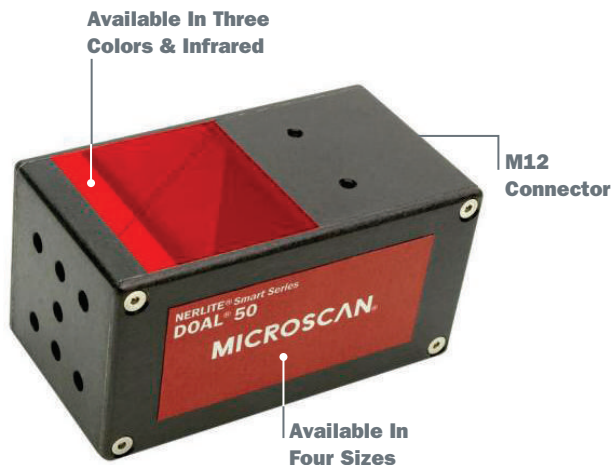


NERLITE® DOAL®



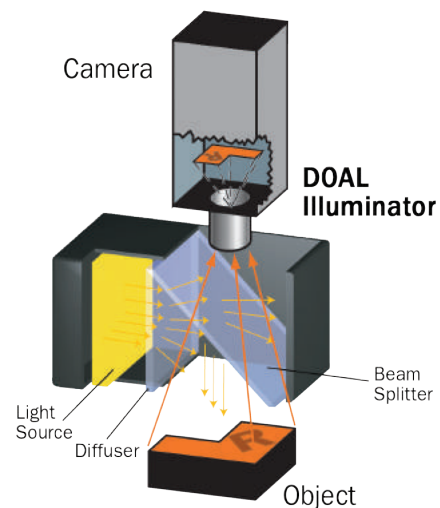
Diffuse On-Axis Lighting (DOAL)

Microscan's Smart Series NERLITE products feature built-in controllers for a complete and easily integrated solution.

DOAL illuminators provide the best contrast for images of features marked or embossed on a flat specular surface with diffuse and uniform on-axis illumination. With the coaxial lighting approach, specular surfaces perpendicular to the camera appear bright, while surfaces which are marked or embossed absorb light and appear dark.

DOAL: At a Glance

- *Smart Series: Built-in controller with adjustable intensity continuous mode and high output strobe mode*
- *Integrated Pulse Width Modulation (PWM) feature for dimming and on-off control*
- *Provides high intensity diffuse illumination with superior uniformity throughout the envelope*
- *Compact, lightweight package can be used on moving camera modules*
- *Passively cooled design for efficient and reliable operation*



Illumination Example:

Object



Resulting Image



Stamped characters on a metal plate: High contrast image allows inspection or reading.

Application Examples

- Evenly illuminate flat, shiny surfaces
- Enhance scribed, indented, or embossed features
- Create contrast between specular, diffuse, or absorptive surfaces
- Diminish visibility of clear overcoats or coverings
- Electronic component inspection
- Fiducial location

NERLITE® DOAL® SPECIFICATIONS AND OPTIONS

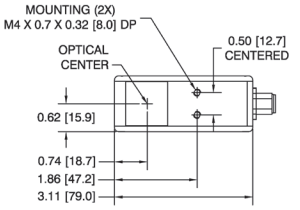
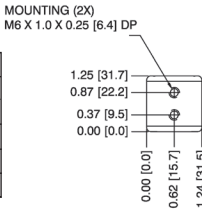
DOAL 25

DESCRIPTION	nm/K	CONT.	STROBE	mcd		mw	
		CURRENT	CURRENT	CONT.	STROBE	CONT.	STROBE
DOAL-25, Smart Series, Red	628 nm	110 mA	400 mA	4173	23369		
DOAL-25, Smart Series, Blue	470 nm	83 mA	200 mA	2522	11096		
DOAL-25, Smart Series, White	5500 K	83 mA	200 mA	5443	23406		
DOAL-25, Smart Series, Infrared	880 nm	75 mA	450 mA			15	134

