MIDOPT

MIDWEST OPTICAL SYSTEMS, INC.

MACHINE VISION FILTER KIT

FK200

CONTENTS

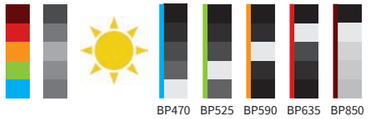
Midwest Optical Systems (MidOpt) has more than 30 years of experience and innovation in the fields of optical design, fabrication and inspection. MidOpt filters are the premier solution for industrial imaging to ensure flawless control, dependable results and exceptional image quality.

EVALUATE AND IMPROVE IMAGE QUALITY

Choosing the appropriate lighting for a system is essential, but selecting the proper wavelength of light is even more important. Test before investing in expensive lighting hardware with a MidOpt Filter Kit. The FK200 features the 10 most popular Bandpass Filters used in machine vision. By using optical filters together with white light, we can determine the specific wavelength that maximizes contrast and improves the resolution of the feature we want to isolate. Once we obtain that information, we can invest in the proper lighting hardware.

FK200 Instructions:

1. Use a broad spectrum light source or white light
2. Thread a filter onto your lens, and securely fasten
3. Pass or block the desired color (wavelength) to highlight or darken the feature you want to isolate



4. Adjust accordingly to find the ideal focus and iris settings

Note: *The filters in this kit have 27mm threaded mounts. If necessary, use the step-up and step-down rings to accommodate a 25.5mm or 30.5mm lens.*

CHOOSING THE BEST WAVELENGTH FOR YOUR SYSTEM

Fluorescence Imaging

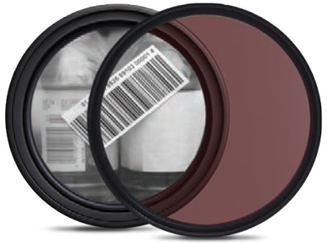
Ultraviolet fluorescence applications require a filter that blocks the ultraviolet excitation light source, transmitting only the weaker fluorescence emission.

Visible Imaging

Block all unwanted ultraviolet, visible and near-infrared wavelengths except for a specific portion of the visible spectrum. Typically, these are matched to the wavelength output of an LED light or laser diode.

Infrared Imaging

Working in the near-infrared can greatly improve contrast. Since most digital cameras have excellent near-infrared sensitivity, testing can be done quickly and easily by placing a visible blocking/near-infrared pass filter over the camera lens.



Glare Reduction

Light reflected from a non-metallic surface can become polarized. A polarizer orientated to pass only light polarized in the direction perpendicular to the reflected light will absorb the unwanted glare to improve contrast.

FK200 CONTENTS:

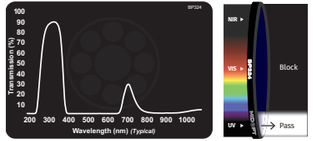
Bandpass Filters

Bandpass Filters are one of the easiest ways to drastically improve image quality. They are specially designed to emulate the output of the most common types of LEDs used in machine vision and are great for testing the effects of monochromatic imaging. All MidOpt Bandpass Filters have an anti-reflection coating to ensure maximum transmission.

KEY FEATURES

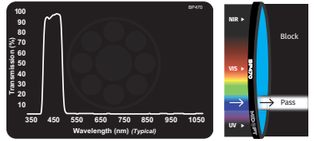
- StablEDGE® Technology
- Gaussian Design
- Anti-Reflection Coated
- 40/20 Scratch/Dig

BP324 Near-UV Bandpass Filter



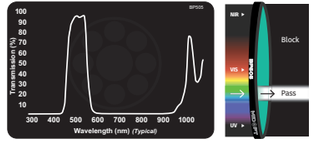
Useful Range: 290-365nm
FWHM: 105nm
Peak Transmission: ≥90%

BP470 Blue Bandpass Filter



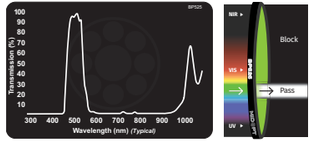
Useful Range: 425-495nm
FWHM: 85nm
Peak Transmission: ≥90%
Compatible LED: 450, 465, 470

