KEYENCE

Multi-input Data Logger

NEW NR-X/NR-500 Series

Selection, transportation, wiring, configuration, data output...

Simplification at every step

NR-500

NR-X

| Temperature | Voltage | Current | Strain |
| Acceleration | Pulse | CAN | Sensor data |

For measuring instruments, simplicity is the best choice

When checking, analyzing, and reporting data,
quick measurements are ideal

Operation requires no special training,
so there's no need for dedicated manuals

Easy to use, even the first time

Simple, fast, and easy to use

After completing measurement, data must be checked, analyzed, and compiled for reports.
Using the NR Series can significantly help reduce the time and effort spent on those tasks.

Problems with conventional systems

1 Device selection

Time-consuming

Multiple measuring instruments must be selected according to the measurement required.

2 Transportability

Big and heavy

Transporting the instrument to the measurement site requires a dolly. Storage space for the instrument is also necessary.

3 Measurement preparation

Time-consuming wiring

Wiring is difficult and requires extensive preparation and cleanup.

4 Software setup

Difficult to configure

Configuring the settings requires an in-house specialist or a subcontractor, which can be time-consuming and costly.

5 Confirmation/output

Separate software required

Learning how to use several different software packages is difficult.

Universal usability

Perform eight different measurements with a single device.
This means a single NR can solve almost any problem.

▶ P. 6

Compact and lightweight

The device can be easily transported to the measurement site,
and there is no need to deliver equipment beforehand when
traveling to a different factory.

▶ P. 8

Simplified wiring

Both the amount of wiring used and the time spent on wiring can
be reduced by installing remote units as close to the
measurement target as possible.

▶ P. 10

Remote unit

Max. **100** m **(328.1')**
power supply
available

Intuitive icons and text

Operation is incredibly intuitive, making it possible even for
first-time users to work without a manual.
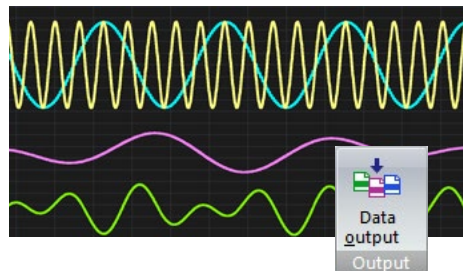The display UI can also be set to English, Chinese (simplified), or
Japanese.

▶ P. 16

Comprehensive software

Users can check measurements immediately and export the
data to an Excel, CSV, or MDF file at the touch of a button.
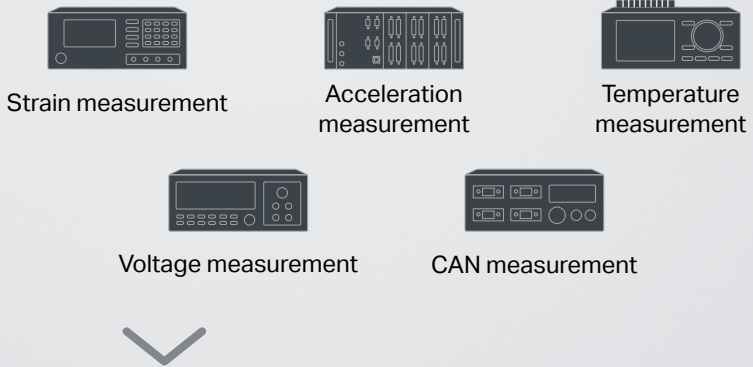
▶ P. 18

Data
output

Wide variety of measurements from a single device

Problems with conventional systems

❚ Selecting a product takes too long.

❚ Learning how to operate several devices is difficult.

Strain measurement

Acceleration measurement

Temperature measurement

Voltage measurement

CAN measurement

Solutions with the NR Series

Diverse applications—
from simple measurements
to complex,
multi-channel measurements

Combination example

Temperature	
3 ch	

NR-500 + NR-TH08

Temperature	Voltage
Strain	Acceleration
24 ch total	
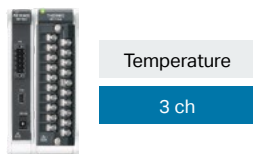
NR-X100W + NR-HA08P + NR-ST04 + NR-CA04 + NR-TH08P + NR-XCP30

Step 1 — Selecting a main unit

Built-in CPU type
NR-X100W

- Can be used even without a PC
- Data can be saved on the unit
- Use up to 72 measurement units
- Battery-operable

Ultra-compact PC connection type
NR-500

- USB connection to PC
- Use up to 8 measurement units
- Bus power function included*
  * When using a single NR-TH08(P)/EN16/C512

Step 2 — Selecting a measurement unit

High-accuracy temperature/voltage measurement unit
NR-TH08

- Inter-channel insulation
- Connectable to resistance thermometers

Input signal	Thermocouple, resistance thermometer, ±50 V
No. of input channels	8
Sampling frequency	10 Hz
A/D resolution	24 bit

High-accuracy temperature measurement unit
NR-TH08P

- Inter-channel insulation
- Compatible with thermocouple connectors

Input signal	Thermocouple
No. of input channels	8
Sampling frequency	10 Hz
A/D resolution	24 bit

High-speed analog measurement unit
NR-HA08/08P

- 1 MHz sampling
- Voltage/current measurement

Input signal	±10 V, ±20 mA
No. of input channels	8
Sampling frequency	1 MHz
A/D resolution	14 bit

High-speed, high-voltage measurement unit
NR-HV04

- Inter-channel insulation
- Fully synchronized sampling

Input signal	±1000 V
No. of input channels	4
Sampling frequency	1 MHz
A/D resolution	14 bit

Strain measurement unit
NR-ST04

- Built-in bridge circuit
- Compatible with 1- to 4-gauge methods

Input signal	Strain gauge, load cell, ±50 mV
No. of input channels	4
Sampling frequency	50 kHz
A/D resolution	16 bit

Acceleration measurement unit
NR-CA04

- Built-in charge amplifier
- TEDS sensor support

Input signal	Electric charge type, voltage type, ±10 V
No. of input channels	4
Sampling frequency	100 kHz
A/D resolution	24 bit

Pulse measurement unit
NR-FV04

- Frequency calculations from rotation pulse signals

Input signal	Pulse (frequency, count), ±100 V
No. of input channels	4
Sampling frequency	1 MHz
A/D resolution	14 bit

CAN data collection unit
NR-C512

- No programs needed
- Analog-synchronized measurement

Input signal	CAN high-speed, single-wire
No. of input channels	512 signals
Sampling frequency	5 kHz

Ethernet data collection unit
NR-EN16

- High-accuracy sensor data measurement
- Sensor power output available

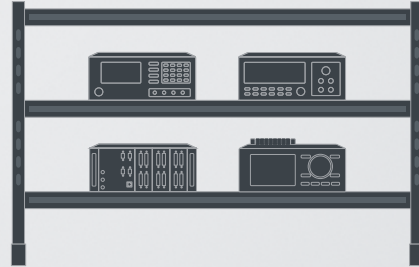| Input signal	Various KEYENCE sensors / measuring instruments
No. of input channels	16
Sampling frequency	1 kHz*

* Effective rate may vary depending on the connected sensor and the communication conditions.

Easily transportable

Problems with conventional systems

Devices are large and heavy.

❚ Dolly required for transport

❚ Storage takes up space

Solutions with the NR Series

Compact and easy to carry

Space-saving design that can be installed anywhere, on-site or at a desk

NR-X	NR-500

950 g
33.54 oz

218.8 mm 8.61"

260 g
9.18 oz

106.5 mm
4.19"

52.1 mm 2.05"

68.0 mm 2.68"

Easily transportable on business trips

Boasting the smallest, lightest design in its class, the NR Series can be easily transported by hand. Never worry about having to deliver the data logger beforehand or if it will be installed properly.

No on-site PC required*

Measurement settings can be configured right from the display panel. Collected data can also be checked using the display, eliminating the need to bring a separate PC to the manufacturing site.

Long battery life*

In addition to AC and DC power supplies, the device can also be operated with lithium-ion batteries. Up to 1020 minutes of measurement are possible when using just the batteries. Using the batteries and a separate power supply at the same time ensures UPS operability for greater peace of mind in the event of a sudden power failure.

Wireless LAN support*

Using a wireless LAN unit allows for cable-free connection to PCs, tablets, and various other devices. Data can even be saved directly to the device when using an SD card, meaning you never have to worry about the on-site communication environment.
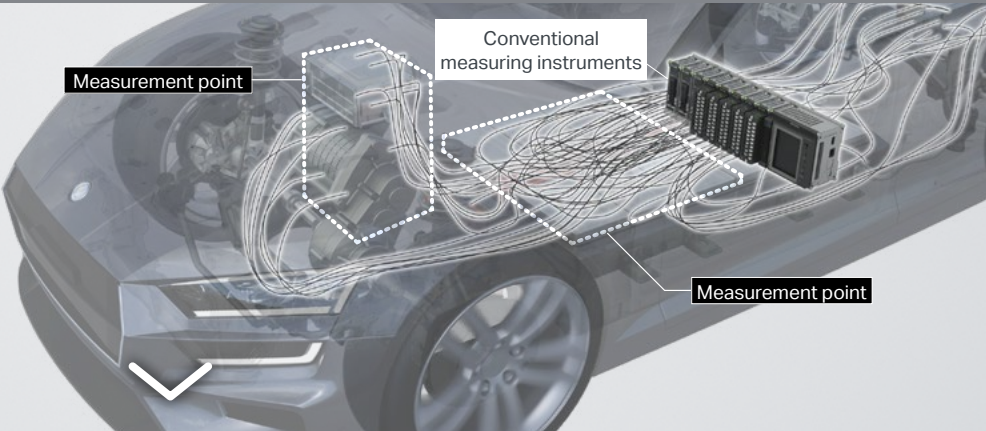
* Available only with the NR-X.

Simplified wiring for simplified wiring work

Problems with conventional systems

All wiring must be routed from the main unit, requiring a lot of time and effort.

Measurement point

Conventional measuring instruments

Measurement point

Solutions with the NR Series

Wiring can be routed from near the measurement point, making wiring work fast and easy.

