 New model

TOF type with built-in digital panel

TOF-DL series

The World's Smallest TOF Sensor lineup with analog output type

- Analog output type and 3-control-output type
- The world's smallest TOF sensor
- Built-in digital display for simple setup

FASTUS

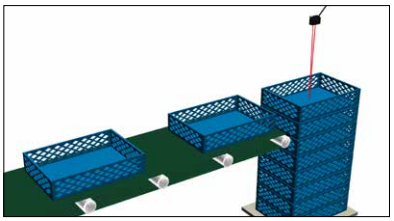
FASTUS is a product brand of Optex FA.

Related products

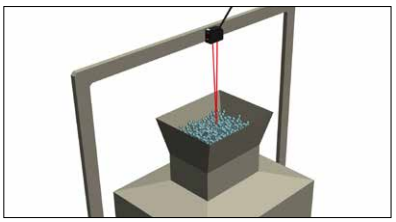
Long-range detection
C-R
● P.224

High-accuracy measurement
CD22
● P.464

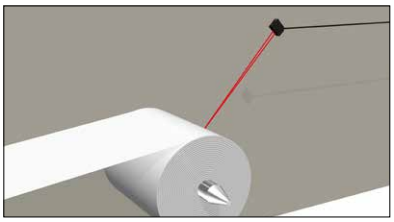
Level control for lifts



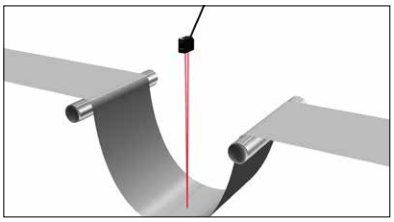
Measuring of material level in tank



Monitoring of remaining non-woven fabrics



Loop control for sheet materials



Selection table

Type	Sensing distance	Interface	Model Pig tail types are shown in parentheses
Laser TOF	0.25 to 2.5 m	Analog output Control output External input	**TOF-DL250A** **(TOF-DL250AM12)**
		Control output × 3 External input	**TOF-DL250T** **(TOF-DL250TM12)**

● For the pig tail type, please order a connector cable.

Options/Accessories

Connector cable

DOL-1205-G02M
Cable length: 2 m

*5 m and 10 m cables are separately available.
*Robot cables are also available.

World's smallest*1 Size: 17 × 32.8 × 44.4 (W × D × H) mm

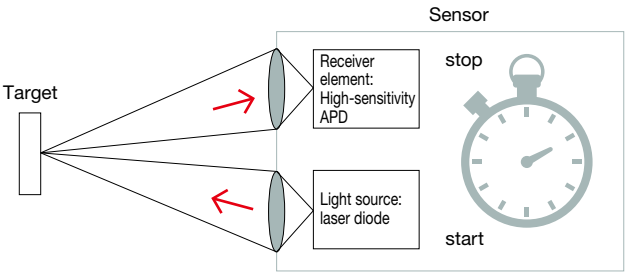
Detect from up to 2.5 m away. "Visualize" distances with the TOF-DL compact sensor.

The FASTUS TOF-DL Series is the world's smallest TOF sensor*1.
This ultra-compact laser distance sensor is capable of detecting at distances of up to 2.5 m.
With a built-in digital display, configuring settings is simple.
Notably, the TOF-DL Series is most useful with applications requiring height and target distance control, such as level and position detection and loop control at a manufacturing site.

*1 Optex FA examination performed November 2016.

TOF (Time Of Flight) principle

The TOF principle measures the time it takes a pulse-emitted laser to hit a target and return, and the measurement is then converted into distance. With strong resistance to influences from the target's surface conditions, this principle is capable of producing stable detection.

