

COGNEX[®]

DataMan[®] 300 Series

Quick Reference Guide

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Symbols

The following symbols indicate safety precautions and supplemental information.

 **WARNING:** This symbol indicates the presence of a hazard that could result in death, serious personal injury or electrical shock.

 **CAUTION:** This symbol indicates the presence of a hazard that could result in property damage.

 **Note:** Notes provide supplemental information about a subject.

 **Tip:** Tips provide helpful suggestions and shortcuts that may not otherwise be apparent.

Getting Started

This section provides general information about the DataMan 300 series readers as well as about the DataMan 300 accessories and systems.

About the DataMan 300 Readers



The DataMan 300 series readers are high-performance, fixed-mount ID readers that, among others, offer the following advanced features:

- Highest Read Rates on 1-D and 2-D codes
- Most flexible optics and lighting
- Intelligent tuning and express setup

The DataMan 300 series readers provide advanced Ethernet connectivity, support for serial RS-232 and discrete I/O, as well as advanced options for lighting and optics.

The DataMan 300 series readers are packaged in a rugged, IP65-rated housing, and they provide numerous ease-of-use features, including one button to trigger and one to start tuning.

For More Information...

This document provides basic information about how to configure and use the DataMan 300 series readers. Additional information is available through the Windows **Start** menu or the DataMan Setup Tool **Help** menu after you install the DataMan software on your PC:

- The **DataMan Communications & Programming Guide** shows how to integrate your DataMan reader with your automation software and factory network.
Cognex->DataMan Software v x.x.x->Documentation->Communications & Programming
- The **DataMan Reader Configuration Codes** document provides printable 2-D codes that you can use to configure the DataMan reader.
Cognex->DataMan Software v x.x.x->Documentation->English->Reader Configuration Codes
- The **DataMan Fixed Mount Readers Reference** is a complete online hardware reference for the DataMan fixed-mount ID readers.
Cognex->DataMan Software v x.x.x->Documentation->English->DM300 Series->Fixed Mount Reference Manual
- The **DataMan Questions and Answers** document provides context-sensitive information. You can view this help inside the Setup Tool or as a stand-alone help file.
Cognex->DataMan Software v x.x.x->Documentation->DM300 Series->Questions and Answers

- The **Release Notes** list detailed system requirements and additional information about this DataMan software release.

Cognex->DataMan Software v x.x.x->Documentation->DataMan v x.x.x Release Notes

Accessories

M12/S-Mount Lens Options

<p>10.3 mm M12 lens with locking (DM300-LENS-10) and 10.3 mm IR M12 lens with locking (DM300-LENS-10-IR)</p>	
<p>Liquid lens module and pre-focused 10.3 mm IR M12 lens with wrench (DM300-LENS-10LL-IR)</p> <p>Liquid lens module and pre-focused 10.3 mm M12 lens with wrench (DM300-LENS-10LL)</p>	
<p>19 mm liquid lens module (DM300-LENS-19LL)</p>	
<p>16 mm M12 lens with locking (DM300-LENS-16)</p>	
<p>25 mm M12 lens with lens spacer and hex wrench (DM300-LENS-25) (also requires Extension kit)</p>	
<p>Extension kit (DM300-EXT)</p>	
<p>DM500 C-Mount cover (DM500-CMTLC-000)</p>	
<p>DM500 Lens cover extender (DM500-LNSEXT-000)</p>	

Lens Covers

Clear lens cover (DM300-CLCOV)	
Clear lens cover with white LED illumination (DM300-CLCOV-WHI)	
Diffuse lens cover with red LED illumination (DM300-DLCOV-RE)	
Diffuse lens cover with blue LED illumination (DM300-DLCOV-BL)	
Diffuse lens cover with IR LED illumination (DM300-DLCOV-IR)	
Polarized lens cover with red LED illumination (DM300-PLCOV-RE)	
Diffuse lens cover, red illumination (assembled), ESD safe (DM300-DLCOV-RE-ESD)	
Polarized red LED high-powered integrated light (DM300-HPIL-RE-P)	
C-Mount cover for C-Mount lenses (DM300-CMCOV)	
Short C-Mount cover for C-Mount lenses (DM300-CMCOV-SH)	

External Lights (Red LED)

Ring Light (CLRR-R7030G1CLR)	
Back light (CLRB-F100100G1)	
Coaxial (DOAL) light (CLRO-K5050G1)	

Spot light (CLRS-P14G1)	
Dark-field light (CLRD-D120G1)	

Laser Aimers

Laser aimer (DM300-AIMER-00)	
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High Power Illuminations

Red narrow (DM30X-HPIA-625)	
Red wide (DM30X-HPIA-625-W)	
White narrow (DM30X-HPIA-WHI)	
White wide (DM30X-HPIA-WHI-W)	
Blue narrow (DM30X-HPIA-470)	
Blue wide (DM30X-HPIA-470-W)	
Infrared narrow (DM30X-HPIA-IR)	
Infrared wide (DM30X-HPIA-IR-W)	

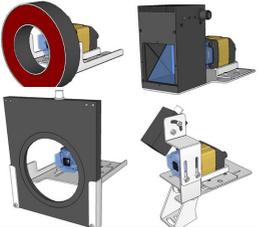
Cables

Connection cable 24V, I/O, RS-232 (CCB-M12x12Fy-xx) (y straight/angled, xx specifies length)	
Connection cable 24V, I/O, RS-232 (CCBL-05-01)	
Power and I/O breakout cable, M12-12, 15m (CCB-PWRIO-15)	
Power and I/O breakout cable, M12-12 (CCBPWRIO-xx) (straight, xx specifies length: 5m, 10m, 15m)	
Power and I/O breakout cable, M12-12 (CCB-PWRIO-xxR) (angled, xx specifies length: 5m, 10m, 15m)	
Connection cable RS-232 (CCB-M12xDB9Y-05)	
Ethernet M12 to RJ45 cable (CCB-84901-y00x-xx) (y straight/angled, x-xx specifies length)	
External light cable (CCB-M12x4MS-xxx) (xxx specifies length)	
I/O extension cable, 5m straight (CKR-200-CBL-EXT)	

Power Supplies

24V power supply (ACC-24I)	
24V power supply (PS-KIT-1)	

Mounting Brackets

External light mounting brackets (DM300-ELMB-xx) (xx specifies light type) (may get used in combination with DM500-BRKT-000 if pivoting is required)	
Universal Mounting Bracket (DM100-UBRK-000)	
Pivot Mounting Bracket (DM100-PIVOTM-00)	

DataMan 300 Systems

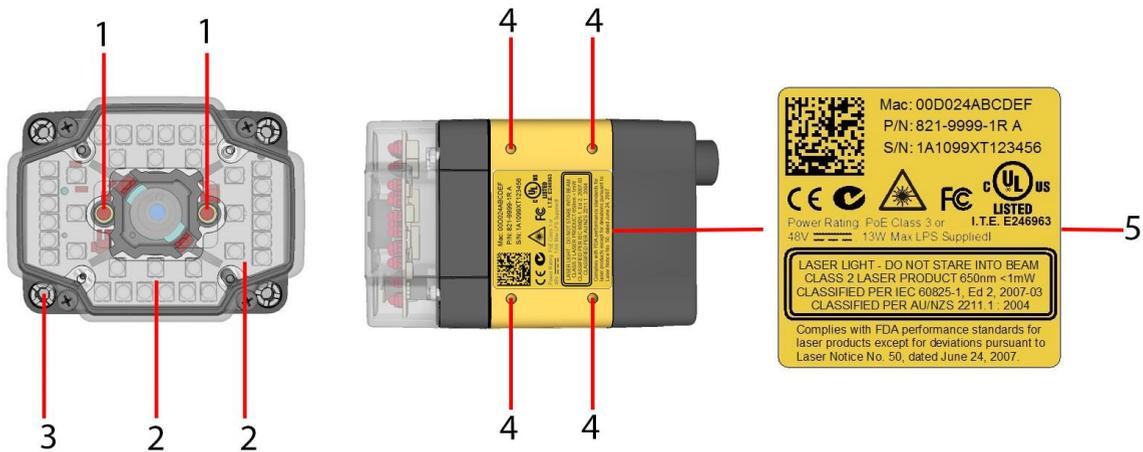
	Omni-directional 1-D Code Reading	1DMax+™ — Best-In-Class 1- D Reading	IDQuick™ — High-Speed 2-D Reading	2DMax+™ — for hard to read DPM and damaged 2-D codes	Resolution
DataMan 300L (DMR-300L-00)		√			800x600
DataMan 300X (DMR-300X-00)	√	√	√	√	800x600
DataMan 302L (DMR-302L-00)		√			1280x1024
DataMan 302X (DMR-302X-00)	√	√	√	√	1280x1024
DataMan 303L (DMR-303L-00)		√			1600x1200
DataMan 303X (DMR-303X-00)	√	√	√	√	1600x1200

Setting Up Your DataMan 300

This section provides information on the physical appearance of the DataMan 300 reader. It also details the steps of installing the lenses and filters of the reader, and gives information on the imager itself.

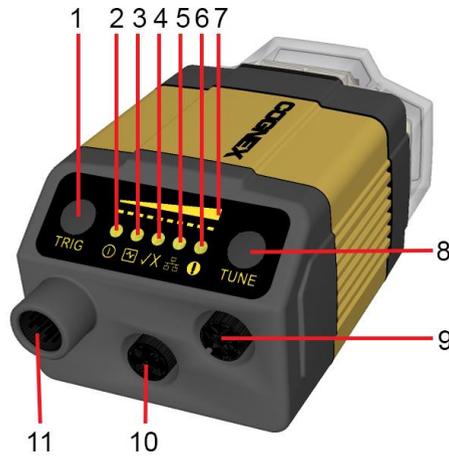
Reader Layout

The following image shows the built-in lighting system of the DataMan 300 series reader, underneath the plastic lighting cover, the mounting holes and the laser safety notice on the bottom of the reader.



1	Laser aimer Can be enabled under Light and Imager Settings in the DataMan Setup Tool (disabled by default) to aid in aiming the lens
2	Illumination LED clusters
3	External illumination mounting point
4	Mounting holes (M3 x 5mm)
5	Laser safety notice

The following image shows a detailed picture about the back cover and the functions of the indicator lights.

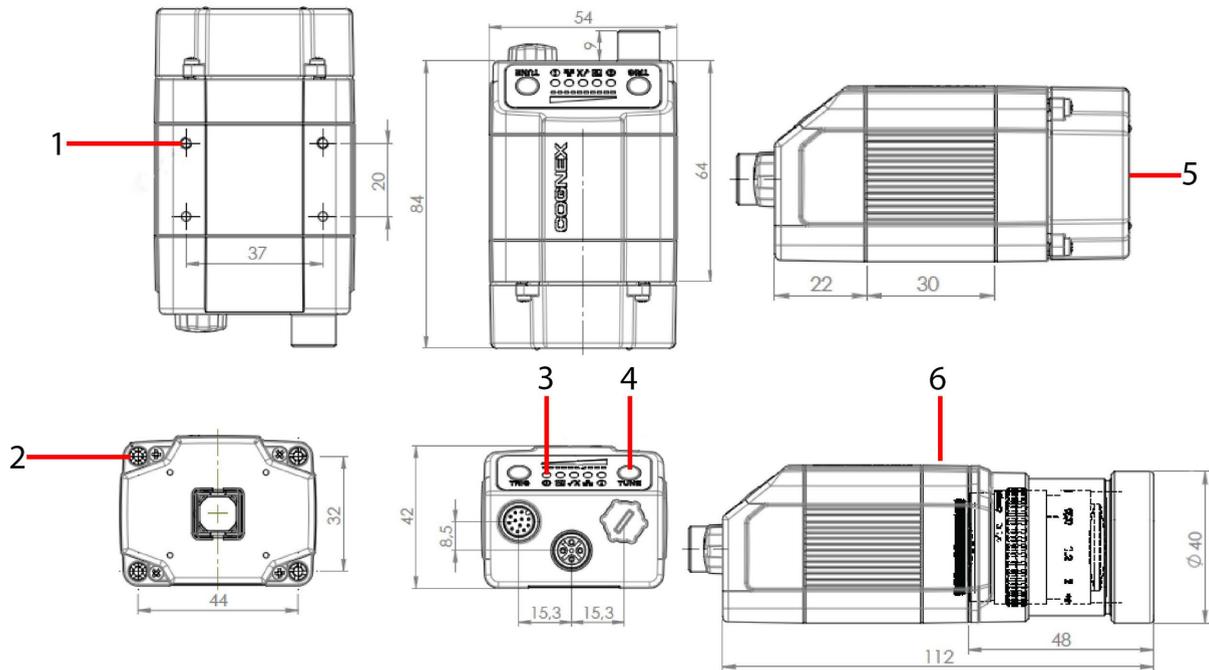


1	Trigger button
2	Power
3	Train status
4	Good/bad read
5	Network
6	Error
7	Peak meter
8	Good/bad read
9	Ethernet
10	External light control
11	Power, I/O and RS232

Type	Signal	Color	Meaning
Status	Power	GREEN	Power ON
	Train status	GREEN	Trained
		YELLOW	Untrained
	Error	RED	Error - check device log
Action	Good/bad read	GREEN	Good read
		RED	Bad read
	Communication	YELLOW	Link up
		<i>blink</i>	Activity
Peak meter	-	Decode yield, train progress/quality	

Dimensions

Observe the following DataMan 300 series reader dimensions when installing your reader. The images also show the DataMan 300 reader dimensions with S-mount (5) and C-mount (6) lens options.



1	M3-5 (4x) mounting holes of the device
2	M3-6 (4x) mounting holes for external illumination
3	Illumination lights
4	Operating buttons
5	S-Mount (M12) Lens version
6	C-Mount Lens version

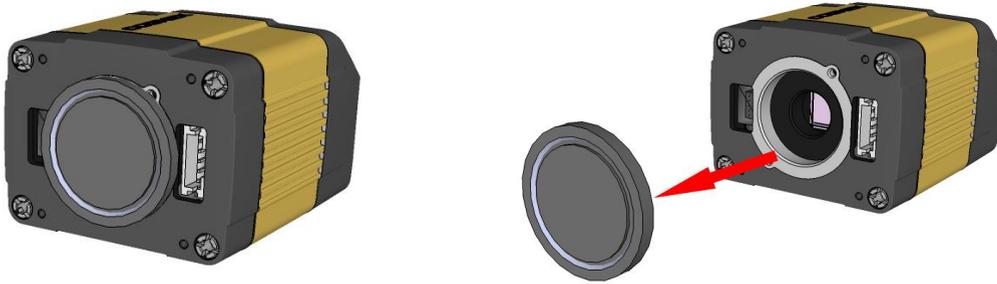
Installing the Lens

You can choose between a variety of different S-Mount/M12 (including variable-focus liquid lens module) and C-Mount lens options to be installed on your DataMan 300 series reader.