Measurement point
Remote unit

Measurement point
Remote unit

Measurement point
Environment-resistant remote unit

Master unit
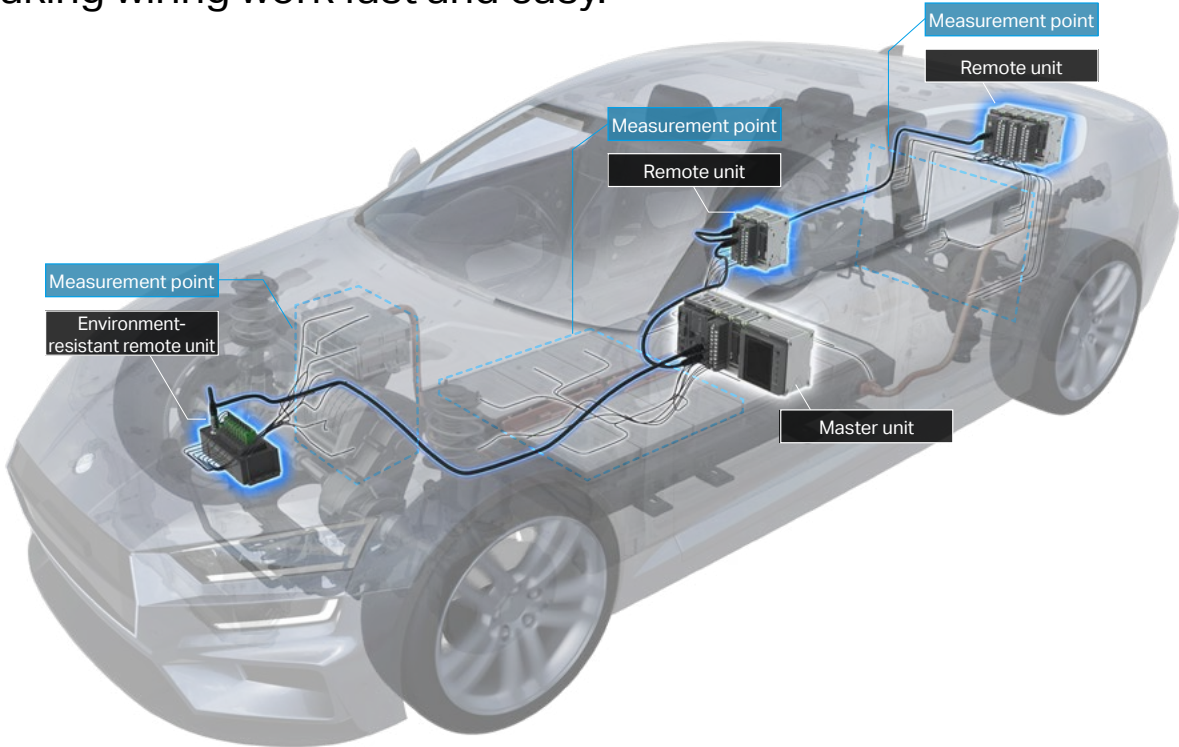
The NR-X Multi-input Data Logger helps reduce wiring distances drastically.

| Significantly reduce wiring time and cost | Prevent wiring mistakes | Recover from disconnections quickly and easily | Stop noise interference |

Connect up to 8 remote units

Up to 8 remote units can be connected via 2 branches from the master unit. This enables greater freedom in designing layouts to suit the measurement application and reduce the time spent on wiring. Each unit can of course be connected to various measurement unit combinations for use in many different measurement situations.

Remote unit

Master unit

Connect up to 8 units via 2 branches
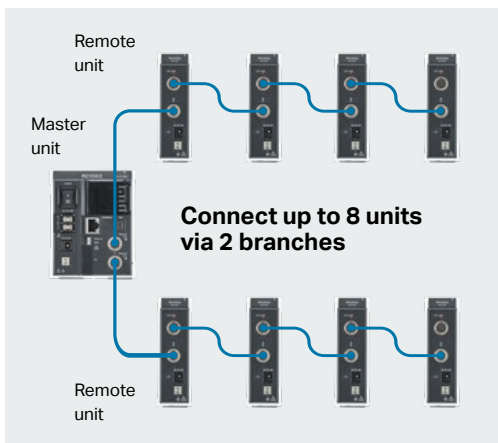
Remote unit

Max. 100 m 328.1' long-range support

Power supply included

The master unit and remote units can be separated by up to 60 m 196.9', or up to 100 m 328.1' when using multiple remote units. Remote units can also be powered by the power supply from the master unit*, ensuring installation even in environments where routing individual power supplies is difficult.


Remote unit

Max. distance:
100 m
328.1'
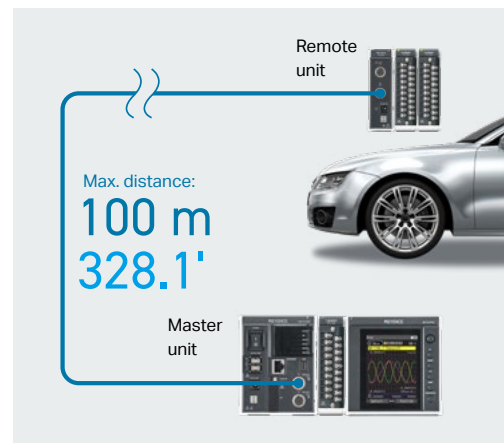
Master unit

* The power supply is limited by the number of channels and connected units. Contact KEYENCE for details.

576-channel max. acquisition with 1 μs syncing

Measurement is possible in up to 576 channels when using remote units. Even if the master unit and remote units are not close, synchronized acquisition at sampling speeds of up to 1 MHz is possible, ensuring reliable data collection even with multi-channel measurement.

See P. 30 for the system configuration.

+
System 3
64 ch
+
System 1
64 ch
+
System 2
64 ch
+

MAX 576 ch
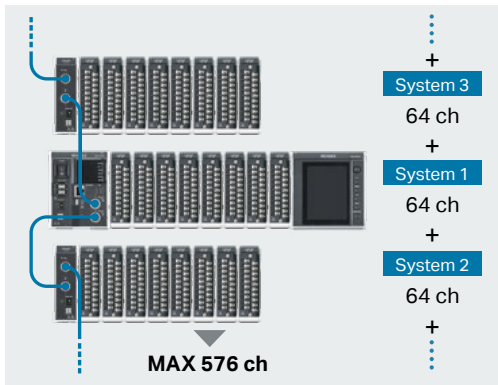
Simplified wiring terminal block

Thermocouple connectors and push-type terminal blocks are available for high-accuracy temperature measurement units and high-speed analog measurement units. This reduces the time needed for wiring thermocouple and voltage input cables.

Thermocouple connectors   Push-type terminal block
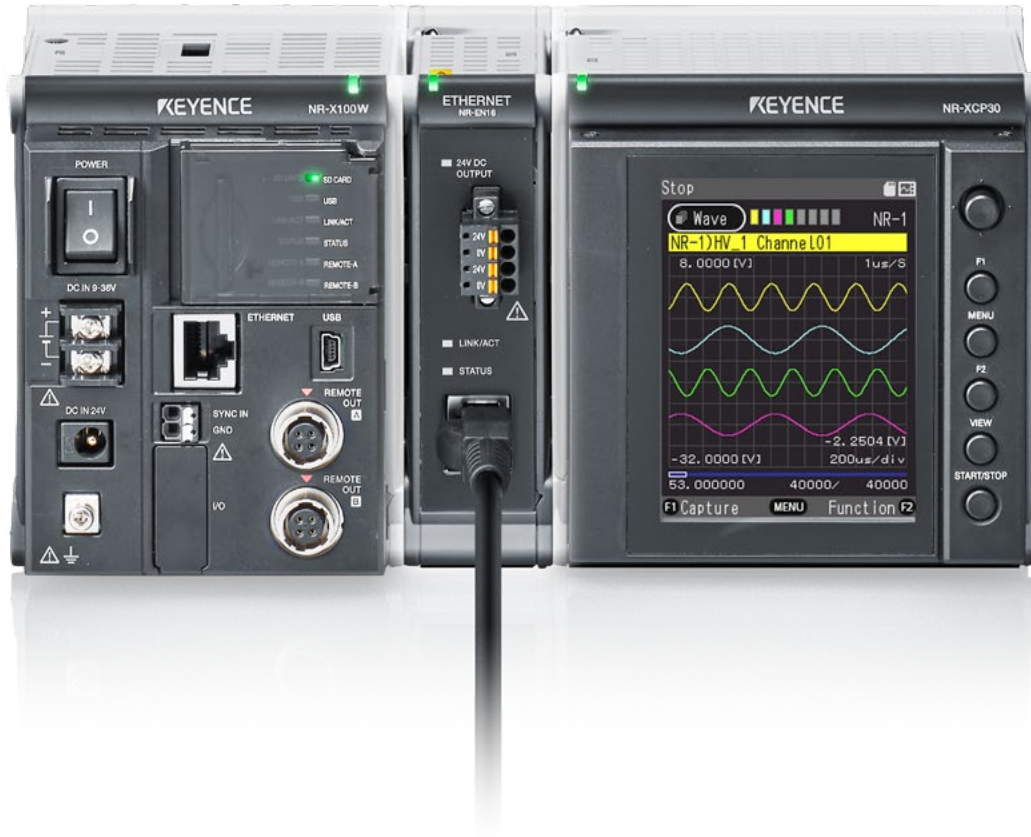

Just plug in the connector.
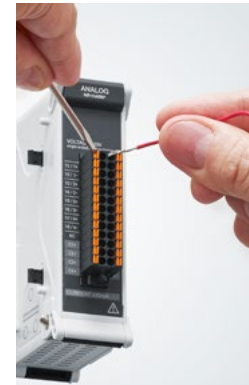
Just push in and insert the wire.

Single Ethernet cable for simplified connections to sensors and measuring instruments


Connectivity between KEYENCE sensors and data loggers

■ Connected to NQ-EP4L ■ Connected to DL-EN1 ■ Direct connection

Difference-checking sensors / electrostatic sensors	Displacement meters

Contact-type LVDT sensor
GT2/GT Series

Laser sensor
IL Series

Thrubeam laser sensor
IG Series

Image-based laser sensor
IX Series

High-speed, high-accuracy laser displacement sensor
LK-G5000 Series

Inline profile measurement system
LJ-X Series
LJ-V Series

Thrubeam sensor
IB Series

Electrostatic sensor
SK Series

All - purpose laser sensor
LR-T Series

Confocal displacement sensor
CL Series

Optical micrometer
LS Series

Reduced wiring for sensor connections

With no need for analog output wiring necessary with conventional systems, wiring work can be kept to a minimum. In addition, the Ethernet data collection unit includes a power supply output function, eliminating the need for separate sensor power supplies.

Power supply

IL Series + DL-EN1

LAN cable

No power supply required*

No analog output required
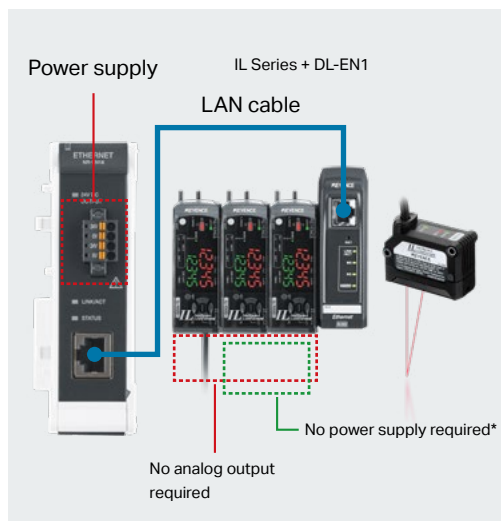
* The power supply is limited by the number of connected sensors.
  Contact KEYENCE for details.

No conversion necessary for digital data

The NR can acquire measured data from measuring instruments and sensors as digital values.
This enables high-accuracy data acquisition with no influence from errors or noise caused by D/A or A/D conversion, a common issue with conventional analog output systems.

Measured value: 10.0005 mm
0.39"

GT2 Series + DL-EN1

Not even 0.1 μm of deviation

Measured value: 10.0005 mm
0.39"

Plus...
• No analog wiring required
• No scaling required

Flow meters / flow rate/pressure/level sensors

Clamp-on flow sensor **FD-H** Series

Clamp-on temperature sensor **FI-1000 + FI-T** Series

Clamp-on flow sensor **FD-Q** Series

Clamp-on micro flow sensor **FD-X** Series

Clamp-on flow meter **FD-R** Series

Clamp-on gas flow meter **FD-G** Series

Air Flow and Pressure Dual Sensor **FD-EP** Series

Clamp-On Air Flow Sensor **FD-EC** Series

Sensing guide pulse level sensor **FL** Series

Heavy duty type digital pressure sensors **GP-M** Series *

* Only models ending with "T" supported.

3 connection patterns

NR-EN16

NQ-EP4L   **DL-EN1**   **Direct connection**

Lineup of units capable of handling harsh environments both indoors and outdoors

Reliable usability even when exposed to water, sand, mud, and heat

Vibration/shock resistance	Cold/heat resistance	Water/dust resistance	Outdoors/weather resistance
10 G / 100 G	**−40 to +85°C (-40°F to +185°F)**	**IP65/IP67**	**Enclosure Type 4X**

Environment-resistant remote units with simplified wiring

KEYENCE environment-resistant remote units are usable in any environment with advanced resistance to temperature, water, shocks, dust, and vibration. With no need to worry about the installation environment, measurement units can be installed as close as possible to the measurement location. This increased installation flexibility helps reduce wiring while enabling high-accuracy and stable data acquisition right away for any user.

