

MITSUBISHI ELECTRIC INDUSTRIAL ROBOT

Network Vision Sensor

Changes for the Better

Option

For CR-500 Series



MELFA-Vision

Nagoya works, Mitsubishi Electric Corporation, has acquired certification for systems of environmental management under ISO 14001, and for quality management systems under ISO 9001.



More powerful Vision Sensors! Introducing a line of new-generation

Though a joint development with Cognex, we have significantly improved the function and performance of our vision sensors. With these user-friendly sensors, any one can create vision sensor applications with ease!

What Is Network Vision Sensor?

A network vision sensor is an optional function that adds vision to a robot. Having "vision," robots can discriminate works to find those that require processing. Accordingly, robots equipped with a network vision sensor can perform various functions, such as transferring, processing, assembling, inspecting and measuring.

Features

• Easy setup

- Easy setup using MELFA-Vision software.
- Easy programming using dedicated robot languages.
- Robots can be monitored remotely through Ethernet® communication to report image status.

• System cost reduction through shared use of vision sensors

Three robots and seven vision sensors can be combined into one system via Ethernet® connection.

• Extended variations available

- Standard and high-speed processing models
- High-resolution(*1), color(*1), and remote-head camera(*1) models

*1) Currently under development.



Network vision sensor



MELFA-Vision software

Specifications/Functions

- Standard job programs supporting various types of operations are provided. Using these programs, even a first-time users can operate vision sensor systems with ease.

MELFA-Vision software is the only tool needed to easily and quickly customize vision applications.

We have also developed original programming languages for network vision sensors to further simplify creation of required programs.

- You can utilize the dedicated robot languages to fully customize standard jobs.

1) "Network vision support software MELFA-Vision"

- [1] MELFA-Vision is the only application required to set up vision sensors and robot controllers.
- [2] Easy calibration function that supports various camera installation positions.
- [3] Log function that allows the user to check sensor images at error occurrences on a personal computer.

2) Network vision templates (job library)

Templates (job library) supporting pattern matching and blob functions are ready to use.

3) Enhanced position detection function

High-speed image processing function can detect moving parts, including those rotated 360°, at high speed.

4) Ethernet® connection interface

- [1] Up to seven vision sensors can be controlled with a single robot controller.
- [2] One vision sensor can be controlled from up to three robot controllers.
- [3] All robot controllers and vision sensors can be debugged on a single personal computer.

5) Dedicated programming languages for network vision sensors

- [1] NVOPEN : Provides a set of commands integrating various vision sensor steps, such as logging in to the vision sensor system
- [2] NVPST : Provides a set of operation commands for starting a vision program, acquiring processing results, and more.

• Network vision sensor unit specifications

Item	Specification
Firmware	Version 3.2 or later
Memory	Vision program storage area: 16 MB Image processing area: 64 MB
Image	Vision sensor 1/3" CCD / 640x480 pixels / Electronic shutter speed: 32 μs to 1,000 ms
Capture	256-level gray scale / 40 frame/sec at exposure time of 8 ms
Lens	C-mounted
Imaging	Pattern matching / blob / edge / barcode / 2D code / character verification / histogram
Communication	Ethernet (10/100BaseT) TCP/IP protocol Communication line: 3 lines
Power supply	24±10% VDC, 350 mA
Weight	297.6 g (including the lens cover, without lens)
Environment specifications	Ambient temperature: 0 to 45°C (operating), 40 to 85°C (in storage) Ambient humidity: 9%, non-condensing Protection: IP67 with the lens cover installed
Certifications	CE, CUL and FCC obtained
Supported product series	In-Sight5100/5400

*2) The high-resolution version and color version are currently under development.

*3) These performance values do not consider image capture speed (communication time).

*4) The image capture speed is based on an exposure time of 8 ms and full image frame capture.

*5) A lens cover (supplied with the sensor) conforming to the protection specifications under the NEMA standards is required.

*6) One high-speed output is used for the flash.

*7) I/O and Ethernet cables: The maximum bending radius is 38 mm.

• Lineup of network vision sensors

		Standard 5100	High- performance 5400	High-resolution 5401 (*2)	Color 5400C (*2)
Performance magnification	Average performance based on the performance of the standard version being 1 (*3)	x1	x2.5	x2.5	x2.5
Camera	Resolution	640 x 480	640 x 480	1024 x 768	640 x 480
	CCD sensor size	1/3"	1/3"	1/3"	1/3"
	Color	×	×	×	○
	Image capture speed (frame/sec) (*4)	60 frames/sec	60 frames/sec	20 frames/sec	60 frames/sec
	Partial image capture	○	○	○	○
	NEMA 6/IP67 camera	○(*5)	○(*5)	○(*5)	○(*5)
	Maximum operating temperature	45°C	45°C	45°C	45°C
Display options	VGA port	×	×	×	×
	PC	○	○	○	○
I/O options (*7)	Number of triggers/high-speed outputs	○/2 (*6)	○/2 (*6)	○/2 (*6)	○/2 (*6)
	I/O breakout/extension module	○	○	○	○
	Ethernet I/O support (maximum 512 inputs/512 outputs)	○	○	○	○
Interface (*7)	Ethernet	○	○	○	○
Lighting	General lighting option	○	○	○	○
Application development	Control pad/VGA	×	×	×	×
	In-Sight Explorer/PC	○	○	○	○
Lens mount	C or CS	C	C	C	C

ation network vision sensors that provide ultimate ease of use!

