# MACHINE VISION SMART CAMERA



www.hikrobotics.com

## Performance and Application of Smart Camera

### **Product Background**

Industrial vision is widely used in food & beverage, cosmetics, pharmaceutical, building materials and chemicals, metal processing, electronics manufacturing, packaging, automotive manufacturing and other industries, and is still dominated by PC solutions. However, embedded (smart camera, X86 open platform) solutions for automated factories, the solution is simple to operate and easy to maintain equipment, and is increasingly becoming the mainstream choice. Smart camera is a highly integrated micro and small machine vision system that integrates image acquisition, storage, processing and communication functions into one, thus forming a multi-functional, modular, highly reliable and easy-to-operate machine vision solution. At the same time, due to the continuous iterative update of DSP, FPGA and a large number of storage technologies, its intelligence has been increasing to meet the needs of increasingly complex machine vision applications.

#### One-button debugging parameters, automatic setting of brightness focus and white balance



### **Industry Cases Automotive & Auto Parts Industry**



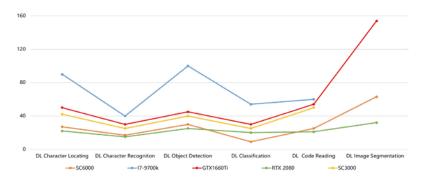
- Resolution range 0.4MP~25MP, Support long-range and large FOV detection
- Built-in large-capacity storage space, support for cyclic saving pictures
- (6) Includes traditional vision algorithms as well as AI deep learning, covering all types of detection
- © Support a variety of industrial communication protocols
- IP65 or higher protection level, adapt to the harsh industrial application environment

#### **Performance**

• Rich algorithms function, 30+ detection tools.



• Powerful computing platform to help more complex applications.





Error-proof detection of multi-model car wheels



results.

Automotive base low contrast character recognition

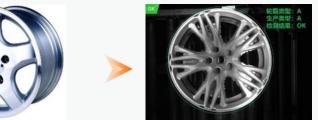
**Medical Industry** 





Pill box code traceability



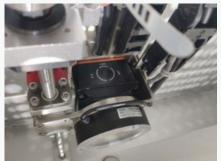


On the complete vehicle assembly line, the SC camera can judge more than 1 hundred types of wheel categories and support instant update and modification of the set wheel type information.



The car base carries production information, and the different materials and brightness of different models lead to shallow etched character information, in which case the AI method is used for fast recognition reading and judgment of the detection

By using the AI method of OCR + code reading, up to more than 99.9% accuracy, it provides a more reliable and integrated solution for reading and identifying multiple information on the outer packaging of pharmaceutical boxes.



Medical culture test tube status tracking



Bacteria ferment in the culture medium over time, showing different color changes in the test tube. the SC camera's ultra-high color reproduction can record the state changes of the culture medium in real time.



Pharmaceutical test tube multi-class judgment





Arbitrary size, shape, label interference, blood color, etc. of the test tube does not affect the full autochemical detection of drug liquid test tube, the integrated camera can realize the sample container code identification, test tube category judgment, liquid level detection, etc.

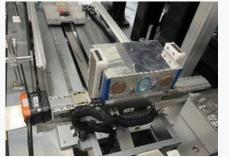
### **Lithium Industry**



Lithium battery color detection



Compact models with efficient algorithms, 40ms can complete a test, 99.99% accuracy can ensure the accuracy of anti-error verification, integrated equipment installation, debugging, maintenance more convenient.



Inkjet interference in lithium battery information detection





Due to inkjet and other process interference resulting in more white dot interference with characters and codes, the use of AI method of OCR + code reading, can achieve up to 99.9% accuracy rate, effectively eliminate the leakage of spray, multiple spray, spray error, missing and other abnormal products.

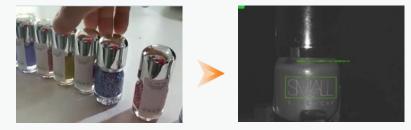
### **Packaging Industry**



Package labeling guide ultra-high speed inspection



Multi-category liquid level detection



than 40ms.





Dynamic tracking and counting during pill packaging



ignored.

