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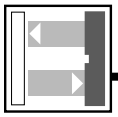
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M1K Series
Mini Limit Switch Style Sensors

- **25-position sensing head**
- **Crosstalk protected**
- **Weak signal output and indicator**



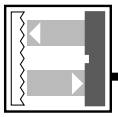
Diffused Mode

See page 504

Features:
- Application specific monitoring of signal strength
- 100,000 hour LED

Sensing Range: 500mm

Outputs: NPN, PNP, AS-Interface



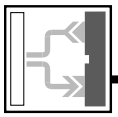
Retro-Reflective Mode

See page 505-506

Features:
- Polarized filter detects shiny objects
- 100,000 hour LED

Sensing Range: 3m

Outputs: NPN, PNP, AS-Interface



Fiber Optic Diffused and Thru-Beam Mode

See page 507

Features:
- Extended operating temperature with fibers rated to 572ºF (300ºC)
- Wide selection of mating fiber optics

Sensing Range: Determined by fiber optic cable

Outputs: NPN, PNP, AS-Interface

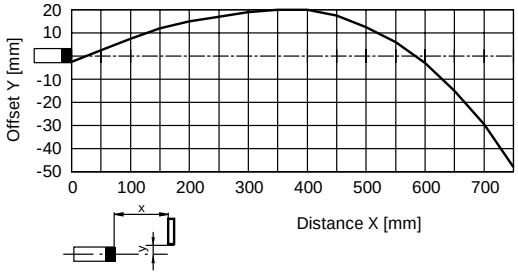
See pages 508-512 for Mini Limit Switch Series specifications, programming, wiring and dimensions.

Diffused Mode

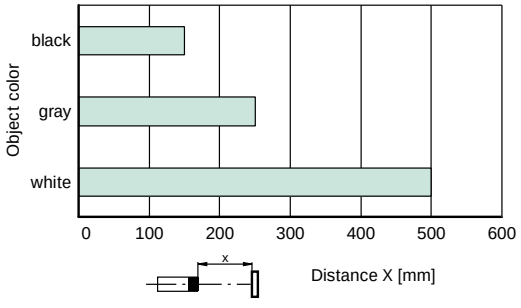
Specifications				
SENSING RANGE		**0-500mm**	**0-500mm**	**0-500mm**
SENSITIVITY ADJUSTMENT		Yes (40-500mm)	Yes (40-500mm)	Yes (40-500mm)
REFERENCE TARGET		200 x 200mm white test card	200 x 200mm white test card	200 x 200mm white test card
MODEL NUMBER(S)		**OJ500-M1K-E01**	—	—
		OJ500-M1K-E23	—	—
		—	**OCT500-M1A-B3**	**OCT500-M1A-B3-V1**
OUTPUT: Normally Open or Normally Closed	**-E01**	NPN	—	—
	-E23	PNP	—	—
	-B3	—	AS-Interface	AS-Interface
LOAD CURRENT		200mA max.	—	—
VOLTAGE DROP		≤2.5VDC	—	—
SUPPLY VOLTAGE		10-30VDC	from AS-Interface	from AS-Interface
VOLTAGE RIPPLE		10%	—	—
CURRENT CONSUMPTION		≤35mA	—	—
OPERATING CURRENT		—	≤40mA	≤40mA
HYSTERESIS		10%	10%	10%
LIGHT SOURCE		Infrared LED 950nm	Infrared LED 950nm	Infrared LED 950nm
AMBIENT LIGHT RESISTANCE		≤40,000 lux	≤40,000 lux	≤40,000 lux
ELECTRICAL CONNECTION		 Terminal housing	 Terminal housing	 Quick disconnect type V1
ADDITIONAL DATA		***See pages 508-512***		

Sensing Characteristics

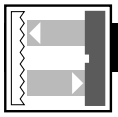
Movement Characteristics OJ500-M1K OCT500-M1A



