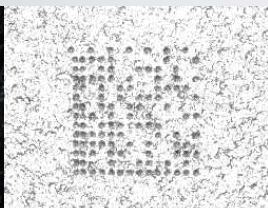# KEYENCE

SETTING THE NEW STANDARD FOR CODE READING

SR-1000 Series

SR-1000 Series

3 CHALLENGES
CODE READERS FACE

1 | **READER CANNOT BE MOUNTED AT DESIRED DISTANCE**

"Selecting the right reader and lens combination for the distance is frustrating."
"The system has to be designed to fit the specifications of the reader."

2 | **OPTIMAL SETTINGS ARE UNKNOWN**

"Reading was successful during setup but there are many errors during actual operation."
"Setup requires a whole day."

3 | **READING FAILS DUE TO GLARE**

"Do we need to mount the reader at a certain angle? What is the best angle?"
"Is external lighting required? What kind?"

1 ANSWER
JUST PRESS THE BUTTON

PRESS THE BUTTON

AUTOFOCUS

1 The reader can be mounted at any distance and maintain a clear image.
(1000 mm max.)

AUTOMATIC TUNING

2 Determines optimal settings for exposure time, image processing filter, etc. [About 750000 combinations]

AUTOMATIC POLARIZATION

3 Glare can be eliminated. Reader angle adjustment or external lighting is unnecessary.
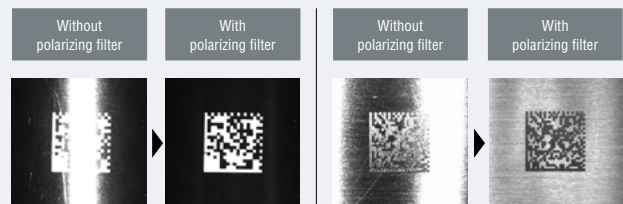
SETTING COMPLETE

Autofocus 1D and 2D code reader
SR-1000 Series

WORLD'S FIRST
AUTOMATIC POLARIZATION CONTROL

The reader features both polarized and direct light sources. Automatic polarizing filter selection eliminates glare and allows flexible mounting.

| Without polarizing filter | With polarizing filter | Without polarizing filter | With polarizing filter |

AUTOFOCUS

ONE READER FOR MANY APPLICATIONS

Mounting is less restricted by performance or specifications of the code reader itself, thus improving flexibility in machine designs for production lines and jigs. With autofocus capabilities, a single reader can detect codes on targets of varying heights.

Detecting targets with differing heights

Securing a robot's movement range

Reading extremely small codes

FIELD OF VIEW 4× LARGER
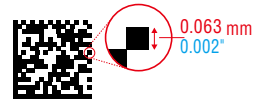
Conventional field of view

Field of view of the SR-1000 Series

EVEN IF THE CODE IS
SMALL

0.063 mm
0.002"
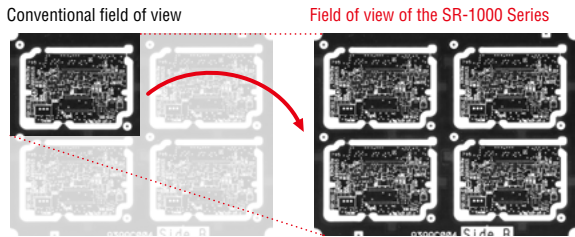
Distance:
110 mm
4.33"

Range:
290 mm × 220 mm
11.42" × 8.66"

4× WIDER
than conventional models

EVEN IF THE POSITION
CHANGES

Distance:
1000 mm
39.37"

1.6× LONGER
than conventional models

EVEN IF THE DISTANCE IS
FAR

AUTOMATIC TUNING

OPTIMAL SETTING OF EXPOSURE TIME, FILTERS AND MORE

The code reader automatically optimizes the exposure time, image processing filter and other parameters according to the target and mounting distance.

CLEAR IMAGE CAPTURE

CORRECTION ITEMS AND EXAMPLES OF AFFECTED CODES

Dark	**CAPTURE BRIGHTNESS CORRECTION** Automatically configures various combinations of exposure time, dynamic range and gain in order to achieve the optimal brightness.	Black resin / PCB
Low contrast	**CONTRAST THRESHOLD CORRECTION** Automatically corrects black/white thresholds and optimizes the contrast between code and background.	Metal / Ceramic
Thin printing	**FILTER CORRECTION** Automatically selects the best filter and filtering intensity to correct the captured image.	Bleeding / Thick printing
Distortion	**GEOMETRIC CORRECTION** Corrects distorted codes, such as those on cylinders and other round surfaces or when the reader is mounted at an angle.	Parallel distortion / Trapezoidal distortion
Stray dots	**IMAGE REDUCTION & CORRECTION** Reducing the image size may reduce background noise or missing spaces relatively smaller.	Primary noise / Dot printing

---

LATEST TECHNOLOGIES PROVIDING STABLE READING

HIGH-SPEED SEARCH

2D CODE SEARCH IN CAPTURED IMAGES

Binary processing enables immediate detection of 2D codes even if there is a code-like pattern in the field of view.