WARNING: Disconnect the DataMan 300 reader from power before installing the lens.

Installing an M12 Lens with Manual Focus

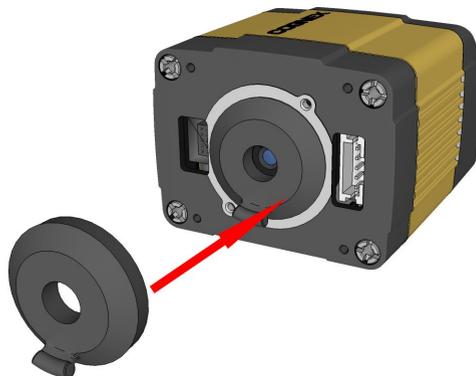
1. Remove the lens plug.



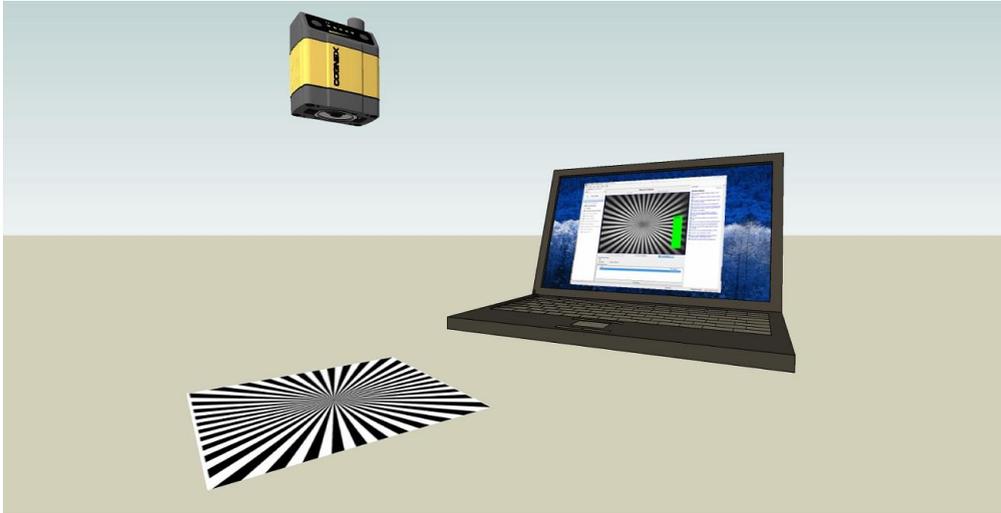
2. Thread the lens into the reader.



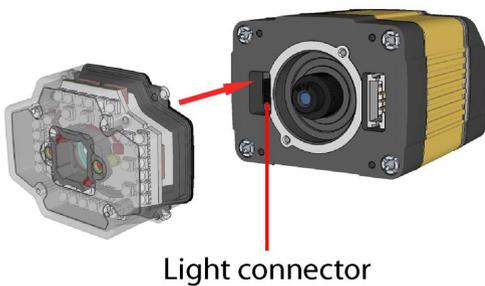
3. Press the rubber lens-locking cone into the reader. While carefully avoiding rotating the lens, press the rubber lens cone into the reader until it snaps into place around the nose of the lens.



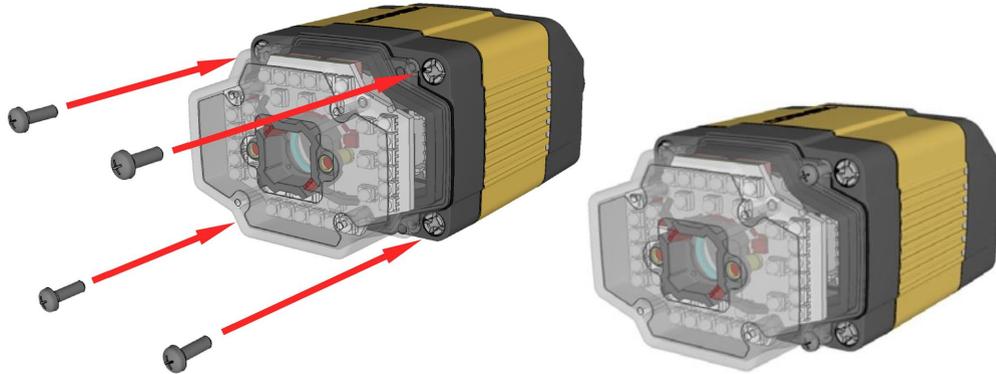
4. Place the reader at the desired working distance from focus target.
 - a. Connect the reader to the DataMan Setup Tool.
 - b. On the **Quick Setup** page, check the **Focus Feedback** option from the drop-down menu of the **Live** button. For best results, adjust your camera settings to make sure you have a brightened and high contrast image.
 - c. Use the DataMan Focus Target template, available through the Windows **Start** menu or the DataMan Setup Tool **Help** menu, to align the edge of the reader body to the line marked with the target distance used in your application.
 - d. Adjust focus for maximum sharpness. Enhance image quality in the DataMan Setup Tool for better guidance.



5. Tighten the lens.
After fixing the lens, verify focus position again, using the steps above.
6. Attach the front cover.

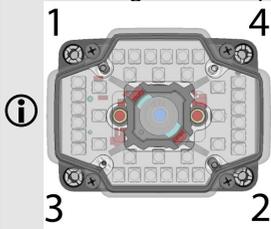


7. Insert and tighten the screws.



PHILLIPS PAN HEAD M2 X 6MM

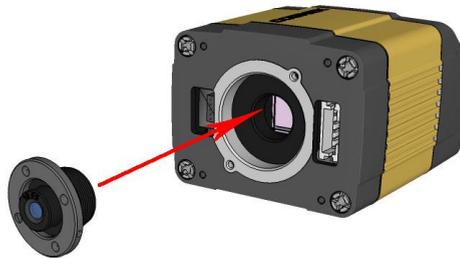
Note: Tighten in sequence. Torque limit: 9 Ncm (0.08 in-lbs).



Note: Remove the protection film applied to the front cover before usage!

Installing a Liquid Lens

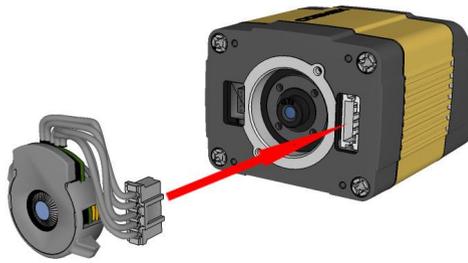
1. Remove the lens plug as described in [Installing the Lens](#).
2. Thread the lens into the reader.



3. Tighten the locking ring.



4. Connect the liquid lens cable to the reader.

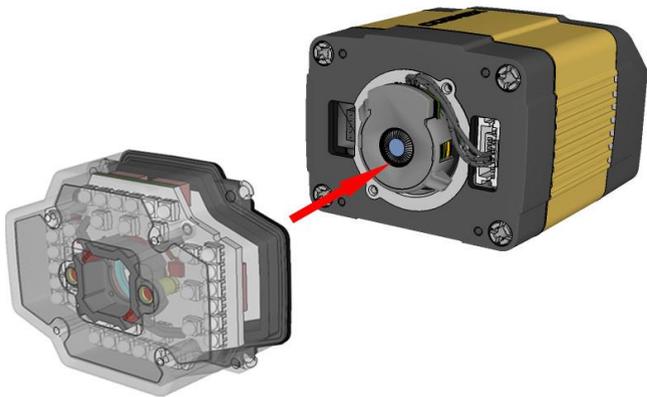


⚠ WARNING: To avoid equipment damage, the cables must be routed as shown in the figure.

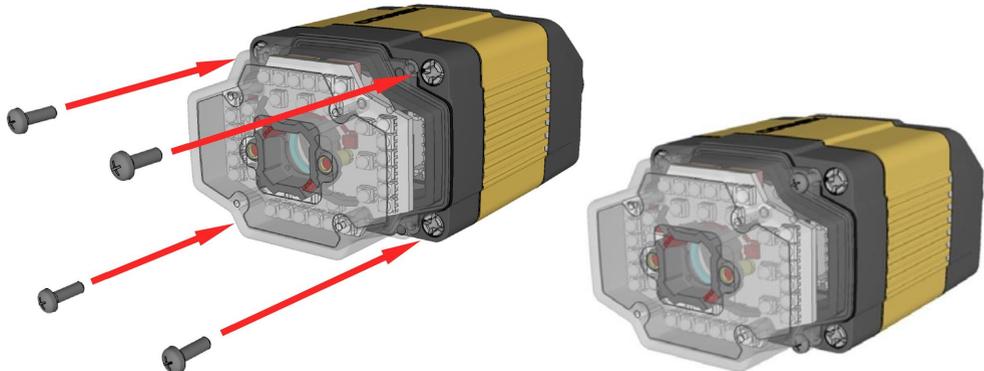
5. Snap the liquid lens module onto the nose of the lens, making sure that it lies flat.



6. Attach the front cover.



7. Insert and tighten the screws.

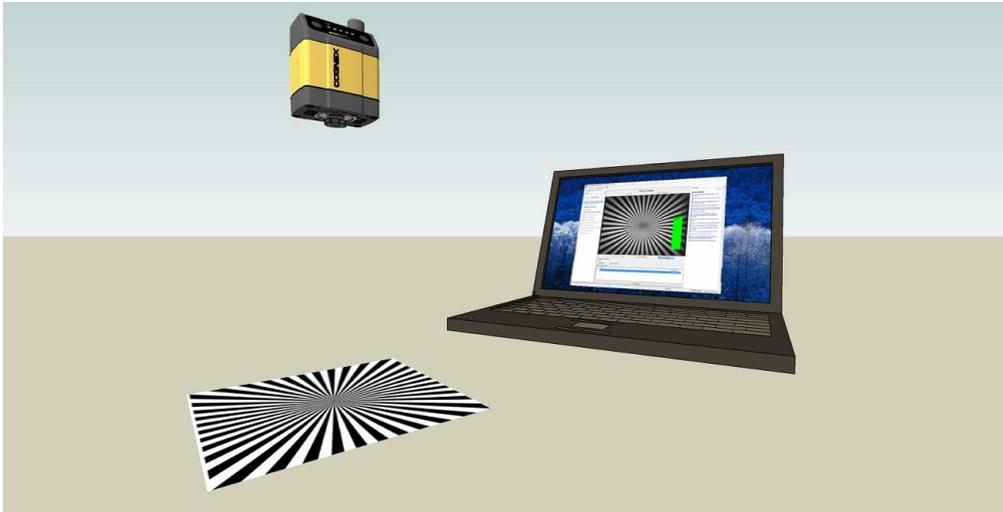


PHILLIPS PAN HEAD M2 X 6MM

Note: Tighten in sequence. Torque limit: 9 Ncm (0.08 in-lbs).

A top-down view of the front cover with four screws numbered 1, 2, 3, and 4 in a clockwise sequence starting from the top-left corner. An information icon (i) is located to the left of the cover.

8. Place the reader at the desired working distance from focus target.
 - a. Connect the reader to the Setup Tool.
 - b. On the **Quick Setup** page, check the **Focus Feedback** option from the drop-down menu of the **Live** button.
 - c. Use the DataMan Focus Target template, available through the Windows **Start** menu or the Setup Tool **Help** menu, to align the edge of the reader body to the line marked with the target distance used in your application.
 - d. Adjust focus for maximum sharpness. Enhance image quality in the DataMan Setup Tool for better guidance.



Installing a 19 mm Liquid Lens

The possible hardware configurations using a 19 mm liquid lens with a DataMan 300 series reader are the following:

- DM3xx-system + DM300-LENS-19LL + DM300-CMCOV-SH
- DM3xx-system + DM300-LENS-19LL + DM300-EXT + DM300-HPIL-RE
- DM3xx-system + DM300-LENS-19LL + DM300-EXT + DM300-HPIL-RE-P

To install a 19 mm liquid lens of a DataMan 300 series reader, perform the following steps:

⚠ WARNING: Disconnect the DataMan reader from power before continuing.

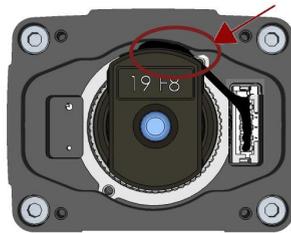
⚠ CAUTION: Do not leave the image sensor exposed to the environment.

With a DM300-CMCOV-SH Cover

1. First, attach the liquid lens cable to the unit.
2. Fix the lens by screwing in the knurled ring. Do not rotate the lens itself. Ensure that the cable and text are at the 12 o'clock position, as shown below.



3. Push the wires into the space behind the lens.



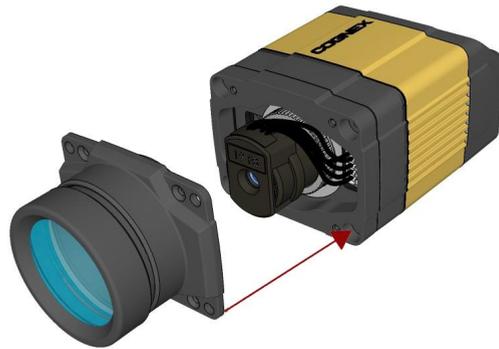
4. Place the spacer over the front of the unit.



Ensure that the gasket side is toward and lines up with the unit.