Usable not only outdoors but also in constant-temperature baths and chambers

Advanced environmental resistance

KEYENCE remote units have been designed for superior durability, allowing for installation in any environment. Data collection is possible in harsh environments both indoors and outdoors thanks to the highly rigid aluminum die-cast body and temperature-resistant electronic components and coating. With power supplied from the master unit, these environment-resistant units do not require a separate power supply, enabling measurement in any application.

| Cold-resistant | Heat-resistant | Waterproof |
| Dustproof | Vibration/shock-resistant | Weatherproof |
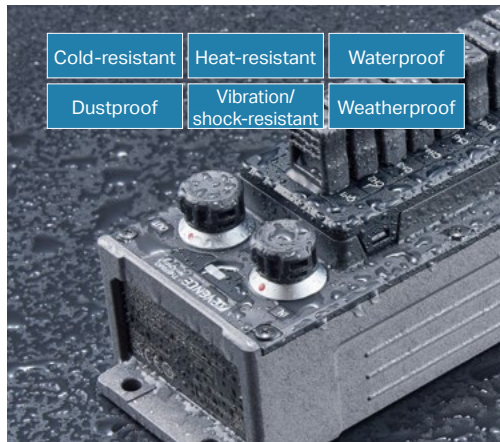
Peripheral equipment with high usability

A one-touch push-pull connector with superior environmental resistance is used, and with no need for screw tightening or fastening tools, wiring work can be significantly reduced. Environment-resistant analog measurement units are available with three types of input cables—BNC, alligator input, and terminal block box (strand wire)—for easy wiring with any measurement target.

One-touch connection
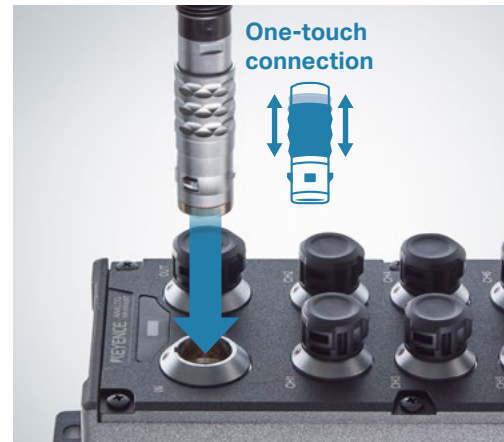
Environment-resistant temperature measurement unit
NR-XTH08T
10 ms sampling

The high-precision delta-sigma A/D converter is used for 24-bit high resolution. Data can be acquired stably even in noisy environments thanks to inter-channel isolation and enhanced filters.

Input signal	Thermocouple
No. of input channels	8
Sampling frequency	100 Hz
A/D resolution	24 bit
Power consumption	5.0 W
Operating ambient temperature	−40 to +85°C -40°F to +185°F
Operating ambient humidity	100%
Vibration/shock resistance	10 G / 100 G
Enclosure rating	IP65/IP67 Enclosure Type 4X (NEMA 250) for indoor/outdoor use

Environment-resistant analog measurement unit
NR-XHA08T

High-speed sampling at 10 kHz is possible with collection over a ±60 V wide current input range. Insulation between channels and support for a delta-sigma A/D converter enable highly accurate, stable measurement.

|	
Input signal	±60 V, ±20 mA
No. of input channels	8
Sampling frequency	10 kHz
A/D resolution	24 bit
Power consumption	5.8 W
Operating ambient temperature	−40 to +85°C -40°F to +185°F
Operating ambient humidity	100%
Vibration/shock resistance	10 G / 100 G
Enclosure rating	IP65/IP67 Enclosure Type 4X (NEMA 250) for indoor/outdoor use

Intuitive operation with a carefully designed UI

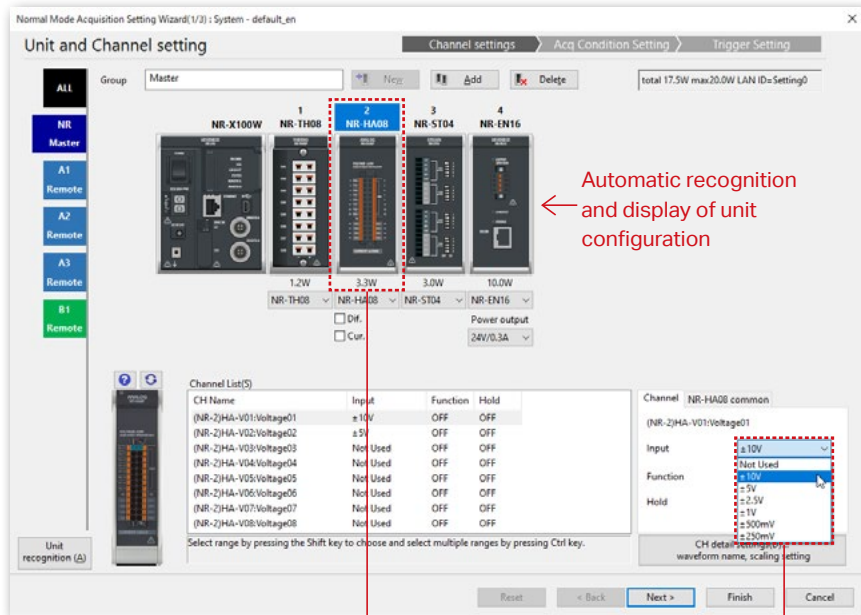* English, Chinese (Simplified), and Japanese supported.

Step 1 | START

Launch the software and press [Acquisition Setting].
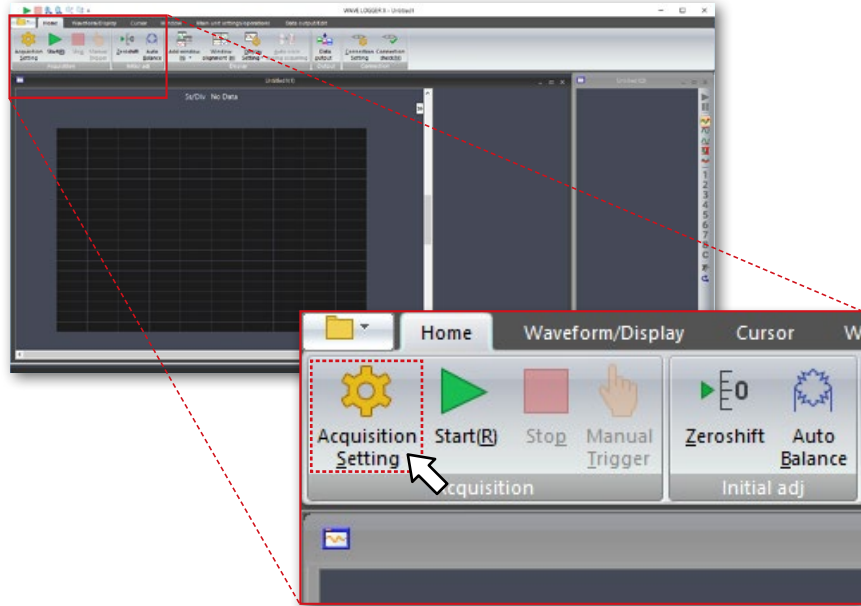
Step 2 | 5 seconds

Select a collection unit and configure the input range settings.

Automatic recognition and display of unit configuration

Simply select the unit to be configured.

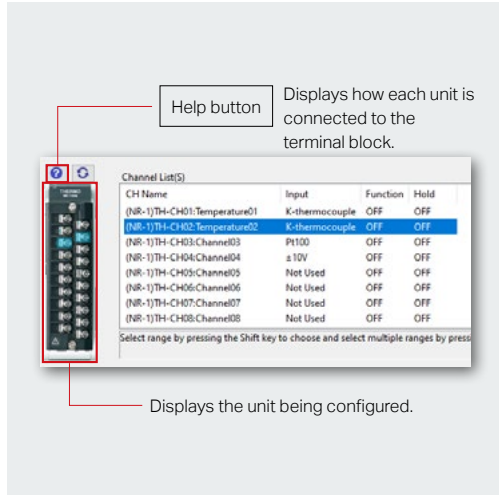Simply select the input range from the pull-down menu.

Just 10 seconds

Configuration of the settings is completed, and measurement starts.

* The time required for configuring settings varies depending on the setting details.

Wiring support

See all channel settings for any selected unit. The Help button also provides a detailed wiring diagram for the unit, which can help in reducing setting and wiring errors.


Help button — Displays how each unit is connected to the terminal block.

Displays the unit being configured.
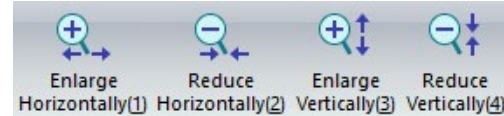
Easily recognizable icons

The icons are designed for easy identification of operations to ensure intuitive acquisition and configuration of display settings even without an instruction manual. Collected data can also be output at the click of a button.
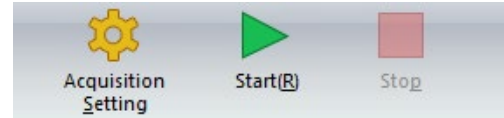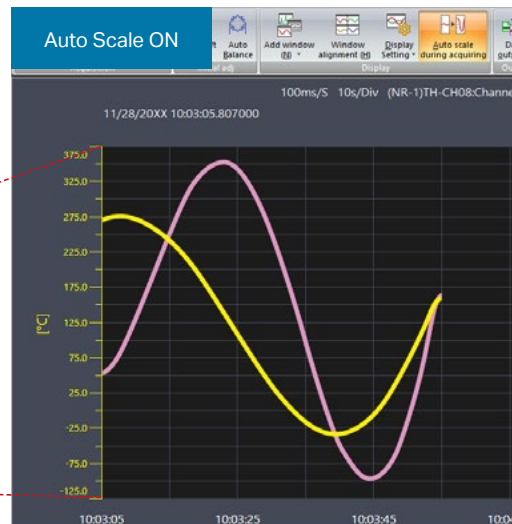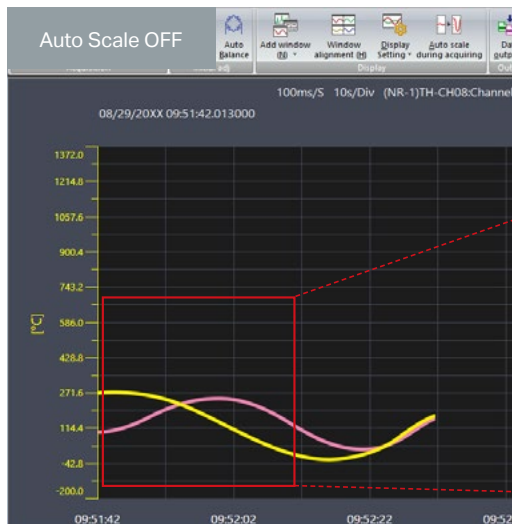

Settings and acquisition operation
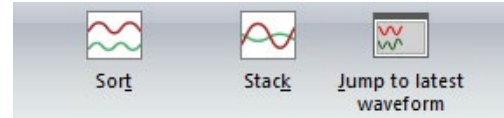
Waveform display

Waveform zooming

Auto Scale function

The Auto Scale function automatically adjusts the display range to the best setting during data acquisition. This function can also be turned off to show a predetermined display range when necessary.

