### Bit

0	Reader Programmable Output #1
1	Reader Programmable Output #2
2	Reader Programmable Output #3
3	Reader Programmable Output #4
4	Reader Programmable Output #5
5	Reader Programmable Output #6
6	Reader Programmable Output #7
7	Reader Programmable Output #8
8-15	Unused

## Common Services

Service Code	Implemented for		Service Name
Class Level		Instance Level	
0EHEX	Yes	Yes	Get Attribute Single

## Discrete Output Data Object (72<sub>HEX</sub> – 1 Instance)

### Class Attributes

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	1	Get

### Instance Attributes

Attribute ID	Name	Data Type	Default Data Value	Access Rule
3	Discrete Output Data	UINT	0	Get / Set

### Discrete Output Word

Bit	Bit = 0	Bit = 1
0*	Trigger Off	Trigger On
1 – 7	Unused	Unused
8*	Reader Relay #1 Off	Reader Relay #1 On
9*	Reader Relay #2 Off	Reader Relay #2 On
10*	Reader Relay #3 Off	Reader Relay #3 On
11*	Reader Relay #4 Off	Reader Relay #4 On
12-15	Unused	Unused

### Common Services

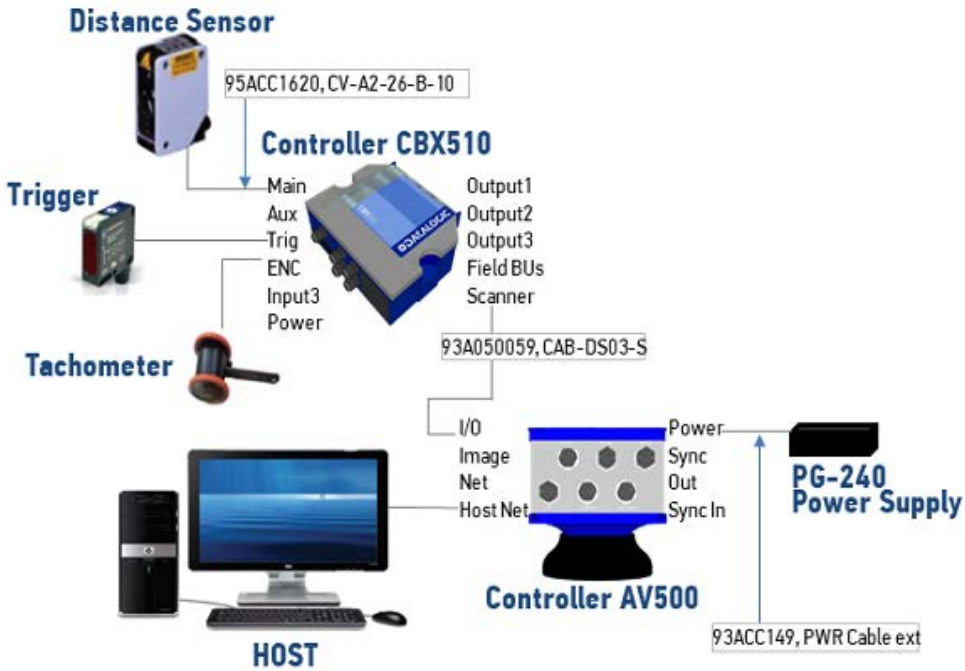
Service Code	Implemented for		Service Name
Class Level		Instance Level	
0EHEX	Yes	Yes	Get_Attribute_Single
10HEX	No	Yes	Set_Attribute_Single

# APPENDIX A

## STANDARD INTERCONNECTION DIAGRAMS

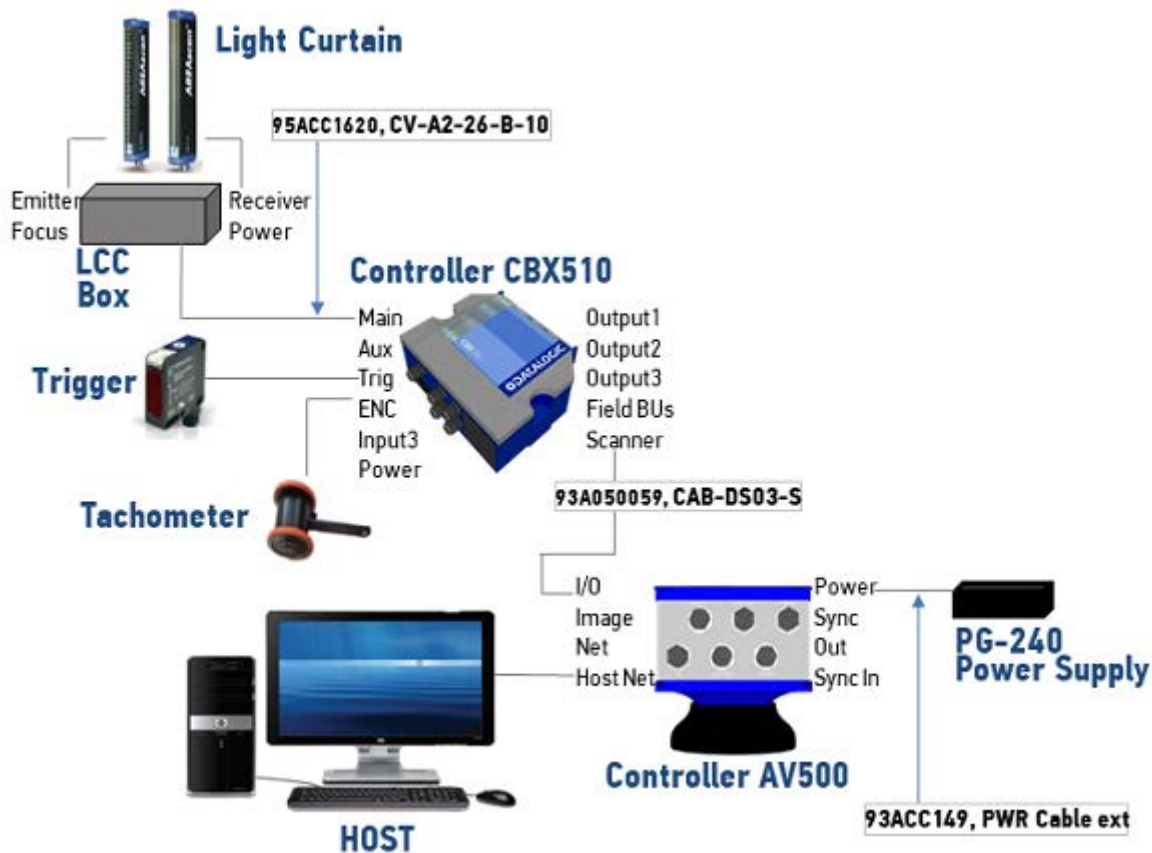
The AV500/900 supports innumerable configurations. Illustrated here are eight typical examples.