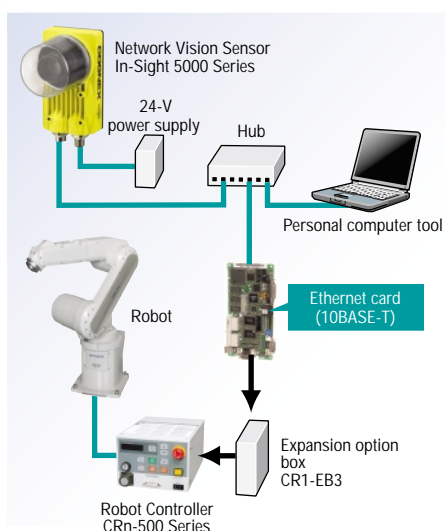


Product Configuration

Model	Type	Part number	Quantity	Remarks
Network vision sensor				
Network vision sensor 5400	4D-2CG5400-PKG	ISS-5400-1000	1	Sensor
		CCB-84901-1003-05	1	Ethernet cable (approx. 5 m)
		CCB-84901-0102-05	1	Breakout cable (approx. 5 m)
		3D-51C-WINJ	1	MELFA-Vision software
Network vision sensor 5100	4D-2CG5100-PKG	ISS-5100-1000	1	Sensor
		CCB-84901-1003-05	1	Ethernet cable (approx. 5 m)
		CCB-84901-0102-05	1	Breakout cable (approx. 5 m)
		3D-51C-WINJ	1	MELFA-Vision software



Example of System Configuration



Item	Model	Manufacturer	Quantity	Remarks
Robot controller	CRn-500 Series	Mitsubishi Electric	1	Software version K6 or later
Robot arm	All models		1	
Expansion option box	CR1-EB3		(1)	For CR1 controller
Ethernet interface card	2A-HR533		1	
Basic network vision sensor set	Vision sensor		1	Software version 3.20 or later
	Breakout cable		1	
	Network cable		1	
Lens	C-mounted lens (*8)	-	1	Provided by the customer (*10)
24-V power supply	- (*9)	-	1	
Personal computer	-	-	1	
Hub	-	-	1	
Ethernet cable (straight)	-	-	2	
Lighting device	-	-	1	

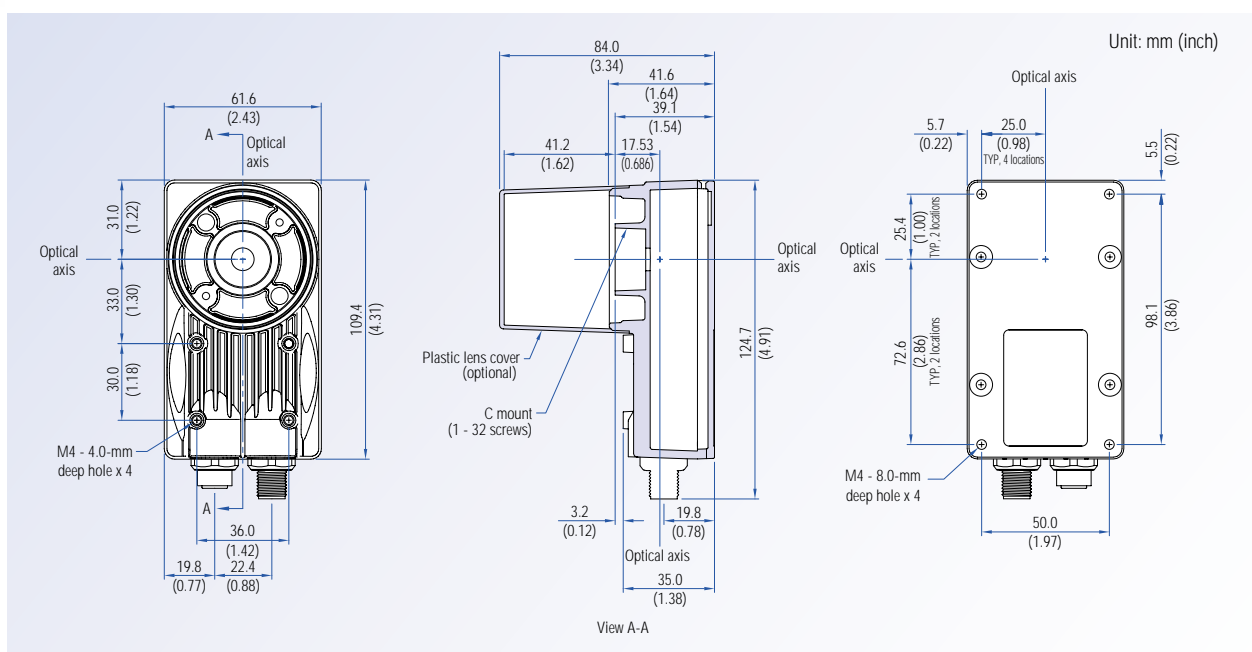
* 8) Select from general-purpose C-mounted lenses.