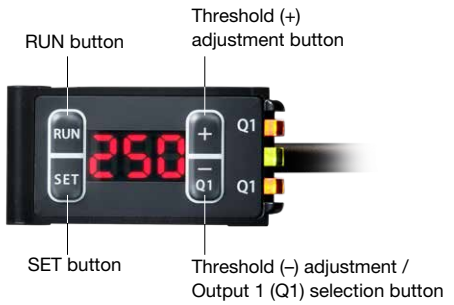


Features

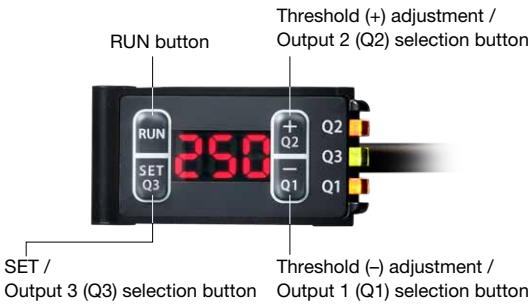
Easy-to-See Digital Display

With its ultra-compact size, the TOF-DL Series is equipped with a three-digit, easy-to-see digital display.
The display allows users to check the distance showing numerical values.
This digital display also makes threshold adjustments easy.

■ Analog output type



■ 3-control-output type



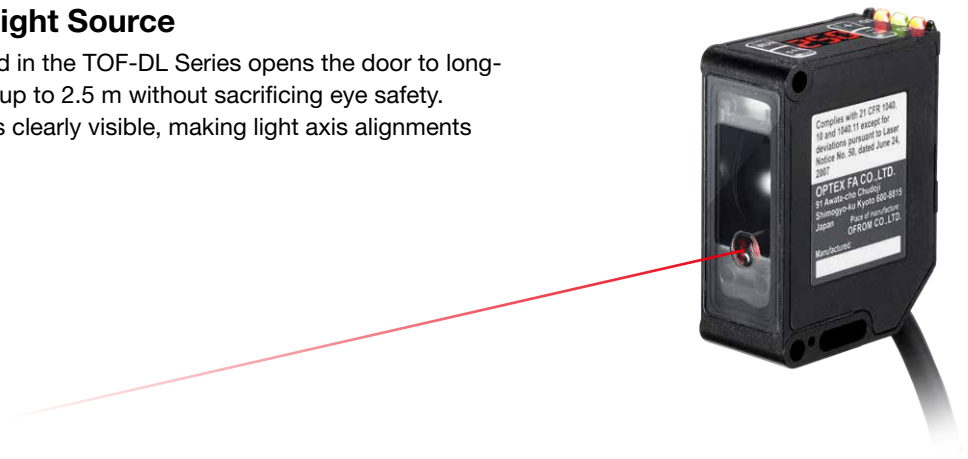
Easy-to-See Indicators and Stability Output

The indicators used on the TOF-DL Series allow for easy visibility from any angle.
In addition, users are able to switch output 1 to Stability Output.
Stability Output turns ON (Central indicator = Green) when detection is stable and turns OFF (Central indicator = Red) when detection is not possible.

Indicators visible from any direction

Class 1 Laser Light Source

The Class 1 laser used in the TOF-DL Series opens the door to long-distance detecting at up to 2.5 m without sacrificing eye safety.
In addition, the spot is clearly visible, making light axis alignments easy.