### AV500, Distance Sensor, CBX510, Trigger and Tachometer



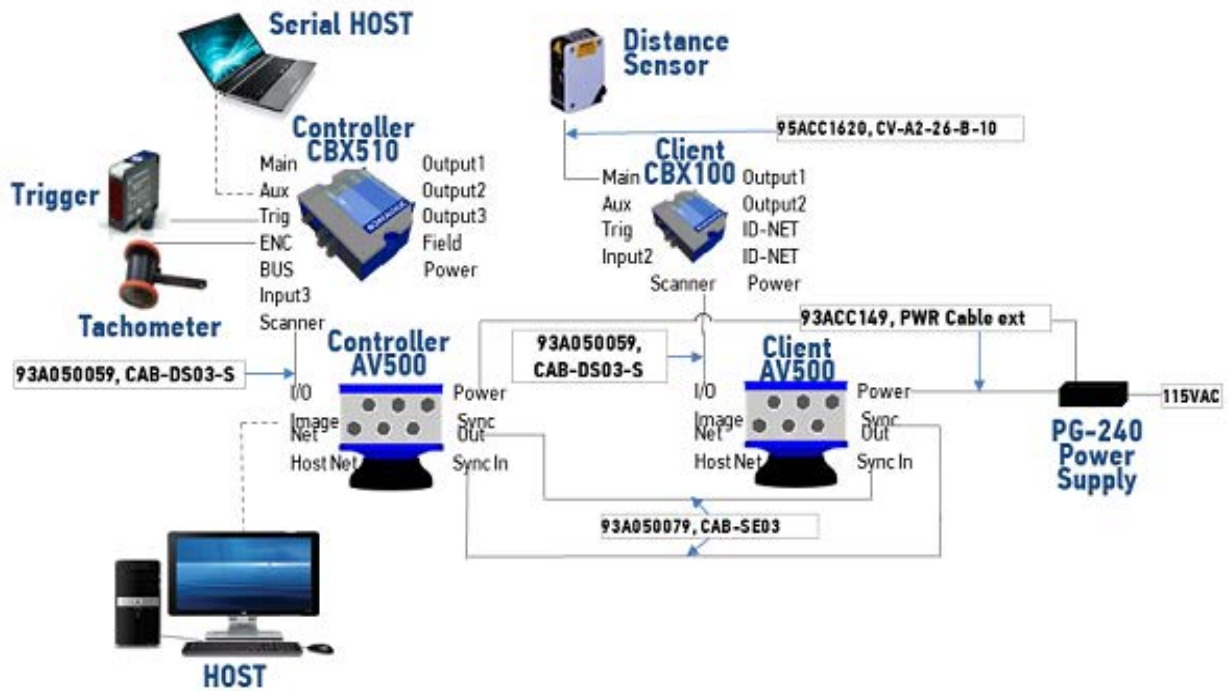
**NOTE:** AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.

## AV500, Light Curtain, CBX510, Trigger and Tachometer



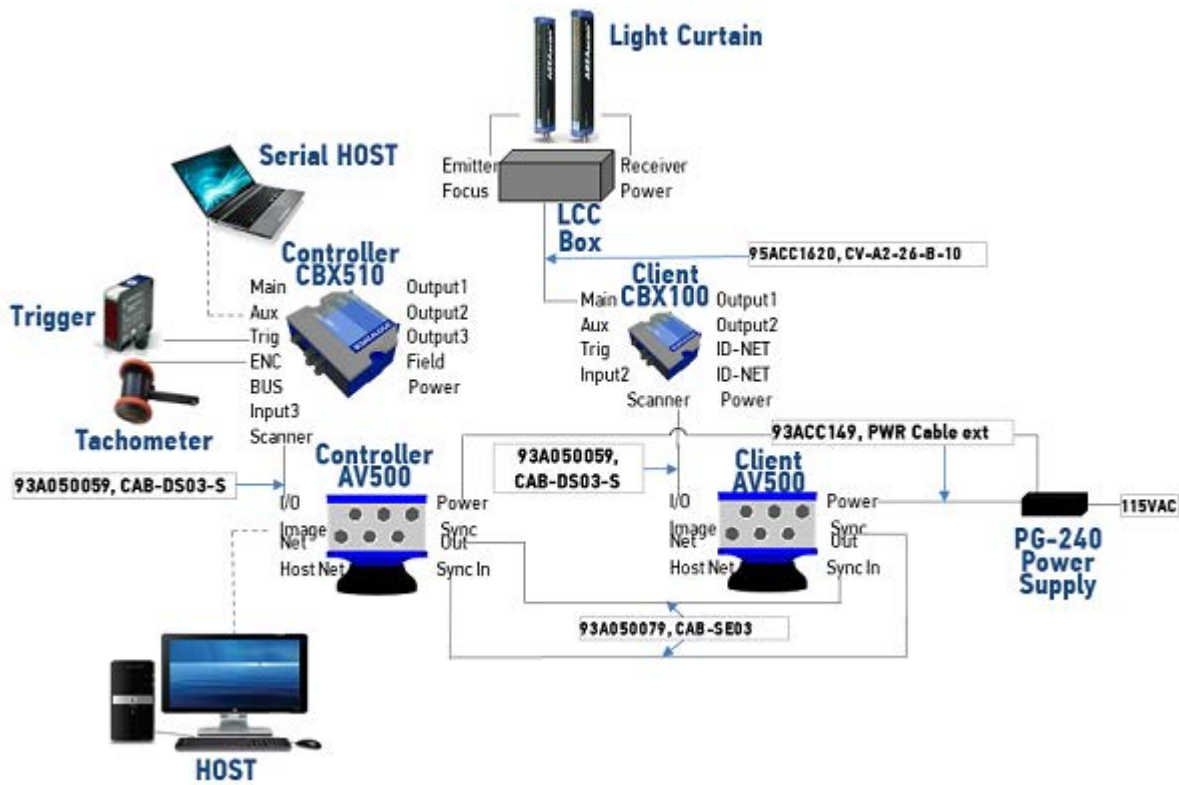
**NOTE:** AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.

## Two AV500, Distance Sensor, CBX510 and CBX100, Trigger and Tachometer



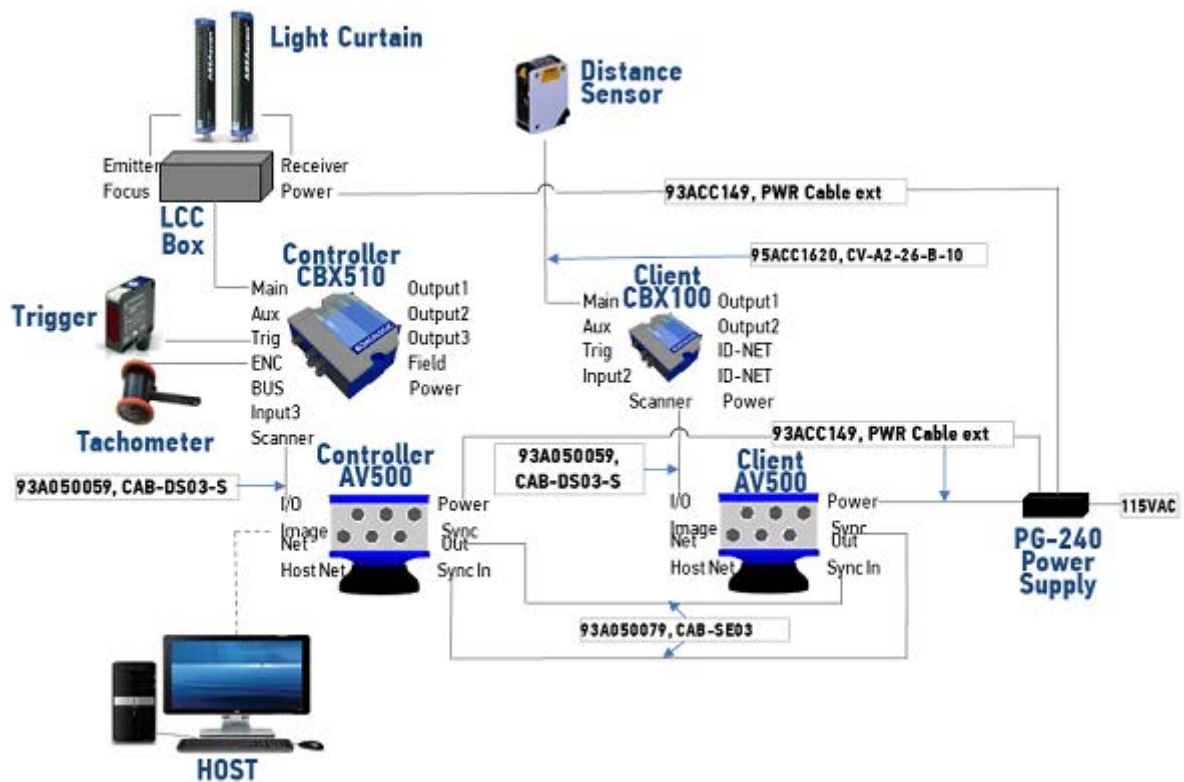
**NOTE:** AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.