Detection Ranges OJ500-M1K OCT500-M1A

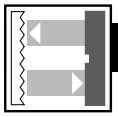


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Retro-Reflective Mode

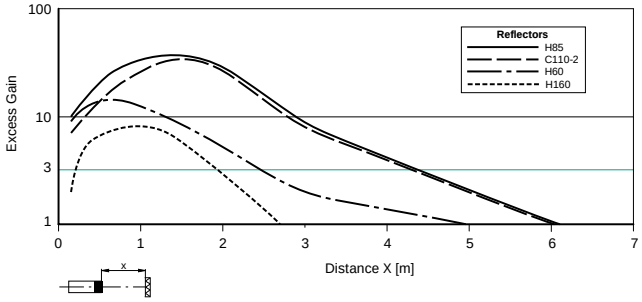
Specifications				
SENSING RANGE		**0-3m**	**0-3m**	**0-3m**
SENSITIVITY ADJUSTMENT		No	No	No
REFERENCE TARGET		C110-2 reflector	C110-2 reflector	C110-2 reflector
REFLECTOR DISTANCE		200mm-3m	200mm-3m	200mm-3m
POLARIZED FILTER		Yes	Yes	Yes
MODEL NUMBER(S)		**OJ3000-M1K-E01**	—	—
		OJ3000-M1K-E23	—	—
		—	**OCS3000-M1A-B3**	**OCS3000-M1A-B3-V1**
OUTPUT: Normally Open or Normally Closed	**-E01**	NPN	—	—
	-E23	PNP	—	—
	-B3	—	AS-Interface	AS-Interface
LOAD CURRENT		200mA max.	—	—
VOLTAGE DROP		≤2.5VDC	—	—
SUPPLY VOLTAGE		10-30VDC	from AS-Interface	from AS-Interface
VOLTAGE RIPPLE		10%	—	—
CURRENT CONSUMPTION		≤35mA	—	—
OPERATING CURRENT		—	≤40mA	≤40mA
LIGHT SOURCE		Visible red LED 660nm	Visible red LED 660nm	Visible red LED 660nm
AMBIENT LIGHT RESISTANCE		≤10,000 lux	≤10,000 lux	≤10,000 lux
ELECTRICAL CONNECTION		 Terminal housing	 Terminal housing	 Quick disconnect type V1
ADDITIONAL DATA		***See pages 508-512***		



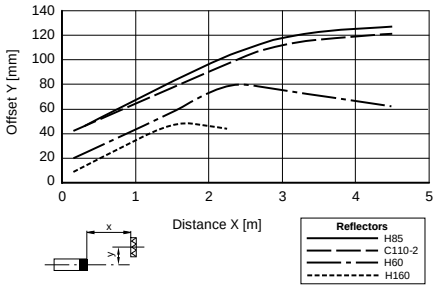
Retro-Reflective Mode

Sensing Characteristics

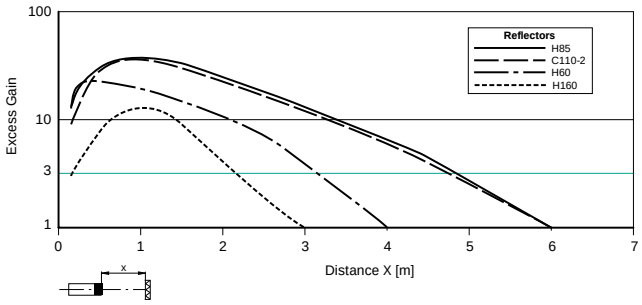
Excess Gain vs. Sensing Range OJ3000-M1K



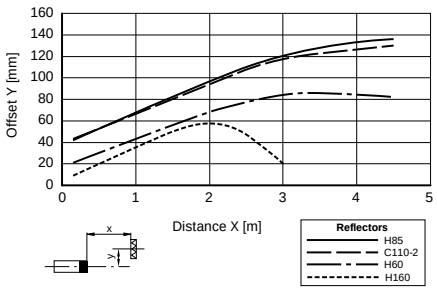
Movement Characteristics OJ3000-M1K



Excess Gain vs. Sensing Range OCS3000-M1A



Movement Characteristics OCS3000-M1A

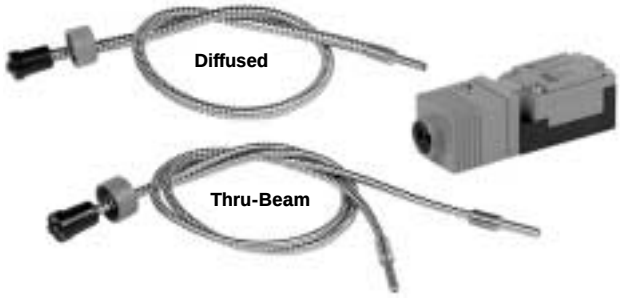


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Fiber Optic Diffused and Thru-Beam Mode