BP505 Cyan Bandpass Filter



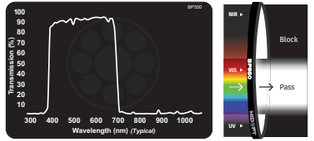
Useful Range: 485-550nm
FWHM: 90nm
Peak Transmission: ≥90%
Compatible LED: 505nm

BP525 Light Green Bandpass Filter



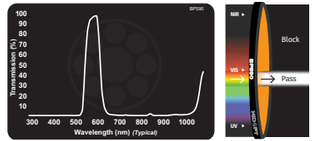
Useful Range: 500-555nm
FWHM: 80nm
Peak Transmission: ≥90%
Compatible LED: 520, 525, 530

BP550 NIR/UV-Block Bandpass Filter



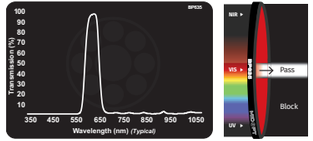
Useful Range: 410-690nm
FWHM: 300nm
Peak Transmission: ≥90%

BP590 Orange Bandpass Filter



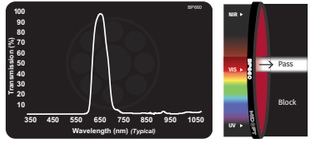
Useful Range: 560-600nm
FWHM: 70nm
Peak Transmission: ≥90%
Compatible LED: 590nm

BP635 Light Red Bandpass Filter



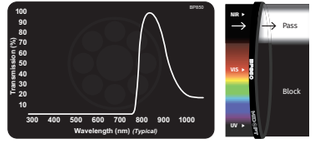
Useful Range: 615-645nm
FWHM: 60nm
Peak Transmission: ≥90%
Compatible LED: 617, 625, 630

BP660 Dark Red Bandpass Filter



Useful Range: 640-680nm
FWHM: 65nm
Peak Transmission: ≥90%
Compatible LED: 660nm

BP850 Near-IR Bandpass Filter



Useful Range: 820-910nm
FWHM: 160nm
Peak Transmission: ≥90%
Compatible LED: 840nm, 850nm

FK200 CONTENTS:

Polarizers

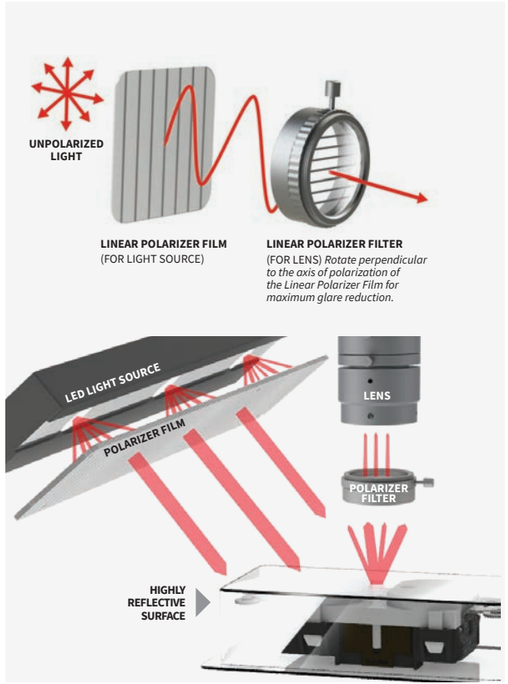
Polarizing Filters for the camera lens should be used in combination with Polarizing Film for the light source to maximize glare reduction and achieve the best results.

No Filter

● Polarizer Filter

● Polarizer Filter
■ Polarizer Film

● Polarizer Filter
■ Polarizer Film
● Red Bandpass Filter



Polarizer Filter

MidOpt rotating Linear Polarizers thread onto the lens. Rotating the mount and visually observing the results makes it easy to determine the position at which glare reduction is maximized. All mounted MidOpt polarizers come with a locking thumbscrew to ensure that jarring or accidental movement during cleaning does not result in a change to the filter's position.

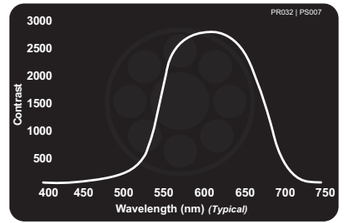
Polarizer Film

To maximize extinction, Linear Polarizers should be placed over the system's light source(s) to decrease glare and to help block incident light.