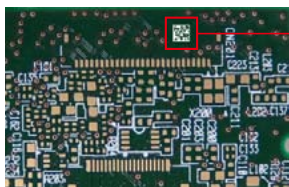**DEFECTIVE CODE POSITIONING PROGRAM**

A newly developed defective code positioning program can identify four corners of a 2D code based on a similar code detection pattern, leading to a significant improvement in code detection performance.
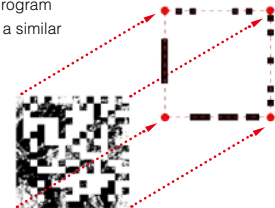
HIGH-LEVEL DECODING

CONTRAST ALGORITHM FOR LOCAL CONCENTRATION (CALC)

Our contrast algorithm for local concentrations divides a code into smaller pieces to perform binary processing using thresholds specified for each division. This enables accurate black/white classification without being affected by uneven print density.

CONVENTIONAL TECHNIQUE

Threshold Determination → Binary Processing

CALC TECHNIQUE

Threshold Determination

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

→ Binary Processing
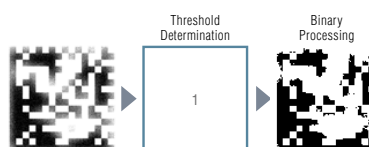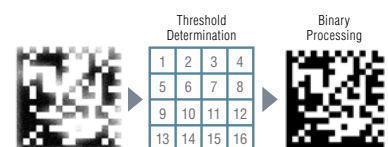
* The above illustration is only for reference and does not mean that a code is always divided into 16 parts.
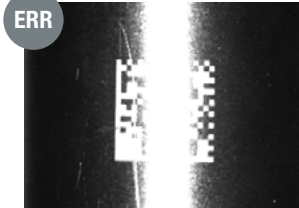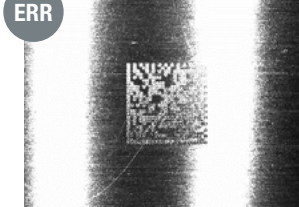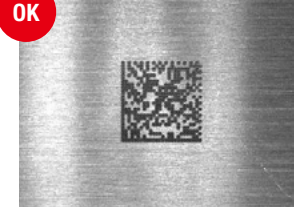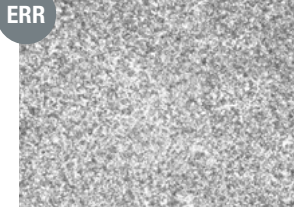
AUTOMATIC POLARIZATION CONTROL

ENSURING FLEXIBLE MOUNTING

Automatic polarization control function World's First

The code reader automatically eliminates glare, thus eliminating the need for mounting angle adjustment or external lighting during installation. When combined with the autofocus function, mounting becomes highly flexible.

With polarizing filter (polarized light)

Without polarizing filter (direct light)
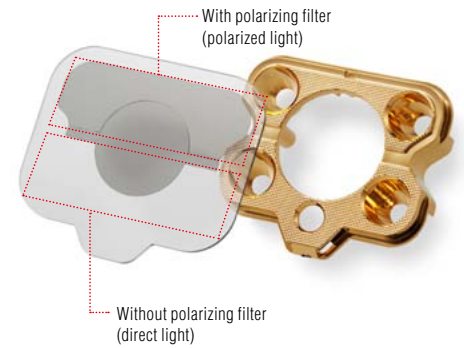
		Without polarizing filter	With polarizing filter
BLACK RESIN	CYLINDER	ERR	OK
METAL	HAIRLINE	ERR	OK
METAL	DPM ON CAST SURFACE	OK	ERR

NEW OPTICAL DESIGN FOR STABLE READING

CPC (Compound Parabolic Concentrator) Illumination

A specially shaped reflector has been designed to create high efficiency illumination by reducing loss in light intensity from the high intensity LEDs. Gold plating maximizes the reflectance to achieve brightness exceeding conventional levels by 400%. This provides reading under bright, uniform illumination even at long ranges.
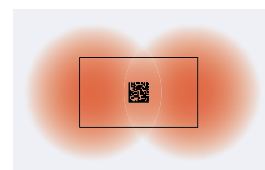
Conventional model   **SR-1000**
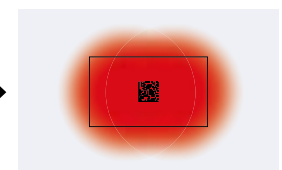
Light is concentrated efficiently within the field of view to provide high intensity illumination.