Specifications

Type		Analog output type	3-control-output type
Model*1	Cable type	**TOF-DL250A**	**TOF-DL250T**
	Pig tail type	**TOF-DL250AM12**	**TOF-DL250TM12**
Sensing distance*2		0.25 to 2.5 m	
Light source	Medium/Wavelength	Red semiconductor laser, wavelength: 650 nm	
	Average output	390 µW or less	
Laser class		Class 1 (IEC/JIS/FDA*3)	
Spot size*4		ø10 mm (At a distance of 2.5 m)	
Sampling period / Response time		200 µs / 500 µs or less (When performing moving average once)	
Hysteresis		15% or less	
Distance adjustment		Teaching (Manual adjustment possible after teaching)	
Indicators		Output indicator (Orange), Stability indicator / laser off indicator: (Green) / (Red) / (Off)	Output 1 indicator (Orange), Output 2 indicator (Orange), Output 3 indicator / Stability indicator / Laser off indicator: (Orange) / (Green) / (Red) / (Off)
Digital display		7-segment, 3-digit LED display (Display unit: cm)	
External input		Laser OFF input / Teaching input (Selectable by setting)	
Control output	No. of outputs	1	3 (Output 3 available by switching external input)
	Stability output	Output 1 switchable to stability output (Selectable by setting)	
	Type	Open collector (NPN/PNP selectable by setting), Max. 100 mA / 30 VDC, residual voltage 1.8 V Max.	
	Output mode	Light ON / Dark ON selectable (Output 1 through 3 will be set to same output mode for 3-control-output type)	
Analog output	Current output	4 to 20 mA, Load impedance: 300 Ω or less	Not equipped
	Voltage output	0 to 10 V, Output impedance: 100 Ω or less	
Connection type		Cable type: ø4.5 mm, 2 m cable, Pig tail type: Cable with M12 5-pin connector, 300 mm	
Protection circuit		Reverse connection protection, Overcurrent protection	
Rating	Supply voltage	12 to 30 VDC, including 10% ripple (p-p)*5	10 to 30 VDC, including 10% ripple (p-p)
	Current consumption	60 mA or less*6	
Applicable regulations	EMC	EMC directive (2014/30/EU)	
	RoHS	RoHS directive (2011/65/EU), China RoHS (Directive 32)	
	Safety	FDA regulations (21 CFR 1040.10 and 1040.11*7)	
Applicable standards		EN 60947-5-7 / IEC 60825-1	EN 60947-5-2 / IEC 60825-1
Environmental resistance	Ambient temperature/humidity	–10 to +50°C (No freezing) / 35 to 85% RH (No condensation)	
	Ambient illuminance	Sunlight: 4,000 lx or less, Fluorescent lamp: 3,000 lx or less	
	Vibration resistance	10 to 55 Hz, double amplitude 1.5 mm, 2 hours in each of the XY and Z directions	
	Shock resistance	500 m/s² (Approx. 50 G), 3 times in each of the XY and Z directions	
	Degree of protection	IEC standard, IP67	
Material		Housing: PC, Front cover: PMMA	
Weight (Incl. cable)		Cable type: 88 g, Pig tail type: 48 g	
Included accessories		Mounting bracket: BEF-WK-190, Mounting screws (M3 × 20 mm)	

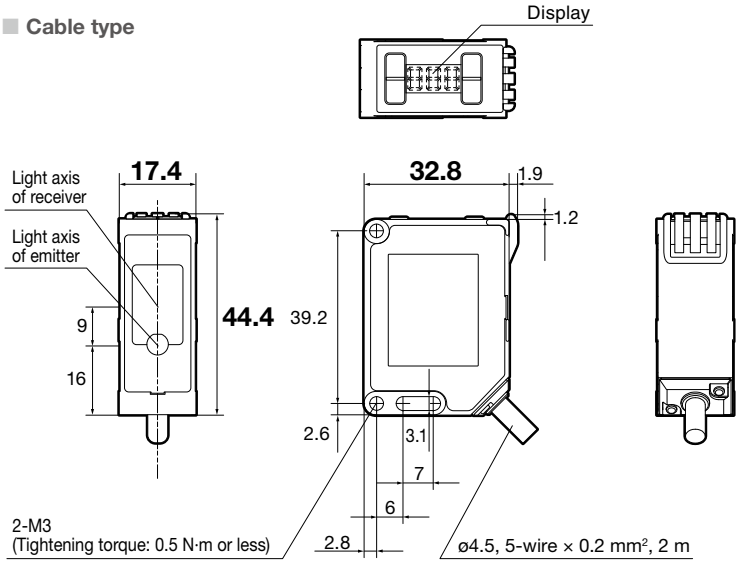
*1 Connector type (M8, 4-pin) also available (Built to order).
*2 For black paper (6% reflectance), gray paper (18% reflectance), and white paper (90% reflectance).
*3 In accordance with the FDA provisions of Laser Notice No. 50, the laser is classified as Class 1 per the IEC 60825-1:2007 and 2014 standards.
*4 Defined with 1/e² (13.5%) of the center strength at the maximum detection distance. The sensor may be affected by light leakage at spot sizes other than the default and when there is a highly reflective object close to the detection area.
*5 For analog output types, use a power supply voltage of 12.0 VDC or higher to obtain normal output.
*6 Not including control output load current. *7 Excluding differences per Laser Notice No. 50.
● Note that specifications are subject to change without prior notice for product improvement purposes.