Light Aperture: 1.00" x 0.95" (25.4 mm x 24.1 mm) Field of View: 0.50" (13 mm)

Stand Off: 0.50" (13 mm) Weight: 4 oz. (113 g)

Dimensions: H 1.24" (31.5 mm) x W 1.25" (31.8 mm) x D 3.11" (79 mm)



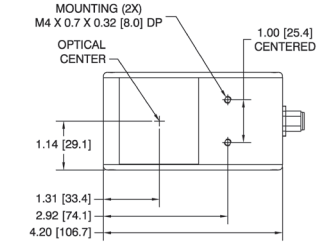
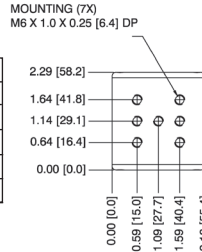
DOAL 50

DESCRIPTION	nm/K	CONT.	STROBE	mcd		mw	
		CURRENT	CURRENT	CONT.	STROBE	CONT.	STROBE
DOAL-50, Smart Series, Red	628 nm	345 mA	1.3 A	15967	76640		
DOAL-50, Smart Series, Blue	470 nm	260 mA	1.0 A	9684	41156		
DOAL-50, Smart Series, White	5500 K	260 mA	1.0 A	20902	89878		
DOAL-50, Smart Series, Infrared	880 nm	250 mA	1.7 A			62	444

Light Aperture: 2.04" x 1.88" (51.8 mm x 47.8 mm) Field of View: 1.00" (25.4 mm)

Stand Off: 1.00" (25.4 mm) Weight: 11.2 oz. (318 g)

Dimensions: H 2.18" (55.4 mm) x W 2.29" (58.2 mm) x D 4.20" (106.7 mm)



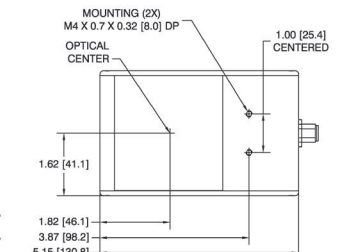
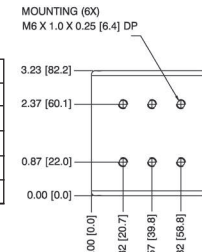
DOAL 75

DESCRIPTION	nm/K	CONT.	STROBE	mcd		mw	
		CURRENT	CURRENT	CONT.	STROBE	CONT.	STROBE
DOAL-75, Smart Series, Red	628 nm	650 mA	2.4 A	31026	148926		
DOAL-75, Smart Series, Blue	470 nm	570 mA	1.5 A	22696	97594		
DOAL-75, Smart Series, White	5500 K	570 mA	1.5 A	48989	210652		
DOAL-75, Smart Series, Infrared	880 nm	580 mA	2.0 A			131	810

Light Aperture: 2.99" x 2.83" (75.8 mm x 71.9 mm) Field of View: 1.50" (38.1 mm)

Stand Off: 1.00" (25.4 mm) Weight: 22.4 oz. (635 g)

Dimensions: H 3.13" (79.5 mm) x W 3.23" (82.2 mm) x D 5.15" (130.8 mm)



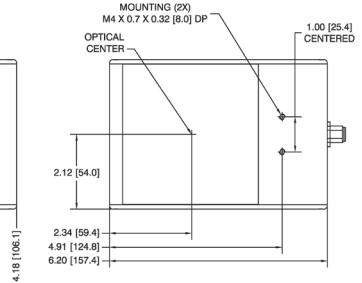
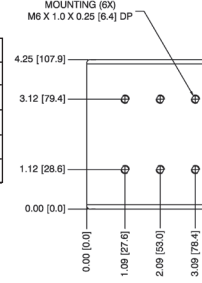
DOAL 100