TWO MODES CAN BE SELECTED DEPENDING ON THE APPLICATION

UNAFFECTED BY CHANGING CONDITIONS

SMART MODE `NEW`

FOR CONSISTENT READING REGARDLESS OF CODE CONDITIONS

LIGHTER CODE

Fluctuations in code conditions are predicted during tuning and expanded reading settings are automatically generated. This ensures stable reading even when the contrast of the code changes, eliminating the need to reconfigure the code reader.

The reader predicts 43 patterns of change in printing conditions.

THICKER

THINNER

REFERENCE CODE

DARKER

LIGHTER
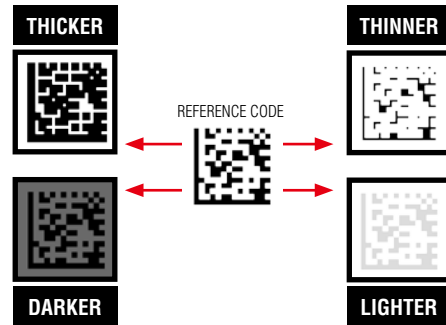
DETECTING CHANGES IN CODE CONDITIONS

CUSTOM MODE

FOR CODE QUALITY MANAGEMENT

The SR-1000 has the functionality to make judgments on code quality. Because code quality degradation can be detected before reading errors occur, this mode can be used for predictive maintenance of the printing process.

Matching level judgment function — Provides code quality comparison

Two codes, which both have a reading rate of 100%, can still be distinguished by the matching level

| Reading rate | **100%** |
| Matching level | **75** |

| Reading rate | **100%** |
| Matching level | **43** |

Code verification function — Verification based on code quality standards

OUTPUT DATA **AD-ERMT-55841:B**

TOTAL GRADE JUDGMENT

Judgment can also be given for each parameter

*This function is designed for 2D codes (QR, DataMatrix, GS1 Composite, PDF417).

SUPPORTED STANDARDS

• ISO/IEC 15415
• ISO/IEC TR 29158
  (AIM DPM-1-2006)
• SAE AS9132
• SEMI T10-0701

EASY-TO-USE HIGH PERFORMANCE

ADVANCED SETUP SOFTWARE

AUTOID NETWORK NAVIGATOR **SR-H4W** [NEW]

The software provides not only easy code reader setup but also functionality to reduce man-hours for preliminary tests.
It is now possible to connect to the software through USB. (SR-1000 Series only)

Monitor — Monitor the field of view to adjust the position of the code.

Auto focus — The focus is adjusted automatically.

Tuning — Automatically selects from about 750000 parameter combinations and whether or not to enable the polarization filter.

ADVANCED SETTINGS

IMAGE CAPTURE RANGE
The smaller the range, the shorter the reading time becomes. Selectable from 800 × 600 mm 31.50" x 23.62", 1280 × 1024 mm 50.39" x 40.31", and user defined.

POLARIZATION FILTER
Selectable between enabled or disabled.

TARGET BANK (in custom mode only)
Specify the parameter bank number to modify.

TUNING HISTORY (in custom mode only)
Tuning history can be reviewed.

NO. OF CODES FOR READING
Specify the number of codes to read simultaneously.

TUNING MONITOR

The optimum settings are automatically determined from multiple combinations of image processing filters and brightness levels.

ETHERNET COMMUNICATION WIZARD [NEW]

Setup can be completed in just four steps with a question-answer form including visual explanations. In previous versions, the user needed to understand the settings available on the screen and determine which items required input.
The new version uses a setup wizard to eliminate the need for item extraction, reducing man-hours for communication setup.

STEP 1 — Trigger Method | STEP 2 — Read Data Destination | STEP 3 — Communication Protocol | STEP 4 — Detailed Settings

STEP 1 — TRIGGER SETTINGS
(I/O input, command input)

STEP 2 — DESTINATION FOR READ DATA
(Field network, PC)

STEP 3 — COMMUNICATION PROTOCOL
(EtherNet/IP™, PROFINET, TCP, UDP, or PLC link)

STEP 4 — ADVANCED SETTINGS
(Detailed setting for each protocol)

SOPHISTICATED MEASUREMENT MODES

The SR-1000 Series provides pre-verification prior to line operation based on tuning results as well as measurement of allowable line speed for reading codes at high speeds.