Dimensions

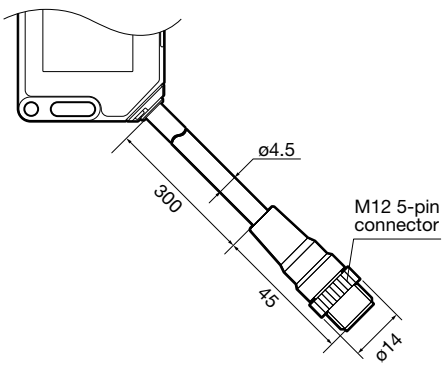
Sensor

(Unit: mm)

Cable type

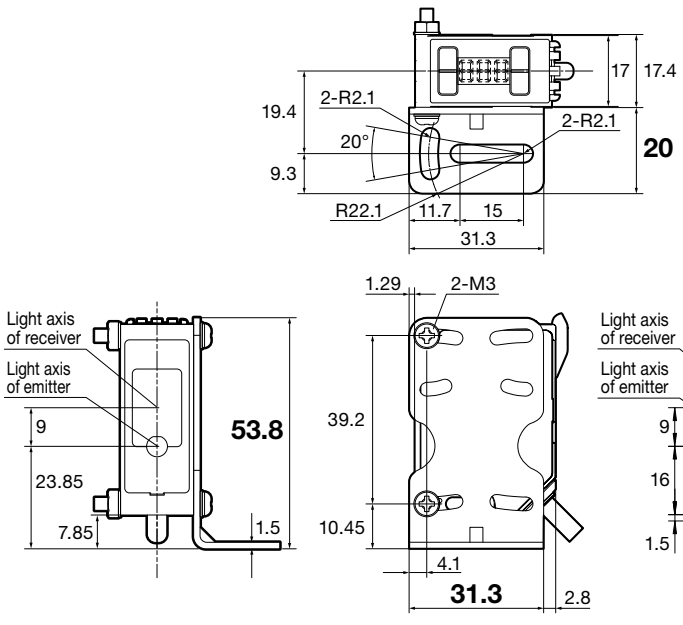


Pig tail type

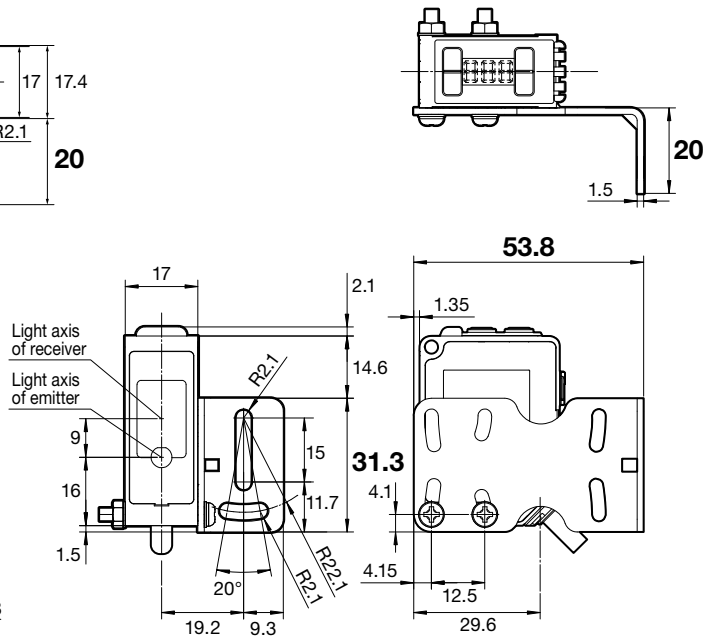


Mounting bracket

BEF-WK-190: Floor-mounted

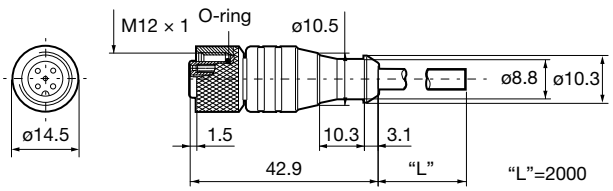


Wall-mounted



Connector cable

DOL-1205-G02M

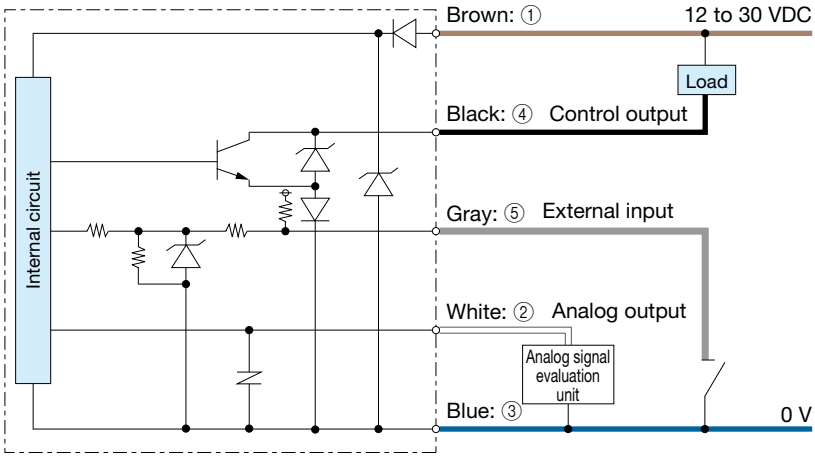