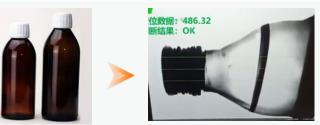
### Robotic arm gripping scene



Robotic arm guided product gripping



The labeling machine applies labels to bottles rotating at high speed, and the SC camera enables a full-flow high-speed inspection application from trigger to IO output, taking less



SC camera is compatible with a variety of product types and adaptive detection of a variety of liquid level heights, effectively avoiding air bubbles, impurities, etc. on the accuracy of liquid level detection.

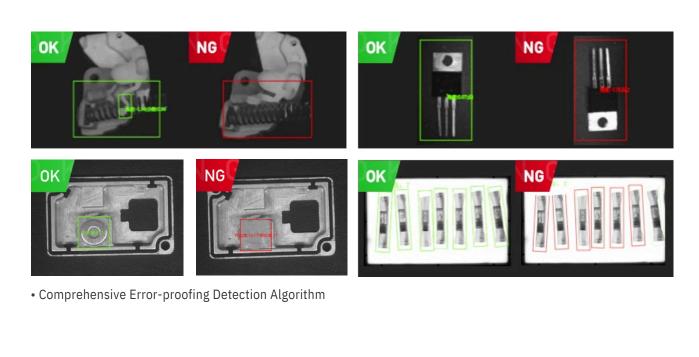
the information such as posture and shape of the real-time movement of materials, combines with AI algorithm, real-time analysis and processing, accurately calculates the number of materials, realizes real-time counting function, without fear of stacking and other problems, and foreign objects are automatically

The robotic arm requires a small product size, easy installation, self-contained camera, light source, and processing algorithm, and the SC camera is compatible with a variety of product positioning gripping applications.

## **Smart Camera**

### **SC2000E** Series Vision Sensor

SC2000E Series Vision Sensor integrates full functions of a vision system: lighting, acquisition, processing, and communication in minimal fuselage. Bring new choices for Y/N, P/N verifications with excellent performance in error-proofing detection scenarios.



46mm -----25mm 38mm

• Ultra-compact size



**Specifications** 

	Model	Vision tool
	MV-SC2004EM(Mini	Defect: OL classification, Whether or not circles, lines, spots, edges, patterns Dosition network of the circles of the circles of the circles Logic: condition judgment, logic judgment, character )comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean. constast measurement, witch
		Measurement: line Angle, diameter measurement, neasurement, bound intermeasurement, with neasurement, bound the measurement, gray area, straight inter Angle nitch description Recognition: Character recognition
		Defect: OL classification, Whether or not, circles, lines, spots, edges, patterns Positioning, Position correction Logic: condition judgment, logic judgment, character
	MV-SC2016EM(Mini	)comparison, variable calculation Measurement: line Angle, diameter measurement, brenchess mean, contrast measurement, work measurement, point tine measurement, gray area, straight line Angle, prich detection Recognition: Character recognition
	MV-SC2004EM	Defect: OL classification Whether or not: circles, lines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement, point line measurement, gray area, straight line Angle, pitch detection Recognition: Character recognition
	MV-SC2004EC	Count: spot count, edge count, pattern count Defect: OL classification Whether or not: circles, lines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement, point and line measurement, gray area straight line Angle, pitch detection, color area

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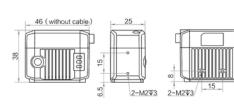
S						Ce		Ð
	Vision tool	Pixel size	Sensor size	Resolution	Max. frame rate	Mono/ color	Focal length	Label
ni	Defect: OL classification Whether or nors frictes rines, spots, edges, patterns Positioning, position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement and the measurement, gray area, Recognition: Character recognition	6.9 µm	1/2.9"	704 × 540	60 fps	Mono	6.72 mm	A
ni	Defect: OL classification, Whether or Positicices rines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, measurement, confast measurement, width measurement, and the surement, gray area, Recognition: Character recognition	3.45 μm	1/2.9"	1408 × 1024	4 60 fps	Mono	6.72 mm	A
	Defect: OL classification Whether or not: circles, lines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement, point line measurement, gray area, straight line Angle, pitch detection Recognition: Character recognition	6.9 µm	1/2.9"	704 × 540	60 fps	Mono	8/12.4/ 14.8m m	В
	Count: spot count, edge count, pattern count Defect: OL classification Whether or not: circles, lines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement, point and line measurement, gray area, straight line Angle, pitch detection, color area Recognition: character recognition, color comparison	6.9 µm	1/2.9"	704 × 540	60 fps	Color	8/12.4/ 14.8m m	В