Incredibly easy-to-understand data collection screen

Operation icons

FFT display window

Waveform display window

Numerical value display window
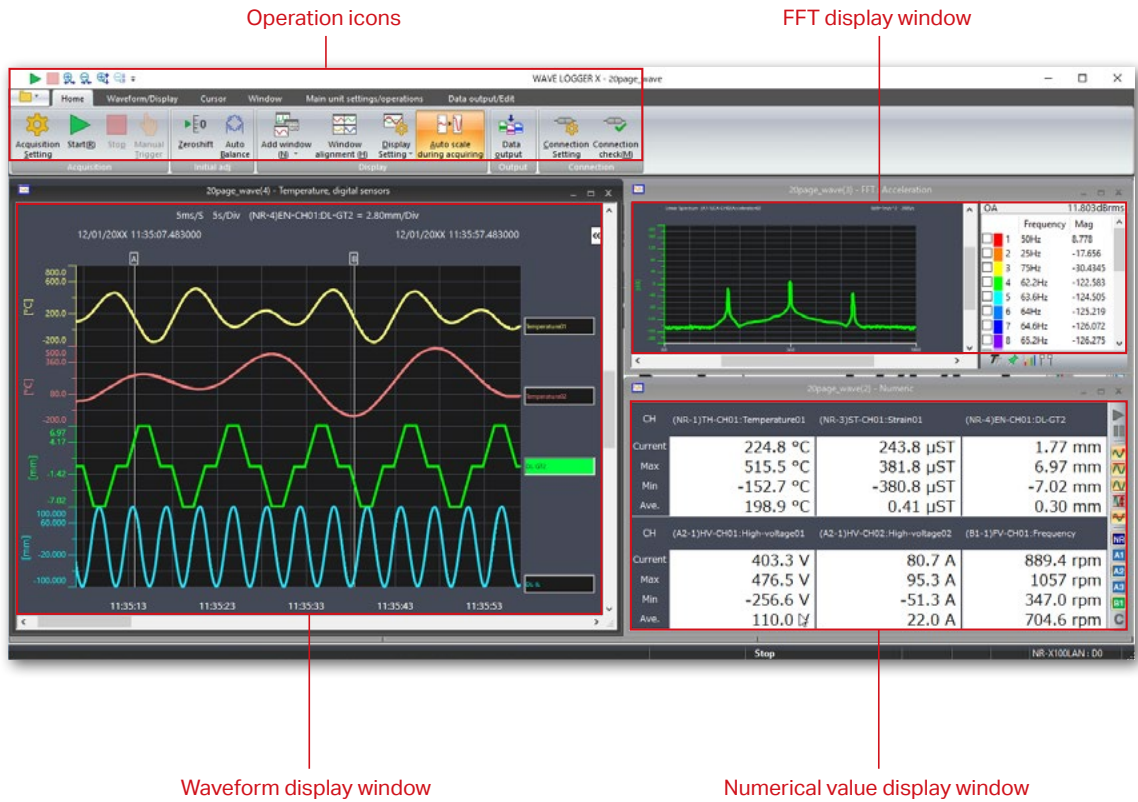
Simple customization

Simply press a display icon to add new windows instantly. The ability to display multiple windows at once makes it easy to create collection screens to suit the measurements being performed.

A numerical value display window will be added.
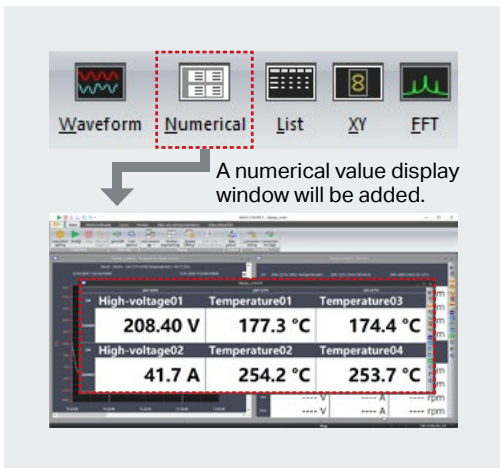
Cursor functionality for easy data review

Using a cursor makes it possible to check not only the selected A/B cursor values but also various other information, including the maximum, minimum, average, area, and integral values between the cursors.

Cursor icon

A cursor   B cursor

Instantly check data between cursors.
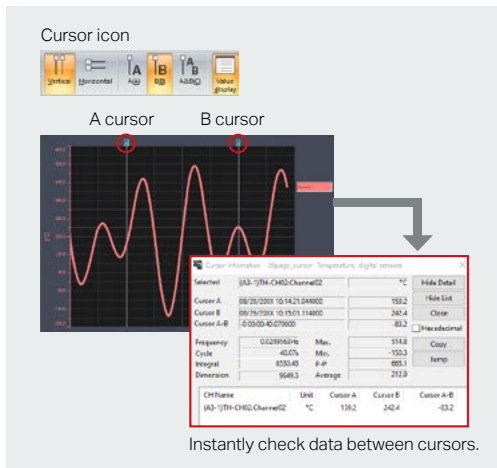
Simplified data output

Collected data can be output instantly at the click of a button. Data can be output not only as waveform data files but also as CSVs, MDFs, and other formats as desired. Using the Excel Direct Transfer function also makes it possible to display waveforms and transfer data to Excel simultaneously.

Easy output at the touch of a button

#EndHeader	Date Time (μs)	(NR-3)ST-CH01	(A1-1)CA-CH01	(B1-1)FV-CH01	(B1-1)FV-CH02
4/12/20XX 10:56	107000	-13.85	35260	1024.3	10049
4/12/20XX 10:56	112000	-86.95	35260	1023.0	10024
4/12/20XX 10:56	117000	-159.20	35260	1020.5	10003
4/12/20XX 10:56	122000	-229.90	34080	1030.2	9977
4/12/20XX 10:56	127000	-298.25	34080	1029.9	9954
4/12/20XX 10:56	132000	-363.65	34080	1028.8	9930
4/12/20XX 10:56	137000	-425.40	34080	1026.9	9911
4/12/20XX 10:56	142000	-428.90	34080	1026.9	9885
4/12/20XX 10:56	147000	-535.60	32558	1034.6	9865
4/12/20XX 10:56	152000	-582.95	32558	1033.0	9843

Batch CSV/MDF conversion

Using File Viewer X file search software

Multiple data files within a single folder can be converted to CSV or MDF files all at the same time. Data can also be thinned out or compressed all at once during data conversion.

Quickly find a specific file

Using File Viewer X file search software

Search for files not only by title, file comment, and data collection start date and time but also by waveform mark comment. This allows users to find specific files without having to open and check each one.

Search by mark

Search by file name or date and time

Target file
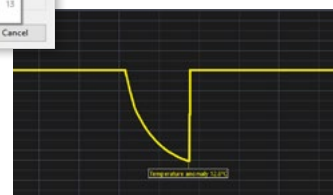
Reliable data storage

Common problems

| Recalling measurement data takes a long time | Data that is lost cannot be recovered |

Data duplication to prevent loss of important data

When collecting data via a PC connection, measurement data can be simultaneously saved to the PC and an SD card in real-time. Saving data to two different destinations helps prevent data from being lost if the connection to the PC is interrupted. Using a battery supply unit also ensures UPS operability to protect data even in the event of a sudden power failure.

Collected data

Battery backup for sudden power failure

Data is saved to the PC via USB/Ethernet.

1 Data is automatically saved to an SD card in the unit.

2 Data is collected and saved to the PC.

Data duplication

Saves data during power failures

A micro uninterruptible power supply (UPS) circuit using KEYENCE's original algorithm significantly improves the reliability of measurement data storage. Even in the event of an unexpected power failure such as a sudden loss of power, data will be saved to reduce the risk of loss.

Operation flowchart

Detection of power supply interruption

Power failure information transmitted to CPU

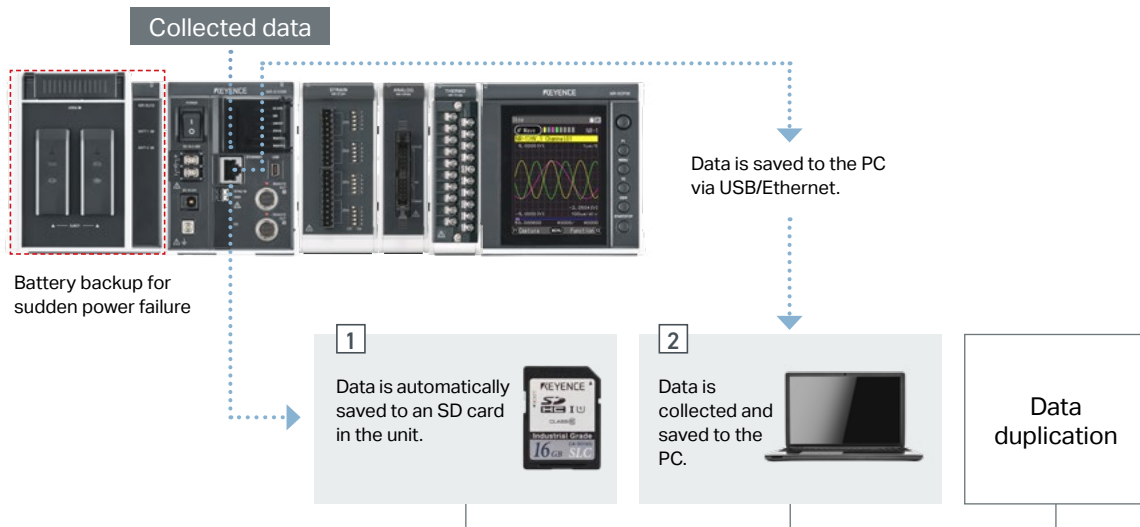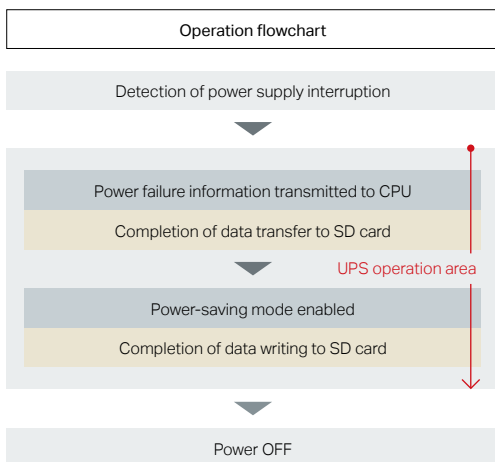Completion of data transfer to SD card

UPS operation area

Power-saving mode enabled

Completion of data writing to SD card

Power OFF

Compliant with vibration standards of JIS (Japanese Industrial Standards)

Despite its small size and lightweight body, the NR has passed the JIS standard for automotive parts (equivalent to a Class 1 passenger car) vibration test and has a highly practical design. It can be used safely not only for in-vehicle testing, but also for installation in production facilities.

JIS Vibration Compliant

Shock-resistant design

Design of corner section effectively disperses drop impact
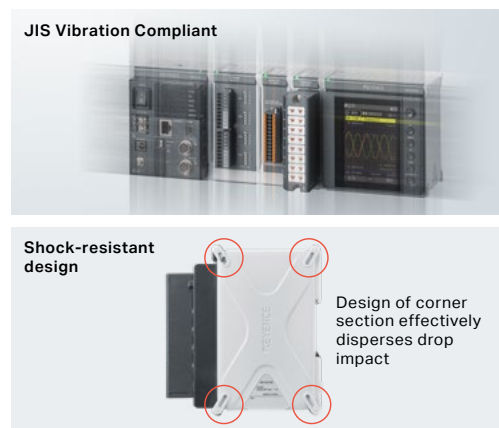
* JIS D 1601: 1995 Type1: passenger car parts / Condition: Class A

Full range of network functions

Common problems

Checking progress remotely	Transferring data to a PLC

Review on-site data from a remote location

Monitoring function + FTP server function

The standard LAN-based monitoring function allows users to check real-time measurement statuses even remotely. Meanwhile, the FTP server function allows users to check data from multiple network-connected units.