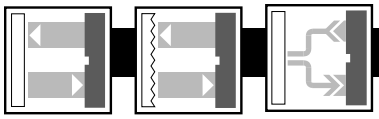
Specifications				
SENSING RANGE		Determined by cable*	Determined by cable*	Determined by cable*
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes
MODEL NUMBER(S)		**OJ500-M1K-E01**	—	—
		OJ500-M1K-E23	—	—
		—	**OCT500-M1A-B3**	**OCT500-M1A-B3-V1**
OUTPUT: Normally Open or Normally Closed	**-E01**	NPN	—	—
	-E23	PNP	—	—
	-B3	—	AS-Interface	AS-Interface
LOAD CURRENT		200mA max.	—	—
VOLTAGE DROP		≤2.5VDC	—	—
SUPPLY VOLTAGE		10-30VDC	from AS-Interface	from AS-Interface
VOLTAGE RIPPLE		10%	—	—
CURRENT CONSUMPTION		≤35mA	—	—
OPERATING CURRENT		—	≤40mA	≤40mA
HYSTERESIS		10% axial	10% axial	10% axial
LIGHT SOURCE		Infrared LED 950nm	Infrared LED 950nm	Infrared LED 950nm
AMBIENT LIGHT RESISTANCE		≤40,000 lux	≤40,000 lux	≤40,000 lux
ELECTRICAL CONNECTION		Terminal housing	Terminal housing	Quick disconnect type V1
ADDITIONAL DATA		***See pages 508-512***		





FIBER OPTIC CABLES

See pages 735-764 for glass fiber optic lengths and specifications.



Series Specifications

Mini Limit Switch Series Specifications

SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes
REVERSE POLARITY PROTECTION		Yes
LED(s)		Yes (3)
CROSSTALK IMMUNITY		2 pulse frequencies, programmable
OPERATING MODE		Light on/dark on
RESPONSE TIME		≤0.3ms at 1.5kHz ≤2.5ms at 200Hz
READINESS DELAY		≤20ms
TIMER FUNCTION		20ms pulse lengthener, programmable
SWITCHING FREQUENCY		1.5kHz or 200Hz, programmable
ELECTROMAGNETIC COMPATABILITY COMPLIANCE		NEMA ICS5-2000 See page 6
PROTECTION (IEC)		IP67
TEMPERATURE RANGE	*WORKING*	-13ºF to +158ºF
	STORAGE	-40ºF to +176ºF
HOUSING MATERIAL		Crastin
LENS		Scratch-resistant glass
WEIGHT		3.5oz
APPROVALS UL LISTED	General Purpose	Yes
CE CSA CERTIFIED	General Purpose	Yes

Wiring Diagrams

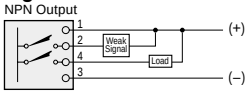
DC



Terminal Connection

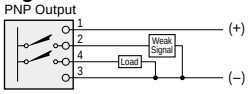
Light On/Dark On
NPN Output

E01



Light On/Dark On
PNP Output

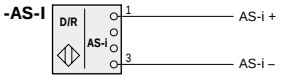
E23



AS-Interface



Terminal Connection

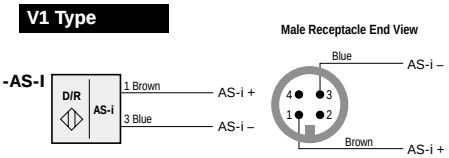




Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers.

V1 Type

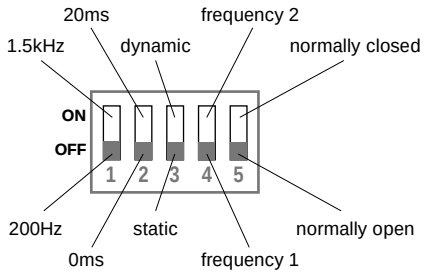


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DIP Switch Settings

DIP switches are accessible when the terminal compartment cover is removed.

S1	Switching Frequency
S2	Pulse Lengthener
S3	Weak Signal Indicator and Output
S4	Pulse Frequency
S5	Switch Output

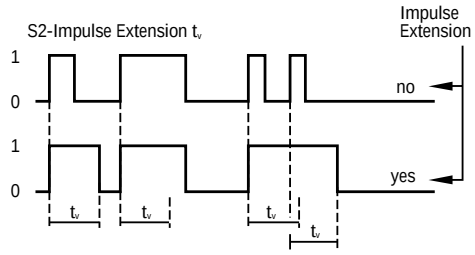


Switching Frequency (S1)

(OFF=200Hz, ON=1.5kHz)
The weak signal output is not available at 1.5kHz.

Pulse Lengthener (S2)

(OFF=0ms, ON=20ms)
The pulse lengthener activates an impulse extension of 20ms. This may be beneficial when the sensor is used with a programmable logic controller and the sensor's output pulses are too fast to be recognized by the controller.