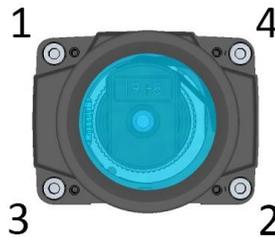


5. Blow out the cover with compressed air.
6. Place the cover on the unit.



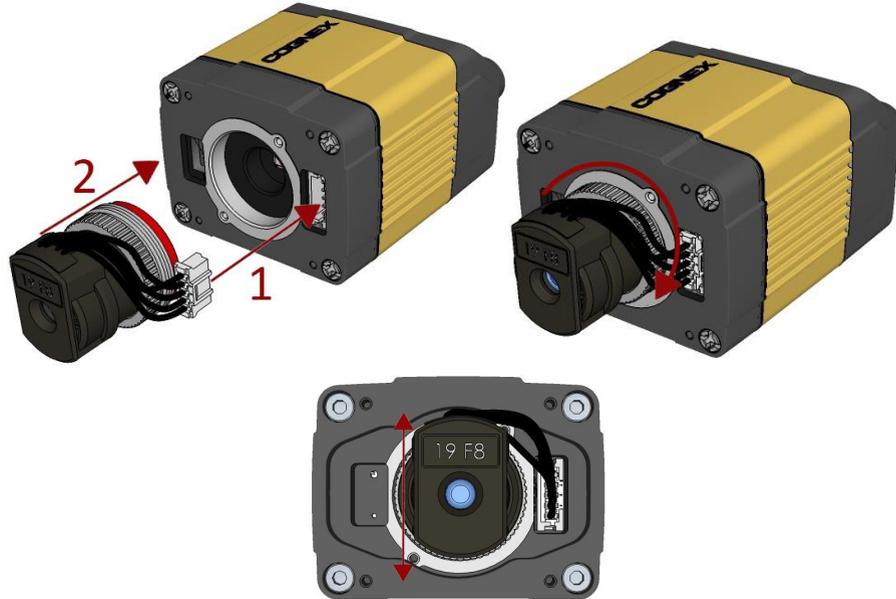
Note: Ensure that the top of each piece of the assembly lines up and the gasket does not stick out.

7. Screw in the four 196-1156R screws using a size 2.5 metric torque driver. Tighten the screws in the sequence shown and observe a torque limit of 0.4 N-m.

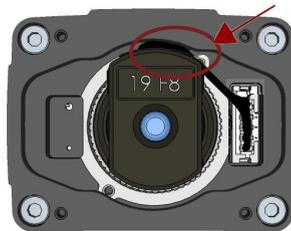


With a DM300-HPIL-RE or DM300-HPIL-RE-P Cover

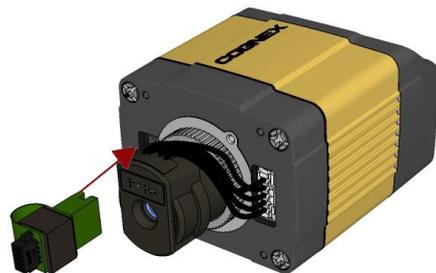
1. First, attach the liquid lens cable to the unit.
2. Fix the lens by screwing in the knurled ring. Do not rotate the lens itself. Ensure that the cable and text are at the 12 o'clock position, as shown below.



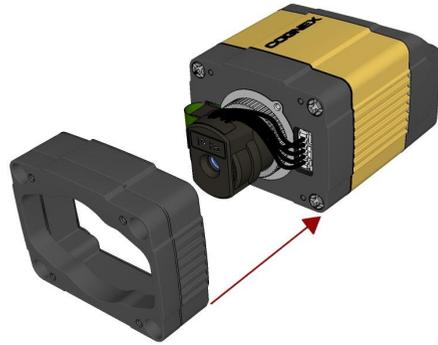
3. Push the wires into the space behind the lens.



4. Install the electrical extender.



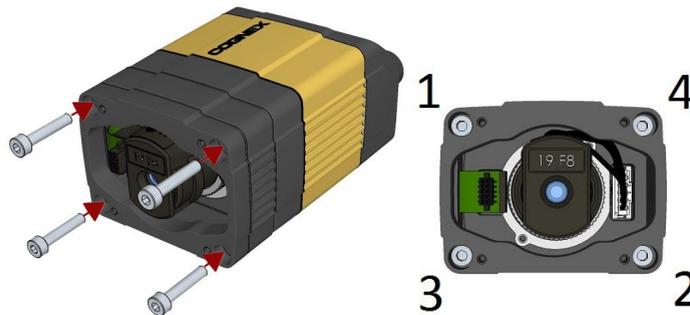
- Place the spacer over the front of the unit.



Ensure that the gasket side is toward and lines up with the unit.

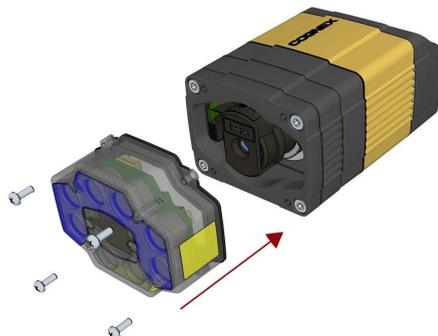


- Screw in the four 196-1156R screws using a size 2.5 metric torque driver. Tighten the screws in the sequence shown and observe a torque limit of 0.4 N-m.



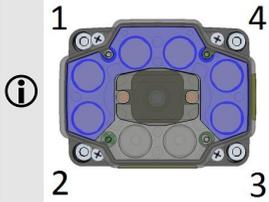
Note: Ensure that the top of each piece of the assembly lines up and the gasket does not stick out.

- Place the cover on the unit.



- Screw in the four screws.

Note: Tighten in sequence. Torque limit: 9 Ncm (0.08 in-lbs).



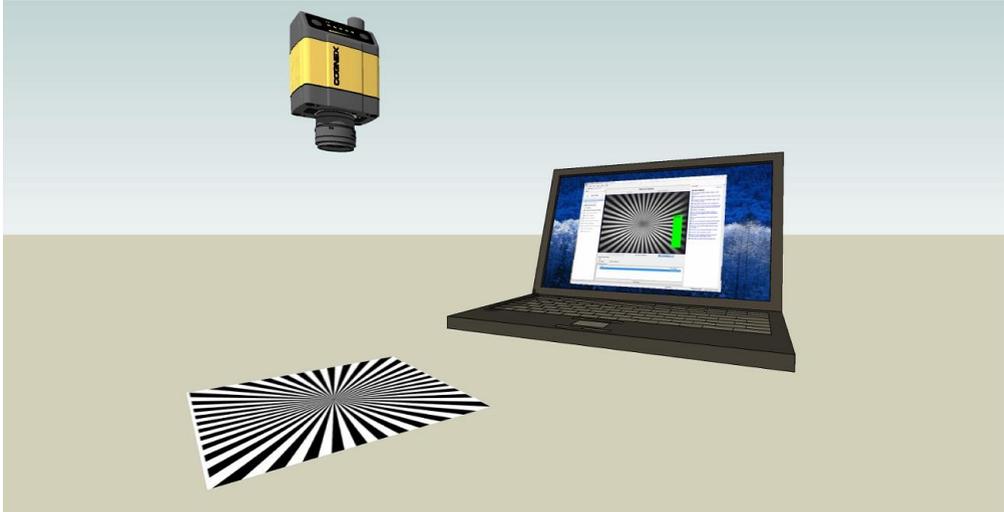
Note: The protection foil must be removed from both light (outer) and lens (center) foils of the polarized cover.

Installing a C-Mount Lens

- Remove the lens plug as described in [Installing the Lens](#).
- Thread the lens into the reader.



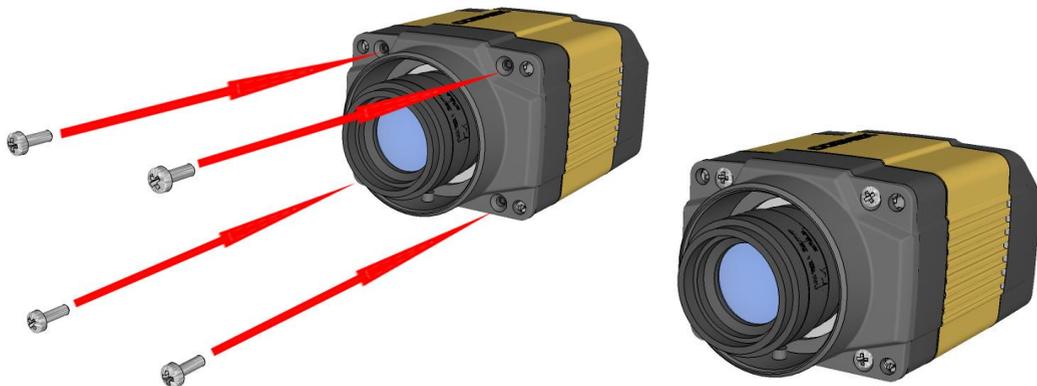
3. Place the reader at the desired working distance from focus target.
 - a. Connect the reader to the DataMan Setup Tool.
 - b. On the **Results Display** pane, check the **Focus Feedback** option and enable **Live Display**.
 - c. Use the DataMan Focus Target template, available through the Windows **Start** menu or the DataMan Setup Tool **Help** menu, to align the edge of the reader body to the line marked with the target distance used in your application.
 - d. Adjust focus for maximum sharpness. Enhance image quality in the DataMan Setup Tool for better guidance.



4. Attach the C-Mount cover base.

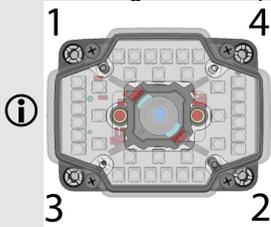


5. Add the screws to the C-mount cover base.

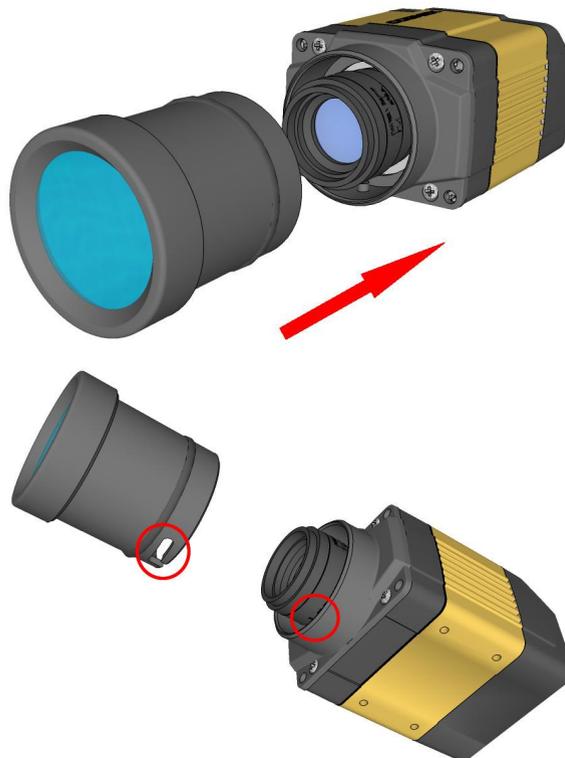


PHILLIPS PAN HEAD M2 X 6MM

Note: Tighten in sequence. Torque limit: 9 Ncm (0.8 in-lbs).



6. Attach the front cover.



Note: Do not unscrew the front-most part of the nose of the cover to avoid risking the glass lens falling out.

- Align the peg on the reader and the slot on the cover so that the cover locks in place.

Installing a Filter

Perform the following steps to install an optical filter in the front cover.

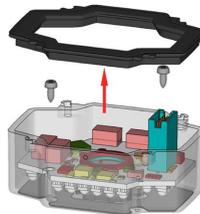
Observe the following constraints on the filter:

- Diameter (\varnothing): $12.3\text{mm} < \varnothing < 12.7\text{mm}$
- Thickness (t): $1.6\text{mm} < t < 2\text{mm}$

- First, remove the front cover: unscrew the four M3 screws and take off the LED cover.



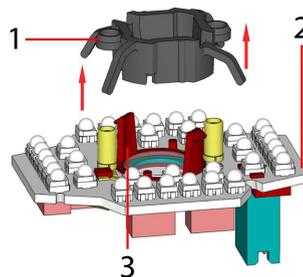
- Take off the rubber seal, remove the two smaller screws, and remove the PCB.



Note: Use a T6 Torx screwdriver.

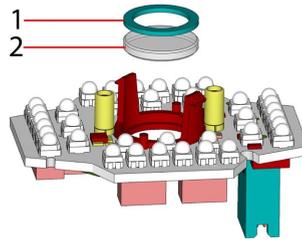
WARNING: Make sure that no electrostatic charges are applied to the PCB. (E.g. wear ESD shoes.)

- Working from the front of the PCB, press the legs of the filter holder gently together and pull off the clip.



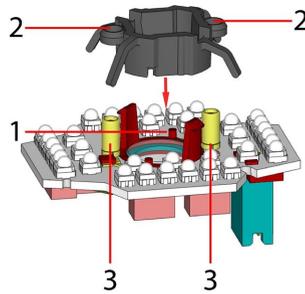
1	Filter retaining clip
2	LED PCB
3	Filter holder

4. Insert first the filter glass, then the soft spacer (which was removed from its place between the filter holder and the filter retaining clip) into the filter holder. A pair of tweezers may be helpful.



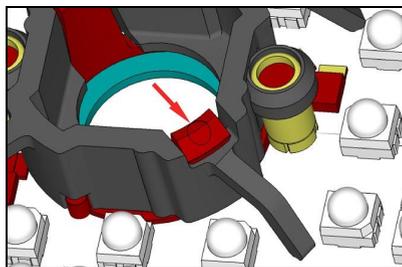
1	Soft spacer
2	Filter glass

5. Snap fit the filter retaining clip onto the legs of the filter holder. Ensure that the laser modules slide into the laser guides and the orientation pin fits into the filter retaining clip.



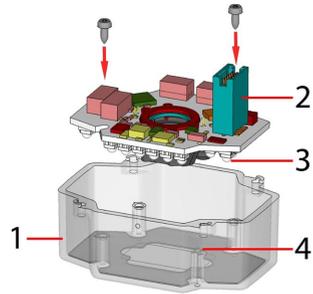
1	Orientation pin
2	Laser guide
3	Laser module

Check that the snap hooks are correctly positioned and fully engaged.



- Insert the PCB with the filter retaining clip and the filter holder back into the front cover. Ensure that the hole in the PCB meets the orientation pin in the front cover. Fix the PCB with two Torx 6 screws of size 2.0x5 mm.

Note: Use a torque of 8-10Ncm (11-14 oz-in).