Model	Vision tool	Pixel size	Sensor size	Resolution	Max. frame	Mono/rat color	e Focal length	Label
MV-SC2016EM	Defect: OL classification Whether or not: circles, lines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement, point line measurement, gray area, straight line Angle, pitch detection Recognition: Character recognition	3.45 µm	1/2.9"	1408 × 1024	60 fps	Mono	8/12.4/ 14.8m m	В
MV-SC2016EC	Count: spot count, edge count, pattern count Defect: OL classification Whether or not: circles, lines, spots, edges, patterns Positioning: Position correction Logic: condition judgment, logic judgment, character comparison, variable calculation Measurement: line Angle, diameter measurement, brightness mean, contrast measurement, width measurement, point and line measurement, gray area, straight line Angle, pitch detection, color area Recognition: character recognition, color comparison	3.45 μm	1/2.9"	1408 × 1024	60 fps	Color	8/12.4/ 14.8m m	В

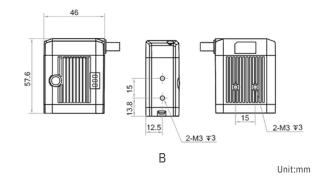
	I/O Power Cables	s Standard	High Softness	Elbow
	1m	MV-ACG-RJ45s-RJ45-ST-1m		
	3m	MV-ACG-RJ45s-RJ45-ST-3m	MV-ACG-RJ45s-RJ45-HF-3m	MV-ACG-RJ45s(up)-RJ45-ST-3m
	5m	MV-ACG-RJ45s-RJ45-ST-5m	MV-ACG-RJ45s-RJ45-HF-5m	MV-ACG-RJ45s(up)-RJ45-ST-5m
	7m	MV-ACG-RJ45s-RJ45-ST-7m	MV-ACG-RJ45s-RJ45-HF-7m	
	10m	MV-ACG-RJ45s-RJ45-ST-10m	NV-ACG-RJ45s-RJ45-HF-10n	n —
	15m	MV-ACG-RJ45s-RJ45-ST-15m	NV-ACG-RJ45s-RJ45-HF-15n	n MV-ACG-RJ45s(up)-RJ45-ST-15m
	30m	MV-ACG-RJ45s-RJ45-ST-30m	NV-ACG-RJ45s-RJ45-HF-30n	n —



Power Supply	Two Wire Adapter	Desktop Two Wire Adapter	Switching Power Supply
Model	ADS-26FSG-12 12024EPCN	KPL-060M-VI	LRS-150F-24



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### Accessories

Dimension



I/O Power Cable	s Standard	High Softness	Elbow				
3m	MV-IDA-PE-M12A17pF-opensRJ45DB9-ST-3r	n MV-IDA-PE-M12A17pF- opensRJ45DB9-HF-3m	MV-ACPE-M12A17F(back) -OPEN/RJ45-FL-3m				
5m	MV-IDA-PE-M12A17pF-opensRJ45DB9-ST-5r	n <mark>RJ45M/DB9/Opens-SP</mark> -5n	n —				
10m	MV-IDA-PE-M12A17pF-opensRJ45DB9-ST-10	m MV-IDA-PE-M12A17pF- open/RJ45/DB9-HF-10m					
15m	MV-IDA-PE-M12A17pF-opensRJ45DB9-ST-15	MV-IDA-PE-M12A17pF-opensRJ45DB9-ST-15m MV-IDA-PE-M12A17pF- opensRJ45DB9-HF-15m					



Mounting Component			Model	
Standard	SC2000E Mounting Plate	Standard	MV-IDA-IO-33	



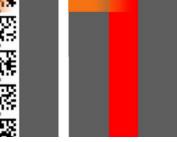
MV-VT3000-128G40



### SC2000A Series Navigation Sensor

SC2000A series navigation sensor is a navigation sensor developed specifically for AGV. With excellent hardware design and high-performance algorithms, the non-contact design can provide various positioning information for AGV cars stably, efficiently, and accurately. It is widely used in multiple industries such as unmanned warehousing, lithium-ion batteries, and photovoltaic systems.