READING RATE MEASUREMENT

The reading success rate can be measured without conducting reading tests on multiple targets with the actual production line or equipment.

Tuning	Reading Test	Tact Test	Depth
Reading Test	100%		
Matching level	97		
Symbology	DataMatrix(12 x 12)		
Cell size	1.00mm		
Code size (width)	12.0mm		
PPC	25.0pixel/cell		
Read Data	123456789		

READING TACT MEASUREMENT

The reading cycle time (tact) can be determined without conducting reading tests on multiple targets with the actual production line or equipment.

Tuning	Reading Test	Tact Test	Depth
Read time	32ms		
Max time	33ms		
Min time	32ms		
Read Data	123456789		

READING DEPTH MEASUREMENT NEW

The depth of field can be determined from the mounting distance and the code used for tuning, without conducting reading tests on targets with the actual production line or equipment.
(When the mounting distance changes, perform re-tuning to enable reading again.)

Tuning	Reading Test	Tact Test	Depth

175 [mm]
120   230

Installation distance	175mm
Reading depth	110mm
Near depth	- 55mm
Far depth	+ 55mm

NEAR

TUNING

FAR
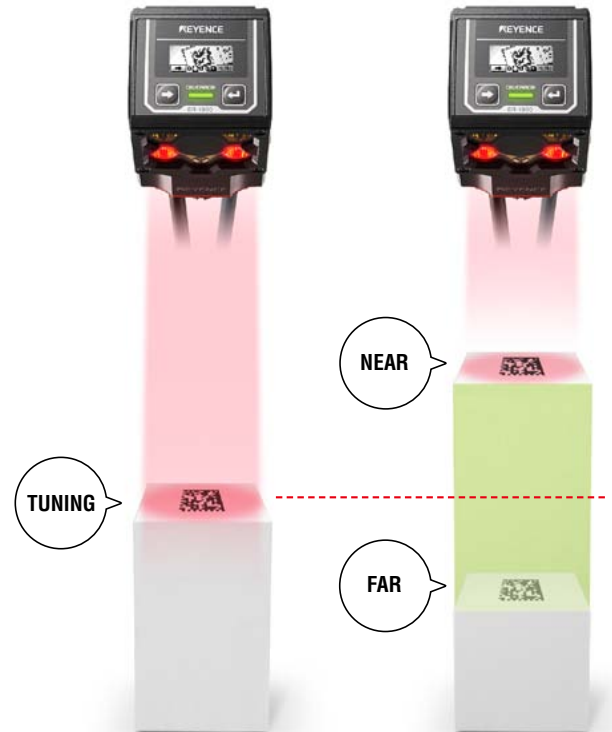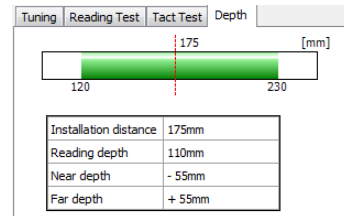
LINE SPEED MEASUREMENT NEW

Allowable line speed

Scan count: 3

Allowable line speed (approximation): 20 m/min

Close
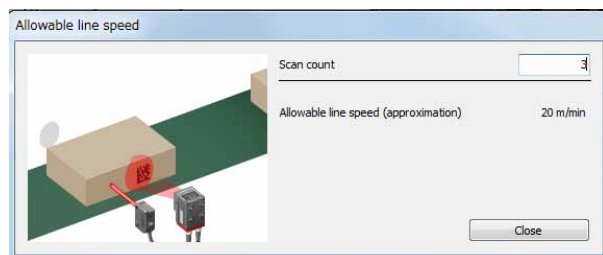
You can check allowable line speed before installation. This helps reduce man-hours spent adjusting production line designs or jigs.

FIRST-IN-ITS-CLASS, BUILT-IN ORGANIC LED (OLED) DISPLAY

CHECK OPERATION ON-SITE WITHOUT A PC

There is no need for a personal computer or monitor in the facility. The code position adjustment and operating condition can be checked simply with the intuitive built-in display.

PUSH!

Live View

Readout data display

OK/ERROR count display
OK 1000
ERR 0

Ethernet setting data
5-2 IP address
192.168.100.100

I/O signal behavior display
IN 1 2
OUT 1 2 3

Data communication condition display
ETHERNET
RS-232C SD RD

EASY SETUP WITHOUT A PC

You can set the optimal reading parameters after adjusting the code position by simply pressing the ENTER button to complete fully automatic tuning.

PUSH!