DESCRIPTION	nm/K	CONT.	STROBE	mcd		mw	
		CURRENT	CURRENT	CONT.	STROBE	CONT.	STROBE
DOAL-100, Smart Series, Red	628 nm	1.05 A	3.6 A	50803	219470		
DOAL-100, Smart Series, Blue	470 nm	740 mA	1.6 A	30665	113461		
DOAL-100, Smart Series, White	5500 K	740 mA	1.6 A	66189	244900		
DOAL-100, Smart Series, Infrared	880 nm	785 mA	2.3 A			189	1076

Light Aperture: 4.00" x 3.88" (101.6 mm x 98.5 mm) Field of View: 2.00" (50.8 mm)

Stand Off: 1.00" (25.4 mm) Weight: 38.4 oz. (1089g)

Dimensions: H 4.18" (106.1 mm) x W 4.25" (107.9 mm) x D 6.20" (157.4 mm)



ENVIRONMENTAL

Enclosure: Black anodized aluminum, IP40 rated; Operating Temperature: 0° to 50° C (32° to 122° F)

Storage Temperature: 0° to 50° C (32° to 122° F); Humidity: up to 95% (non-condensing)

LIGHTING PARAMETERS

Light Aperture Defined: Area of light output from the coaxial illuminator.

Field of View Defined: Largest recommended evenly illuminated area as seen from the camera (also know as Area of Interest [AOI]).

Stand Off Defined: Recommended distance between the bottom of the light and the surface of the object being illuminated.

LIGHT SOURCE

Type: High output LEDs

Light Output: Millicandelas

Radiant Output: Milliwatts

Expected Life: 50,000 hours (Red, Infrared LEDs)

Expected Life: 10,000 hours (Blue, White LEDs)

Eye Safety: EN 60825-1: Class 1 (Red, White, Infrared LEDs); Class 2 (Blue LEDs)

CONNECTOR

Type: M12 5-pin plug, A-code

M12 5-pin plug:



Pin Assignment

- 1 +24 VDC
- 2 Trigger (-)
- 3 DC Ground
- 4 Trigger (+)
- 5 Dimmer

ELECTRICAL

Power: 20.2–28.8 VDC

Continuous Operation: No additional signals required

Continuous Operation with Dimming: 0 VDC (LEDs off) to 3.1–3.5 VDC (LEDs on) PWM signal. < 1 mA, modulation frequency 2 KHz +/- 100 Hz. Note: LED duty cycle will equal duty cycle of dimming signal when using this mode.

Continuous Operation with On/Off Control: 0 VDC (LEDs off) to 3.1–3.5 VDC (LEDs on), < 1 mA

High Output Strobe Operation: Optoisolated. 0 VDC (LEDs off) to 3.1–28.8 VDC (LEDs on). 10 mA max, 5 µs min to 10 mS max pulse width. Note: High Output Strobe internally limits LED frequency and pulse width to maximum of 90 Hz and 1 mS respectively.