For more information, visit **midopt.com/polarizing**

● **PR032** Linear Polarizer Filter

Useful Range: 400-700nm
Contrast Ratio: 3000:1
Material: Glass



■ **PS007** Linear Polarizer Film

Useful Range: 400-700nm
Contrast Ratio: 3000:1
Material: Laminate
Thickness: 0.007"

THE MIDOPT DIFFERENCE

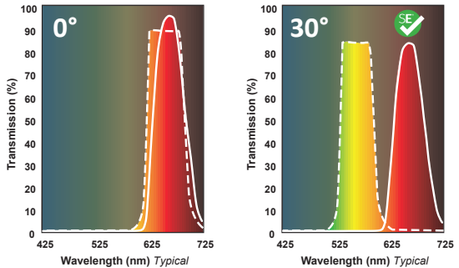
Key Features of a Quality Machine Vision Filter

A MidOpt machine vision filter is not just a machine vision filter. Here's what to look for when choosing a filter for your imaging system.

1 Wavelength Control

Short-shifting occurs when the angle of light passing through a traditional filter increases. This is most commonly seen when the filter is placed in front of a lens with a focal length of 12mm or less (lenses with greater than 50° (±25°) angular fields of view). This accounts for almost 60% of all lenses used today—a number that continues to grow as the demand for space forces inspection footprints to shrink.

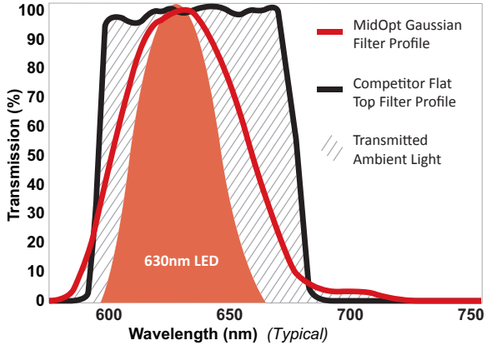
For more information, visit **midopt.com/stabledge**



2 Passband Performance

Some filters on the market have a high, flat transmission profile. With this design, an overwhelming amount of ambient light is able to pass through at the weaker tail ends of the LED spectral output curve. To ensure maximum performance, the position, height and width of the passband should emulate the bell-shaped spectral output curve (Gaussian curve) of the LED illumination being used.

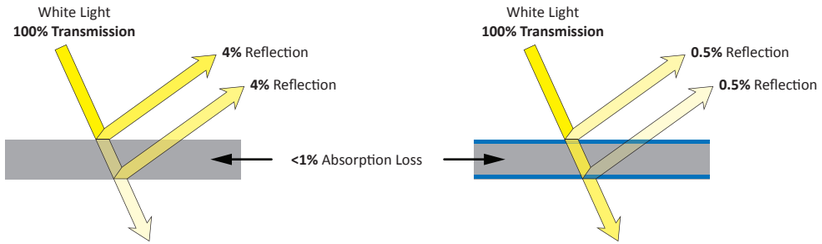
For more information, visit **midopt.com/gaussian**



3 High-Transmission Anti-Reflection Coating

When a ray of light passes through a glass surface, a portion of the light is reflected, resulting in a 4% transmission loss per surface. MidOpt uses anti-reflection coating on all filter designs, reducing surface reflection to less than 1%. This improves the efficiency of the vision system by increasing transmission, enhancing contrast and eliminating ghost images.

For more information, visit **midopt.com/anti-reflection**



4 Optimal Performance & Repeatability

MidOpt sets the quality standard for machine vision filters. Every filter is examined to ensure near-flawless surface quality and is 100% inspected by state-of-the-art spectrophotometer technology to ensure optimal performance and repeatability. They are also one of the only manufacturers to use controlled torque when securing filters into their mounts, eliminating distortion and guaranteeing optical flatness.

For more information, visit **midopt.com/performance**

**PV = Transmitted Wavefront Irregularity*

Mounting Solutions

MidOpt offers same-day shipping and stocks over 20,000 mounted filters, ranging in size from M13.25 to M105. A variety of other mounting solutions are also available, including options for applications without filter threads, custom mounting solutions and the MidOpt exclusive 25.4® C-Mount filter.