## Two AV500, Light Curtain, CBX510 and CBX100, Trigger and Tachometer



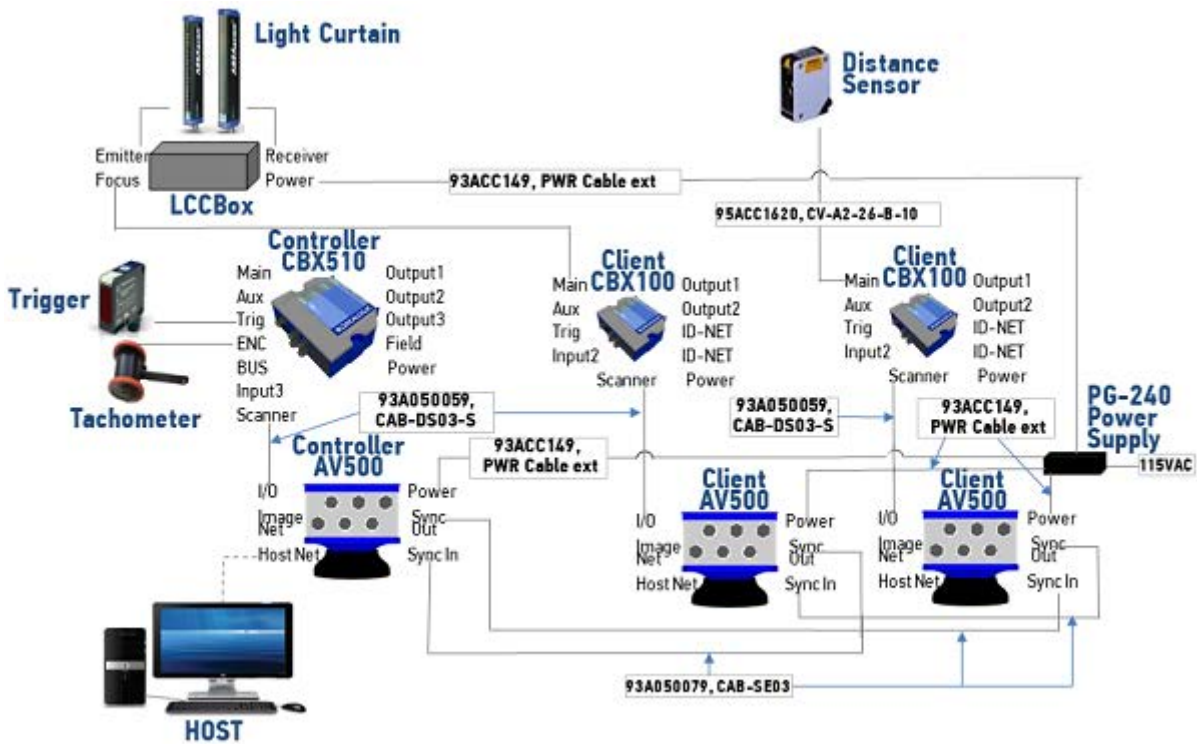
**NOTE:** AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.

## Two AV500, Light Curtain, Distance Sensor CBX510 and CBX100, Trigger and Tachometer



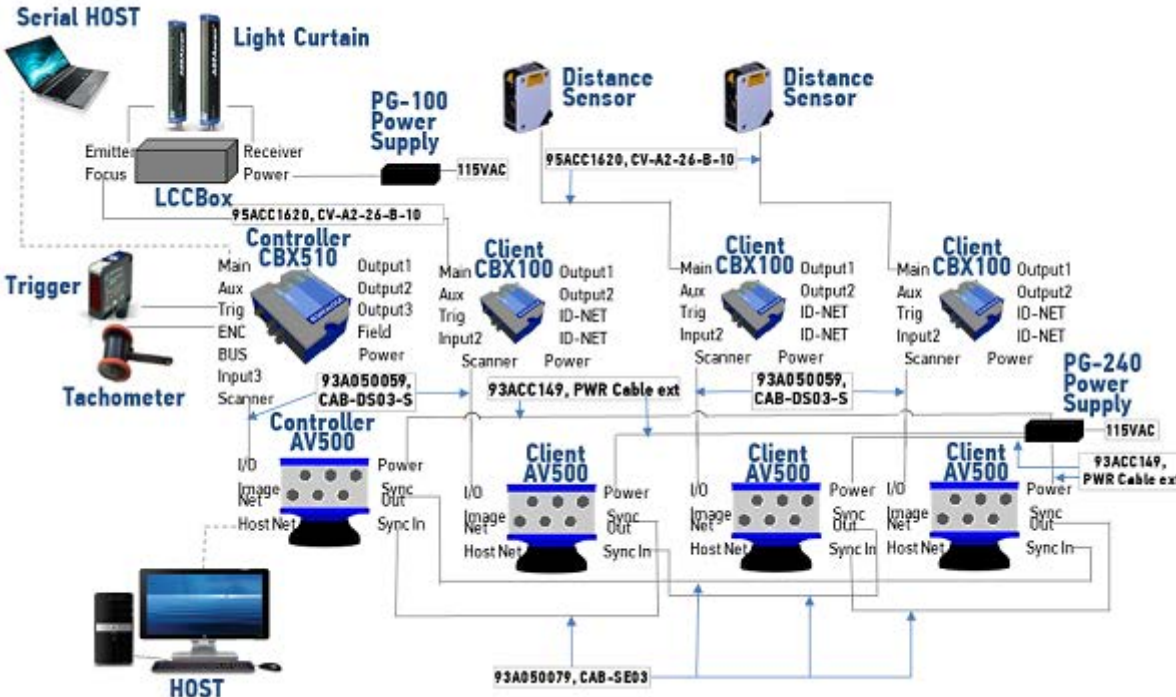
**NOTE:** AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.

## Three AV500's, Light Curtain, Distance Sensor CBX510 and CBX100, Trigger and Tachometer



**NOTE: AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.**

# Four AV500's, Light Curtain, Two Distance Sensors CBX510 and CBX100, Trigger and Tachometer



**NOTE:** AV500/900 cameras cannot accommodate fieldbus, however a CBX800 can be used for fieldbus applications.

# APPENDIX C

## BIDIRECTIONAL SETUP

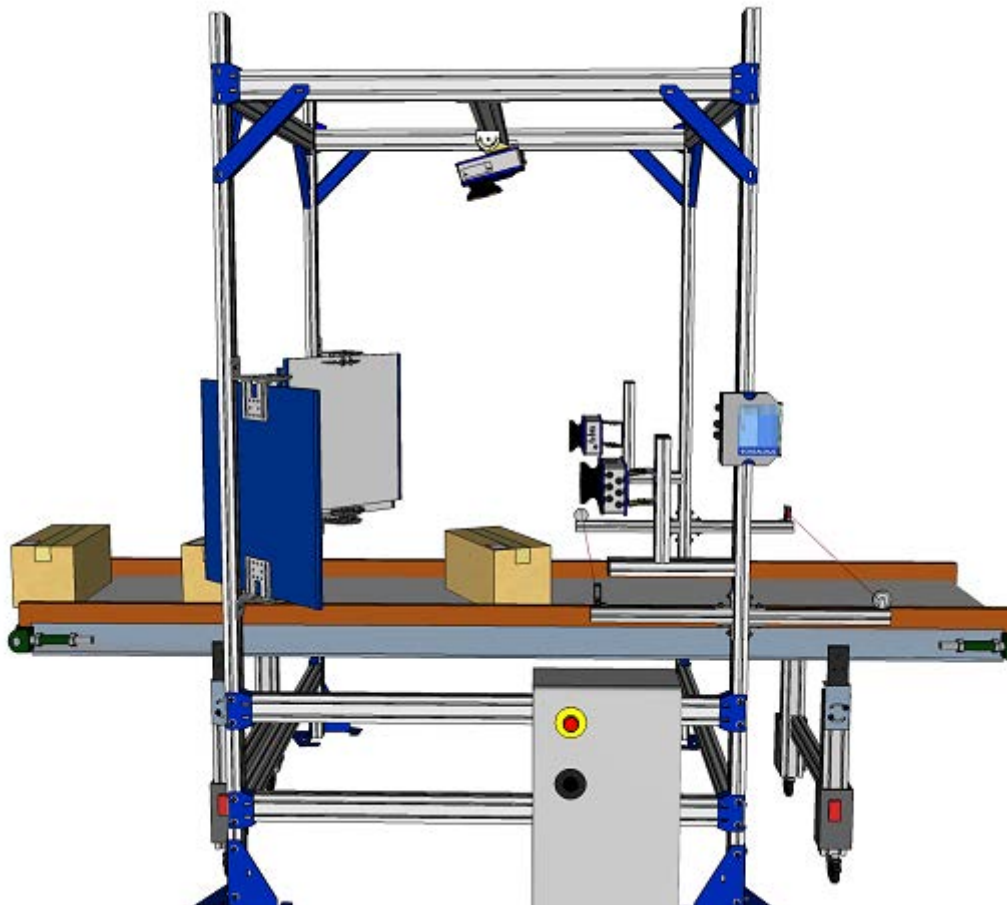
---

### BIDIRECTIONAL SETUP INTRODUCTION

The AV500/AV900 supports bi-directional conveyor travel. A Datalogic Bidirectional system accommodates an application where the customer can change the direction of the conveyor. To accommodate a Bidirectional system, an additional photocell is required, as well as other special equipment:

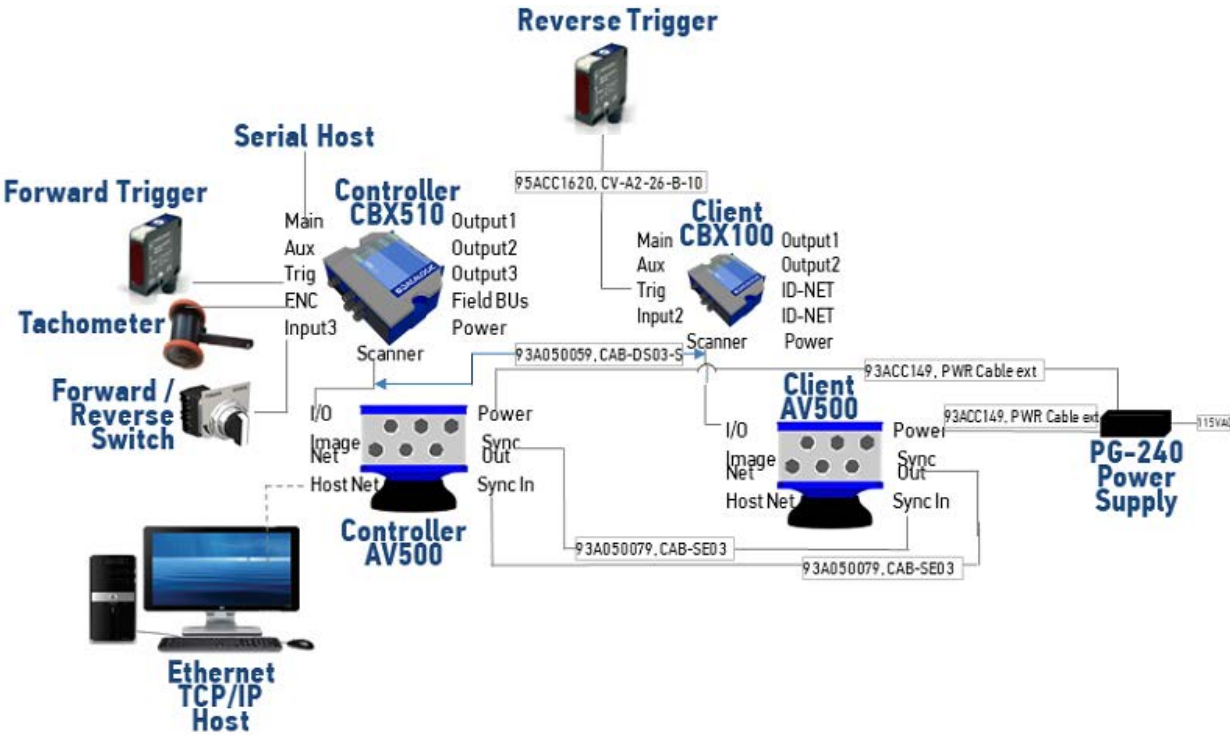
- Special tachometer bracket to more securely fasten the tachometer to the conveyor
- An additional photocell to signal in the reverse direction
- A customer supplied switch (relay) to indicate to the system in which direction the conveyor is going

Bidirectional functionality is made up of two configurations; one is used in the “forward” direction and the other is used in the “reverse” direction.



# Bidirectional System Wiring

Connect your system components as show in the diagram below.



## Prerequisites/Considerations

- Unless a single AV500/AV900 is setup in **Continuous** Operating Mode, two AV500/AV900 units are required to provide the necessary I/O support.
- Dynamic Focus is not supported.
- The tachometer input to the Controller is shared by all units.
- The Active Configuration bit must be input to the Controller's I/O box
- A bi-directional system behaves like two unique AV500/AV900 arrays. The functionality is enabled by setting an Input Mode, on the "Digital IO" page, to "Indicate Active Configuration" to "Active Low".

Once this parameter is set, the AV500/AV900 RTP reads the active state of the configured input and sends a message to the COMe to enable the *Primary* or *Secondary* configuration. Each configuration has its own unique XML file. It is advisable that for any given application, the state of the Direction bit is provided by the customer. This must be kept in mind during the application development and installation phases of the project.

**Inactive state** (high) on the selected "Input" will force "Primary Configuration"

**Active state** (low) on the selected "Input" will force "Secondary Configuration"

## Configuration of Bidirectional System

**Follow these steps to configure a bi-directional system.**

1. Configure the "forward" direction
2. Enable "Indicate Active Configuration" which allows a digital input to determine the direction in use.
3. Configure the "reverse" direction

Tunnels generally require a single Tach Controller. The tach controller camera is connected to a CBX with the tach jumper installed, and the Tachometer, Photo Sensor, and/or Position Sensor used in the "Forward" direction are connected.

For a bidirectional system an additional CBX, without the tach jumper, is connected to another camera in the tunnel. A Tachometer, Photo Sensor and/or Position Sensor are also connected to this CBX/Camera and setup to be used in the "Reverse" direction.

The tach controller CBX must be wired to receive an input on "Input 3". This input is used to indicate the active controller.

- Inactive state on "Input 3" = Forward Direction (CBX Input 3 light off)
- Active Stats on "Input 3" = Reverse Direction (CBX Input 3 light on)

4. Physically wire all cameras in a loop via the Sync Network.
5. Make sure the Tach Controller, and only the Tach Controller, has the Tach jumper installed in its CBX box. The green LED, next to the cameras IO connector, is illuminated when the CBX/Tach Jumper is installed. This camera is the primary controller (IP address 192.168.0.145).
6. See Assign Cameras to a Cluster in the e-Genius Online help.
7. Perform a default on all of the cameras in the tunnel if redundancy or forward/reverse has been enabled in the past. When "Indicate Active Configuration" is enabled, the old configuration files are loaded and this **WILL** create confusion!