* 9) For the 24-V power supply, the power source of +24 VDC ($\pm 10\%$) capable of supplying 2.2 A or more is recommended since the vision sensor requires at least 350 mA.

* 10) The items indicated in light blue need to be provided by the customer.



External Dimensions of Network Vision Sensor

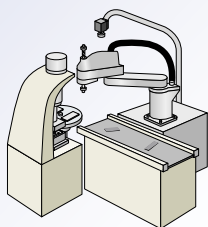


Mitsubishi Electric Industrial Robot Network Vision Sensor

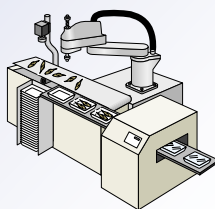


Applications

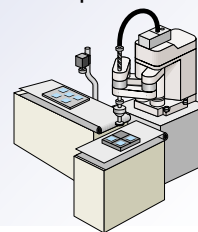
- Loading/unloading of machining parts



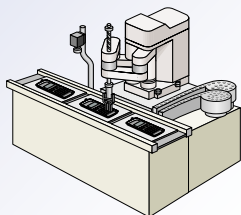
- Placement of processed food on pallets



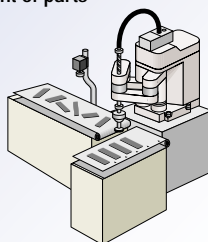
- Alignment and palletization of electronic components



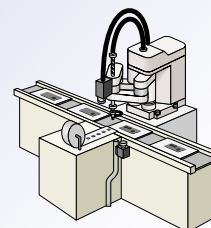
- Assembly of small electrical products



- Alignment of parts



- Mounting of small electronic components



Optional Configuration

Name	Model	Quantity	Remarks	Name	Model	Quantity	Remarks
Ethernet cable				I/O module cable			
Straight out type	CCB-84901-1001-00	1	0.6m	Straight out type	CCB-84901-0901-02	1	2m
	CCB-84901-1002-02	1	2m		CCB-84901-0902-05	1	5m
	CCB-84901-1003-05	1	5m		CCB-84901-0903-10	1	10m
	CCB-84901-1004-10	1	10m		CCB-84901-0904-15	1	15m
	CCB-84901-1005-15	1	15m	Power-supply unit			
	CCB-84901-1006-30	1	30m	24-V power supply unit	PS-KIT-1	1	100V→24V conversion adapter
Breakout cable (power cable)				Dedicated lighting for In-Sight 5000 Series			
Straight out type	CCB-84901-0101-02	1	2m	Diffused ring light (red)	IFS-DRL-050	1	
	CCB-84901-0102-05	1	5m	Direct ring light (red)	IFS-RRL050	1	
	CCB-84901-0103-10	1	10m	Direct ring light (white)	IFS-WRL050	1	
	CCB-84901-0104-15	1	15m	Operation manual (bound)			
I/O module				MELFA-Vision Operation Manual	BFP-A8476	1	
Terminal block conversion module	CIO-1350	1		System support			
I/O extension module (8 inputs/8 outputs)	CIO-1450	1		System support, startup support		1	



Restrictions on Applicable Controllers

Item	Specification
Software	Robot controller: Version K6 or later (*11) RT ToolBox: Version F3 or later (*12)
Supported robot controllers	All CRn-500 Series controllers (*13)
Connectable robots	All robots (*14)
Options (*15)	An Ethernet interface card (2A-HR533) is required.

*11) With the version K5 or earlier, vision sensor communication can be established by a combination of existing commands "OPEN, PRINT, INPUT and CLOSE."

*12) The version F2 or earlier does not support the dedicated MELFA-BASIC IV vision sensor commands, and thus errors occur in syntax check. If you are using RT ToolBox Version F2 or earlier, disable the syntax check.

*14) Take note that if the tracking function is used, robot models that can be used will be limited.

*15) An expansion option box is needed to use CR1/CR1B controllers with vision sensors. Install the Ethernet interface card (2A-HR533) in Option slot 1.



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