AUTOFOCUS SETTING

AUTOMATIC TUNING

AUTOMATIC POLARIZATION CONTROL

RATE
100%
END   LIVE
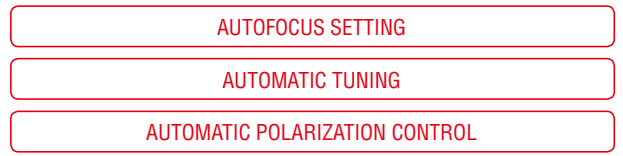
Reading test starts automatically.

HIGHLY-ADVANCED FUNCTIONS OFFER SIMPLE OPERATION

MASTER/SLAVE FUNCTION FOR USING MULTIPLE READERS EFFICIENTLY

This function reduces the programming load on the host computer drastically when multiple readers are used. Two modes are available: multi-drop link mode and multi-head mode.

* SR-D100/750 Series units can also be included in the connection.

MULTI-DROP LINK MODE

HUB

Host

Slave station   Slave station   Master station

The master station sends data from slave stations to the host.

MULTI-HEAD MODE

Slave station   HUB

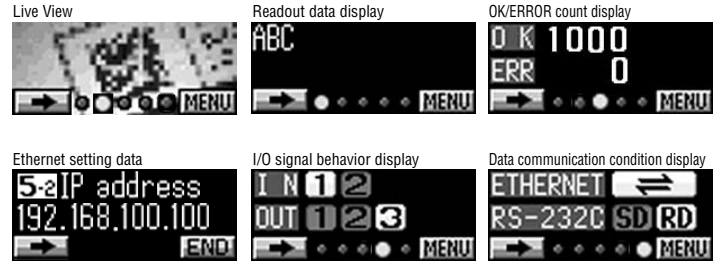Host

Slave station

Master station

The master station controls slave stations.
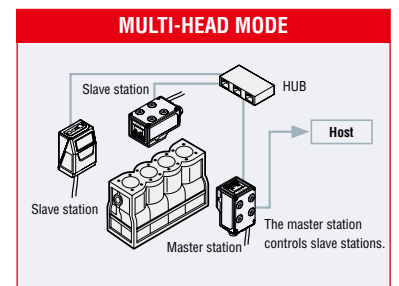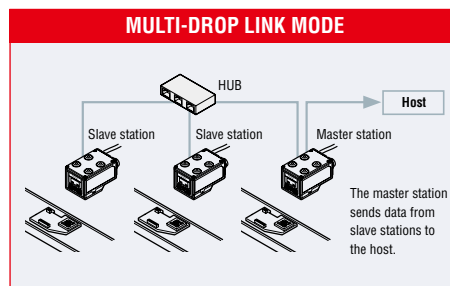
AUTOMATIC SELECTION OF OPTIMAL READING CONDITIONS (PARAMETER BANK FUNCTION)

CUSTOM MODE ONLY

The reader will automatically alternate between registered parameter banks until the proper reading conditions are determined.

ORDINARY MARKING

BLACK/WHITE INVERSION

LOW CONTRAST

MISALIGNMENT

REGISTER   REGISTER   REGISTER   REGISTER

Automatically alternates 16 banks. Reads using the best conditions.

BANK 1   ▶   BANK 2   ▶   BANK 3   ▬▬▬▬   BANK 16
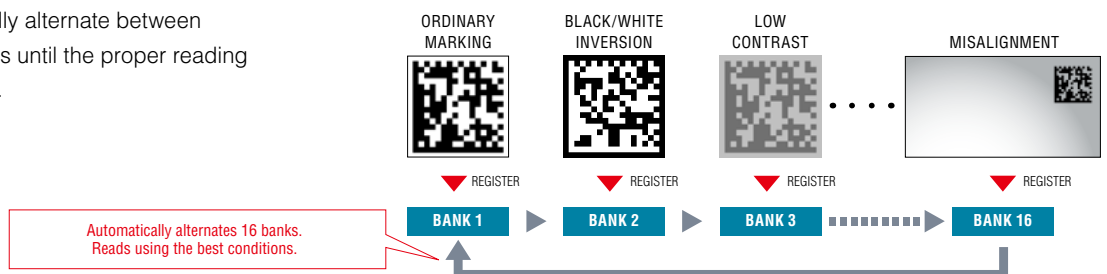
SYSTEM CONFIGURATION DIAGRAM

SR-1000 Series

Standard type
SR-1000

Wide-field type
SR-1000W

Mounting bracket
OP-87866

Cable

USB CABLE

USB cable plugA-miniB
2 m 6.56': **OP-51580**

CONTROL CABLE

NFPA79 compliant control cable
2 m 6.56': **OP-87353**
5 m 16.4': **OP-87354**
10 m 32.8': **OP-87355**