8. Complete the **Device > Camera#n > Digital IO** for the “forward” configuration.

**NOTE: Do not set any of the inputs to “Indicate Active Configuration”. That will be done later in this procedure**

9. Complete the Operating Mode settings for the “forward” configuration
10. Complete Automated Mounting Calibration for the “forward” configuration. Repeat for each camera in the cluster.
11. Configure any Barcode Settings, Communications, Output Format, and Image Saving parameters.
12. Make sure the tach controller CBX is wired to receive an input on “Input 3”.
13. Make sure “Input 3” of the controller CBX is inactive (Input 3 LED off).
14. In the menu tree under Modify Settings, navigate to Device Settings | Camera Name | Digital IO. The Digital IO window opens.
15. Set the Input 3 Mode (other)” to Indicate Active Configuration.
16. Enter an name for Input 3 (other).
17. When you select **Indicate Active Configuration** a Configuration Name option appears at the top of the IO window.
  - Enter Forward as the Primary Configuration name and Reverse as the Secondary Configuration name.
18. Click **Update** to save your changes.
19. Initially the config name is set to Primary. You need to change the state of Input 3 on the controller if Secondary is displayed instead of Primary.
20. Click **Real-Time Diagnostics** on the menu. If it’s not already connected and monitoring, Configuration Swap is Enabled and the Active Configuration is Forward (the config is still Primary)
21. Click **Copy Primary to Secondary** to copy all of the Primary (Forward) settings to the Secondary (Reverse) configuration.
22. Change the state of Input 3 in the tach controller CBX to Active – Input 3 LED On



**NOTE: The “Force Configuration Swap” in Real-Time Diagnostics can be used to switch to the “Reverse” configuration. Doing so will get “Input 3” out of sync with the current configuration. You will need to set “Input 3” inactive and then active to get back in sync.**

23. The **Active Configuration** in **Real-Time Diagnostics** should switch to Reverse.
24. Reload your webpage.
25. The config should be set to Reverse.
26. Configure Digital IO for the reverse configuration.
27. NOTE: You will get a warning after clicking Update to save Digital IO settings. This is OK. The warning is displayed because the Forward configuration settings were the starting point for the Reverse configuration.
28. Configure Operating Mode for the reverse configuration.

29. Complete Field Calibration for the reverse configuration. Repeat for each camera in the cluster.
30. Configure any Barcode Settings, Communications, Output Format, and Image Saving parameters that need to be different from the Forward configuration.
31. Forward/Reverse (Bidirectional) configuration is complete.



**NOTE: Toggling the GPIN continuously could get the Input 3 state and active configuration out of sync. The cameras will recover on their own after ~2 minutes. The RTP will report an error ("Active Configuration is Out of Sync. Please wait...") for ~2 minutes before forcing the camera to synchronize with the current Input 3 state**

# APPENDIX D

## REDUNDANT SETUP

---

### REDUNDANT SETUP OVERVIEW

A Redundant System provides duplicate controller and scanner camera stations for improved reliability and performance.

1. Mount and wire all cameras in your redundant system.
2. Since a redundant configuration requires a Primary and Secondary Controller, determine which cameras in the cluster are your Primary and Secondary Controllers.
3. A CBX with tach jumper installed must be connected to the Primary Controller. The green LED, next to the cameras IO connector, is illuminated when the CBX/Tach Jumper is installed. This camera is the primary controller (IP address 192.168.0.145). Connect another CBX to the Secondary Controller.
4. Apply power to all the cameras in the cluster.
5. Bring the primary and secondary cameras into the cluster.
6. Perform a default on all of the cameras in the tunnel, if redundancy or bidirectionality (forward/reverse) have been enabled in the past. The old configuration files will be loaded if they exist, which **WILL** cause confusion.
7. In Operating Mode | Redundant Controller Settings assign Primary and Secondary Controllers.

**Redundant Controller Settings**

Use GPIN to Indicate Active Controller

Disable Error Detection Switchover

Controller Mode: AV500\_TopLeft Auto-Detect

Controller Mode: AV7000\_TopFront Auto-Detect

Controller Mode: AV7000\_TopBack Primary Controller

Controller Mode: AV900\_TopRight Secondary Controller

---

Tracking Offsets Enable

**Switchover Parameters**

Consecutive Package Lost Enable Enabled

Consecutive Package Lost Threshold 5

Percentage Package Lost Enable Disabled

Percentage Package Lost Threshold 15  %

Tachometer Lost Enable Enabled

Tachometer Package Lost Threshold 5

8. Do you want to switch between the Primary and Secondary controllers using a GPIN? Under Redundant Controller Settings check the box next to **Use GPIN to Indicate Active Controller**.
9. Click **Update** to save your changes.
10. The new Primary and Secondary controllers display an error indicating all cameras in the tunnel need to be rebooted in order to finish configuring redundancy.
11. **Reboot** the cameras in the cluster.

### Important Information

- The **Primary Controller** always boots with static IP Address **192.168.0.145**. Regardless of its tach controller state.
- The **Secondary Controller** always boots with static IP Address **192.168.0.146**. Regardless of its tach controller state.
- Default the entire cluster if redundancy was previously enabled

#### Boot-up without Use GPIN to Indicate Active Controller enabled:

On boot-up the **Primary Controller** always becomes the **Active Controller** if it's available. The **Secondary Controller** only boots as the **Active Controller** if the **Primary Controller** is not available.

#### Boot-up with Use GPIN to Indicate Active Controller enabled:

**Input 3** is used to determine the primary and secondary tach controller on boot-up when the **Primary Controller** and **Secondary Controller** are both available.

This is how the cameras boot based on the **Input 3** state of the Primary and Secondary controllers:

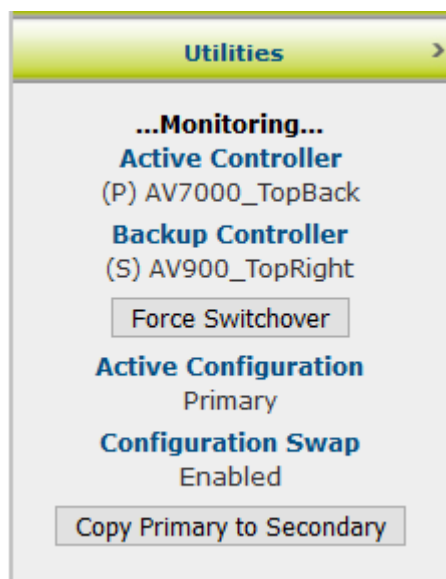
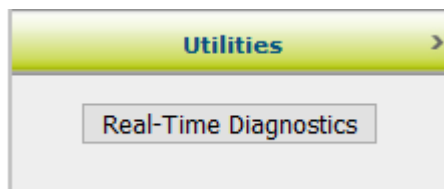
Input 3 Primary Controller	Input 3 Secondary Controller	Active Controller	Backup Controller
Active	Active	Primary	Secondary
Inactive	Inactive	Primary	Secondary
Active	Inactive	Primary	Secondary
Inactive	Active	Secondary	Primary

- Input 3 must be used for Active Controller detection
- Input 3 on the Digital IO page automatically sets to **Indicate Active Controller** after enabling
- Use GPIN to Indicate Active Controller. Primary and Secondary controller cameras only
- Input 3 will not allow Debounce, Active State, Leading Offset or Trailing Offset to be configured when Mode is set to Indicate Active Controller
- Rising edge on Input 3 forces the secondary controller to become the Active Controller
- The Backup Controller will ignore all tracking inputs (Start/End PS, Start PS, End Trigger PS, and Zone PS)

**Primary Configuration** is the Primary Controller and the connected components (CBX, Tachometer, Photo Sensor, Position Sensor, etc.)

**Secondary Configuration** is the Secondary Controller and the connected components (CBX, Tachometer, Photo Sensor, Position Sensor, etc.).

12. Access e-Genius via one of the cameras in the cluster.
13. Access **Utilities | Real-Time Diagnostics**. Real-time diagnostics, related to redundancy and the current configuration display.



14. **Real-Time Diagnostic** allows you to monitor the Active Controller, Backup Controller and Active Configuration information.
  - (P) indicates Primary Controller
  - (S) indicates Secondary Controller
  - Primary under Active Configuration should match the config: type displayed in the top right corner of the web page.

user: setup    ? ?  
 config: Primary



**NOTE: Refresh the web page, if the Active Configuration and config, do not match.**

15. In the menu tree under **Modify Settings |Operating Mode**. Tach, Trigger, and Communication errors on the active controller force a failover to the backup controller.

**If you do not want this to happen, rely solely on Input 3 or the external controller (SC5000 or SC5100) to force the switchover.**

16. Click the Disable Error Detection Switchover check-box and click Update to save your changes.

**If you want to force a switchover if the backup controller detects packages that are not detected by the active controller, which would indicate a potential photo sensor failure?**

17. Enable **Consecutive Package Lost Enable**.
18. For **Consecutive Package Lost Threshold** enter the number of consecutive packages lost before the switchover occurs.