PC

Remote status checking

Network

NR-X

Office

On-site
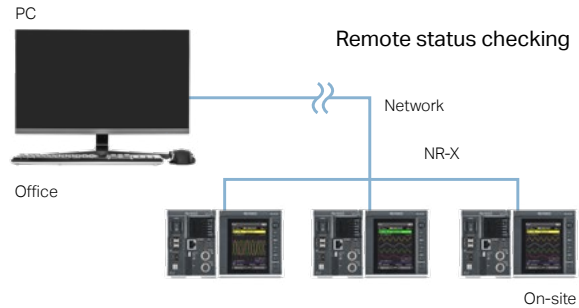
Easy equipment and testing machine integration

FTP client function

The included FTP client function can be used to periodically transfer data from the NR to an FTP server. This means data can be transferred even without a ladder program for easy data consolidation and linking.

File server

NR-X + SD card

PLC

1 Measured data storage

2 Automatic file transfer with FTP client function

3 Data storage on server
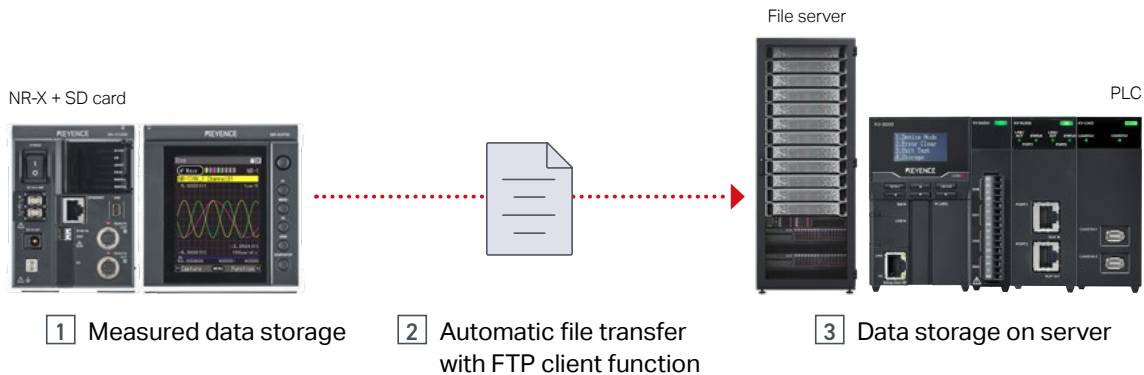
Other useful functions

SNTP client function
→ Regularly adjust the main unit time to match the SNTP server time for accurate automatic time synchronization.

Program register function
→ Use up to 16 programs with easy external switching between various acquisition setting programs.

Various inputs and outputs
→ Take advantage of 8 inputs and 8 outputs to control acquisition using external inputs or output judgments and alarm statuses according to measured values.

Proven track record

The NR Series can be used in a diverse array of applications—from simple to complex, multi-channel measurements. The proven track record in various industries highlights the reliability of KEYENCE products.

Presses:
Stroke and load measurement

Sintering machines:
Temperature control

Conveyors:
Vibration measurement

Exciters:
Vibration measurement

Tension test:
Load and strain measurement

Injection molding machines:
Mold temperature measurement

Sterilizers:
Temperature measurement

Semiconductor machines:
Voltage waveform measurement

R&D

With conventional vehicle data acquisition systems, all wiring must be routed through a single data logger. Using remote units means the time and effort spent on routing thermocouples and other components can be greatly reduced.

Interior AC:
Temperature distribution measurement

Heating furnaces:
Temperature data collection
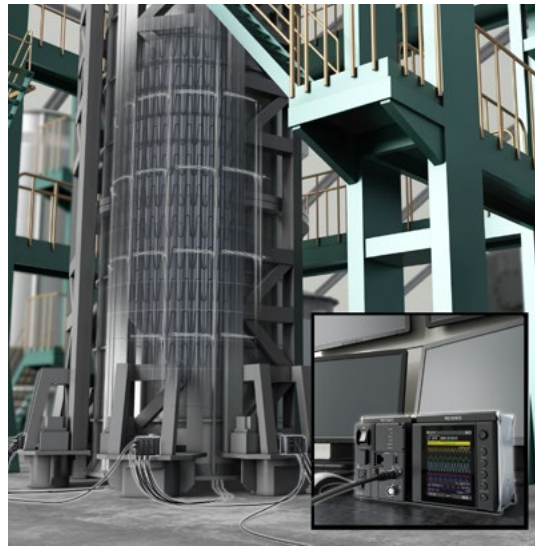
Body/chassis:
Strength and durability testing

Constant-temperature chambers:
Electronic PCB evaluation

Reduced-wiring applications

| Before | The wiring distance to the measurement target is long, so wiring takes time. Keeping track of the purpose of each line is difficult, and checking the lines also takes time. |

Sensor wiring distance:
6 m (19.7')

Sensor wiring distance:
5 m (16.4')

Conventional measuring instruments
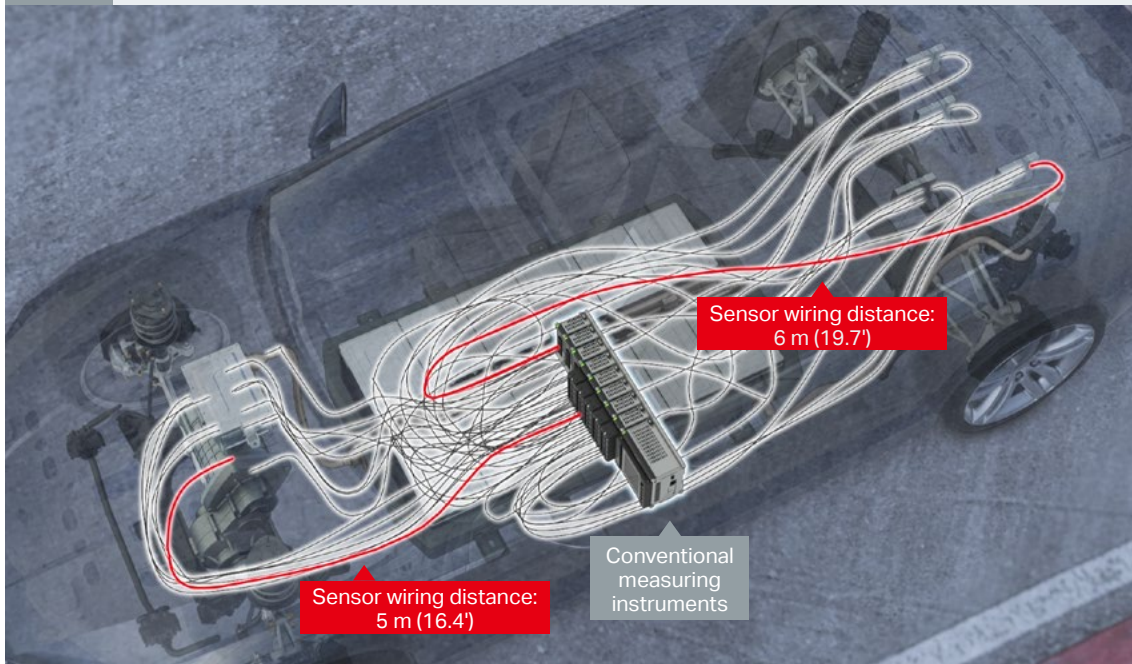
| After | The wiring distance to the measurement target is short, so wiring is simple and easy. The short wiring distance also makes it easy to check the purpose of each line. |

Remote unit

Remote unit

Sensor wiring distance:
0.5 m (1.6')

One remote cable

Remote unit

Sensor wiring distance:
0.5 m (1.6')

Master unit
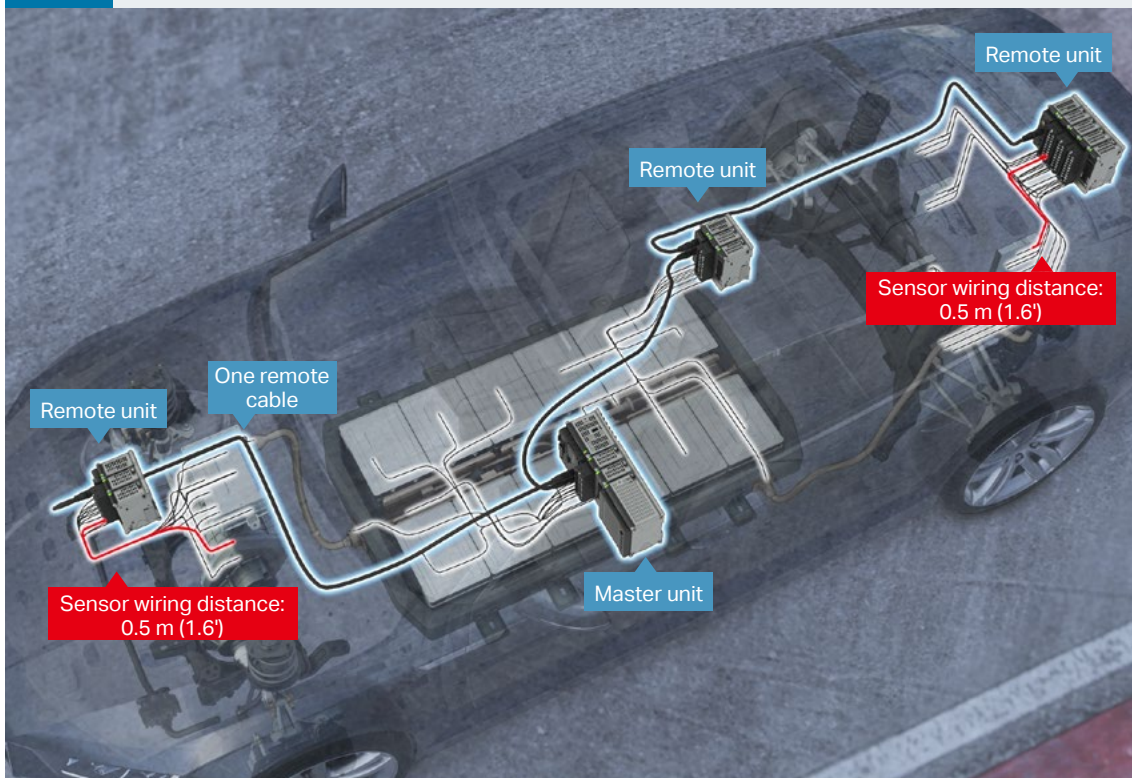
Manufacturing site

Acquiring data from die-casting machines means data loggers must be installed outside the safety fence with cables routed to each measurement target. With remote units, however, the data logger can be installed right next to the die-casting machine, so cable wiring can be kept to a minimum.

Molding machines:
Temperature monitoring

Machining equipment:
Failure/error analysis
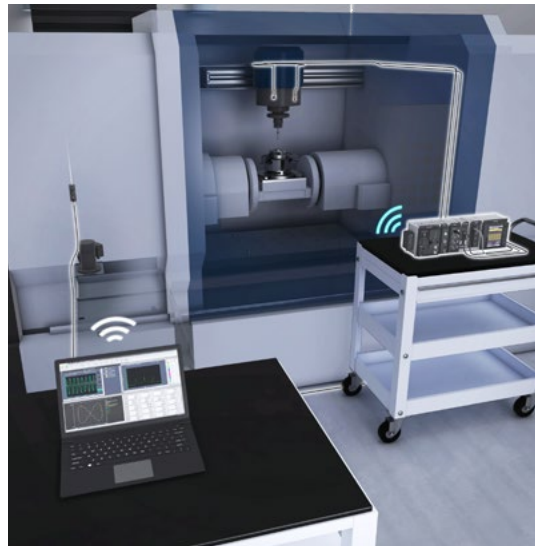
Electronic PCB:
Performance inspection

Motors:
Quality inspection

Reduced-wiring applications

Before — The distance between the safety fence and the die-casting machine means multiple wires must be used, potentially introducing noise.