NFPA79 compliant control cable with D-sub 9-pin
2 m 6.56': **OP-87527**
5 m 16.4': **OP-87528**
10 m 32.8': **OP-87529**

ETHERNET CABLE

NFPA79 compliant Ethernet cable
2 m 6.56': **OP-87230**
5 m 16.4': **OP-87231**
10 m 32.8': **OP-87232**

PC

For setup
USB
Ethernet

PC for setup

AutoID Network
Navigator
SR-H4W

POWER SUPPLY

24 VDC power supply

24 VDC

HOST

PC/Panel PC/Board PC

RS-232C
I/O terminal

PLC

EtherNet/IP
PROFI NET

Ethernet
EtherNet/IP™
PROFINET

HMI [Touch panel]

READING RANGE CHARACTERISTICS [TYPICAL]

SR-1000

MINIMUM RESOLUTION

Unit (mm inch)

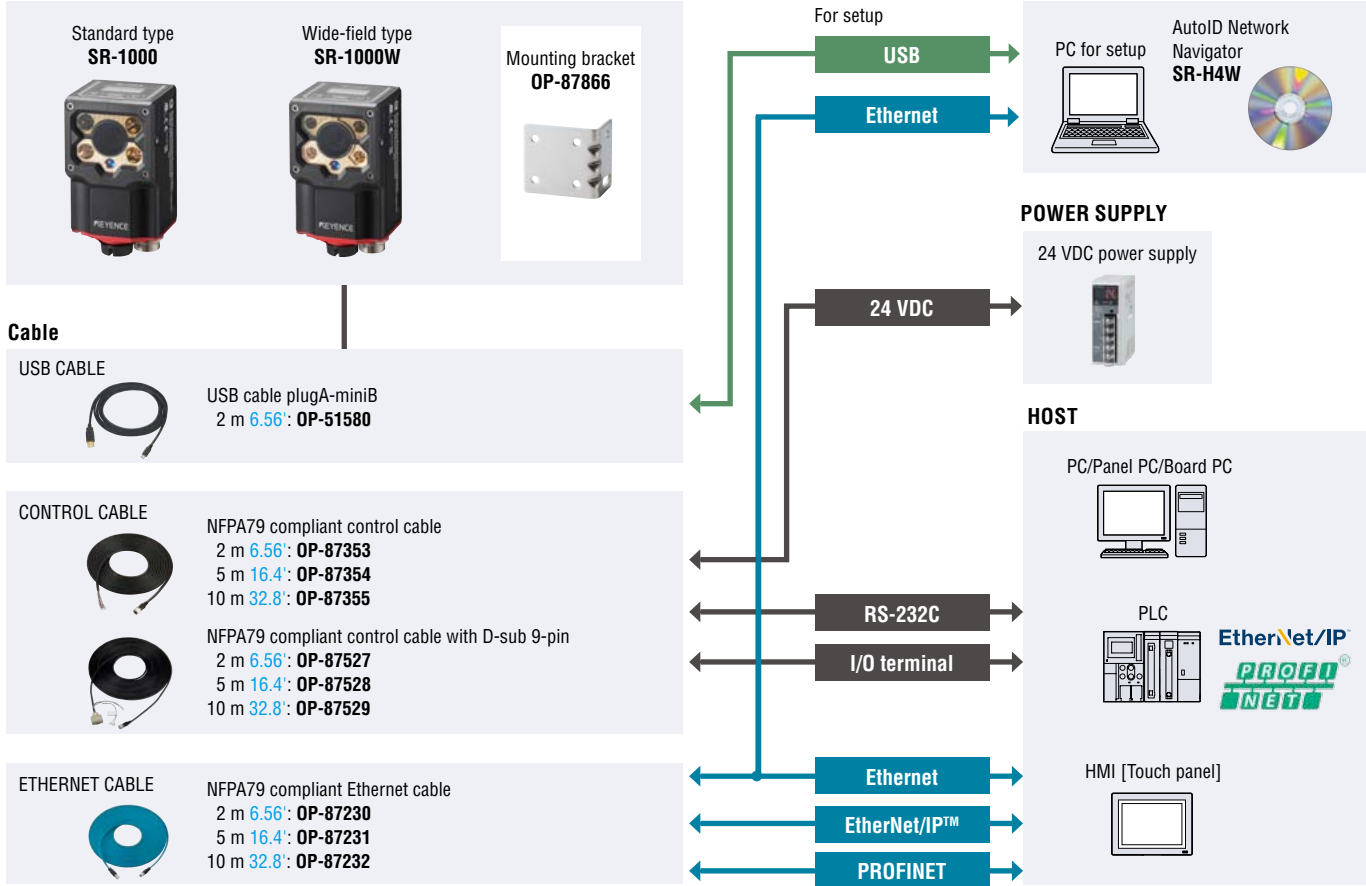| Distance	2D	Barcode
110 4.33"	0.063 0.002"	
110 to 140 4.33" to 5.51"	0.082 0.003"	0.082 0.003"
110 to 230 4.33" to 9.06"	0.14 0.006"	
110 to 300 4.33" to 11.81"	0.18 0.007"	0.11 0.004"
110 to 400 4.33" to 15.75"	0.24 0.009"	0.15 0.006"
110 to 600 4.33" to 23.62"	0.37 0.015"	0.22 0.009"
110 to 1000 4.33" to 39.37"	0.61 0.024"	0.37 0.015"