"L"=2000

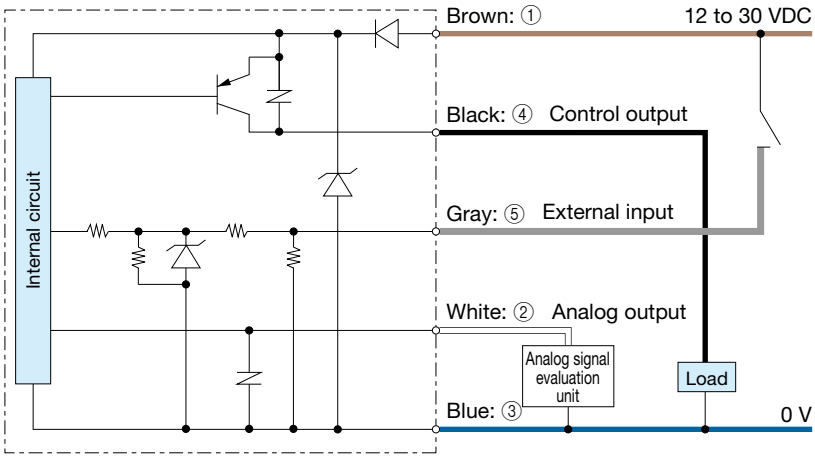
Cable section material: PVC
Conductor cross-section: 5-wire × 0.5 mm²

I/O circuit diagram

Analog output type: With the NPN setting

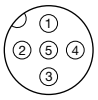


Analog output type: With the PNP setting



Pig tail type pin No.

■ ① to ⑤ are connector pin No.