SMART SERIES DOAL

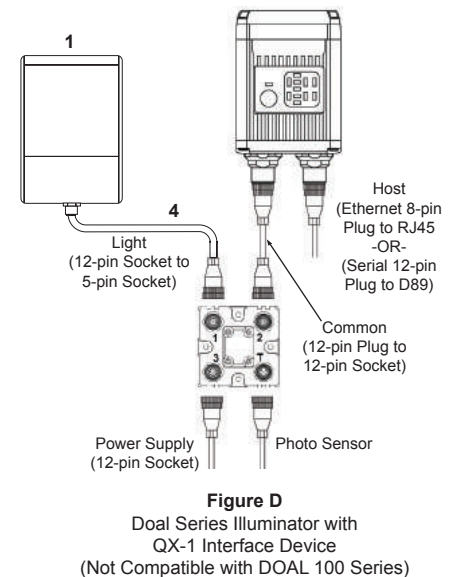
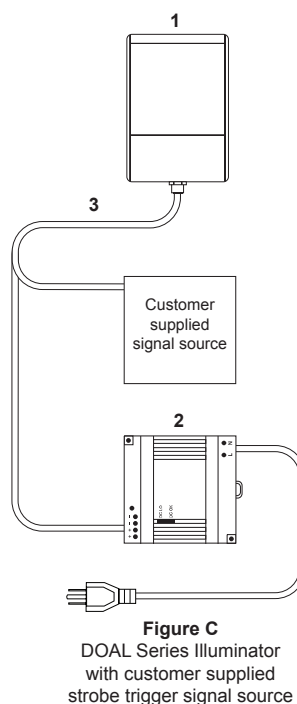
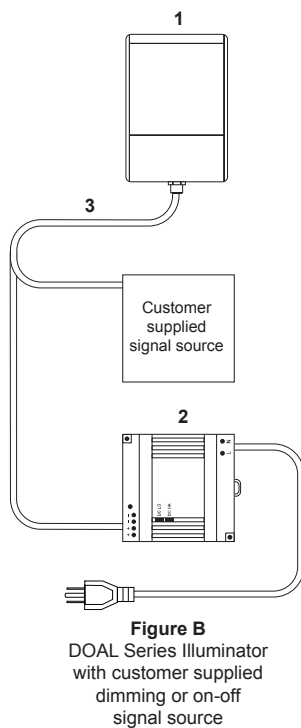
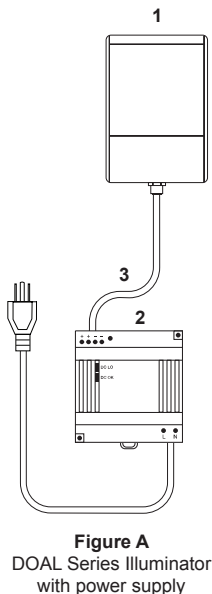
CONFIGURATION GUIDE



PART NUMBER	DESCRIPTION	Current Draw @ 24VDC (typ.)	Continuous Mode	Continuous Mode With Dimming Or On-Off Control	High Output Strobe Mode
			No Controller Required (Can Be Connected Directly To 24VDC)	No Controller Required (Can Be Connected Directly To 24VDC)	No Controller Required (Can Be Connected Directly To 24VDC)
NER-011660400G	SMART SERIES DOAL-25, RED	.40A	Figure A or D	Figure B	Figure C
NER-011660410G	SMART SERIES DOAL-25, WHITE	.20A	Figure A or D	Figure B	Figure C
NER-011660420G	SMART SERIES DOAL-25, BLUE	.20A	Figure A or D	Figure B	Figure C
NER-011660430G	SMART SERIES DOAL-25, INFRARED	.45A	Figure A or D	Figure B	Figure C
NER-011660500G	SMART SERIES DOAL-50, RED	1.3A	Figure A or D	Figure B	Figure C
NER-011660510G	SMART SERIES DOAL-50, WHITE	1.0A	Figure A or D	Figure B	Figure C
NER-011660520G	SMART SERIES DOAL-50, BLUE	1.0A	Figure A or D	Figure B	Figure C
NER-011660530G	SMART SERIES DOAL-50, INFRARED	1.7A	Figure A or D	Figure B	Figure C
NER-011660600G	SMART SERIES DOAL-75, RED	2.4A	Figure A or D	Figure B	Figure C
NER-011660610G	SMART SERIES DOAL-75, WHITE	1.5A	Figure A or D	Figure B	Figure C
NER-011660620G	SMART SERIES DOAL-75, BLUE	1.5A	Figure A or D	Figure B	Figure C
NER-011660630G	SMART SERIES DOAL-75, INFRARED	2.0A	Figure A or D	Figure B	Figure C
NER-011660700G	SMART SERIES DOAL-100, RED	3.6A	Figure A	Figure B	Figure C
NER-011660710G	SMART SERIES DOAL-100, WHITE	1.6A	Figure A	Figure B	Figure C
NER-011660720G	SMART SERIES DOAL-100, BLUE	1.6A	Figure A	Figure B	Figure C
NER-011660730G	SMART SERIES DOAL-100, INFRARED	2.3A	Figure A	Figure B	Figure C