• Built in multifunctional algorithms for efficient operation



• Compact structure, perfectly embedded inside the AGV

#### Accessories



Model

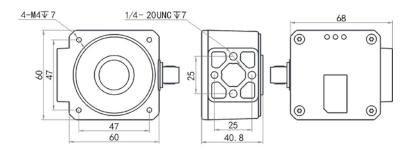


Gigabit Network Cable	Standard	High Softness	Elbow
1m	MV-ACG-RJ45s-RJ45-ST-1m		
3m	MV-ACG-RJ45s-RJ45-ST-3m	MV-ACG-RJ45s-RJ45-HF-3m	MV-ACG-RJ45s(up)-RJ45-ST-3m
5m	MV-ACG-RJ45s-RJ45-ST-5m	MV-ACG-RJ45s-RJ45-HF-5m	MV-ACG-RJ45s(up)-RJ45-ST-5m
7m	MV-ACG-RJ45s-RJ45-ST-7m	MV-ACG-RJ45s-RJ45-HF-7m	
10m	MV-ACG-RJ45s-RJ45-ST-10m	MV-ACG-RJ45s-RJ45-HF-10m	
15m	MV-ACG-RJ45s-RJ45-ST-15m	MV-ACG-RJ45s-RJ45-HF-15m	MV-ACG-RJ45s(up)-RJ45-ST-15
30m	MV-ACG-RJ45s-RJ45-ST-30m	MV-ACG-RJ45s-RJ45-HF-30m	
15m	MV-ACC-01-1101-15m	MV-ACC-01-1102-15m	
30m	MV-ACC-01-1101-30m	MV-ACC-01-1102-30m	

### **Specifications**

Model	Pixel size	Sensor sizeR	esolutionMa	x. frame rateMa	x. reading speed	Max.running speed	1ono/colorFo	ocal length
MV-SC2005AM-02WBN	I 4.8 μm	1/3.6"	800 × 600	100 fps	100 codes/sec	3 m/s	Mono	2.5 mm
MV-SC2005AC-02WBN	4.8 µm	1/3.6"	800 × 600	96 fps	83 codes/sec	3 m/s	Color	2.5 mm

#### Dimension





ADS-26FSG-12 12024EPCN

Unit:mm	



Standard

MV-ACC-02-2211-01m

Desktop Two Wire Adapter

KPL-060M-VI

Switching Power Supply

LRS-150F-24

### **SC3000** Series Vision Sensor

Integrated with imaging, processing and communication functions, the SC3000 series has a more compact size and the vision detection tools lead to better performance. Equipped with a new SCMVS for on-site deployment and lower debugging requirements, bringing a more comprehensive and cost-effective choice for visual inspection!



• Comprehensive Error-proofing Detection Algorithm



• Outgoing right angle design, supporting 180 degree rotation, flexible adaptation to narrow spaces