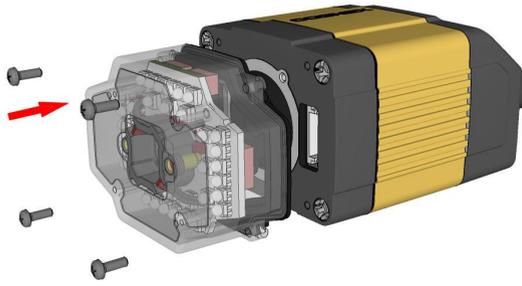
1	LED cover
2	PCB with filter holder and filter retaining clip
3	Notch in PCB
4	Orientation pin

- Insert the rubber seal.



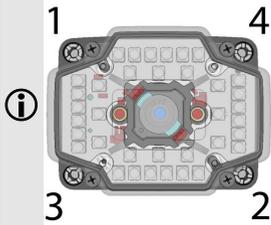
Note: The seal can only be installed in the correct orientation.

8. Remount the front cover. Observing the tightening sequence below, tighten all four screws to 9 Ncm using a torque wrench.



PHILLIPS PAN HEAD M2 X 6MM

Note: Tighten in sequence. Torque limit: 9 Ncm (0.08 in-lbs).

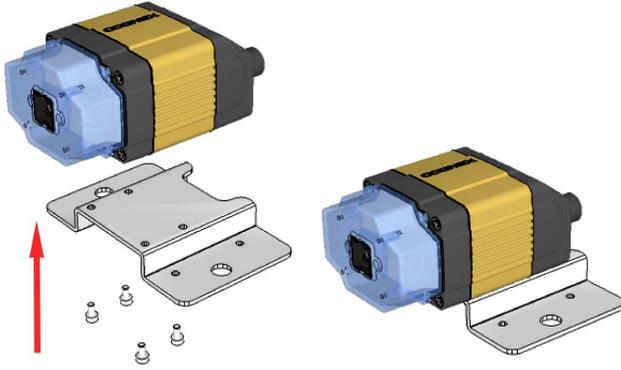


External Light Mounting Brackets

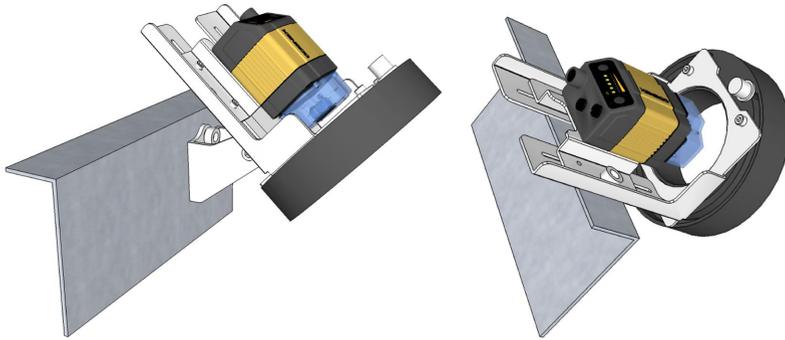
You can mount your reader using external light mounting brackets. The brackets are intended to mount any of the different lights to the reader. They can also be used to mount the reader (with lights attached) to your machine. Pivot mounting, as illustrated, is optional.

Perform the following steps to mount your reader with external mounting brackets in order to use the light options illustrated below:

1. Mount your reader on the camera plate and attach the screws.

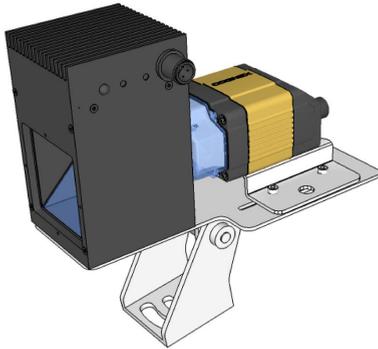


2. Mount your reader with the camera plate attached to any of the external light bracket adapters.

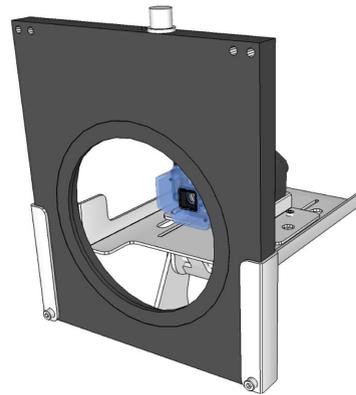


3. Choose one of the following light options:

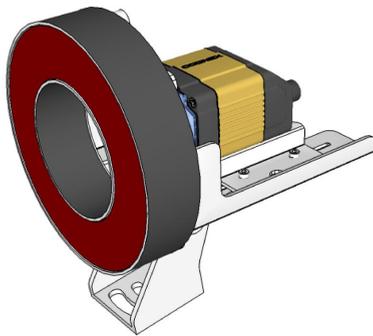
Using coaxial (DOAL) light



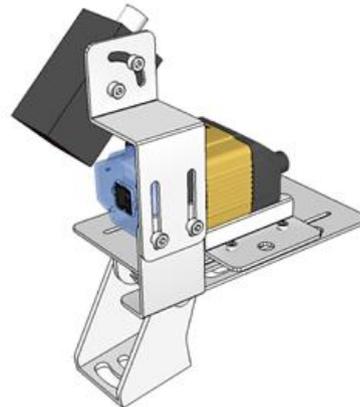
Using dark field light



Using ring light

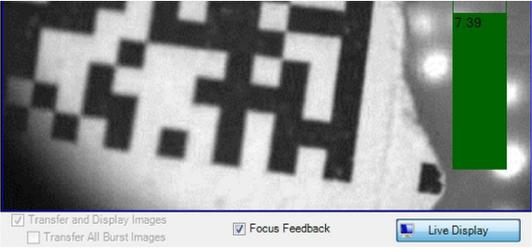
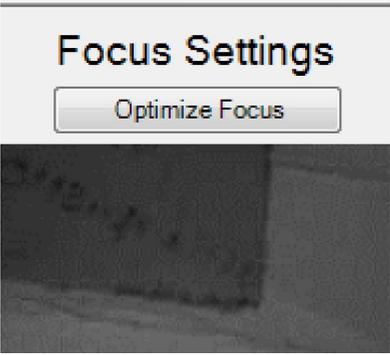
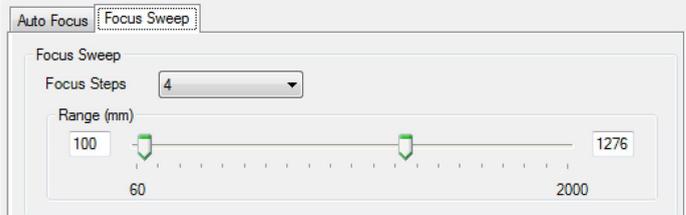


Using spot light



Setting Focus

There is a range of reading distances available for different code sizes and focus positions. To set focus on your reader, use the following options depending on whether you use a liquid lens or a manual focus lens.

Liquid Lens	Manual Focus Lens
<p>Focus Feedback (Results Display)</p> 	<p>Focus Feedback (Results Display)</p> 
<p>Optimize Focus (Focus Settings)</p> 	
<p>Focus Sweep (Focus Settings)</p> 	

For setting **Focus Sweep**, follow these guidelines:

- If your application has a consistent reading range, set the focus range to a limited depth of field with no steps (for example, set it to 20) or with limited steps (for example, set it to 2 steps between 0 and 30). This way you can achieve fast performance.
- If your application has a variety of code types and sizes, set the focus range to a wider depth of field with increased number of steps (for example, set it to 6 steps between 0 and 200). This way you can get better coverage.

Both **Optimize Focus** and the **Focus Feedback** use the same procedure for testing the current focus. They consider various subregions of the image.

For maximizing the performance of **Optimize Focus** and **Focus Feedback**, observe the following:

- Use a focus target (such as the one supplied with this Quick Reference Guide) that includes high-contrast features and is big enough that it fills at least a 100x100 pixel region in the center of the field of view at the desired working distance.

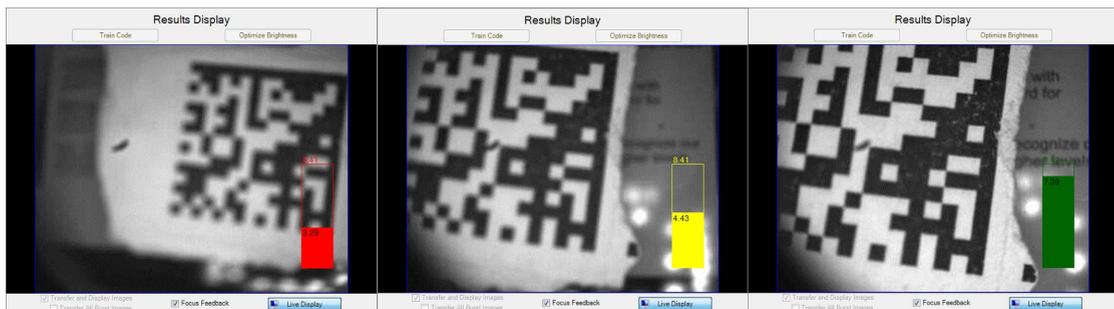
- Make sure the target is perfectly flat (avoid floppy pieces of paper).
- Make sure that the target is perfectly perpendicular to the optical axis of the reader.
- Make sure that the rest of the field of view (such as the part not covered by the focus target) does not contain any high-contrast features. For example, you would ideally fill the entire field of view with a white card or sheet of paper (no shadows), then position the focus target in the middle.
- The supplied focus target (120x120mm) is appropriate for typical working distances. If you are using a working distance such that the target does not completely fill the image, make sure that there are no high-contrast features visible outside of the target (see previous bullet).

Note:

- If you are using the focus feedback indicator to adjust a manual focus lens, you must apply power to the reader before you remove the cover. If you remove the cover before applying power, the internal illumination will not function.
- If you are using a Liquid Lens, make sure that the cover is mounted and connected before you apply power. If you attach or remove the front cover while the reader is powered, the focus settings will be lost.

Perform the following steps to use **Focus Feedback**:

1. Connect the reader to the DataMan Setup Tool.
2. On the **Results Display** pane, check the **Focus Feedback** option and enable **Live Display**.
3. The **Focus Feedback** column is displayed in colors ranging from red (bad focus) through yellow to green (sharp focus).



Position the reader in a way that the focus column becomes green. The maximum focus peak gets locked for better orientation. When the focus column is green, the lens is in focus and you will be able to decode the image.

Field of View and Reading Distances

The following maps show the field of view of the DataMan 300 series readers. Reading distance values are also provided for 1-D and 2-D example code distances.

For the C-mount (or other non-Cognex) and S-Mount lenses, the focal length of the lens, focus setting, and aperture setting determine the field of view and reading distance.

Reading Distance and Field of View (DataMan 300 Readers with a 10.3 mm Lens)

The map below shows the field of view (FoV) of the DataMan 300 series readers with a 10.3 mm lens (with or without a liquid lens).

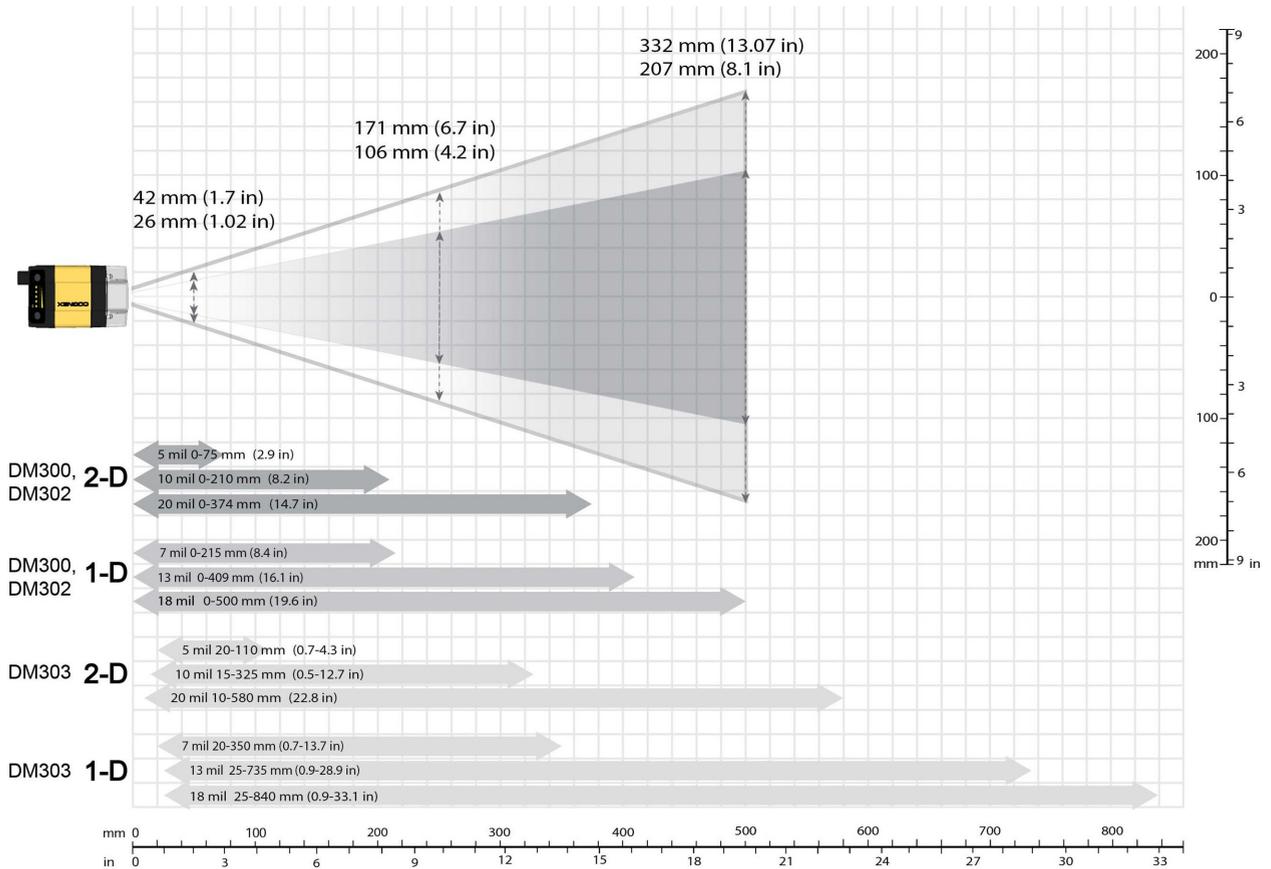
The FoV values are shown as follows:

- outer: DM302, DM303
- inner: DM300

The reading distances for the DM300 and DM302 readers are the same. DM303 features a higher resolution and more pixels in about the same sensor size.