FIELD OF VIEW

Unit (mm inch)

Distance	Image capture range (1280 × 1024 50.39" x 40.31")		Image capture range (800 × 600 31.50" x 23.62")	
	Width	Height	Width	Height
110 4.33"	30 1.18"	24 0.94"	19 0.75"	14 0.55"
140 5.51"	40 1.57"	32 1.26"	25 0.98"	18 0.71"
230 9.06"	68 2.68"	54 2.13"	42 1.65"	32 1.26"
300 11.81"	90 3.54"	72 2.83"	56 2.20"	42 1.65"
400 15.75"	122 4.80"	97 3.82"	76 2.99"	57 2.24"
600 23.62"	185 7.28"	148 5.83"	116 4.57"	87 3.43"
1000 39.37"	312 12.28"	250 9.84"	195 7.68"	146 5.75"

Mounting
distance

110
4.33"

1000
39.37"

24 0.94"
30 1.18"
312 12.28"
250 9.84"
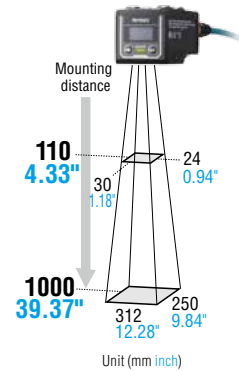
Unit (mm inch)

SR-1000W

MINIMUM RESOLUTION

Unit (mm inch)

Distance	2D	Barcode
50 1.97"	0.082 0.003"	0.082 0.003"
50 to 100 1.97" to 3.94"	0.14 0.006"	
50 to 150 1.97" to 5.91"	0.20 0.008"	0.12 0.005"
50 to 230 1.97" to 9.06"	0.30 0.012"	0.18 0.007"
50 to 300 1.97" to 11.81"	0.38 0.015"	0.23 0.009"
50 to 400 1.97" to 15.75"	0.51 0.020"	0.31 0.012"
50 to 600 1.97" to 23.62"	0.76 0.030"	0.45 0.018"

FIELD OF VIEW

Unit (mm inch)

Distance	Image capture range (1280 × 1024 50.39" x 40.31")		Image capture range (800 × 600 31.50" x 23.62")	
	Width	Height	Width	Height
50 1.97"	35 1.38"	28 1.10"	22 0.87"	16 0.63"
100 3.94"	67 2.64"	54 2.13"	42 1.65"	31 1.22"
150 5.91"	99 3.90"	79 3.11"	62 2.44"	46 1.81"
230 9.06"	150 5.91"	120 4.72"	93 3.66"	70 2.76"
300 11.81"	194 7.64"	155 6.10"	121 4.76"	91 3.58"
400 15.75"	257 10.12"	206 8.11"	161 6.34"	120 4.72"
600 23.62"	384 15.12"	307 12.09"	240 9.45"	180 7.09"

Mounting
distance

50
1.97"

600
23.62"

28 1.10"
35 1.38"
384 15.12"
307 12.09"

Unit (mm inch)