Weak Signal Indicator and Ouput (S3)

(OFF=Static Operating Mode, ON=Dynamic Operating Mode)
The weak signal output is not available at 1.5kHz

Static Operating Mode

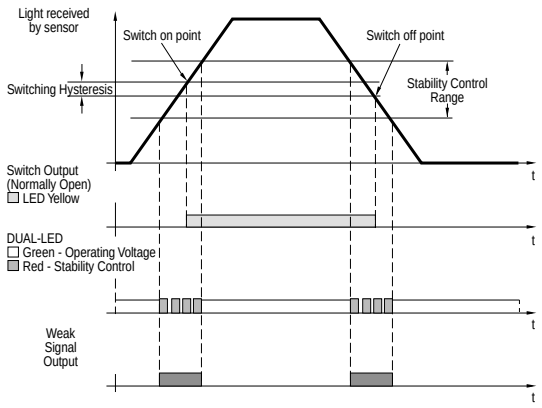
This mode should be chosen for applications that have a fixed sensing distance and position. Web break detection or edge guiding are typical examples.

The weak signal indicator (red LED) will flash and the weak signal output will turn ON as the target enters the sensing range. When the target is fully within the sensing range, the weak signal output will turn OFF and the red LED will stop flashing.

The weak signal output can be used as an alignment aid. If the sensor goes out of alignment, the weak signal output will turn ON, indicating a need for adjustment.

If the lens gets dirty, when the light level received falls between the minimum and maximum points of the stability control range, the weak signal output will turn ON and the red LED will flash. When the lens is cleaned and the light level received returns to normal, the weak signal output will turn OFF and the red LED will stop flashing.

Static Mode of Operation for the Diffused Mode M1K sensors



Dynamic Operating Mode

This mode should be chosen for use with targets that have variable sensing distances or high switching frequencies. Counting of gear teeth or positioning are typical examples.

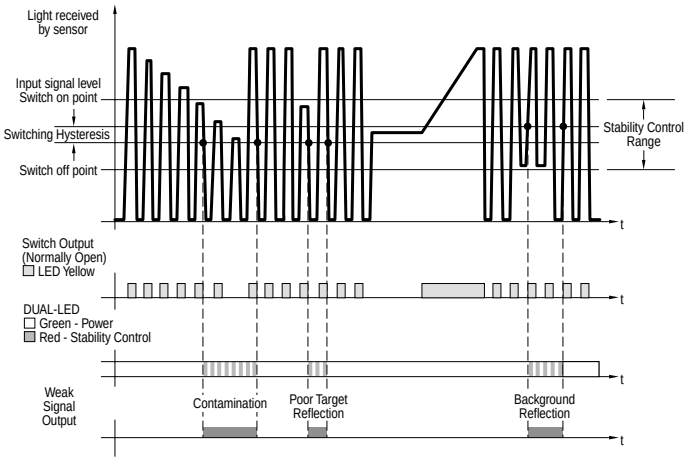
The weak signal indicator (red LED) will flash and the weak signal output will turn ON as the target enters the sensing range. When the target is fully within the sensing range, the weak signal output will turn OFF and the red LED will stop flashing.

The weak signal output can be used as an alignment aid. If the sensor goes out of alignment, the weak signal output will turn ON, indicating a need for adjustment.

In dynamic mode, the sensor examines each full cycle (switch output OFF – ON – OFF) to determine whether the light received falls between the minimum and maximum points of the stability control range for the cycle. As long as the light level stays out of this range for the cycle, the weak signal

output and the red LED will stay OFF. If the light received doesn't exceed the maximum level, perhaps due to a dirty lens, or doesn't fall below the minimum level, perhaps due to a background reflection, then the red LED will flash and the weak signal output will turn ON. This condition will continue until the normal light levels are received again by the sensor for one full cycle.

Dynamic Mode of Operation for the Diffused Mode M1K sensors



Pulse Frequency (S4)

(OFF=Pulse frequency 1, ON=Pulse frequency 2)
Setting two different pulse frequencies for two sensors prevents cross-talk between them even for side-by-side mounting.