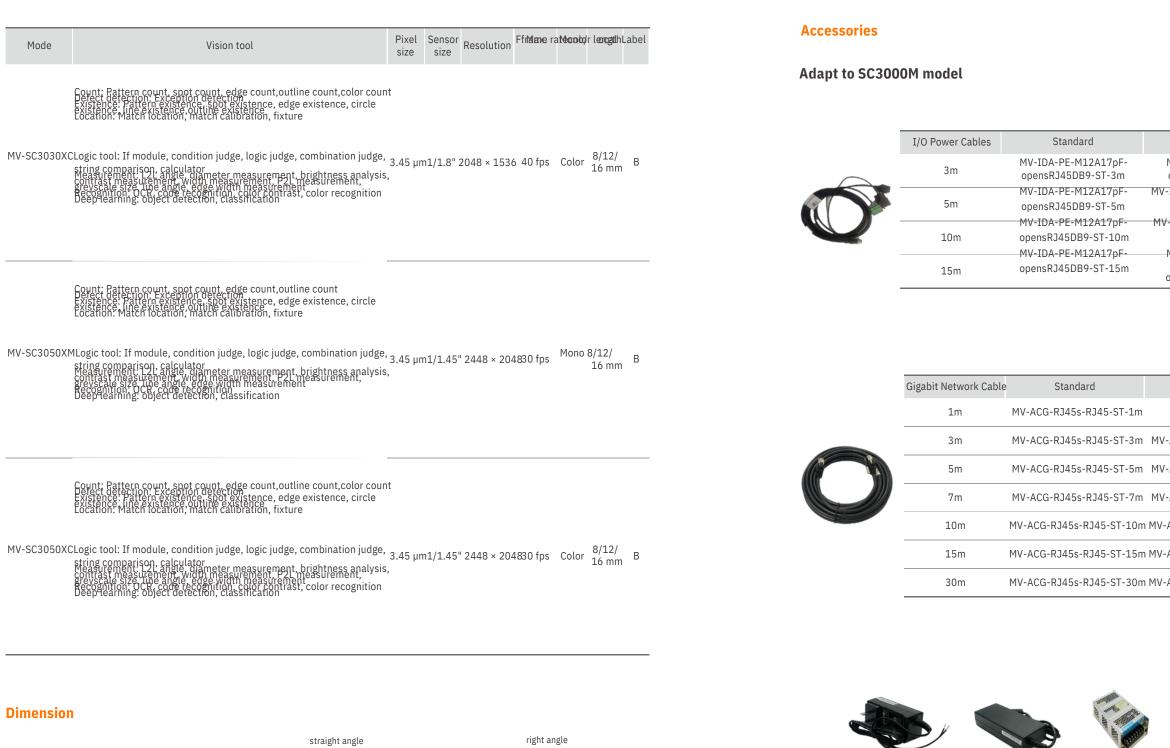
**Specifications** 

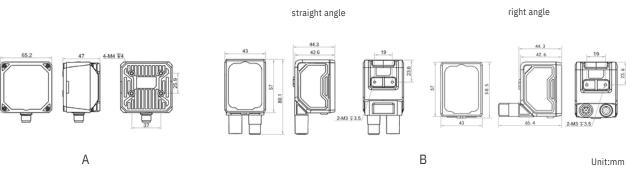
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Mode	Vision tool	Pixel size	Sensoi size	Resolution	Ffi <b>talen</b> er	altecnodøi	r ocal lengthLa	bel
MV-SC3016	Count: Pattern count, spot count, edge count Defect detection: Exception detection Existence: Pattern existence, spot existence, edge existence, circle existence, line existence Location: Match location, match calibration, fixture MLogic tool: If module, condition judge, logic judge, combination judge, string comparison, calculator Measurement: L2L angle, diameter measurement, brightness analysis, contrast measurement, width measurement, P2L measurement, greyscale size, line angle, edge width measurement Recognition: OCR, code recognition	3.45 µm	1/2.9"1	1408 × 1024	4 60 fps		o/12.4/ 14.8 mm	A
MV-SC3016	Count: Pattern count, spot count, edge count Defect detection: Exception detection Existence: Pattern existence, spot existence, edge existence, circle existence, line existence Location: Match location, match calibration, fixture CLogic tool: If module, condition judge, logic judge, combination judge, 3 string comparison, calculator Measurement: Color size, L2L angle, diameter measurement, brightness analysis, contrast measurement, width measurement, P2L measurement, greyscale size, line angle, edge width measurement Recognition: OCR, color contrast, code recognition, color recognition	3.45 µm	1/2.9"1	.408 × 1024	60 fps	Coloré	)/12.4/ 14.8 mm	А