Hardware Required

Item	Description	Part Number
1	Smart Series DOAL Lights	NER-011660XXXG
2	Power Supply DSP60 24VDC 2.5A DIN Mount	NER-011504100
2	Power Supply DSP100 24VDC 4.2A DIN Mount	97-000006-01
3	Cable 5 Pin M12 Female To Flying Leads, 3M	61-000186-01
3	Cable 5 Pin M12 Female To Flying Leads, 5M	61-000187-01
4	Cable, Power Smart Series to QX-1	61-000204-01

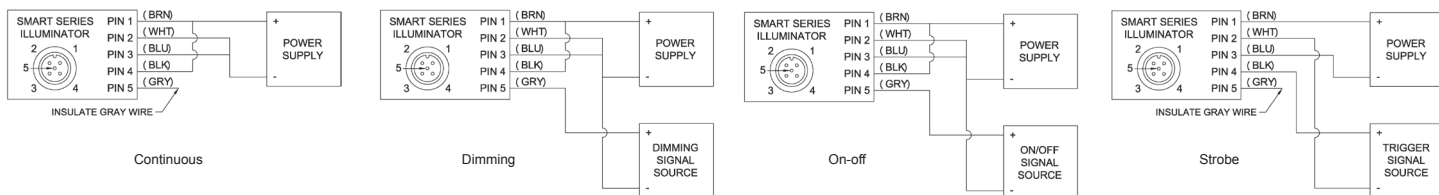


Accessories

Description	Part Number	Application
AC Power Cord US	NER-030028300	Power Cord For Power Supply
AC Power Cord EU	NER-030028400	Power Cord For Power Supply
AC Power Cord UK	NER-030028500	Power Cord For Power Supply

Connections:

Input Connector (M12 Male, 5 Circuit, A-Code)	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Backshell
Continuous Mode (Figures A & D):	+20.2-28.8VDC	DC GND	DC GND	+20.2-28.8VDC	No Connection	Shield
Continuous Mode With Dimming (Figure B):	+20.2-28.8VDC	DC GND	DC GND & DIM (-)	+20.2-28.8VDC	Dim (+)	Shield
Continuous Mode With On-Off Control (Figure B):	+20.2-28.8VDC	DC GND	DC GND & DIM (-)	+20.2-28.8VDC	Dim (+)	Shield
High Output Strobe Mode (Figure C):	+20.2-28.8VDC	TRIG (-)	DC GND	TRIG (+)	No Connection	Shield



Control Signals

DIM (Continuous Mode With PWM Dimming):

0VDC (LEDs off) to 3.1-3.5VDC (LEDs on) pulse width modulated (PWM) signal, <1mA, Modulation Frequency 2KHz +/- 100Hz

Note: When using Continuous Mode With Dimming, the LED duty cycle will equal the duty cycle of the dimming signal.

DIM (Continuous Mode With On-Off Control):

0VDC (LEDs off), 3.1-3.5VDC (LEDs on), (<1mA)

TRIG (High Output Strobe Mode):

optoisolated, 0VDC (LEDs off) to 3.1-28.8VDC (LEDs on), 10mA max, 20 μ s min Trigger pulse width. Note: High Output Strobe internally limits LED frequency and pulse width to a maximum of 90Hz and 1mS respectively. Light output pulse will follow Trigger pulse width from 20 μ s to 1ms.

Note: When using Continuous Mode With Dimming, the LED duty cycle will equal the duty cycle of the dimming signal.

Cable Specifications:

Wire colors for flying lead cables:

Pin 1 = Brown

Pin 2 = White

Pin 3 = Blue

Pin 4 = Black

Pin 5 = Gray

Connector Nut = Shield

Note: Non-Microscan cables may use different wire colors. It is the customer's responsibility to make sure the light is connected correctly per the pin numbers in the table above.