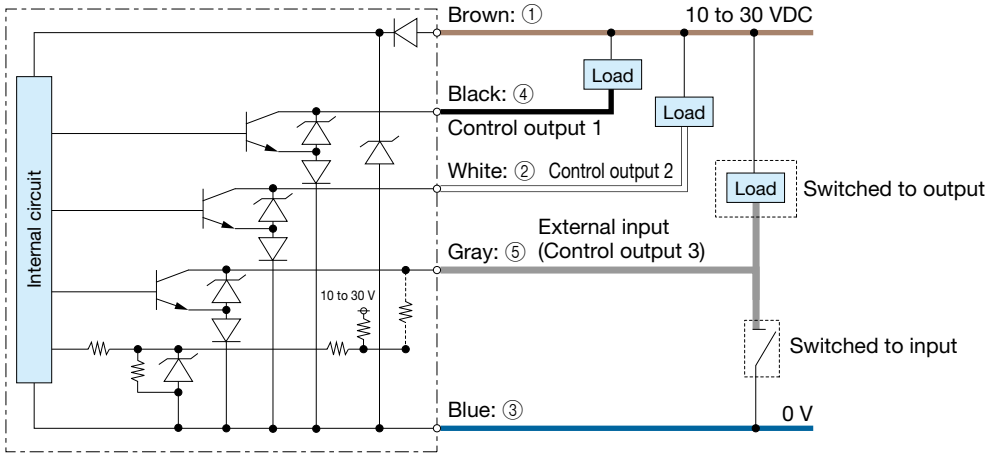
① 12 to 30 VDC
② Analog output
③ 0 V
④ Control output
⑤ External input

Notes

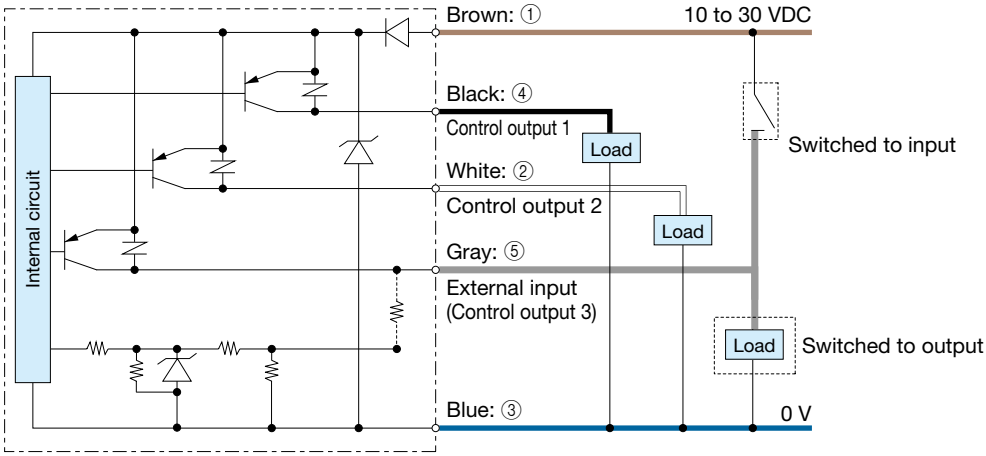
■ When using a switching regulator for the power supply, be sure to ground the frame ground terminal.
■ Wring sensor cables with high-voltage or power supply lines can result in malfunctions due to noise, which can cause damage, make sure to wire separately.
■ Avoid using the transient state while the power is on (approx. 300 ms).

I/O circuit diagram

3-control-output type: With the NPN setting

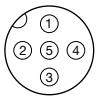


3-control-output type: With the PNP setting



Pig tail type pin No.

■ ① to ⑤ are connector pin No.



① 10 to 30 VDC
② Control output 2
③ 0 V
④ Control output 1
⑤ External input (Control output 3)

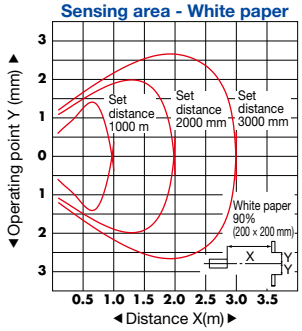
Notes

■ When using a switching regulator for the power supply, be sure to ground the frame ground terminal.
■ Wring sensor cables with high-voltage or power supply lines can result in malfunctions due to noise, which can cause damage, make sure to wire separately.
■ Avoid using the transient state while the power is on (approx. 300 ms).