Mode	Vision tool	Pixel size	Sensor size	Resolution	M <b>d%ia</b> ∦fra		Focal length	Label
MV-SC3050M	Count: Pattern count, spot count, edge count Defect detection: Exception detection Existence: Pattern existence, spot existence, edge existence, circle existence, line existence Location: Match location, match calibration, fixture Logic tool: If module, condition judge, logic judge, combination judge, string comparison, calculator Measurement: L2L angle, diameter measurement, brightness analysis, contrast measurement, width measurement, P2L measurement, greyscale size, line angle, edge width measurement Recognition: OCR, code recognition		1/1.7"2	368 × 1760	30 fps	Mono 8	8/12.4/ 16 mm	A
MV-SC3013XN	Count: Pattern count, spot count, edge count,outline count Existence, Figure Exception detection Existence, Figure State of existence, edge existence, circle Existence, Figure State of existence, edge existence, circle Existence, Figure State of existence, fixture (Logic tool: If module, condition judge, logic judge, combination judge, string comparison, calculator Contrast measurement, which measurement, brightness analysis, greyscale streatment, which measurement Becognition, October ecognition Deep learning: object detection, classification	6.9 µm	1/1.45'	' 1216 × 102	2460 fps	Mono	8(12/ 16mm	В
MV-SC3013X0	Count: Pattern count, spot count, edge count,outline count,color count Description: Exception experience spot existence, edge existence, circle Existence: Pattern existence outline existence, edge existence, circle Existence where existence outline existence, fixture Coation: Match location, match calibration, fixture Clogic tool: If module, condition judge, logic judge, combination judge, string comparison, calculator Vient measurement, width measurement, brightness analysis, grevscas size internet, width measurement, brightness analysis, Becognition och contenent, color contrast, color recognition Deepfearning: object detection, classification	( 0	1/1.45'	' 1216 × 102	2460 fps	Color	8/12/ 16 mm	В
MV-SC3030XN	Count: Pattern count, spot count, edge count,outline count Defect detection: Exception experience spot existence, edge existence, circle Existence: Fattern existence outline existence, edge existence, circle Existence: Match location, match calibration, fixture ALogic tool: If module, condition judge, logic judge, combination judge, string comparison, calculator contrast measurement, width measurement, brightness analysis, greyscale size fire angle, edge width measurement Becognition, och calibration, classification	3.45 µr	n1/1.8"	2048 × 153	:6 40 fps	Mono	8/12/ 16 mm	В







 Power Supply
 Two Wire Adapter
 Desktop Two Wire Adapter
 Switching Power Supply

 Model
 ADS-26FSG-12 12024EPCN
 KPL-060M-VI
 LRS-150F-24

High Softness	Elbow
MV-IDA-PE-M12A17pF- opensRJ45DB9-HF-3m	MV-ACPE-M12A17F(back)- OPEN/RJ45-FL-3m
MV-IDA-PE-M12A17pF-RJ45M/ DB9/Opens-SF-5m	
MV-IDA-PE-M12A17pF-open/ RJ45/DB9-HF-10m MV-IDA-PE-M12A17pF-	
opensRJ45DB9-HF-15m	

	High Softness	Elbow
-1m		
-3m	MV-ACG-RJ45s-RJ45-HF-3m	MV-ACG-RJ45s(up)-RJ45-ST-3m
-5m	MV-ACG-RJ45s-RJ45-HF-5m	MV-ACG-RJ45s(up)-RJ45-ST-5m
-7m	MV-ACG-RJ45s-RJ45-HF-7m	
10m	MV-ACG-RJ45s-RJ45-HF-10m	
15m	MV-ACG-RJ45s-RJ45-HF-15m	MV-ACG-RJ45s(up)-RJ45-ST-15m
30m	MV-ACG-RJ45s-RJ45-HF-30m	



Lens	SC3013	SC3050
6mm	BTY0640-MP	
8mm		BHYB0856-12S
12mm	BTS1240-MP B	HP1256-12S
15mm	BTS1540-01S	
16mm		BHP1656-12S
25mm		BHP2556-12S