THREADED MOUNT

Designed for lenses with filter threads.

CREATE PART #: Select a filter, and add a mount size (e.g. M27)

Example: BP470-27

Standard Mount Sizes Available

M13.25	M39	M62
M22.5	M40.5	M67
M25.5	M43	M72
M27	M46	M77
M30.5	M48	M82
M34	M49	M86
M35.5	M52	M95
M37	M55	M105
M37.5	M58	

25.4® C-MOUNT

Threads directly into any C-mount camera between the lens and sensor.

CREATE PART #: Select a filter, and add "-25.4"

Example: BP470-25.4

SLIP MOUNT

Designed for wide-angle lenses without filter threads.

CREATE PART #: Select a filter, use "S" for slip and add the outside diameter of the lens in mm (e.g. 43mm)

Example: BP470-S43

Outside Dia. Range	Threaded Mount
15.1-19.0	M22.5
19.1-26.5	M30.5
26.6-31.9	M40.5
32.0-40.9	M46
41.0-50.9	M55
51.0-57.9	M62
58.0-68.0	M72
68.1-79.0	M82
79.1-101.0	M105

For step-by-step instructions on how to build your filter part number and how to install your filter mount, visit **midopt.com/videos**

SOLUTIONS FOR M12 LENSES

Offered in aluminum slip mount over the lens.

CREATE PART #: Select a filter, use "S" for slip and add the outside diameter of the lens in mm followed by the letter "A"

Example: BP470-S14A

Outside Dia.	Part #
13.2-14.2	S14A
14.3-15.0	S15A

Can be optically cemented behind the lens. Call for more information.

UNMOUNTED

All MidOpt filters can be custom cut to any shape or size.

CREATE PART #

CIRCLE: Use "D," and add diameter in mm
Example: BP470-D19

SQUARE: Use "R," and add side measurement in mm
Example: BP470-R15

RECTANGLE: Use "R," and add lens in mm x width in mm
Example: BP470-R30x15

For more information, visit **midopt.com/mounts**

MORE MIDOPT PRODUCTS

For more information, visit **midopt.com/accessories**

EXTENSION RINGS

ROTATING RIGHT ANGLE ATTACHMENTS

STEP ADAPTER RINGS

CLOSE-UP LENS SET

LENS ENCLOSURES

CLEANING KITS

MORE MIDOPT FILTER KITS

For more information, visit **midopt.com/filter-kits**

FK100 MACHINE VISION FILTER BINDER KIT

For sizes M22 to M105

IK100 NEAR-INFRARED FILTER BINDER KIT

For sizes M22 to M105

NK100 NEUTRAL DENSITY FILTER BINDER KIT

For sizes M22 to M105

SK100 SUPER FILTER TEST KIT

Includes 70 filters for UV, Visible and Near-IR imaging

NS100 NEUTRAL DENSITY FILTER SWATCH KIT

FS100 MACHINE VISION FILTER SWATCH KIT

FK220 BN SERIES FILTER TEST KIT

MIDOPT STOCK FILTERS

BANDPASS | BP Series: Broad Bandwidth

Part #	Description	Useful Range (nm)
BP250	Deep-to-Near UV Bandpass	230-275
BP324*	Near-UV Bandpass	290-365
BP365*	Near-UV Bandpass	335-400
BP470*	Blue Bandpass	425-495
BP485*	Absorptive VIS Bandpass/NIR Block	380-585
BP500*	Green-Blue Bandpass	440-555
BP505*	Cyan Bandpass	485-550
BP525*	Light Green Bandpass	500-555
PE530*	Photopic Response Filter	495-565
BP550	NIR/UV Block-Visible Bandpass	410-690
BP590*	Orange Bandpass	560-600
BP635*	Light Red Bandpass	615-645
BP660*	Dark Red Bandpass	640-680
BP695*	Near-IR Bandpass	680-720
BP735*	Near-IR Bandpass	715-780
BP800*	Near-IR Bandpass	745-950
BP850*	Near-IR Bandpass	820-910
BP880*	Near-IR Bandpass	845-930