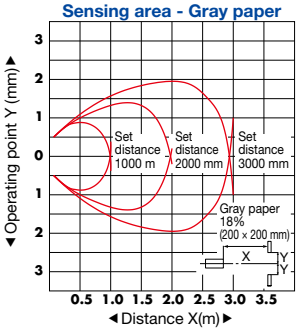
Typical characteristic data

TOF-DL250□

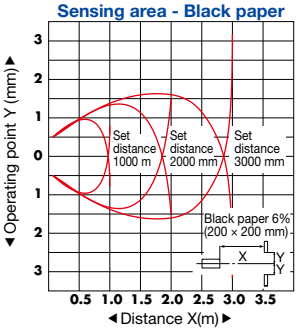
Sensing area - White paper



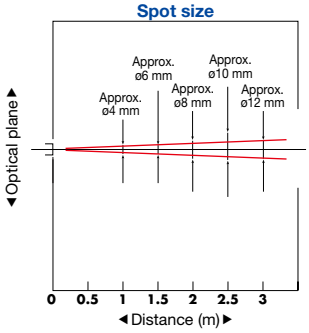
Sensing area - Gray paper



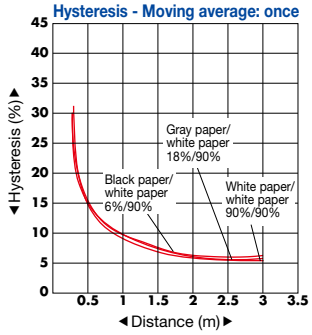
Sensing area - Black paper



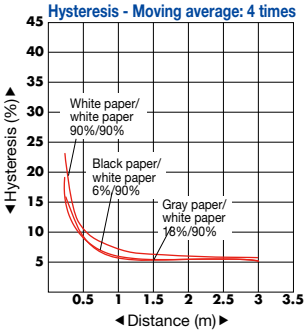
Spot size



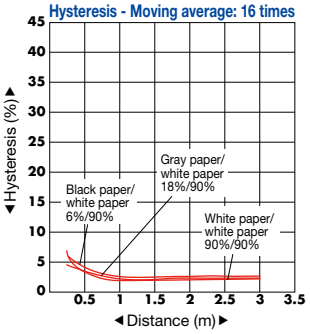
Hysteresis - Moving average: once



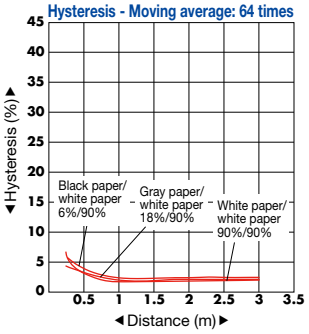
Hysteresis - Moving average: 4 times



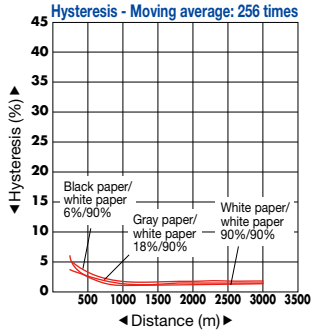
Hysteresis - Moving average: 16 times



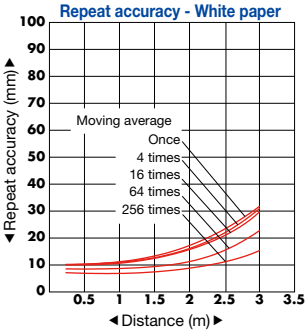
Hysteresis - Moving average: 64 times



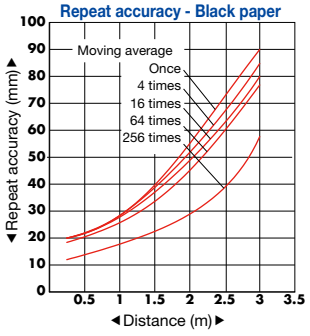
Hysteresis - Moving average: 256 times



Repeat accuracy - White paper



Repeat accuracy - Black paper



Material response