The following table shows the FoV widths in mm at various distances.

Distances in mm	DM300	DM302/DM303
50	26	42
100	46	74
150	66	106
250	106	171
500	207	332



Reading Distance and Field of View (DataMan 300 Readers with a 16 mm Lens)

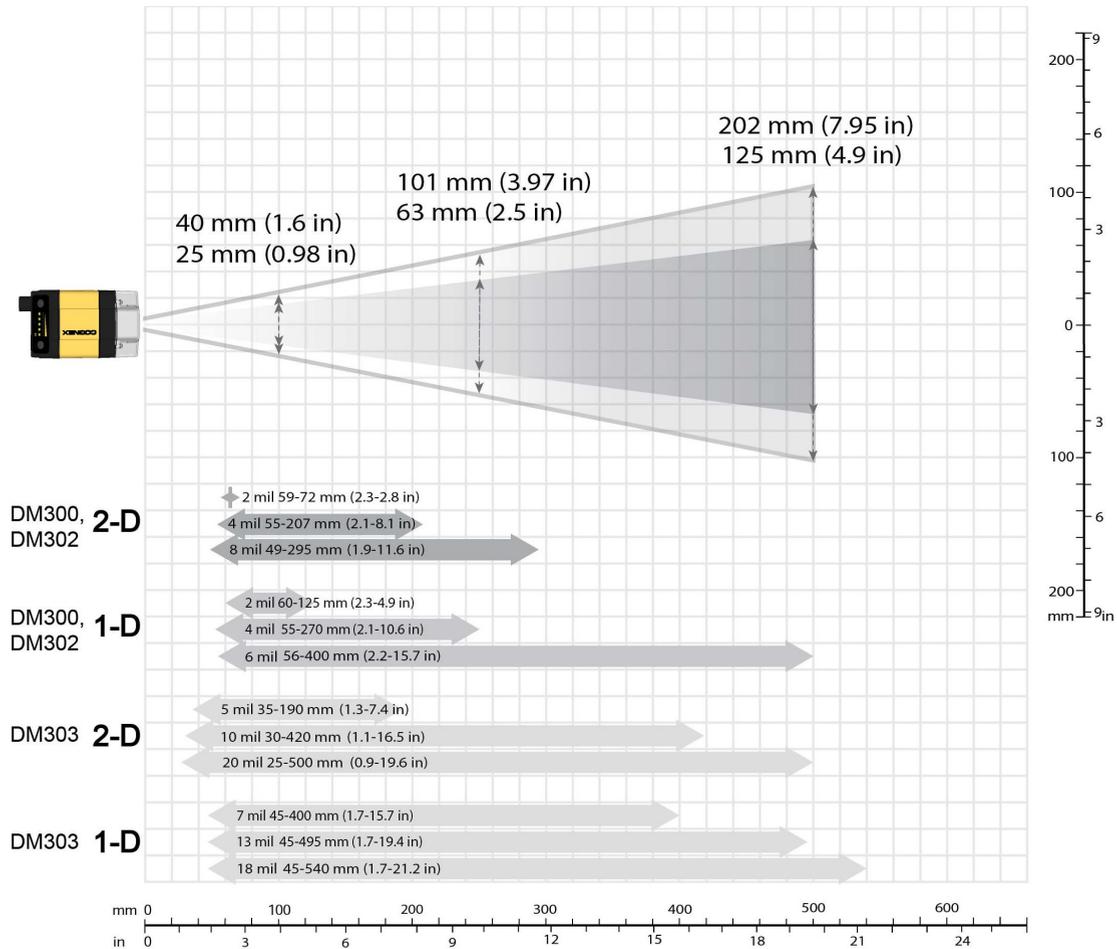
The following map shows the FoV of the DataMan 300 series readers with a 16 mm lens (with or without a liquid lens). The FoV values are shown as follows:

- outer: DM302, DM303
- inner: DM300

The reading distances for the DM300 and DM302 readers are the same. DM303 features a higher resolution and more pixels in about the same sensor size.

The following table shows the FoV widths in mm at various distances.

Distances in mm	DM300	DM302/DM303
50	13	20
100	25	40
150	38	60
250	63	101
500	125	202



Reading Distance and Field of View (DataMan 300 Readers with a 19 mm Lens)

The map below shows the FoV of the DataMan 300 series readers with a 19 mm lens (with or without a liquid lens).

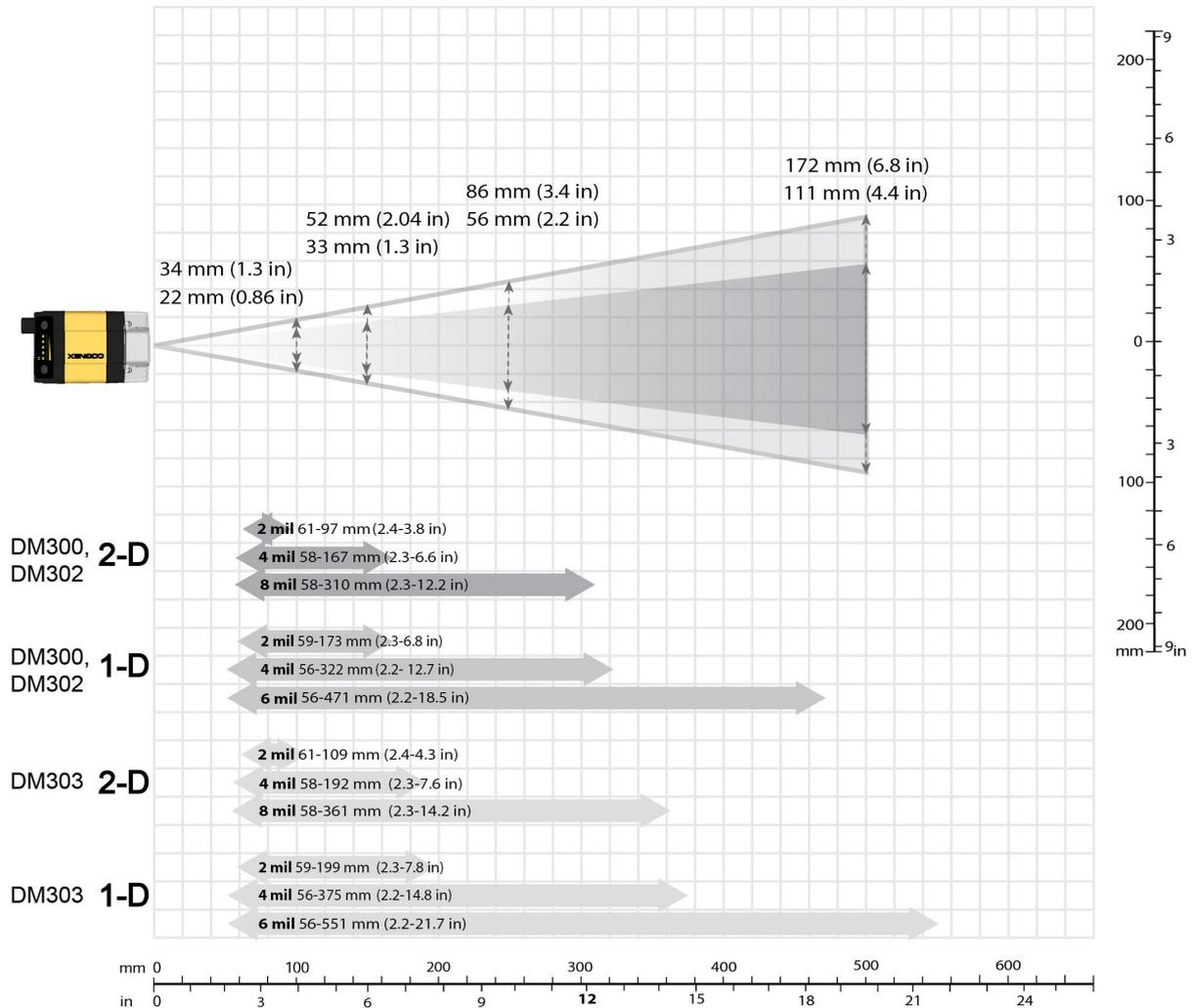
The FoV values are shown as follows:

- outer: DM302, DM303
- inner: DM300

The reading distances for the DM300 and DM302 readers are the same. DM303 features a higher resolution and more pixels in about the same sensor size.

The following table shows the FoV widths in mm at various distances.

Distances in mm	DM300	DM302/DM303
50	11	17
100	22	34
150	33	52
250	56	86
500	111	172



Reading Distance and Field of View (DataMan 300 Readers with a 25 mm Lens)

The following map shows the FoV of the DataMan 300 series readers with a 25 mm lens (with or without a liquid lens).

The FoV values are shown as follows:

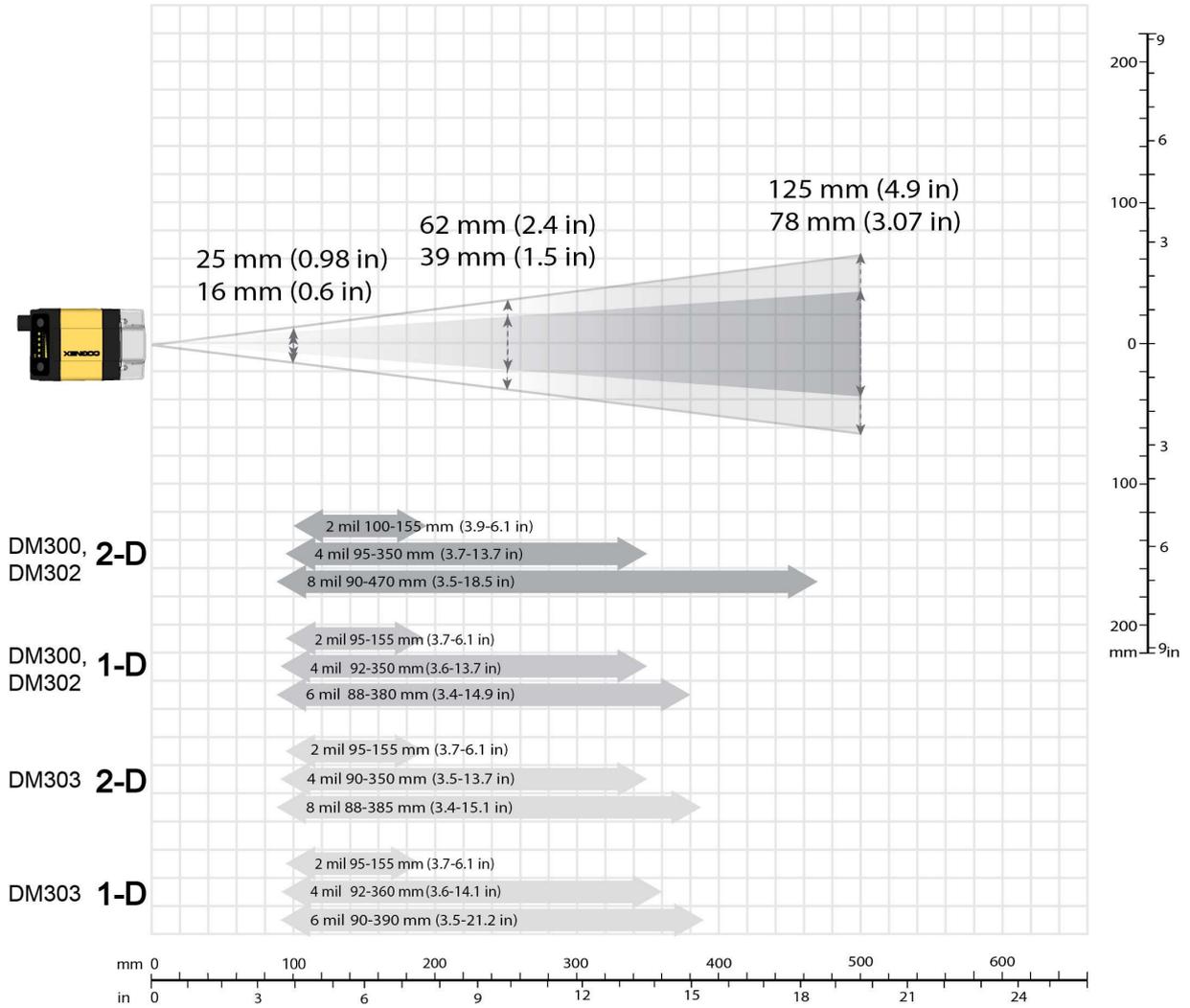
- outer: DM302, DM303
- inner: DM300

The reading distances for the DM300 and DM302 readers are the same. DM303 features a higher resolution and more pixels in about the same sensor size.

The following table shows the FoV widths in mm at various distances.