Sensor wiring distance: 7 m (23.0')

Sensor wiring distance: 10 m (32.8')

Conventional measuring instruments

After — Installing a remote unit next to the die-casting machine means wiring between the unit and the target can be minimized, reducing noise and improving measurement stability.

Sensor wiring distance: 1 m (3.3')

Remote unit

Remote unit

Sensor wiring distance: 3 m (9.8')

Master unit

One remote cable

Environmental resistance (Outdoors)

Evaluating excavator controllers and conducting heat balance tests means data loggers must be installed in the seats with cables routed to each measurement target. With the ability to use environment-resistant remote units in environments subject to dust and water, however, the data logger can be installed close to the measurement target, so cable wiring can be kept to a minimum.

Fatigue testing of air conditioners and outdoor equipment

Environmental resistance testing of automotive components

Railroad rail endurance tests
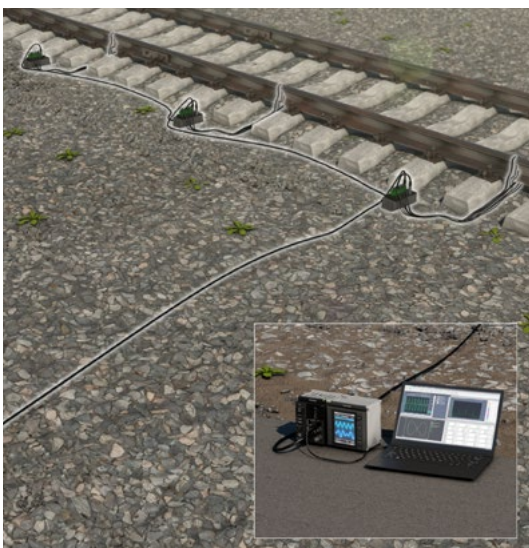
Evaluation of ship motors and gears

Reduced-wiring applications

| Before | Outdoor use means the data logger must be protected by the seat to prevent damage, with wiring being run from the seat to the measurement targets. |

Sensor wiring distance: 15 m 49.2'

Conventional measuring instruments

▼
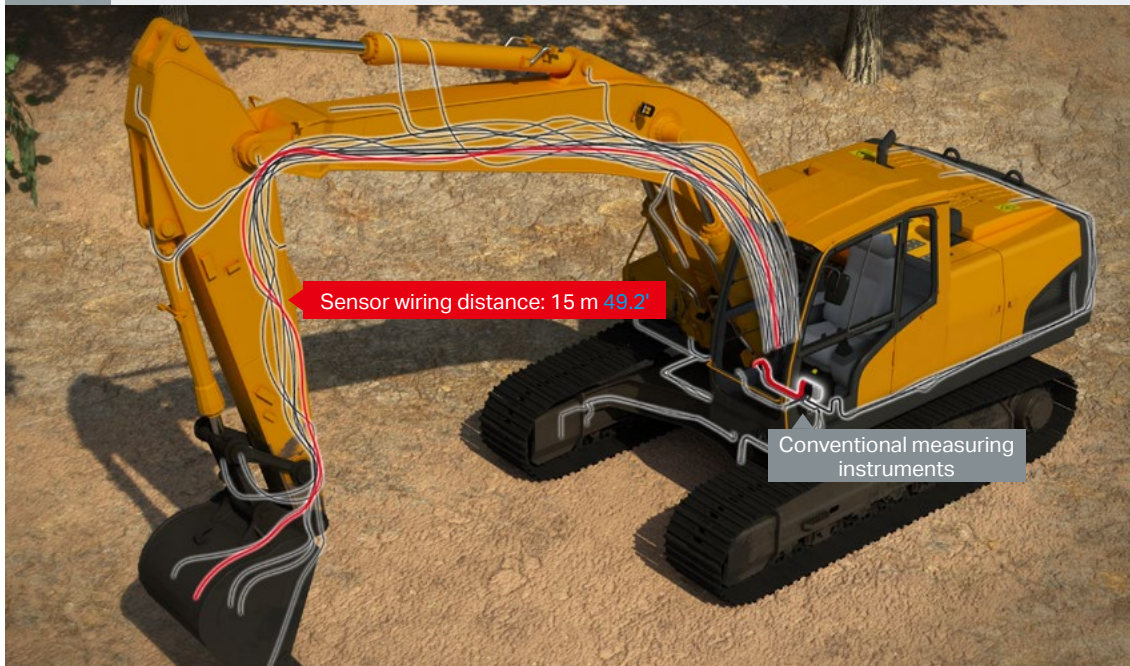
| After | The outdoor usability of the environment-resistant remote unit allows for installation closer to the measurement target, reducing the necessary timing work. |

Environment-resistant remote unit

Environment-resistant remote unit

Environment-resistant remote unit

Master unit

Sensor wiring distance: 2 m 6.6'
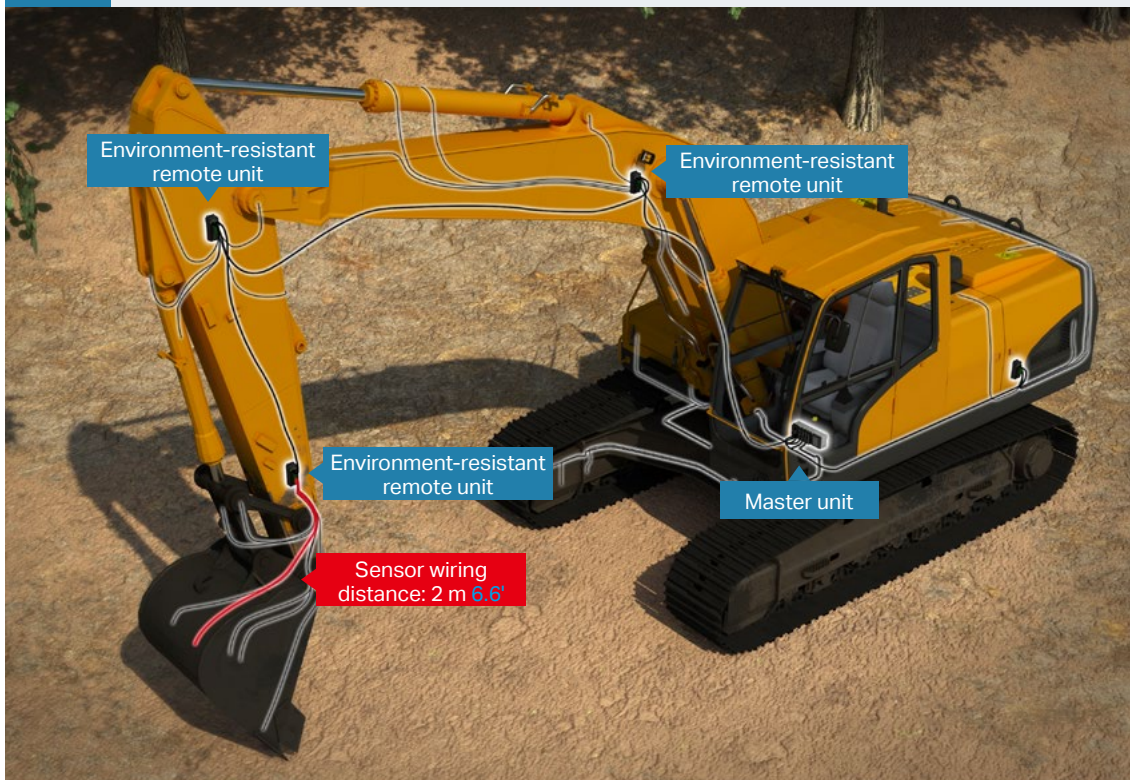
Simple three-step process for selecting the ideal equipment

Step 1

Selecting a main unit

Select the interface that best suits the measurement application. Select any necessary optional accessories for the main unit, including control panels, SD cards, and batteries.

> See P. 31 for details

Standalone + PC connection
NR-X Series

PC connection
NR-500
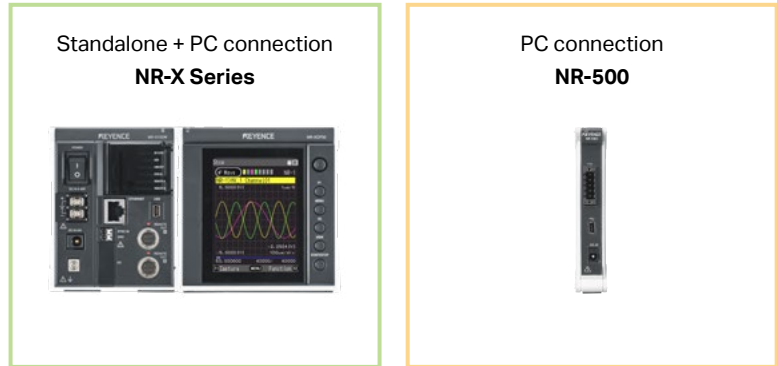
Step 2

Selecting a measurement unit

Select a measurement unit suitable for the measurement target. Select any necessary optional accessories.

> See P. 32 for details

| Temperature | Voltage | Current | Strain | Acceleration | Rotation | CAN | Sensor |

* Environment-resistant units are also available.

When using remote connections

Step 3

Selecting a remote unit

Select the remote connection units according to the measurement environment and type, and the number of channels needed.

> See P. 34 for details

Remote unit*

Temperature	Voltage
Acceleration	Rotation
Current	Strain
CAN	Sensor

Environment-resistant remote unit*

| Temperature | Voltage |
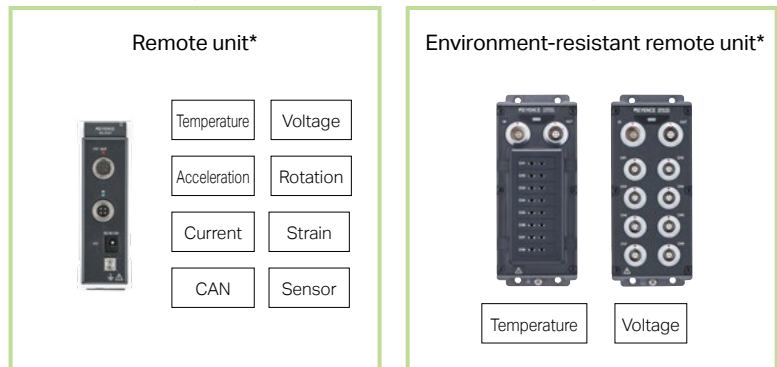
* Remote units and environment-resistant remote units can only be connected to NR-X100W.

Selecting a main unit and optional accessories

Standalone, PC-connectable, and remotely connectable models

Standalone + PC connection

Wireless LAN unit
NR-XW1

Battery power supply unit for NR-X
NR-XU15A

Master data collection unit
NR-X100W

Control panel for NR-X
NR-XCP30

High-performance PC software
NR-XH1W
▮ WAVE LOGGER X
▮ File Viewer X
▮ LAN TOOL X

NR handle
OP-76022

Optional accessories for NR-XU15A
Battery **NR-XB1A**
Charger **NR-XJ1**
AC adapter **NR-XU1***

Optional accessories for NR-X100W

NR-X100W I/O terminal block
OP-88512
(Included with NR-X100W)

USB cable
OP-51580
(Included with NR-X100W)

AC adapter
NR-XU1*

SD card, 16 GB
CA-SD16G

SD card, 4 GB
CA-SD4G

* An AC power cord (OP-99022) is required separately.
Contact a KEYENCE sales office for details.