**Do you want to force a switchover, if the number of packages detected by the backup controller is X percent greater than the packages detected by the active controller? This would indicate a potential photo sensor failure.**

19. Enable **Percentage Package Lost Enable**.
20. For **Percentage Package Lost Threshold** enter a percentage difference required to force a switchover.

**Do you want to force a switchover if a tachometer issue is detected on the active controller?**

21. Enable **Tachometer Lost Enable**.
22. For **Tachometer Package Lost Threshold** enter the number of consecutive packages detected by the backup controller, without a tachometer being detected by the active controller, before a switchover occurs.

**If using an S80 or S85 to provide focus, skip to Step 26>>>**

**If using a Photo Sensor or Position Sensor in one configuration, but not the other, skip to Step 26>>>**

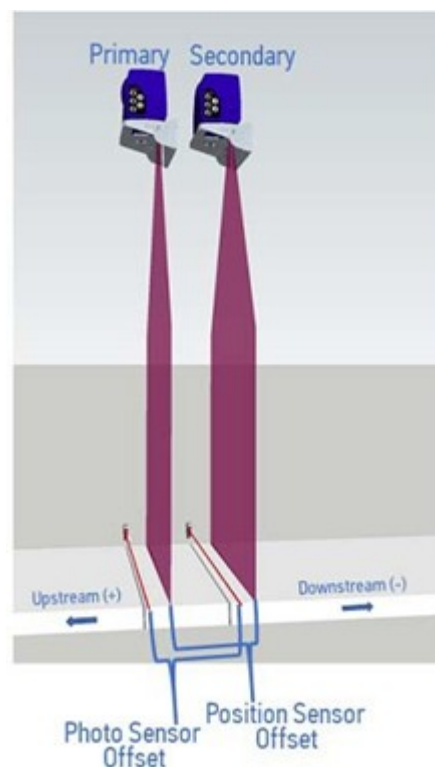


**NOTE: The “Tracking Offsets Enable” parameter cannot be used with an S80/S85. The “Tracking Offsets Enable” parameter cannot be used if a Photo Sensor or Position Sensor is enabled in one configuration and not the other. It needs to be enabled in both configurations or not enabled at all**

23. Enabling **Tracking Offsets Enable** allows you to calibrate your cameras one time (primary configuration) and set the offsets within Primary to Secondary Tracking Offsets for secondary configuration. Enable Tracking Offsets.

**If you do not want to enable Tracking Offsets, skip to Step 26>>>**

24. Measure the distance from the primary Photo Sensor to the secondary Photo Sensor. Enter this value for the **Photo Sensor Offset** = The value is positive if the secondary Photo Sensor is upstream of the primary Photo Sensor and negative if the secondary Photo Sensor is downstream of the primary Photo Sensor. Enter 0 if the same Photo Sensor is being used (not recommended in a redundant configuration).
25. Measure the distance from the primary Position Sensor to the secondary Position Sensor. Enter this value for the **Position Sensor Offset** = The value is positive if the secondary Photo Sensor is upstream of the primary Photo Sensor and negative if the secondary Photo Sensor is downstream of the primary Photo Sensor. Enter 0 if the same Photo Sensor is being used (not recommended in a redundant configuration).



26. Click **Update** to save your parameter settings.

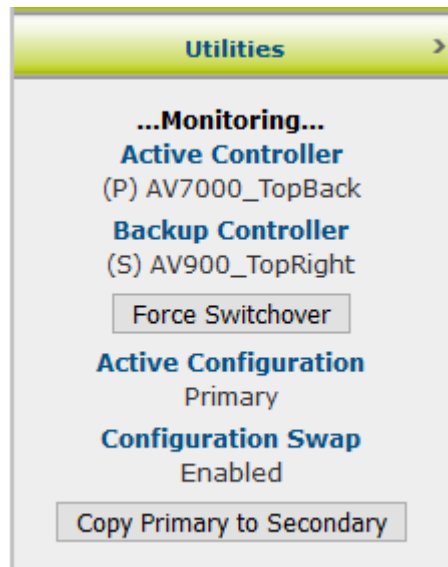
### Complete Configuration for the Primary Controller

1. Configure Digital IO for the primary configuration. Make sure the photo sensor input (if available) is enabled for both the primary and secondary controller, in both the primary and secondary configurations.
2. Configure **Operating Mode** for the primary configuration.
3. Complete the **Field Calibration** for the primary configuration. Make sure to calibrate each camera in the cluster.

4. Configure **Barcode Settings, Communications, Output Format, and Image Saving** parameters.
5. Click the **Real-Time Diagnostics** button. If it's not already connected and monitoring.
6. Click the Copy Primary to Secondary button to force the current primary configuration to the secondary configuration. Now both configurations are the same.





**NOTE: This is the only time the Primary configuration needs to be copied to the Secondary configuration. The goal is to make both configurations the same and only change the secondary parameters that are different.**



7. Click **OK** when asked if you're sure you want to copy the primary configuration to the secondary configuration.

## Force Cameras to Load Secondary Configuration

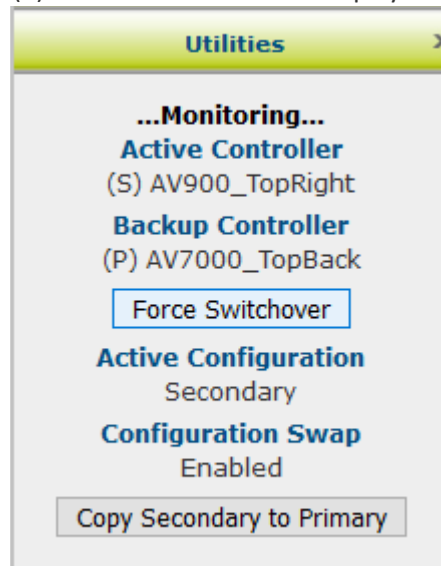
1. Use Input 3 to force a switchover if **Use GPIN to Indicate Active Controller** is enabled, or Use the Force Switchover button in Real-Time Diagnostics to force a switchover.
2. Access e-Genius to view the secondary configuration.
  - **config: Secondary** in the top right of the web page displays
  - **Active Configuration Secondary** under Real-Time Diagnostics displays

user: setup  

config: Secondary

  - Active Controller (S) YOUR CAMERA NAME displays

- Backup Controller (P) YOUR CAMERA NAME displays



3. Configure **Digital IO** settings for the secondary configuration.
  4. Configure **Operating Mode** for the secondary configuration. Is **Tracking Offset Enable** enabled on the **Operating Mode** page.
  5. Complete the Field Calibration for the secondary configuration. Repeat for each camera in the cluster.
  6. Configure any **Barcode Settings, Communications, Output Format,** and **Image Saving** parameters that need to be different from the primary configuration.
- Redundancy configuration is complete.**

# APPENDIX A

## BARCODE GRADING REFERENCES

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### BARCODE GRADING

#### Symbol Verification Versus Code Grading

**Symbol Verification** involves completely testing the adherence of 2D and 1D codes to the parameters defined in specific International Standards in order to guarantee their reliability and therefore ability to be correctly decoded. In Symbol Verification the (Overall) Symbol Grade is only meaningful if it is expressed in conjunction with the measurement wavelength and aperture used. It should be shown in the format:

Grade / Aperture / Wavelength [ / Angle ]

Where:

“Grade” is the overall symbol grade (i.e. the arithmetic mean of the individual Scan Grades for a number of tested images of the symbol).

“Aperture” is the aperture reference number or the diameter in thousandths of an inch (to the nearest thousandth) of the synthesized aperture.

“Wavelength” is the peak light wavelength in nanometers.

“Angle” is the angle of incidence of the illumination relative to the plane of the symbol of the illumination (if 45° it is omitted).

**Code Grading** for the Datalogic readers is a feature used to evaluate the quality of a code within a specific application based only on the Scan Grade parameters defined in certain International Standards. **It does not take into consideration the external environmental lighting parameters such as Aperture, Wavelength and Illumination Angle which can in any case affect the Scan Grade.**

The Overall Code Grade is determined by the lowest resulting Scan Grade within the evaluated set of individual Scan Grade parameters.