Distances in mm	DM300	DM302/DM303
50	8	12
100	16	25
150	23	37

Distances in mm	DM300	DM302/DM303
250	39	62
500	78	125



DataMan 300 Series Specifications

Weight	165 g			
Operating Temperature	0°C — 45°C (32°F — 113°F)			
Storage Temperature	-10°C — 60°C (-14°F — 140°F)			
Maximum Humidity	< 95% (non-condensing)			
Environmental	IP65 (with cable or protection cap attached to all connectors, front cover properly installed)			
Vibration	EN61373 including IEC 60068-2-6, 60068-2-64 6.4 and 60068-2-27			
RS-232	Rx/D, Tx/D according to TIA/EIA-232-F			
Codes	Data Matrix™ (IDMax: ECC 0, 50, 80, 100, 140, and 200; IDQuick: ECC200) QR Code and microQR Code, MaxiCode, Aztec Code UPC/EAN/JAN Codabar, Interleaved 2 of 5, Code 39, Code 128, and Code 93, Pharma, Postal, RSS/CS, PDF 417, MicroPDF 417, MSI			
Discrete I/O operating limits	HS Output 0,1,2,3	I_{MAX}	@ 24 VDC	50 mA
		R_{MAX}	@ 12 VDC	200 Ω
			@ 24 VDC	470 Ω
	Input 0 (Trigger)	V_{IH}	± 12 — ± 28 V	
		V_{IL}	0 — ± 8 V	
	Input 1	I_{TYP}	@ 12 VDC	2.0 mA
		@ 24 VDC	4.2 mA	
Power Supply Requirements	24V +/- 10%	Maximum current: 250 mA (internal illumination) 850 mA (internal + external lights) Maximum power: 5W (internal illumination) 18W (internal + external lights)		
Light Connector	Current load	Average: 500mA Peak: 1A (max. 100 μ s)		
Ethernet Speed	10/100			
Duplex Mode	Full duplex or half duplex			

DataMan 300 Series Imager Specifications

Specification	DataMan 300 Series Imager
Image Sensor	1/1.8 inch CMOS
Image Sensor Properties	6.9 mm x 5.5 mm (H x V); 5.3 μm square pixels (DataMan 300 and 302), 4.5 μm square pixels (DataMan 303)
Image Resolution (pixels)	<ul style="list-style-type: none"> • DataMan 300: 800 x 600 • DataMan 302: 1280 x 1024 • DataMan 303: 1600 x 1200
Electronic Shutter Speed	<ul style="list-style-type: none"> • minimum exposure: 5 μs (DataMan 300 and 302), 12 μs (DataMan 303) • maximum exposure: 1000 μs with internal illumination/100000 μs with external illumination
Image Acquisition at Full Resolution	<ul style="list-style-type: none"> • DataMan 300 and 302: up to 60 fps • DataMan 303: up to 40 fps
Lens Type	<ul style="list-style-type: none"> • S-Mount 10.3 mm F:5 (with optional liquid lens) • S-Mount 16 mm F:9 • C-Mount lenses (with limitations, see below)

Limitations to C-Mount lenses:

- The length of the thread may not exceed 5.4 mm.
- The back side of the lens may not exceed beyond the C-Mount threads. Possibly a lens spacer is required.
- When using the C-Mount lens cover, lens dimensions including spacer and filters may not exceed 32 x 42 mm (diameter x length).

To avoid accelerated aging of built-in illumination LEDs, which results in light intensity degradation, consider the following duty cycle limits above 25°C (77°F):

- at 35°C (95°F): 4% duty cycle, for example, 750 μs exposure and 18493 μs interval
- at 45°C (113°F): 2% duty cycle, for example, 350 μs exposure and 18093 μs interval or 1000 μs exposure and 50000 μs interval

Using Your DataMan 300

This section provides information on the installation process of the DataMan Setup Tool, troubleshooting Ethernet connection issues, tuning, image filtering, as well as reader training and package detection.

Installing DataMan Software and Connecting the Reader

Follow the steps below to install and connect your reader to the DataMan Setup Tool:

1. Check the DataMan **Release Notes** for a full list of system requirements.
2. Download the DataMan Setup Tool from <http://www.cognex.com/support/dataman> and follow the on-screen steps.
3. Connect the DataMan 300 Series reader to your PC.
4. Launch the DataMan Setup Tool and click **Refresh**.
Detected readers will appear under **COM ports** or **Network devices**, or both.
5. Select a reader from the list and click **Connect**.

⚠ WARNING: Do not stare into beam when adding, removing, or changing cables. Cognex recommends to unpower the reader any time you make physical changes to it.

Follow the steps below to connect your reader to power and network:

1. Connect the I/O+RS232+24V cable to your reader.
2. For a network connection, connect your reader, through an Ethernet cable, to your network.
3. Connect the cable to a 24V power supply.

Troubleshooting an Ethernet Connection

Based on your network configuration, the DataMan Setup Tool may not be able to communicate with the reader and it will not appear in the list of **Network devices**.

1. First, check your Ethernet connection with the reader and click **Refresh** in the DataMan Setup Tool.
2. Next, scan the **Enable DHCP** code in the **Reader Configuration Codes** document available from the **Start** menu.
This might allow the reader to acquire a suitable IP address from a DHCP server on your subnet.

If the reader still does not appear, you can use either the **Add Device** or **Force Network Settings** options in the DataManSetup Tool.

For more information, see the **DataMan Setup Tool Quick Reference Guide**.

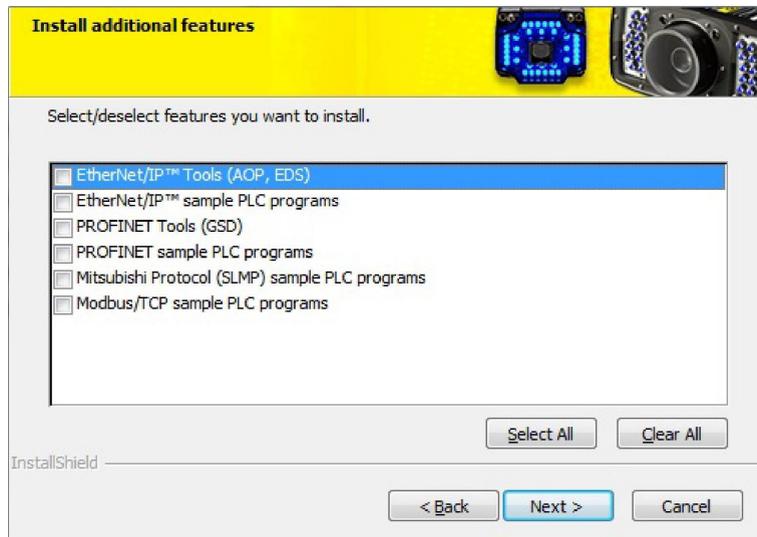
You can also use the RS-232 connection to configure the reader with parameters that allow it to communicate over your Ethernet network.

Industrial Protocols

The DataMan 300 readers support the following industrial protocols:

- EtherNet/IP™
- PROFINET
- MC Protocol
- Modbus TCP

Select industrial protocol samples and tools you want to use when you install the DataMan Setup Tool.



There are three ways to enable or disable industrial protocols. Using either method, a reboot is required for the changes to come into effect.

- Enable the protocols using the **Industrial Protocols** pane of the DataManSetup Tool (under **Communication Settings**).
- Scan the appropriate **Reader Configuration codes** (see *Reader Configuration Codes* available through the Windows **Start** menu or the Setup Tool **Help** menu).
- Send the appropriate **DMCC** (see *Command Reference* available through the Windows **Start** menu or the Setup Tool **Help** menu).

For more information on using the industrial protocols, read the **DataMan Communications and Programming Guide** available through the Windows **Start** menu or the Setup Tool **Help** menu.

DataMan 300 Series Triggering

DataMan 300 readers support the following trigger modes:

- **Self**: At an interval you configure, the reader automatically detects and decodes codes in its field of view. If you set a higher re-read delay than the trigger interval, there is a code output only once until the code is out of the field of view for the duration of the re-read delay.
- **Single** (external trigger): Acquires a single image and attempts to decode any symbol it contains, or more than one symbol in cases where multicode is enabled. The reader relies on an external trigger source.

- **Presentation:** Scans, decodes and reports a single code in the field of view. The reader relies on an internal timing mechanism to acquire images.
- **Manual:** Begins acquiring images when you press the trigger button on the reader, and continues acquiring images until a symbol is found and decoded or you release the button.
- **Burst:** Performs multiple image acquisitions based on an external trigger and decodes any symbol appearing in a single image or within a sequence of images, or multiple symbols in a single image or within a sequence of images when multicode is enabled. You can control the number of images within each burst and the interval between image acquisitions.
- **Continuous:** Begins acquiring images based on a single external trigger and continues to acquire and decode images until a symbol is found and decoded, or until multiple images containing as many codes as specified in multicode mode are located, or until the trigger is released. You can configure your reader to acquire images based on the start and stop signal from separate digital IO pulses.

In **Single**, **Burst**, **Continuous**, and **Self** trigger modes, it is possible to **synchronize image acquisition** on multiple devices using the synchronization interface. Synchronization allows using one shared strobe illumination to expose all sensors simultaneously. You can synchronize up to 16 readers, with optionally triggering them in a defined sequence to avoid that opposing readers blind each other. Note that this and other imager settings will not get synchronized by this mechanism - for example, you must configure exposure and gain on each reader individually. This feature only synchronizes the actual image acquisition, triggering happens through the existing master-slave mechanism.

To set up synchronized acquisition on DM300, enable PTP (Precision Time Protocol) on the **Master/Slave** pane of the DataMan Setup Tool under Synchronized Readers (IE1588). Set the Slave Only accordingly on each reader individually to define **Master/Slave** reader relations.

The setting in 7 steps:

1. Check the Enable PTP check box.
2. Keep set the Slave Only check box if there is already a PTP master clock in the net (uncheck otherwise on at least one reader)
3. Tune fine by Priority 1 and Priority 2
4. Status: Set the protocol state
5. Enable MST Sync by trigger: Use PTP to actually sync Master/Slave triggering
6. Time between Trigger Start and the Synchronized Acquisition Timestamp: Time the Master adds to the trigger to make sure all devices already received the TCP package before this time stamp.
7. Local Offset Added to the Synchronized Acquisition Timestamp: Time the slave adds to the timestamp to realize offset image acquisitions.

Synchronized Readers (IEEE1588)

PTP Stack Parameters

Enable PTP

Slave Only

Priority 1 - + 128

0 255

Priority 2 - + 128

0 255

Status DISABLED

Trigger Synchronization

Enable MST Synchronized by PTP

Time Between Trigger Start and the Synchronized Acquisition Timestamp [μs] - + 100000

0 1000000

Local Offset Added to the Synchronized Acquisition Timestamp [μs] - + 0

0 1000000

External Triggers

If you are using external triggering you can use any of the following methods to trigger your DataMan 300 reader:

- Press the trigger button on the reader.



- Send a pulse on the I/O cable:
 - Trigger + (red)
 - Trigger - (black)
- Send a serial trigger command over the RS-232 connection or Ethernet connection.
- Press <CTRL-T> on the keyboard while the DataMan Setup Tool has the input focus.

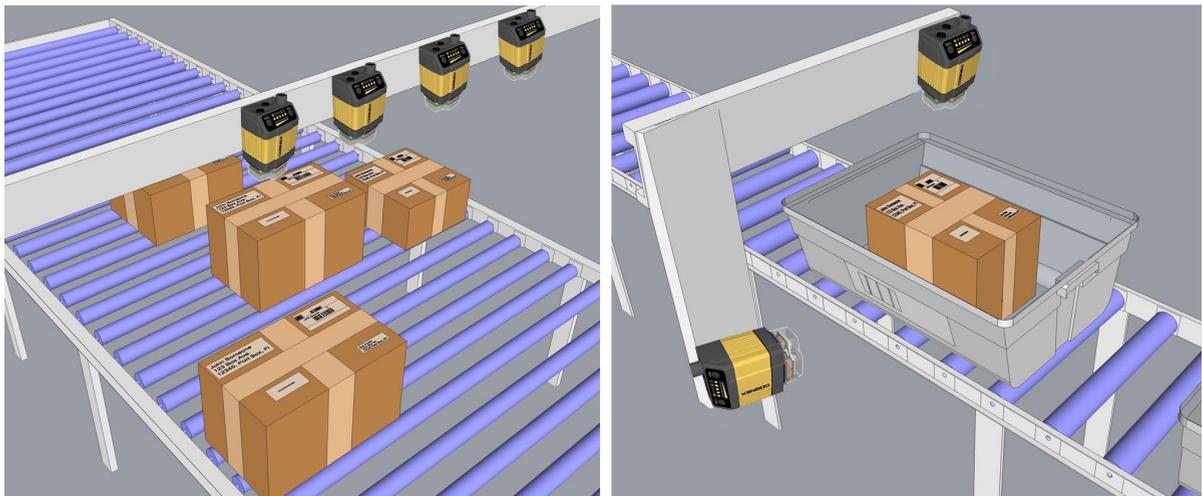
- Click the **Trigger** button in the DataMan Setup Tool:



Multi-Reader Triggering

For trigger modes other than Presentation, the DataMan 300 supports multi-reader triggering, also known as master-slave configuration. In this configuration, you configure multiple DataMan readers as a group. Whenever any reader in the group is triggered, all the readers are triggered and the results from all the readers are assembled and transmitted by a single reader that you designate as the master.

Multi-reader triggering is used to support extended field of view reading and reading codes from multiple product surfaces:



To configure multi-reader triggering, select the **Master/Slave** pane in the Setup Tool (under **System Settings**). For more information, see the *DataMan Fixed Mount Readers Reference*.

Note: The DataMan 300 readers use IEEE1588 for high speed trigger synchronization.

DataMan 300 Series Tuning

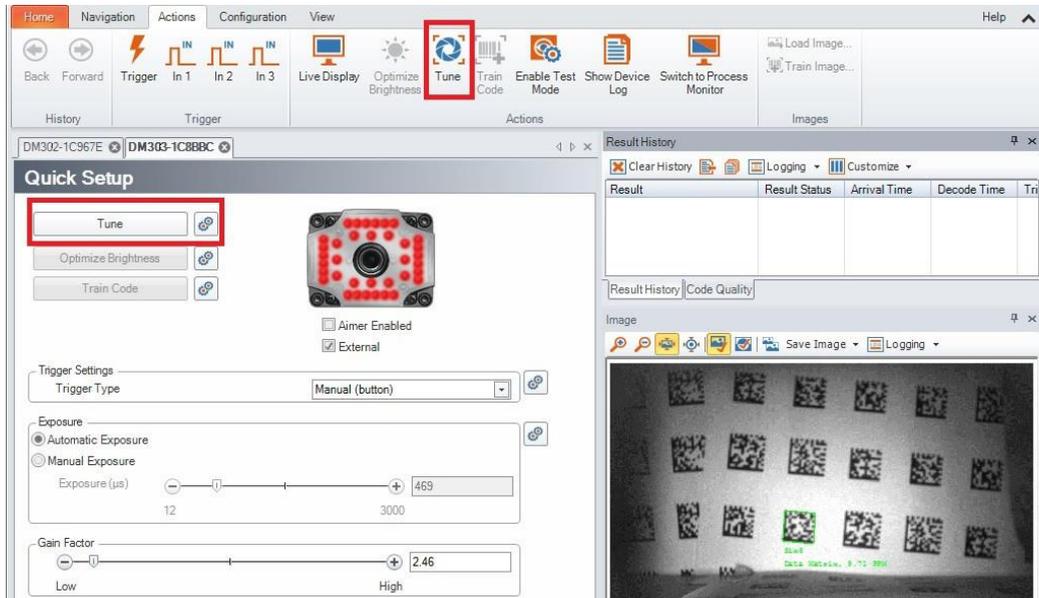
By tuning, your reader automatically selects the best settings for the given reading situation, based on parameters of illumination, camera and decoder properties, and focal distance. Tuning autodisciminates all enabled symbologies (both 1-D and 2-D). If multiple symbols are found in the field of view, tuning locks on the first one found. Use this feature to create an optimum setting to read your codes.