Unit: mm inch
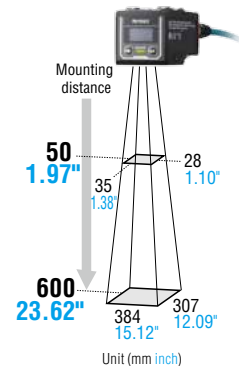
Main unit

Model		SR-1000	SR-1000W
Type		Standard type	Wide-field type
Receiver	Sensor	CMOS Image Sensor	
	Number of pixels	1280 × 1024 pixels	1280 × 1024 pixels
Light emitter	Illumination light source	High intensity red LED	
	Pointer light source	High intensity green LED	
Focus adjustment		Autofocus*	
Reading specifications	Supported symbol — 2D	QR, MicroQR, DataMatrix (ECC200), GS1 DataMatrix, PDF417, Micro PDF417, GS1 Composite (CC-A, CC-B, CC-C)	
	Supported symbol — Barcode	GS1 DataBar, CODE39, CODE39 Full ASCII, ITF, NW-7 (Codabar), CODE128, 2of5(Industrial 2of5), COOP 2of5 GS1-128, JAN/EAN/UPC, Trioptic CODE39, CODE93, Pharmacode	
	Minimum resolution — 2D	0.063 mm 0.002"	0.082 mm 0.003"
	Minimum resolution — Barcode	0.082 mm 0.003"	0.082 mm 0.003"
	Reading distance	110 mm to 1000 mm 4.33" to 39.37"	50 mm to 600 mm 1.97" to 23.62"
	Field of view for reading (Typical example at 400 mm)	122 × 97 mm 4.80" × 3.82"	257 × 206 mm 10.12" × 8.11"
I/O specifications	Control input — Number of inputs	2	
	Control input — Input type	Bidirectional voltage input	
	Control input — Maximum rating	26.4 VDC	
	Control input — Minimum ON voltage	15 VDC	
	Control input — Maximum OFF current	0.2 mA or less	
	Control output — Number of outputs	3	
	Control output — Output type	Photo MOS relay output	
	Control output — Maximum rating	30 VDC	
	Control output — Maximum load current	1 output: 50 mA or less, Total of 3 outputs: 100 mA or less	
	Control output — Leakage current when OFF	0.1 mA or less	
	Control output — Residual voltage when ON	1 V or less	
	Ethernet — Communication standard	IEEE 802.3 compliant, 10BASE-T/100BASE-TX	
	Ethernet — Supported protocol	TCP/IP, SNTP, FTP, BOOTP, MC Protocol, Omron PLC link, KV STUDIO, EtherNet/IP™, PROFINET	
	Serial communication — Communication standard	RS-232C compliant	
	Serial communication — Transmission speed	9600, 19200, 38400, 57600, 115200 bps	
	Serial communication — Supported protocol	No-protocol, MC Protocol, SYSWAY, KV STUDIO	
	USB — Communication standard	USB 2.0 Full Speed compliant	
Environmental resistance	Enclosure rating	IP65	
	Ambient temperature	0 to +45°C 32 to 113°F	
	Ambient storage temperature	−10 to +50°C 14 to 122°F	
	Relative humidity	35 to 85% RH (No condensation)	
	Storage ambient humidity	35 to 85% RH (No condensation)	
	Ambient luminance	Sunlight: 10000 lux, Incandescent lamp: 6000 lux, Fluorescent lamp: 2000 lux	
	Operating environment	No dust or corrosive gas present	
	Vibration	10 to 55 Hz Double amplitude 0.75 mm 0.030", 3 hours each in X, Y and Z directions	
Rating	Power voltage	24 VDC ±10%	
	Current consumption	Approx. 700 mA	
Weight		Approx. 200 g	

* The focal position can be adjusted automatically during installation.

Setup software

Model	SR-H4W
Supported OS	Microsoft Windows 8 Professional or later 32bit/64bit (Except for Windows RT) Microsoft Windows 7 Professional or later 32bit/64bit Microsoft Windows VISTA Business/Ultimate SP2 or later 32bit
Running environment*	• RAM: System memory 1 GB or more (2 GB or more for 64 bit OS) • Screen resolution: 1024 × 768 or more

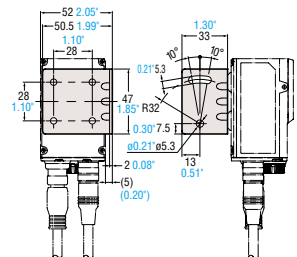* .NET Framework 3.5 SP1 or above has been installed.

Main unit
SR-1000/1000W
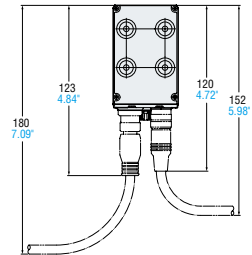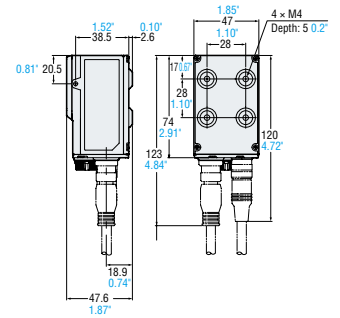
When the mounting bracket
(OP-87866) is used