**NOTES: Overall Code Grading cannot be equated with and should not be confused with Symbol Verification.**

# INTERNATIONAL STANDARDS APPLIED TO CODE GRADING

Datalogic readers can be used to evaluate printed or marked symbols according to the ISO/IEC 16022, 18004, AIM DPM, and ISO/IEC 15416 standards.

ISO-IEC 16022

## **(Data Matrix - International Symbology Specification)**

The ISO-IEC 16022 Standard specifies general requirements (data character encoding, error correction rules, decoding algorithm, etc.) for Data Matrix symbology.

ISO-IEC 18004

## **(QR Code - International Symbology Specification)**

The ISO-IEC 18004 Standard specifies general requirements (data character encoding, error correction rules, decoding algorithm, etc.) for QR Code symbology.

ISO-IEC TR 29158 (AIM DPM 2006)

## **(Direct Part Mark Quality Guideline)**

The AIM DPM Quality Guideline is applicable to the symbol quality assessment of direct parts marking performed in using two-dimensional bar code symbols. It defines modifications to the measurement and grading of several symbol quality parameters.

The marking processes covered by this guideline are as follows: Dot Peening, Ink Jet, Laser Etching and Electro-Chemical Etching.

ISO-IEC 15415

## **(Two-Dimensional Symbols - Print Quality Test Specification)**

The ISO-IEC 15415 Standard specifies the methodologies for the measurement of specific attributes of two-dimensional bar code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

ISO-IEC 15416

## **(Linear Symbols - Print Quality Test Specification)**

The ISO-IEC 15416 Standard specifies the methodologies for the measurement of specific attributes of linear bar code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

## Parameters Overview

Standards	ISO/IEC 16022	ISO/IEC 18004	ISO/IEC TR 29158	ISO/IEC 15415	ISO/IEC 154156
Parameters	Data Matrix	QR	2D DPM	2D	1D
Print Growth	X	X	Non Graded	X	Non Graded
Axial Non Uniformity	X	X	X	X	
Unused Error Correction	X	X	X	X	
Symbol Contrast	X	X		X	X
Cell Contrast			X		
Cell Modulation			X		
Decode			X	X	X
Fixed Pattern Damage			X	X	
Grid Non Uniformity			X	X	
Minimum Reflectance			X		X
Minimum Edge Contrast					X
Decodability					X
Modulation				X	X
Defects					X
Reflectance Margin					X

You can enable Code Grading by selecting the International Code Quality (CQ) Standard from the Advanced Setup General Settings menu.

## ISO/IEC 16022 AND ISO/IEC 18004 STANDARDS

The ISO-IEC 16022 and ISO-IEC 18004 Standards specify the methodologies for the measurement of specific attributes respectively for Data Matrix and QR code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

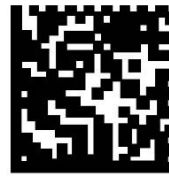
Each quality parameter shall be measured and a grade on a descending scale of integers from 4 to 0 shall be allocated to it. The grade 4 represents the highest quality, while the grade 0 represents failure.

## Code Quality Scan Grade Parameters

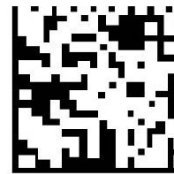
The following scan grade parameters can be evaluated for the ISO-IEC 16022 and ISO-IEC 18004 Standards:

## Print Growth

Measures the deviation of actual element dimension from the expected element dimension due to the printing problems (i.e. overprint or underprint).



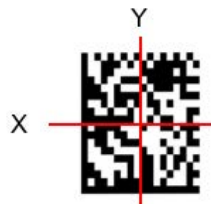
Overprinting



Underprinting

## Axial Non-Uniformity (ANU)

Measures and grades the squareness of all modules in the direction of each of the symbol's major axes (X-axis and Y-axis) by applying the decode algorithm to the binarized image.



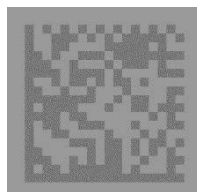
## Unused Error Correction (UEC)

This parameter tests and grade the extent to which regional or spot damage in the symbol has eroded the information redundancy margin that error correction provides. 100% Unused Error Correction Capacity is the ideal condition.



## Symbol Contrast (SC)

Symbol Contrast tests that the two reflective states in the symbol, namely Light and Dark, are sufficiently distinct within the symbol.



The Overall Code Grade is determined by the lowest resulting Scan Grade within the evaluated set of individual Scan Grade parameters.

## ISO/IEC TR 29158 (AIM DPM 2006) QUALITY GUIDELINE

The AIM DPM Quality Guideline is applicable to the symbol quality assessment of direct parts marking performed in using two-dimensional bar code symbols. It defines modifications to the measurement and grading of several symbol quality parameters.

The marking processes covered by this guideline are as follows: Dot Peening, Ink Jet, Laser Etching and Electro-Chemical Etching.

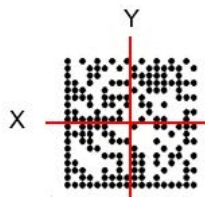
Each quality parameter shall be measured and a grade on a descending scale of integers from 4 to 0 shall be allocated to it. The grade 4 represents the highest quality, while the grade 0 represents failure.

### Code Quality Scan Grade Parameters

The following scan grade parameters can be evaluated for the AIM DPM Standard:

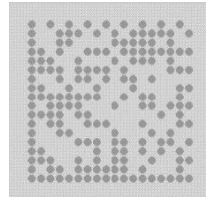
#### Axial Non-Uniformity (ANU)

Measures and grades the squareness of all modules in the direction of each of the symbol's major axes (X-axis and Y-axis) by applying the decode algorithm to the binarized image.



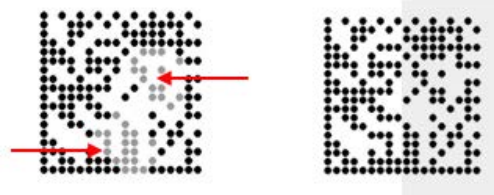
## Cell Contrast (CC)

Measures and grades the difference between the means of brightest and darkest values of the symbol (instead of determining differences between the brightest and darkest values).



## Cell Modulation (CM)

Cell modulation analyzes the grid center points within the data region to determine the reflectance uniformity of light and dark elements after considering the amount of error correction available in the code.



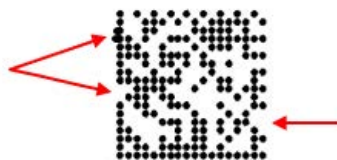
## Decode

The Decode parameter tests, on a Pass/Fail basis, whether the symbol has all its features sufficiently correct to be readable. If the image cannot be decoded using the symbology reference decode algorithm, then it shall receive the failing grade 0. Otherwise, it shall receive the grade 4.

This parameter then will always produce Grade A for good reads. If the code cannot be decoded, then a No Read result will be produced by the reader so you will never have a Grade F result for this parameter.

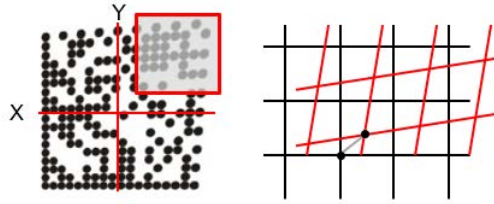
## Fixed Pattern Damage (FPD)

This metric is similar to Cell Modulation, but it analyzes the finder pattern and clock pattern as well as the quiet zone around the code instead of the data region.



## Grid Non-Uniformity (GNU)

Measures and grades the largest vector deviation of the grid intersections, determined by the reference decode algorithm from the binarized image of a given symbol, from their "ideal" theoretical position. Assuming a grid on which the ideal angle of intersection is 90°, any angle deviation from 90° constitutes Grid Non-Uniformity.

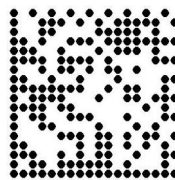


### Minimum Reflectance (MR)

The image brightness is adjusted on a reference part, after which this calibrated value is compared with the reflectance of that part. Minimum Reflectance is the ratio of the parts reflectance to the calibrated reflectance.