Compact	Multi-input	Easy operation	Max. **576** channels	Sensor connection	ASAM/MDF	Remote	Environmental resistance
LAN (Wired/wireless)	Standalone	Battery	DC power supply	SD card	Redundant saving	UPS circuit	Monitor display

PC-connectable model

PC connection

5-pole terminal block
OP-51581
(Included with NR-500)

USB cable
OP-51580
(Included with NR-500)

PC direct interface unit
NR-500

AC adapter
NR-U5*

High-performance PC software
NR-XH1W
▮ WAVE LOGGER X
▮ File Viewer X
▮ LAN TOOL X

* An AC power cord (OP-99022) is required separately.
Contact a KEYENCE sales office for details.

Compact	Multi-input	Easy operation	Max. **64** channels	Sensor connection	ASAM/MDF

Step 2

Selecting a measurement unit and optional accessories

Measurement unit	Accessories	Optional accessories
Temperature/ voltage High-accuracy temperature/voltage measurement unit (Screw terminals) **NR-TH08**	NR-TH08 terminal block **OP-51582**	
Temperature High-accuracy temperature measurement unit (Thermocouple connectors) **NR-TH08P**	NR-TH08P terminal block **OP-88519**	K thermocouple miniature connectors (set of 4) **OP-88520**
Voltage/ current High-speed analog measurement unit **NR-HA08**	26-pin connector*1 **OP-35413**　Analog input probe*1 (2-channel differential input) **OP-24777**	Analog input probe (2-channel single-end input) **OP-29371**　26-pin terminal block cable **OP-51583**　Dedicated terminal block **OP-24423**　BNC terminal block*2 **OP-66853** Differential input cable (10 m 32.8') **OP-24422**　Contact (200 pcs) **OP-22186**　Pressure welding tool **OP-21734**
Voltage/ current High-speed analog measurement unit (Push-type terminal block) **NR-HA08P**	NR-HA08P terminal block **OP-88521**	
High voltage High-speed, high-voltage measurement unit **NR-HV04**		Voltage-resistant probe (1:1) **OP-35409** (2-channel set) Small voltage-resistant probe (1:1) **OP-84266** (2-channel set)　Voltage-resistant probe (10:1) **OP-88998** Current probe*3
Strain Strain measurement unit **NR-ST04**	NR-ST04 10-pole terminal block **OP-51584**	NDIS conversion connector (2 channels) **OP-51585**　NR-ST04 Push type terminal block **OP-88869**

*1 NR-HA08 included items come pre-wired.　*2 Cannot be used in the ±20 mA range.　*3 Contact KEYENCE for details.

Measurement unit	Accessories	Optional accessories

Acceleration

Acceleration measurement unit
NR-CA04

Pulse

Pulse measurement unit
NR-FV04

Sensor power supply for NR-FV04
OP-88003

CAN

CAN data collection unit
NR-C512

CAN connection cable

NR import library
NR-H8DB
Settings can be imported from data from CANdb++ (Vector).

D-sub 9-pin connector (female)
OP-66874

Ethernet data

Ethernet data collection unit
NR-EN16

NR-EN16 power supply output terminal block
OP-88513

Ethernet cable

NR-EN16 to DL-EN1 (direct connection)
OP-66843 (3 m 9.8')

NR-EN16 to NQ-EP4L
OP-88448 (2 m 6.6')
OP-88449 (5 m 16.4')
OP-88450 (10 m 32.8')

Temperature

Environment-resistant temperature measurement unit*[4]
NR-XTH08T

Protective cap set for environment-resistant temperature measurement unit
OP-88621

Protective caps for temperature input connectors (set of 8)

Protective caps for remote unit connectors (set of 2)

K thermocouple miniature connectors (set of 4)
OP-88520

Remote conversion cable for environment-resistant measurement unit
OP-88615

Environment-resistant unit cable (0.5/2/5/10 m 1.6'/6.6'/16.4'/ 32.8')
OP-88616/88617/ 88618/88619

Voltage/ current

Environment-resistant analog measurement unit*[4]
NR-XHA08T

Protective cap set for environment-resistant analog measurement unit
OP-88623

Protective caps for analog input connectors (set of 8)

Protective caps for remote unit connectors (set of 2)

Terminal block-type input cable for environment-resistant analog measurement unit
OP-88625

BNC-type input cable for environment-resistant analog measurement unit
OP-88627

Alligator input probe for environment-resistant analog measurement unit
OP-88626

Environment-resistant unit cable (10 m 32.8')
OP-88620

Mounting sheet metal (for heat dissipation) for environment-resistant measurement unit
OP-88613

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*4 If using an environment-resistant remote unit, see Step 3 (P. 34–35) and select the necessary optional cable.

33

Step 3

Selecting a remote unit and cable

When using remote units

NR-XR01   NR-XR01

NR-X100W

A

B

C

* Multiple remote extension cables can be connected.

When using environment-resistant remote units

NR-XTH08T   NR-XHA08T

C

D

E

D

* Multiple environment-resistant unit extension cables can be connected.

NR-XHA08T
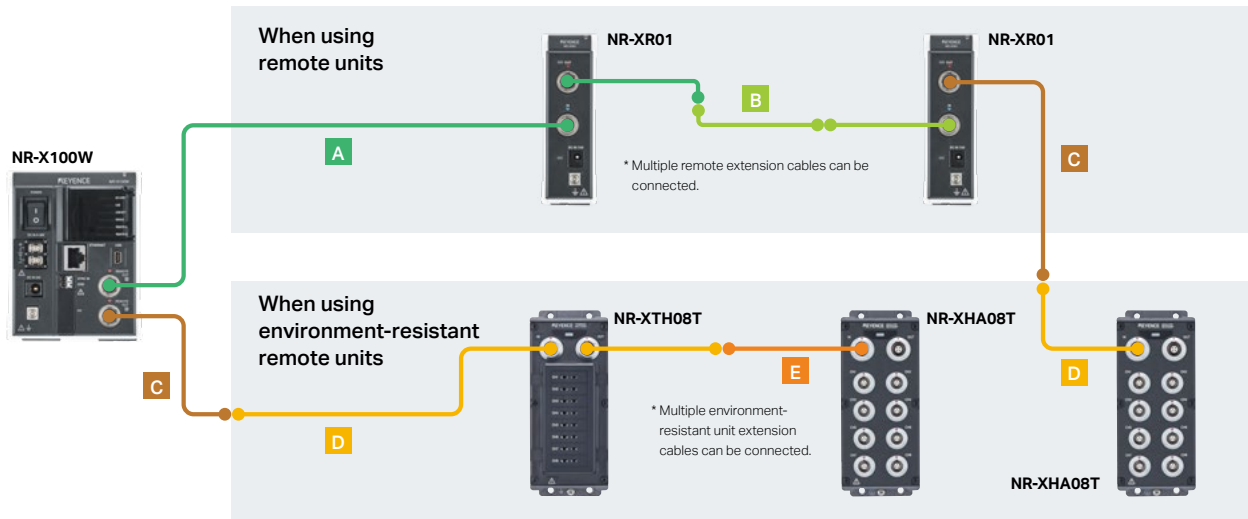
	Symbol	Type	Model	Name	Cable length
NR-XR01	A		OP-88514/88515/88516/88517	Remote unit cable	0.5 m, 2 m, 5 m, 10 m 1.6', 6.6', 16.4', 32.8'
	B		OP-88518	Remote extension cable	10 m 32.8'
NR-XTH08T NR-XHA08T	C		OP-88615	Remote conversion cable for environment-resistant measurement unit	0.1 m 0.3'
	D		OP-88616/88617/88618/88619	Environment-resistant unit cable	0.5 m, 2 m, 5 m, 10 m 1.6', 6.6', 16.4', 32.8'
	E		OP-88620	Environment-resistant unit extension cable	10 m 32.8'

* The total length of each cable above used in the system should be no more than 100 m 328.1'.   * The cable length between each unit above should be no more than 60 m 196.9'.
* The total cable length does not include the remote conversion cable for environment-resistant measurement units (0.1 m 0.3').   * Remote units cannot be connected beyond the environment-resistant measurement unit.

With remote units connected

When using the NR-X100W as the main unit, NR-XR01 devices can also be used.

Up to eight NR-XR01 units can be connected to a single NR-X100W. Also, up to 100 m 328.1' of extension cabling can be used.

NR-X100W   NR-TH08

A

A

A

A

A

B

NR-XR01   NR-TH08

NR-XR01   NR-TH08

NR-XR01   NR-ST04   NR-HA08P

NR-XR01   NR-CA04   NR-EN16
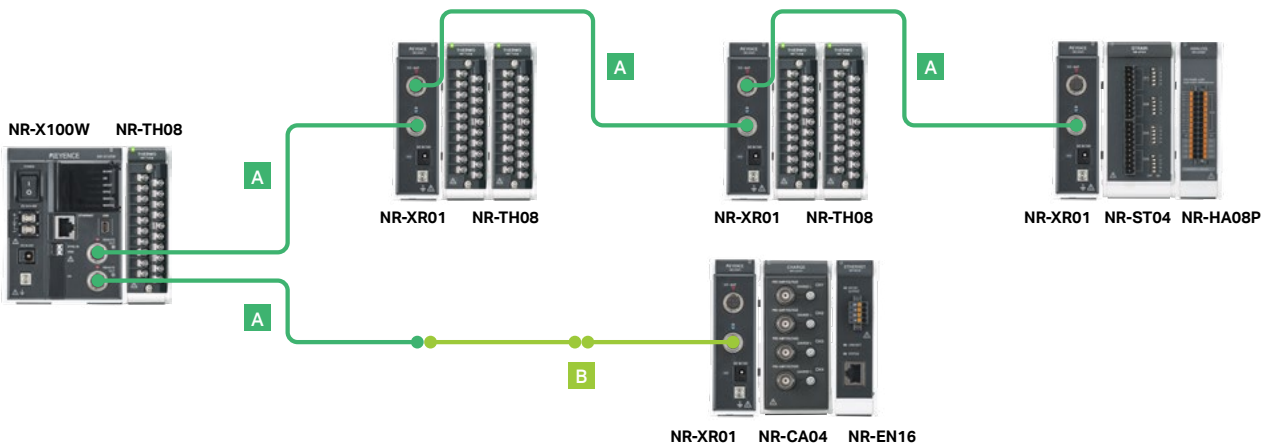
Multiple measurement units (including different types) can be connected not only to the master data collection unit but also to each remote unit.

When connected to environment-resistant remote units

When using the NR-X100W as the main unit, NR-XTH08T/NR-XHA08T devices can also be used.

Up to eight units can be connected to a single NR-X100W. Also, up to 100 m 328.1' of extension cabling can be used.

NR-X100W   NR-TH08

D   D   E

C   C

NR-XTH08T   NR-XHA08T

A   D   D

NR-XR01 NR-ST04 NR-HA08P   NR-XTH08T   NR-XHA08T
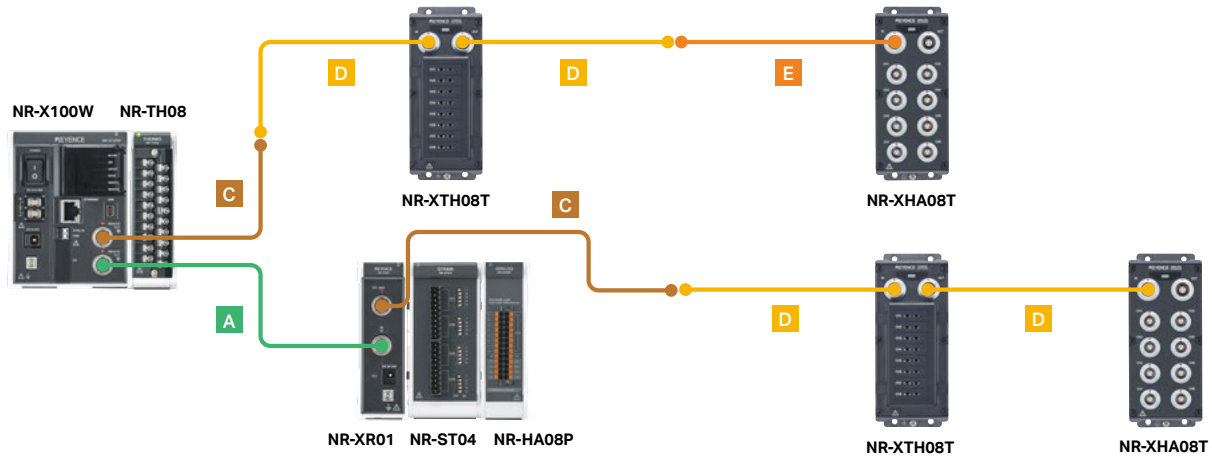
Connecting multiple environment-resistant units as well as combining with various other measurement units are possible.