Model

MV-SC3000-C-NN

MV-SC3000-C-HP

MV-SC3000-C-FP

MV-IDA-C-Y-62-62-M1

MV-IDA-C-Y-62-62-M2

Lens Cap

Transparent

Semi-polarization

Polarization

Magnifier



Model

MV-SV100

MV-SV400

MV-VT1010-008G50

MV-VT3000-128G40

Display Equipment

Expansion Box

Touch Screen

### Adapt to SC3000X model

I/O Power Cables	Standard	High Softness	Elbow
3m	MV-IDA-P-M12A12pF-open-ST-3m	MV-IDA-P-M12A12pF-open-HF-3m	
5m	MV-IDA-P-M12A12pF-open-ST-5m	MV-IDA-P-M12A12pF-open-HF-5m	MV-ACP-M12A12pF (up)-open-ST-5m
7m	MV-IDA-P-M12A12pF-open-ST-7m		
10m	MV-IDA-P-M12A12pF-open-ST-10m	MV-IDA-P-M12A12pF-open-HF-10m	
15m	MV-IDA-P-M12A12pF-open-ST-15m		
20m		MV-IDA-P-M12A12pF-open-HF-20m	
30m	MV-IDA-P-M12A12pF-open-ST-30m		



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Light source	Model
White	MV-SC3000-L-WB
Blue	MV-SC3000-L-BB
Red	MV-SC3000-L-RB
Near-infrared	MV-SC3000-L-IB

Mounting Component	Model
Standard	V020-Mounting Component

Gigabit Network Cable	Standard	High Softness	Elbow
3m	MV-IDA-E-M12A8pF-RJ45-ST-3m	MV-IDA-E-M12A8pF-RJ45-HF-3m	
5m	MV-IDA-E-M12A8pF-RJ45-ST-5m	MV-IDA-E-M12A8pF-RJ45-HF-5m	MV-ACE-M12A8Pm (UP)-RJ45-C5e-5m
7m	MV-IDA-E-M12A8pF-RJ45-ST-7m		
10m	MV-IDA-E-M12A8pF-RJ45-ST-10m	MV-IDA-E-M12A8pF-RJ45-HF-10m	
15m	MV-IDA-E-M12A8pF-RJ45-ST-15m		
20m		MV-IDA-E-M12A8pF-RJ45-HF-20m	
30m	MV-IDA-E-M12A8pF-RJ45-ST-30m		



IO Box	Model
Standard	MV-IDA-IO-33



Lens Cap	Model
SC3000X	Magnifier
	Uniform light cover
	YAG guard
	ESD guard

### SC6000 Series Smart Camera

SC6000 series smart cameras are developed based on high-performance embedded processors, with powerful hardware performance and fully functional VM Algorithm Development Platform. They can meet machine vision applications such as visual positioning, size measurement, defect detection, and information recognition. The highly integrated product form brings more choices for intelligent manufacturing.



• Built in over 140 visual tools, various deep learning algorithms



• Rich interfaces, breaking through limitations **Specifications** 

Model	Function module	Pixel sizeS	ensor size	Resolution 1408 × 1024	Max. frame rate	Mono/colo	rFocal lengthLa	abel
MV-SC6016M	VM Platform (Including deep learning modules)	3.45 µm	1/2.9"	1408 × 1024	60 fps	Mono	6/12/16 mm	А
MV-SC6016C	VM Platform (Including deep learning modules)	3.45 µm	1/2.9"	1408 × 1024	60 fps	Color	6/12/16 mm	А
MV-SC6050M	VM Platform (Including deep learning modules)	<u>3.2</u> нт 3.45 нт	1/1.7" 4/2.2"	2592 2548 2592		Mon Color	8/ <del>1</del> 2/ <del>1</del> 8 mm	Â
MV-SC6050C	VM Platform (Including deep learning modules)	3.45 µm 3.45 µm	1/1:45"	1024 1024 2048 2048		Color	1	
MV-SC6016M-00C-NNN	VM Platform (Including deep learning modules)			2048		Folor glon		
MV-SC6016C-00C-NNN	VM Platform (Including deep learning modules)							
MV-SC6050M-00C-NNN								
MV-SC6050C-00C-NNN	VM Platform (Including deep learning modules)							
MV-SC6250M-00C-NNN	VM Platform							
	(Including deep learning modules)							



Dimension