You can use any of the following methods to tune your reader:

- Press the **Tune** button at least for 3 seconds on your reader. The first press starts the tuning, and the second press cancels the tuning, if it is still ongoing.

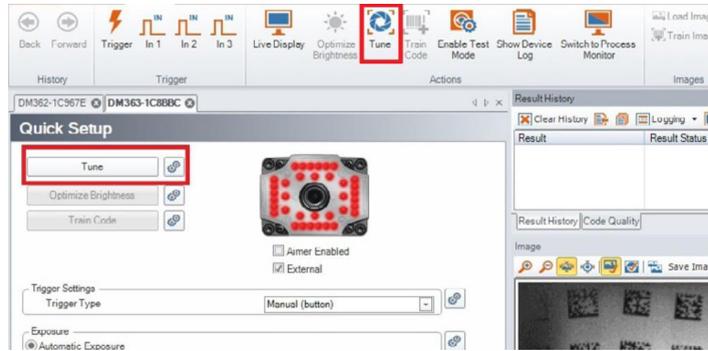


- Turn on tuning in the DataMan Setup Tool.



- Start tuning by sending a DMCC, for more information, see the *DataMan Control Commands Documentation*, available through the Windows **Start** menu or the DataMan Setup Tool **Help** menu.

- Use Input line 1 for tuning. Go to the **System Settings** pane of the DataMan Setup Tool and check **Tune**.



You can also use the **In 1** button on the toolbar.



DataMan 300 Series Image Filtering

You can define a stack of filters to be applied to each image acquired by your DataMan 300 series reader. You can select the following filters on the DataMan Setup Tool's Image Filtering pane (under Light and Imager Settings):

- *Equalize*
This filter redistributes the brightness values of the pixels in the image. As a result, the range of brightness levels are more evenly represented. Use this filter if you have too dark or too bright images.
- *Stretch*
This filter linearly scales up or stretches the greyscale values in the input image to the full 256-step greyscale. The result is an output image with increased contrast.
- *Low Pass*
Using this filter results in output images where edges are smoothed or blurred.
- *Dilate*
This filter increases bright features and shrinks dark features. The result is an output image with larger areas of bright pixels. Use this filter to remove dark specks.
- *Erode*
This filter shrinks bright features and increases dark features. The result is an output image with larger areas of dark pixels. Use this filter to remove light specks.
- *Open*
This filter performs an erosion followed by a dilation to filter out bright features that are smaller than the size of the processing neighborhood. The result is an output image with slightly decreased overall brightness.
- *Close*
This filter performs a dilation followed by an erosion to filter out dark features that are smaller than the size of the processing neighborhood. The result is an output image with slightly increased overall brightness.
- *Auto Stretch*
This filter reduces the pixel value range. It maps the pixel values from 0 to 255.
- *Optical Density*
This filter specifies an inversion of pixel values based on a logarithmic scale. The result is an output image that reveals the density of objects and features in the input image by measuring the amount of light that passes through them. Denser objects and features are represented by lighter pixels in the output image.
- *Invert*
This filter specifies an inversion of pixel values based on the 256-step greyscale. The result is an output image that is a "negative" of the input image.

To use Image Filtering, perform the following steps:

1. On the Image Filtering pane, click **Add**.
2. Select a filter from the **Filter Properties** drop-down box. You can add more than one filter. You can also specify the order in which filtering is done by moving the filters using the **Up** and **Down** buttons.
3. If the filter you selected require further settings, change properties according to your needs.
4. Change the selection in the **Image to Use** group box according to the symbology you want to be filtered (after making sure that that Symbology is enabled):

If no image is read, the Results Display shows the image according to your selection under No-Read Image.
5. Go to the Displayed Image Settings pane and change the Images to Use according to what you want to see on Live Display: the original or the filtered image.

6. You can compare the original and filtered results on the Results Display if you choose the images from the Read Result History.

The example images were taken using the Equalize filter.

Training the Reader

Training your reader with the expected symbology can make the time required to decode successive symbols more consistent. In addition, training may help increase decode yield.

To train your reader, place a code in front of the reader and do one of the following:

- Press and hold the trigger button for a minimum of 3 seconds.



- Click and hold the trigger button in the DataMan Setup Tool for a minimum of 3 seconds.



- Click **Train Code** in the Results Display pane.



You can use training in **Single**, **Burst**, **Continuous** or **Self** trigger modes.

Note: Only a single symbol of each symbology kind can be trained.

Training Feedback

The second LED from left on the reader glows green to indicate that it is currently trained, or yellow to indicate that it is not trained.



Connect the reader to the DataMan Setup Tool to untrain it and allow it to recognize other enabled symbologies.

Incremental Training for Multiple Symbologies

If you want to train the reader to recognize multiple symbologies, you can present a single image showing all the desired symbologies and perform the training procedure previously described.

If you cannot present a single image showing all the necessary symbologies, you can enable incremental training on the **Training** tab of the **Symbology Settings** pane:



With incremental training enabled, you can train the reader using multiple images showing the symbologies you expect to decode. The reader will train each new symbology while retaining the existing trained symbologies.

Package Detection Support

You can connect your package detection sensor to one of the digital inputs of your DataMan reader. When the reader receives a signal that a package is detected, images that the reader collected are not discarded at the end of the trigger. This way you can make sure that there was a package there, only the code was not readable. Looking at the No Read images will help you find out why there was no decode results.

Package detection is only supported with Continuous trigger mode.

To make sure that the No Read images are collected, perform the following:

1. Connect your package detection device to one of the Inputs of your reader.
2. On the Inputs tab (under System Settings), check **Allow Buffered No-Read Images** on the input you connected your reader to.
3. On the **Image Record and Playback** pane of the DataMan Setup Tool, change **What Images to Buffer** to All, or No Read.
 - In the case of **All**, good reads are also saved together with No Reads.
 - In the case of **No Read** the image is buffered if the reader fails to read.

For more information, see the **DataMan Fixed Mount Readers Reference**, available through the Windows **Start** menu or the DataMan Setup Tool **Help** menu.

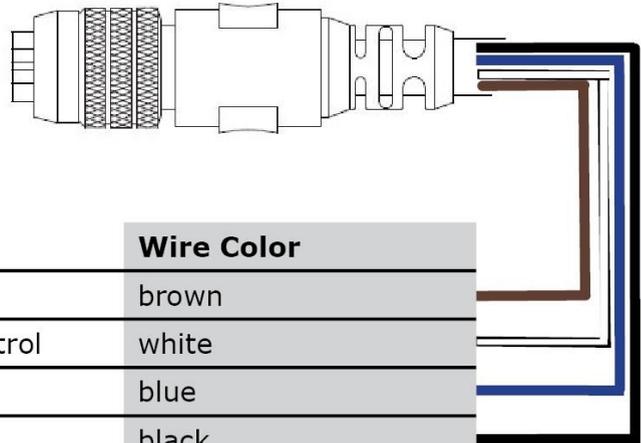
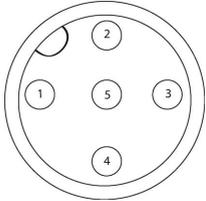
Connections, Optics, and Lighting

This section contains descriptions about the external light control, I/O Cables, high-speed output lines, high-speed output wiring, Ethernet M12 to RJ45 cable, and acquisition triggering.

External Light Control

A 4-pin cable is provided for the external light control.

The drawing on the left shows the socket on the device. This socket does not work if the external light is connected to one of the outputs on the Breakout cable.



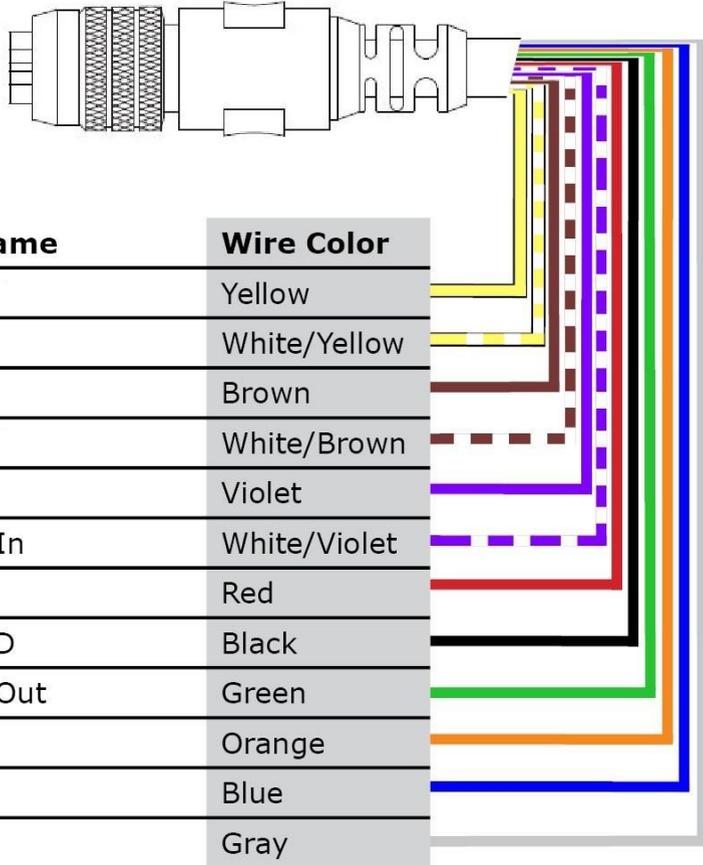
Pin #	Signal Name	Wire Color
1	+24 VDC	brown
2	Brightness Control	white
3	GND	blue
4	Strobe	black
5	Chassis	not connected

Current load: average: 500mA, peak: 1A (max. 100 μ s).

5m Breakout Cable (CCBL-05-01)

The Breakout cable provides access to trigger and high-speed outputs. Unused wires can be clipped short or tied back using a tie made of non-conductive material. For RS-232, use the Power Supply return path for ground.

The drawing on the left shows the plug on the device.

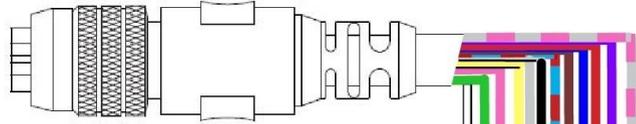


Pin #	Signal Name	Wire Color
1	Out 2	Yellow
2	TxD	White/Yellow
3	RxD	Brown
4	Out 3	White/Brown
5	In 1	Violet
6	Common In	White/Violet
7	+24 VDC	Red
8	RS232GND	Black
9	Common Out	Green
10	In 0	Orange
11	Out 0	Blue
12	Out 1	Gray

5m Breakout Cable (CCB-M12xM12Fy-xx)

The Breakout cable provides access to trigger and high-speed outputs. Unused wires can be clipped short or tied back using a tie made of non-conductive material.

The drawing on the left shows the plug on the device.

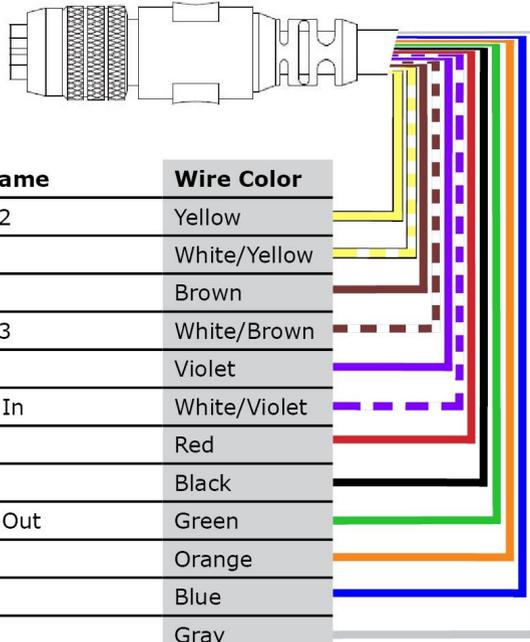


Pin #	Signal Name	Wire Color
1	Out 2	White
2	TxD	Green
3	RxD	Pink
4	Out 3	Yellow
5	In 1	Grey
6	Common In	Black
7	+24 VDC	Brown
8	GND	Blue
9	Common Out	Purple
10	In 0	Red
11	Out 0	Grey/Pink
12	Out 1	Red/Blue

15m Breakout Cable (CCB-PWRIO-15)

The Breakout cable provides access to trigger and high-speed outputs. Unused wires can be clipped short or tied back using a tie made of non-conductive material. For RS-232, use the Power Supply return path for ground.

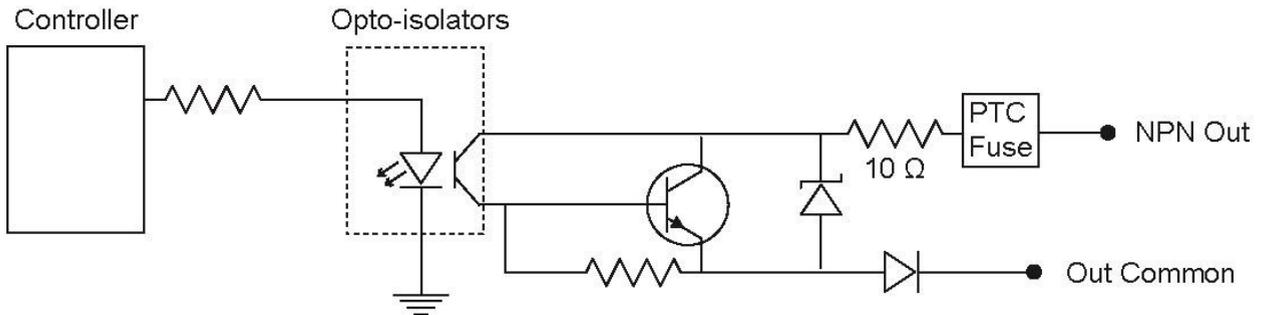
The drawing on the left shows the plug on the device.