### Unused Error Correction (UEC)

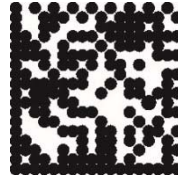
This parameter tests and grade the extent to which regional or spot damage in the symbol has eroded the information redundancy margin that error correction provides. 100% Unused Error Correction Capacity is the ideal condition.



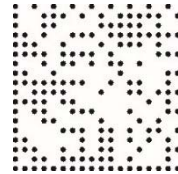
## Non Graded Parameters

### Print Growth

Measures the deviation of actual elements dimension from the expected element dimension due to printing problems (i.e. overprint or underprint).



Overprinting



Underprinting

## ISO/IEC 15415 STANDARD

The ISO-IEC 15415 Standard specifies the methodologies for the measurement of specific attributes two-dimensional bar code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

Each quality parameter shall be measured and a grade on a descending scale of integers from 4 to 0 shall be allocated to it. The grade 4 represents the highest quality, while the grade 0 represents failure.

## Code Quality Scan Grade Parameters

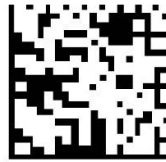
The following scan grade parameters can be evaluated for the ISO-IEC 15415 Standard:

### Print Growth

Measures the deviation of actual elements dimension from the expected element dimension due to printing problems (i.e. overprint or underprint).



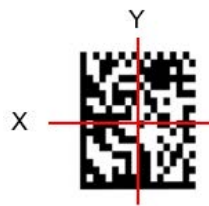
Overprinting



### Underprinting

### Axial Non-Uniformity (ANU)

Measures and grades the squareness of all modules in the direction of each of the symbol's major axes (X-axis and Y-axis) by applying the decode algorithm to the binarized image.



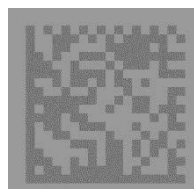
### Unused Error Correction (UEC)

This parameter tests and grade the extent to which regional or spot damage in the symbol has eroded the information redundancy margin that error correction provides. 100% Unused Error Correction Capacity is the ideal condition.



### Symbol Contrast (SC)

Symbol Contrast tests that the two reflective states in the symbol, namely Light and Dark, are sufficiently distinct within the symbol.



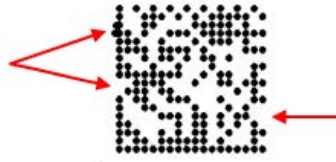
### Decode

The Decode parameter tests, on a Pass/Fail basis, whether the symbol has all its features sufficiently correct to be readable. If the image cannot be decoded using the symbology reference decode algorithm, then it shall receive the failing grade 0. Otherwise, it shall receive the grade 4.

This parameter then will always produce Grade A for good reads. If the code cannot be decoded, then a No Read result will be produced by the reader so you will never have a Grade F result for this parameter.

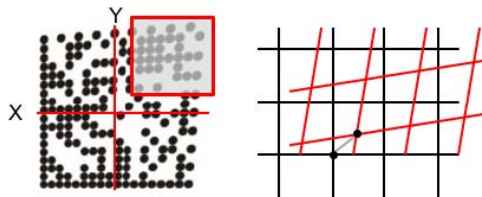
### Fixed Pattern Damage (FPD)

This metric is similar to Cell Modulation, but it analyzes the finder pattern and clock pattern as well as the quiet zone around the code instead of the data region.



### Grid Non-Uniformity (GNU)

Measures and grades the largest vector deviation of the grid intersections, determined by the reference decode algorithm from the binarized image of a given symbol, from their “ideal” theoretical position. Assuming a grid on which the ideal angle of intersection is 90°, any angle deviation from 90° constitutes Grid Non-Uniformity.



### Modulation (MOD)

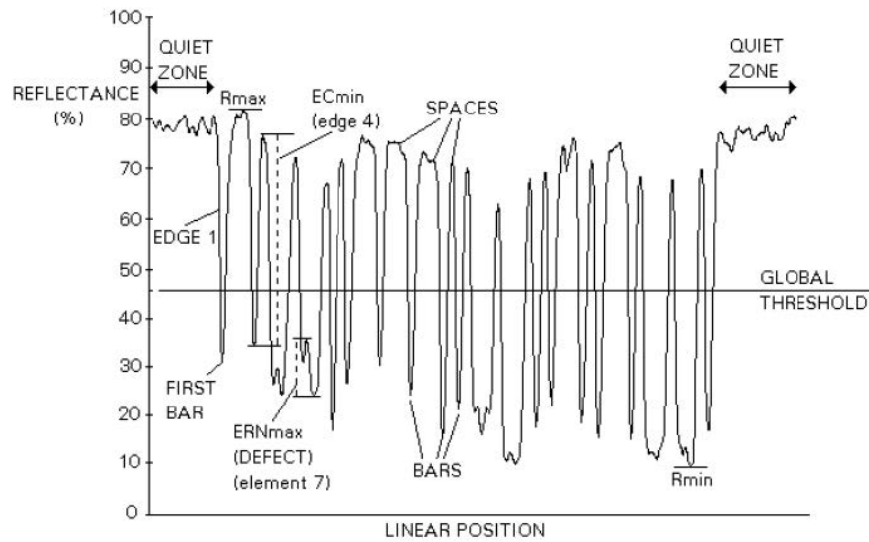
Modulation is the ratio of the minimum edge contrast to Symbol Contrast. It can be considered as the quality of the Analog signal related to the printing contrast.

The Overall Code Grade is determined by the lowest resulting Scan Grade within the evaluated set of individual Scan Grade parameters.166 DL.CODE

# ISO/IEC 15416 1D STANDARD

The ISO/IEC 15416 Standard specifies the methodologies for the measurement of specific attributes of linear bar code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

Bar code symbol quality assessment shall be based on an analysis of the Scan Reflectance profiles. The scan reflectance profile is a record of the Reflectance values measured on a single line across the entire width of the barcode.



**Scan Reflectance Profile**

Symbol Quality grading shall be used to derive a relative measure of symbol quality under the measurement conditions used. Each scan reflectance profile shall be analyzed and a grade on a descending scale of integers from 4 to 0 shall be allocated to each of the parameters evaluated.

## Code Quality Scan Grade Parameters

The following scan grade parameters can be evaluated for the ISO-IEC 15416 Standard:

### Decode

The symbology reference decode algorithm shall be used to decode the symbol using the element edges determined on the Scan Reflectance profile. This algorithm may be found in the symbology specification.

### Decodability

The decodability of a bar code symbol is a measure of the accuracy of its production in relation to the appropriate reference decode algorithm.

### Defects

Defects are irregularities found within elements and quiet zones, and are measured in terms of element reflectance non-uniformity.

Element reflectance non-uniformity within an individual element or quiet zone is the difference between the reflectance of the highest peak and the reflectance of the lowest valley. ISO/IEC 15416 1D Standard User's Manual 167

Defect measurement is expressed as the ratio of the maximum element Reflectance Non-Uniformity (ERNmax) to Symbol Contrast.

## Minimum Edge Contrast (EC)

Edge contrast is the difference between the  $R_s$  (Space Reflectance) and  $R_b$  (Bar Reflectance) of adjoining elements including quiet zones.

The lowest value of edge contrast found in the scan reflectance profile is the minimum edge contrast,  $EC_{min}$ .

## Minimum Reflectance ( $R_{min}$ )

$R_{min}$  is the lowest reflectance value in the scan reflectance profile.  $R_{min}$  shall not be higher than  $0,5 \times R_{max}$ . This parameter is intended to ensure that  $R_{min}$  shall not be too high, especially when the value of  $R_{max}$  is high.

## Modulation (MOD)

Modulation is the ratio of the minimum edge contrast to Symbol Contrast. It can be considered as the quality of the Analog signal related to the printing contrast.

## Symbol Contrast (SC)

Symbol contrast is the difference between the highest and lowest reflectance values in a scan reflectance profile.

## Reflectance Margin

Reflectance margin measures how close the reflectance value of the darkest space or palest bar is to the global threshold, expressed in terms of the symbol contrast. When this value is less than 5% it is likely that the barcode is close to failing on decode.

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