BANDPASS | Bi Series: Narrow Interference Bandwidth

Part #	Description	Useful Range (nm)
Bi405	Violet Interference Bandpass	400-415
Bi450	Blue Interference Bandpass	445-465
Bi520	Light Green Interference Bandpass	515-525
Bi550	Green Interference Bandpass	535-558
Bi632	Light Red Interference Bandpass	625-640
Bi650	Red Interference Bandpass	643-665
Bi660	Dark Red Interference Bandpass	650-665
Bi725	Red Edge Bandpass	717-732
Bi808	Near-IR Interference Bandpass	798-820
Bi850	Near-IR Interference Bandpass	845-860

BANDPASS | BN Series: Narrow Bandwidth

Part #	Description	Useful Range (nm)
BN470*	Narrow Blue Bandpass	460-490
BN532*	Narrow Green Bandpass	525-550
BN595*	Narrow Orange Bandpass	580-610
BN630*	Narrow Light Red Bandpass	625-645
BN650*	Narrow Dark Red Bandpass	638-672
BN660*	Narrow Dark Red Bandpass	645-675
BN740*	Narrow Near-IR Bandpass	730-755
BN785*	Narrow Near-IR Bandpass	770-790
BN810*	Narrow Near-IR Bandpass	798-820
BN850*	Narrow Near-IR Bandpass	840-865
BN880	Narrow Near-IR Bandpass	855-890
BN940	Narrow Near-IR Bandpass	928-955

DUAL BANDPASS | DB Series: Dual Bandwidth

Part #	Description	Useful Range (nm)
DB395/870*	Absorptive VIS + NIR	375-425, 745-970
DB475/850	Blue + 850nm NIR	460-490, 830-870
DB550/850	Green + 850nm NIR	535-565, 830-870
DB660/850	Red + 850nm NIR	645-675, 830-870
DB735	Visible + 735nm NIR	405-645, 725-755
DB850	Visible + 850nm NIR	405-645, 835-875
DB940	Visible + 940nm NIR	405-650, 925-965

TRIPLE BANDPASS | TB Series: Triple Bandwidth

Part #	Description	Useful Range (nm)
TB475/550/850	Blue + Green + NIR	468-483, 543-558, 835-865
TB550/660/850	Green + Red + NIR	543-558, 653-668, 835-865

LONGPASS | LP Series: Longpass

Part #	Description	Useful Range (nm)
LP470*	Light Yellow Longpass	480-1100
LP500*	Yellow Longpass	510-1100
LP515*	Yellow-Orange Longpass	520-1100
LP530*	Orange Longpass	545-1100
LP550*	Orange Longpass	560-1100
LP580*	Red-Orange Longpass	585-1100
LP590*	Red Longpass	605-1100
LP610*	Red Longpass	620-1100
LP630*	Red Longpass	645-1100
LP645*	Dark Red Longpass	650-1100
LP665*	Dark Red Longpass	680-1100
LP695*	Near-IR Longpass	715-1100
LP715*	Near-IR Longpass	730-1100
LP780*	Near-IR Longpass	800-1100
LP800*	Near-IR Longpass	820-1100
LP815*	Near-IR Longpass	825-1100
LP830*	Near-IR Longpass	845-1100
LP850*	Near-IR Longpass	870-1100
LP900	Near-IR Longpass	910-1100
LP920	Near-IR Longpass	930-1100
LP1000*	Near-IR Longpass	1010-1500

SHORTPASS | SP Series: VIS Pass

Part #	Description	Useful Range (nm)
SP510	Blue Shortpass	340-500
SP570	Blue-Green Shortpass	410-560
SP585	Cyan Shortpass	395-575
NF550	Magenta Dichroic (Green Block)	395-475, 605-700

PROTECTIVE | LP Series: Lens Protection

Part #	Description	Useful Range (nm)
LP285*	High Transmission Heat Resistant VIS-NIR A/R Protective Window	350-1100
LP330*	Protective Window	350-1100
LP340*	A/R Protective Window	350-800
LP390*	UV Absorbing Protective Window	410-1100
LP415	UV Block	415-1100