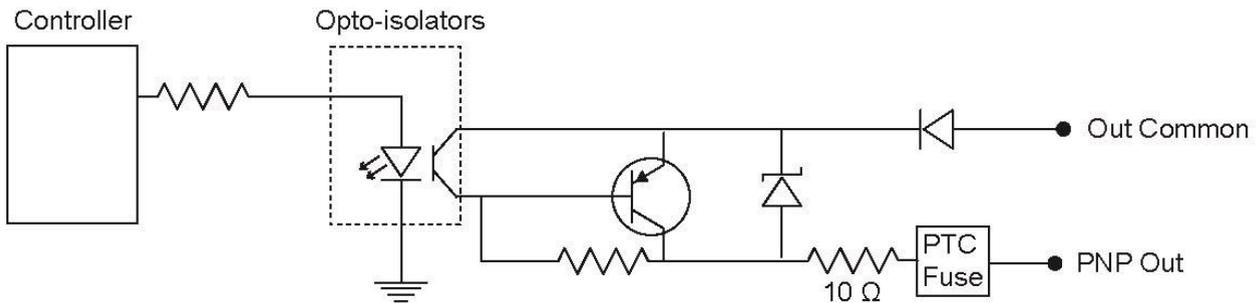
High-Speed Output Lines

Specification	Description
Voltage	26.4V maximum through external load
Current	50mA maximum sink current
	OFF state leakage current 100 μ A
	External load resistance 240 Ohms to 10K Ohms
	Each line rated at a maximum 50mA, protected against over-current, short circuits and transients from switching inductive loads. High current inductive loads require external protection diode.

The high-speed outputs can be used as either NPN (pull-down) or PNP (pull-up) lines. For NPN lines, the external load should be connected between the output and the positive supply voltage (<26.4V). The outputs pull down to less than 3V when ON, which causes current to flow through the load. When the outputs are OFF, no current flows through the load.

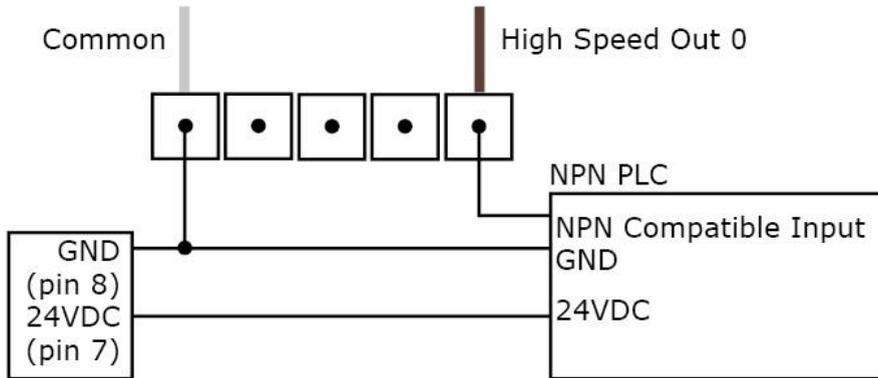


For PNP lines, the external load should be connected between the output and the negative supply voltage (0V). When connected to a 24VDC power supply, the outputs pull up greater than 21V when ON, and current flows through the load. When the outputs are OFF, no current flows through the load.

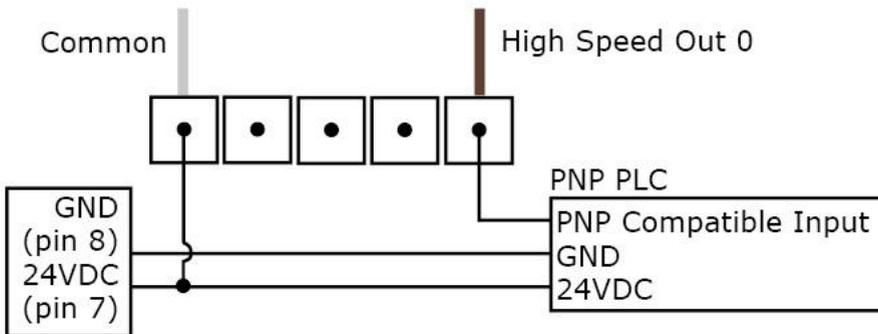


High-Speed Output Wiring

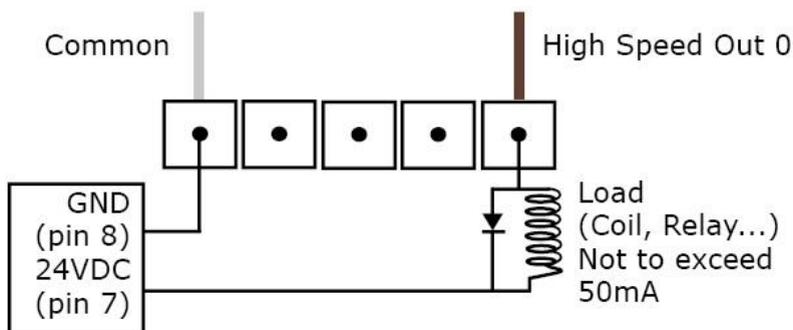
To connect to an NPN-compatible PLC input, connect Output 0, Output 1, Output 2, or Output 3 directly to the PLC input. When enabled, the output pulls the PLC input down to less than 3V.



To connect to a PNP-compatible PLC input, connect Output 0, Output 1, Output 2 or Output 3 directly to the PLC input. When enabled, the output pulls the PLC input up to greater than 21V.

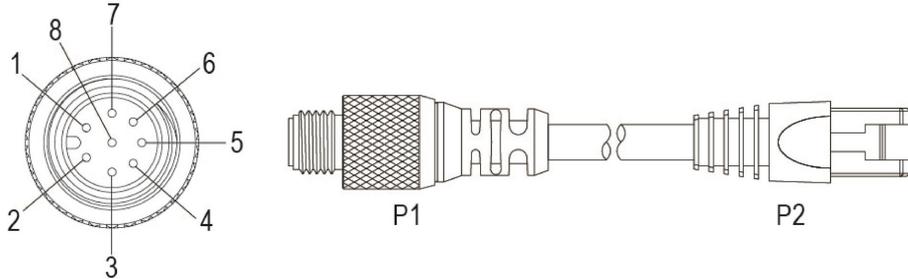


To connect the high-speed outputs to a relay, LED or similar load, connect the negative side of the load to the output and the positive side to +24V. When the output switches on, the negative side of the load is pulled down to less than 3V, and 24 appears across the load. Use a protection diode for a large inductive load, with the anode connected to the output and the cathode connected to +24V.



Ethernet M12 to RJ45 Cable (CCB-84901-y00x-xx)

The Ethernet cable provides Ethernet connection for network communications. The Ethernet cable can be connected to a single device or provide connections to multiple devices via a network switch or router.



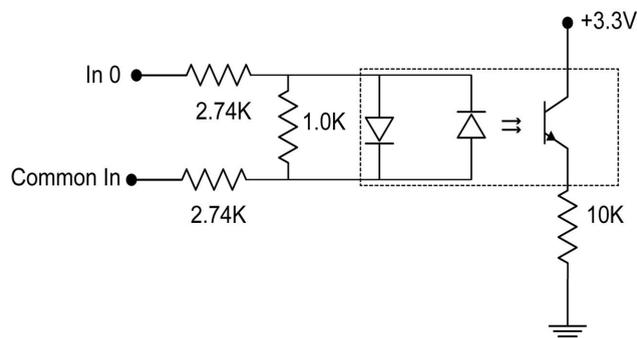
P1 Pin#	Signal Name	Wire Color	P2 Pin#
6	TPO+	White/Orange	1
4	TPO-	Orange	2
5	TPI+	White/Green	3
7	TRMA	Blue	4
1	TRMB	White/Blue	5
8	TPI-	Green	6
2	TRMC	White/Brown	7
3	TRMD	Brown	8

Note: Cables are sold separately. The wiring for this cable follows standard industrial Ethernet M12 specifications. This differs from the 568B standard.

Acquisition Triggering

The acquisition trigger input on the reader is opto-isolated. To trigger from an NPN (pull-down) type photo-detector or PLC output, connect **Common In** to +24V and connect **In 0** to the output of the detector. When the output turns on, it pulls **In 0** down to 0V, turning the opto-coupler on.

To trigger from an PNP (pull-up) photo-detector or PLC output, connect **In 0** to the output of the detector and connect **Common In** to 0V. When the output turns on, it pulls **In 0** up to +24V, turning the opto-coupler ON.

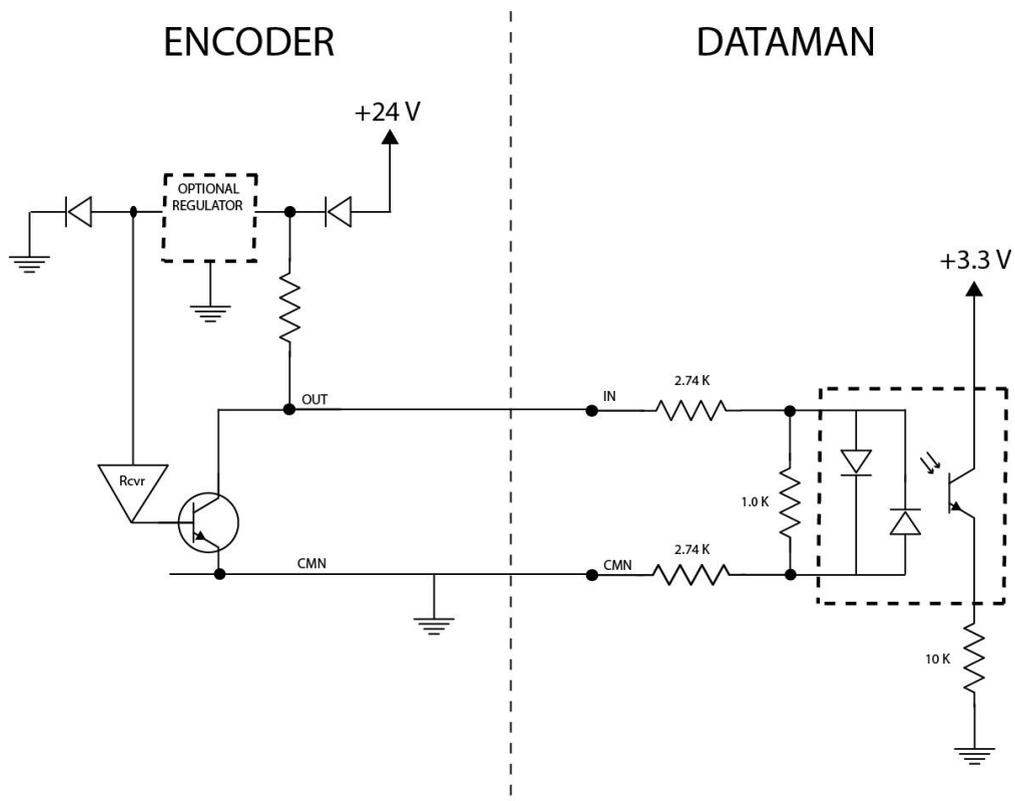


26.4V Max. across input pins - Transition approximately 12V (Min.)

Connecting the Encoder to a DataMan Reader

The encoder has four wires. The color coding of the wires is the following:

Wire Color	Signal Name
Red	+24 V
Black	common- can be connected to either +24V (NPN) or ground (PNP)
White	the output connected to the input line of the DataMan 300 series reader
Bare	ground



According to the speed of the line, set the number of pulses per revolution on the wheel by using the switches on the encoder (for more information, see the encoder documentation). The number of pulses, however, must not exceed 150 Hz.

In the DataMan Setup Tool, configure the use of your DataMan reader with the encoder in the Pulse Encoder tab of the **System Settings** pane.

Compliance Information, Warnings and Notices

Precautions

⚠ WARNING: LASER LIGHT, DO NOT STARE INTO BEAM: CLASS 2 LASER PRODUCT FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE SERIOUS INJURY

- CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- LED RADIATION - DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS - CLASS 1M LED PRODUCT
- Do not attempt to service or repair this product -- return it to Cognex for service.
- Do not permit anyone other than Cognex Corporation to service, repair, or adjust this product.
- Do not attempt to open or modify this device except as described in this document.
- Do not direct or reflect laser light toward people or reflective objects.
- Do not operate this device if it is damaged or if the covers or seals are missing or damaged.
- IP protection is ensured only when all connectors are attached to cables or shielded by a sealing cap.

This Laser Product is designated as Class 2 during all procedures of operation.

Wavelength	650 nm
Laser Power for classification	< 1mW
Beam Diameter	< 3mm at aperture
Divergence	< 1.5 mrad

Regulations/Conformity

DataMan 300 readers meet or exceed the requirements of all applicable standards organizations for safe operation. However, as with any electrical equipment, the best way to ensure safe operation is to operate them according to the agency guidelines that follow. Please read these guidelines carefully before using your device.

Regulator	Specification
USA	FCC Part 15, Class A FDA/CDRH Laser Notice No 50
Canada	ICES-003
European Community	EN55022:2006 +A1:2007, Class A
	EN55024:1998 +A1:2001 +A2: 2003 EN60950
	EN60825-1
Australia	C-TICK, AS/NZS CISPR 22 / EN 55022 for Class A Equipment
Japan	J55022, Class A

Safety and Regulatory	
European Compliance 	The CE mark on the product indicates that the system has been tested to and conforms to the provisions noted within the 2004/108/EEC Electromagnetic Compatibility Directive and the 2006/95/EEC Low Voltage Directive. For further information please contact: Cognex Corporation, One Vision Drive, Natick, MA 01760, USA . Cognex Corporation shall not be liable for use of our product with equipment (i.e., power supplies, personal computers, etc.) that is not CE marked and does not comply with the Low Voltage Directive.
FCC Class A Compliance Statement 	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 commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. 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 personal expense.
Canadian Compliance	This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.
C-Tick Statement 	Conforms to AS/NZS CISPR 22/ EN 55022 for Class A Equipment.
UL and cUL Statement	

Laser Safety Statement



Compliance with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

This device has been tested in accordance with IEC60825-1 2nd ed., and has been certified to be under the limits of a Class 2 Laser device.



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

For European Community Users

Cognex complies with Directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on waste electrical and electronic equipment (WEEE).

This product has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment, if not properly disposed.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems for product disposal. Those systems will reuse or recycle most of the materials of the product you are disposing in a sound way.



The crossed out wheeled bin symbol informs you that the product should not be disposed of along with municipal waste and invites you to use the appropriate separate take-back systems for product disposal.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You may also contact your supplier for more information on the environmental performance of this product.

Reader Programming Codes



Reset Scanner to Factory Defaults



Reboot Scanner