Selectable Switch Output (S5)

(OFF=Normally Open, On=Normally Closed)

AS-Interface Programming

Address	preset to 00, can be changed via the master or with a hand-held addressing device.
IO-Code	1
ID-Code	1

Data bits

Bit	**Function**
D0	switch output
D1	weak signal indication (0=on, 1=off)
D2	operational availability
D3	switching frequency, 200Hz*/1.5kHz†

Parameter bits

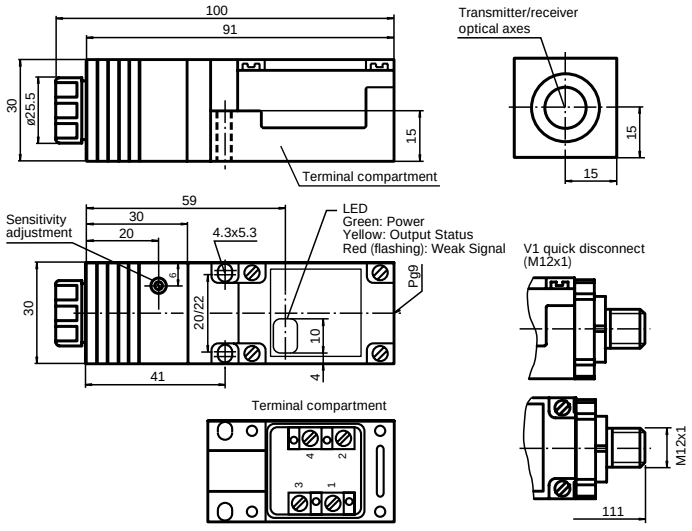
Bit	**Function (1/2)**
P0	pulse frequency, 1*/2
P1	switch output, light on*/dark on
P2	pulse lengthener (20ms), off*/on
P3	weak signal indication†, dynamic*/static

†no weak signal indication with 1.5kHz
*default setting

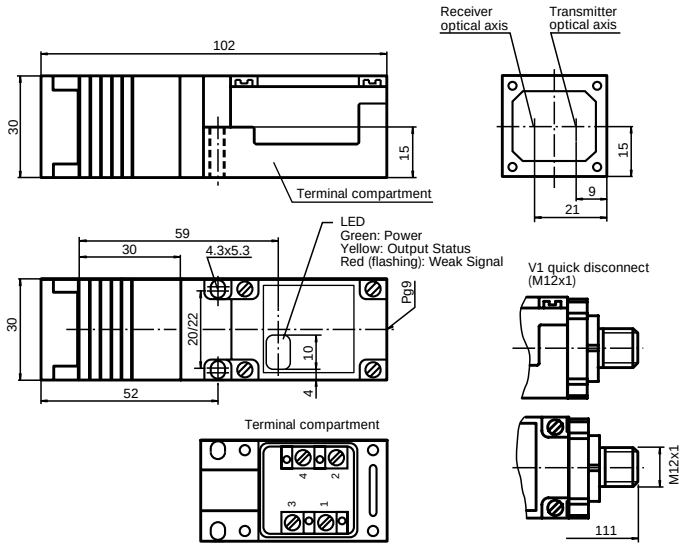
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Dimensions (mm)

OJ500-M1K..., OCT500-M1A...



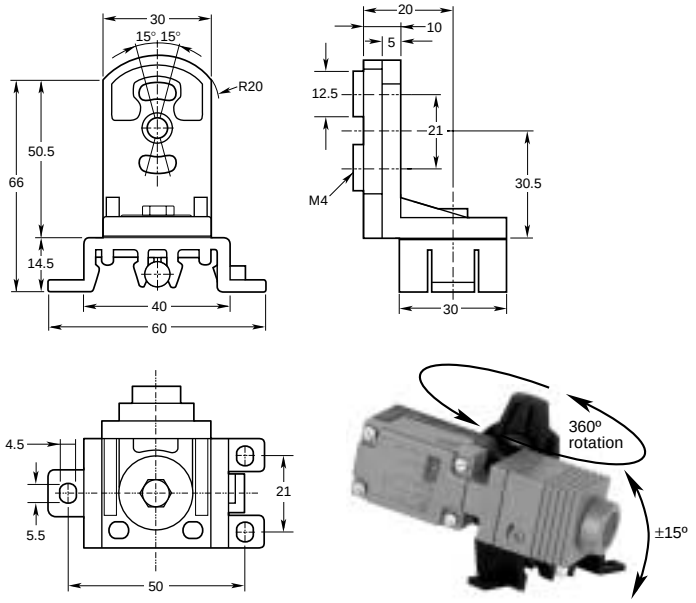
OJ3000-M1K..., OCS3000-M1A...



Accessories

(Dimensions in mm)

Rotating Mounting Bracket Model OMH-4-4950



Replacement Lens Model OTS18
(only for OJ500 and OCT500 models)



Conduit Adapter Model PG9-1/2”NPT



See pages 769-828 for cordsets

See pages 829-840 additional accessories for photoelectric sensors

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