LIGHT BALANCING

Part #	Description	Useful Range (nm)
LA080*	Light Balancing (Minus Blue)	400-700
LA120*	Light Balancing (Minus Blue)	400-700
LB080*	Light Balancing (Minus Red)	400-700
LB120*	Light Balancing (Minus Red)	400-700
FL550*	Light Balancing (Minus Green)	400-700

SHORTPASS | SP Series: NIR Block

Part #	Description	Useful Range (nm)
SP625	Blue-Orange Shortpass	425-620
SP635*	Absorptive VIS Shortpass/NIR Block	380-585
SP644	Near-IR/Mid-Red Dichroic Block	395-638
SP645	Near-IR/Mid-Red Dichroic Block	400-640
SP650	Near-IR/Mid-Red Dichroic Block	400-640
SP675	Near-IR/Deep Red Dichroic Block	420-660
SP700	Near-IR/UV Block-Visible Shortpass	410-690
SP701	Extended Hot Mirror	410-690
SP705*	Near-IR/Deep Red Absorp. Block	370-630
SP730	Near-IR/Colorless Dichroic Block	400-710
SP785	Modified Near-IR Dichroic Block	425-770

ACRYLIC | AC Series: Acrylic Longpass

Part #	Description	Useful Range (nm)
AC370*	A/R Acrylic Protective Window	380-850
AC380*	A/R Acrylic Protective Window	450-850
AC685*	Acrylic Near-IR Longpass	710-1100
AC760*	Acrylic Near-IR Longpass	780-1100
AC800*	Acrylic Near-IR Longpass	815-1100
AC850*	Acrylic Near-IR Longpass	880-1100
AC900*	Acrylic Near-IR Longpass	930-1100

POLARIZING FILTERS

Part #	Description	Useful Range (nm)
PR032	Linear Polarizer	400-700
PR120	Ultra High Contrast Linear Polarizer	400-700
PC052	Circular Polarizer	400-700
Pi031	NIR Linear Polarizer, High Extinction	400-2000
Pi035	NIR Linear Polarizer, High Transmission	400-2000

POLARIZING SHEETS

Part #	Description	Useful Range (nm)
PS007	High Contrast Linear Film .007" thk	400-700
PSA007	High Contrast Linear Film .007" thk *(self adhesive)*	400-700
PS010	High Contrast Linear Film .010" thk	400-700
PS030	Ultra High Contrast Linear Film .030" thk	400-700
HT008	High Temp. Linear Film .008" thk	400-700
HTA008	High Temp. Linear Film .008" thk *(self adhesive)*	400-700
HT025	High Temp. Linear Film .025" thk	400-700
PG120	Ultra High Contrast Glass Linear Sheet	400-700
Pi005	NIR High Contrast Linear Film .005" thk	450-1000

ACRYLIC | AB Series: Acrylic Bandpass

Part #	Description	Useful Range (nm)
AB555*	Acrylic Absorptive NIR/UV-Block Visible Bandpass	470-645

NEUTRAL DENSITY | ND Series: VIS

Part #	Description	Useful Range (nm)
ND030	Absorptive 50% Transmission	425-675
ND060	Absorptive 25% Transmission	425-675
ND090	Absorptive 12.5% Transmission	425-675
ND120	Absorptive 6.25% Transmission	425-675
ND200	Absorptive 1.0% Transmission	425-675
ND300	Absorptive 0.1% Transmission	425-675
ND400	Absorptive 0.01% Transmission	425-675

NEUTRAL DENSITY | Ni Series: VIS/NIR

Part #	Description	Useful Range (nm)
Ni030	Low Reflectivity 50% Transmission	400-2000
Ni060	Low Reflectivity 25% Transmission	400-2000
Ni090	Low Reflectivity 12.5% Transmission	400-2000
Ni120	Low Reflectivity 6.25% Transmission	400-2000

***StableEDGE® FILTER DESIGN**

Due to continuous product improvement, specifications are subject to change without notice. For the most up-to-date information, visit ***midopt.com***

MIDOPT

MIDWEST OPTICAL SYSTEMS, INC.

INNOVATIVE FILTER DESIGNS

for Industrial Imaging

REV. 11/17

info@midopt.com • +1-847-359-3550 · MIDOPT.COM