Example of multi-channel measurement using remote units

NR-X100W   NR-TH08   NR-TH08

Max. 64 ch

Synchronized acquisition from up to 576 channels is possible when using remote units. This allows users to collect whatever data they want without having to worry about the number of channels.

A

NR-XR01   NR-TH08   NR-TH08

Max. 64 ch

Example with max. connected units

A

NR-XR01   NR-TH08   NR-TH08

Max. 64 ch

Unit name	Input type	Max. number of connected units	Max. number of channels
NR-TH08 (P)	Temperature/ voltage	72 units	576
NR-HA08 (P)	High-speed voltage/ current	54 units	432
NR-ST04	Strain	54 units	216
NR-CA04	Acceleration	45 units	180
NR-HV04	High voltage	54 units	216

* Contact KEYENCE for details about using the AC adapter with a remote unit.

A

Connect up to eight NR-XR01 units

Max. 576 ch

Specifications

▌NR-X100W: Master data collection unit

Model		NR-X100W
Main unit buffer memory capacity		50M data*[1]
Expansion memory		SD card (SD/SDHC)*[2]
PC interface	USB	USB mini-B connector, USB 2.0 High-speed–compliant, Simultaneous USB connection from one PC to up to four units (switchable by ID switch)
	Ethernet*[3]	RJ45 connector, 100Base-TX (AUTO MDI/MDIX supported)
	Wireless LAN*[3]	Connection via NR-XW1 wireless LAN unit, IEEE 802.11b/g/n
Network function		FTP client function, FTP server function, SNTP client function
Display/operation		Operation via NR-XCP30 control panel, or via WAVE LOGGER X with PC connection
Expansion remote unit connection		Dedicated remote connection connector × 2 (Remote OUT A port, B port) Unit expansion possible by connecting up to eight NR-XR01 remote units (connected by remote unit cable)
Number of connectable measurement units	Master data collection unit group	Max. 8 units*[4]
	Total with remote units connected	Max. 72 units*[5]
Continuous acquisition speed*[6]	Master data collection unit group	Max. 100 kHz for all acquisition channels
	Total with remote units connected	Max. 500 kHz for all acquisition channels*[7]
Inter-unit synchronization*[8]	Between measurement units in the master data collection unit group	±1 µs or less
	Between the master data collection unit and each remote unit / environment-resistant measurement unit	±1 µs or less
Time axis accuracy		±50 ppm (23°C ±3°C 73.4°F ±5.4°F); Same time used for all remote groups, SNTP server time synchronization possible
Synchronous trigger input (SYNC input)	Performance specifications	• Use as external trigger input (normal mode) or synchronous acquisition input (logging mode) • Non-voltage (contact/non-contact)/voltage input, Falling edge input • Not insulated from system bus
	Input specifications	• For non-voltage input: ON voltage 1.0 V or lower (short circuit current: 1 mA typ.), OFF current 0.1 mA or lower • For voltage input: ON voltage (Lo) 1.0 V or lower, OFF voltage (Hi) 2.4 V or more, Max. input voltage: 6 V
Control input	Common specifications	• Input type: Bidirectional voltage input • Maximum rating: 30 VDC, Minimum ON voltage: 10 VDC, Maximum OFF current: 0.2 mA • Insulation between input and system bus (500 VDC/1 minute)
	Individual specifications	• External trigger input (TRG IN): Edge input • Acquisition start/stop input (START IN): Level input (only enabled in external control mode) • Auto-balance input (BAL): Edge input (only enabled in external control mode) • Program selection input 0 to 3 (PROG IN0 to 3): Level input (only enabled in external control mode)
Control output	Common specifications	• Output format: Photo MOS relay output • Maximum rating: 36 VDC, Output current: 50 mA or less (9-point total: 300 mA or less) • Leak current at OFF: 0.1 mA or less, Residual voltage when ON: 1 V or less • Insulation between output and system bus (500 VDC/1 minute)
	Individual specifications	• Trigger output (TRG OUT): N.O. output, one-shot output • System error output (SYS ERR): N.C. output • Alarm output (ALARM): N.O. output • Judgment output 1 to 4 (OUT1 to 4): N.O. output • Ready output (READY): N.O. output
Operating ambient temperature		0 to +40°C 32°F to 104°F
Operating ambient humidity		10 to 85% RH (no condensation)
Power supply		• NR-XU1 AC adapter, or 9 to 36 VDC (including ripple) / Max. 72 W (when connected to DC terminal block; at 9 V: 8.0 A or less; at 24 V: 3.0 A or less; at 36 V: 2.0 A or less) • Battery operation possible when connected to the NR-XU15 Series battery power supply unit
Power consumption		8.4 W or less (excluding connected units)
Weight		Approx. 490 g 17.30 oz (including approx. 10 g 0.35 oz for the OP-88512 (NR-X100W I/O terminal block))

*1 Data is not backed up when the power is turned off. The available data buffer memory per NR-X100W and NR-XR01 group is limited to 25M. *2 Use only products recommended by KEYENCE (CA-SD4G: 4 GB, CA-SD16G: 16 GB). Using a product not recommended by KEYENCE may result in data not being saved to the SD card during continuous acquisition. *3 Wired LAN and wireless LAN cannot be used at the same time. When acquiring data from a PC (using WAVE LOGGER X software), use a wired local connection only between the NR-X100W and the PC. Using an onsite local network connection or wireless LAN connection may cause acquisition to stop due to a decrease in transfer speeds caused by network load or wireless LAN communication conditions. The main unit's automatic saving function allows data to be saved to an SD card in the main unit even if acquisition by PC stops. *4 Use is permitted only if the total power consumption of all connected measurement units is 20 W or less. *5 Use is permitted only if the total power consumption of all measurement units, remote units, and environment-resistant measurement units used in the system is 50 W or less when remote units are not connected to an AC adapter. *6 Acquisition from a PC may not be possible in some PC environments. [Tested conditions] OS: Windows 10 Pro (64 bit), CPU: 3.70 GHz, RAM: 16.0 GB, USB connections: One NR-X100W (no other USB devices), Ethernet connection: One-to-one connection between NR-X100W and PC; Using normal mode and saving in the standard format with a pre-installed OS and running only WAVE LOGGER X. Windows is a registered trademark or a trademark of Microsoft Corporation in the United States and/or other countries. *7 Each master data collection unit group and remote unit group is limited to 100 kHz for all acquisition channels. When using 5 or more remote units, each remote unit group can have up to 50 kHz per acquisition channel. *8 The sampling cycle and sampling timing vary depending on the connected measurement unit. When using the NR-CA04 in combination with other unit types, a sampling delay may occur between the NR-CA04 and the other units with some setting configurations.

▌NR-XCP30: Control panel for NR-X

Model	NR-XCP30
Display	3.5" TFT color LCD, 240 × 320 dot
Applicable models	NR-X100W*[1]
Supported languages	Japanese, English, Chinese (Simplified)
Operating ambient temperature	0 to +40°C 32°F to 104°F
Operating ambient humidity	10 to 85% RH (no condensation)
Power consumption	1.6 W or less
Weight	Approx. 290 g 10.24 oz

*1 Cannot be connected to the NR-XR01 remote unit.

▌NR-XB1A: Battery for NR-X

Model	NR-XB1A
Type	Lithium-ion battery
Applicable models	NR-XU15 Series
Nominal voltage	14.4 V
Nominal capacity	3.3 Ah
Number of charges/discharges	Approx. 300 times (at 80% full charge capacity)
Operating ambient temperature	0 to +40°C 32°F to 104°F
Operating ambient humidity	10 to 70% RH (no condensation)
Weight	Approx. 240 g 8.47 oz

▌NR-XJ1: Charger for NR-XB1 Series

Model		NR-XJ1
Applicable battery		NR-XB1 Series
Charging part	Charging method	Constant current and constant voltage method
	Charging time	1 battery: Approx. 3.0 hours, 2 batteries: Approx. 4.5 hours
Display	Charging confirmation LED	Green LED (Flashing: charging, Constant: charging complete)
Power supply		NR-XU1 AC adapter
Operating ambient temperature		5 to 40°C 41°F to 104°F
Operating ambient humidity		10 to 85% RH (no condensation)
Weight		Approx. 410 g 14.47 oz

▌NR-XU15A: Battery power supply unit for NR-X

Model				NR-XU15A		
Battery				Dedicated lithium-ion battery pack NR-XB1 Series × 2		
Display LED	Status indicators			Battery operation: Blue, With NR-X100W battery power: Green		
	Battery level indicator			30% or more remaining: Green, Less than 30% remaining: Red, No remaining battery: Off Individual displays for 2 battery slots		
Battery life (typical example)*[1]	Using only the NR-X100W	NR-TH08(P)	Number of connected units / Power consumption		With 1 battery	With 2 batteries
			1		Approx. 510 min.	Approx. 1020 min.
			4		Approx. 300 min.	Approx. 600 min.
			8		Approx. 200 min.	Approx. 400 min.
		NR-HA08(P)/ NR-HV04/NR-ST04	1		Approx. 370 min.	Approx. 740 min.
			6		Approx. 110 min.	Approx. 220 min.
		NR-CA04/NR-FV04	1		Approx. 340 min.	Approx. 680 min.
			5		Approx. 110 min.	Approx. 220 min.
		NR-C512/NR-EN16*[2]	1		Approx. 480 min.	Approx. 960 min.
			4		Approx. 260 min.	Approx. 520 min.
		Total power consumption of connected units	At 10 W		Approx. 190 min.	Approx. 380 min.
			At 20 W (max. configuration)		Approx. 110 min.	Approx. 220 min.
	When using remote units and environment-resistant measurement units	Total power consumption of units to be powered by the NR-X100W	At 10 W		Approx. 160 min.	Approx. 320 min.
			At 30 W		Approx. 70 min.	Approx. 140 min.
			At 50 W (max. configuration)		Approx. 40 min.	Approx. 80 min.
Operating ambient temperature				0 to +40°C 32°F to 104°F*[3]		
Operating ambient humidity				10 to 85% RH (no condensation)		
Weight				Approx. 370 g 13.06 oz (Not including NR-XB1A)		

*1 The operating time is a typical example with a fully charged new battery. Contact KEYENCE for more information when combining measurement units. When using the NR-XCP30 (or the NR-XW1), the battery duration is found according to the following formula: length of time that the measurement unit is run × total power consumption/(total power consumption + 1.6 W (+1.2 W)). *2 The NR-EN16 is a typical example when the power output function is not used. However, the power supply output varies when using the power supply output function. *3 Use between 0 32°F and +35°C 95°F if the total power consumption of the units powered by the NR-X100W exceeds 35 W.

▌NR-XR01: Remote unit for **NR-X**

Model	NR-XR01
Expansion remote connection	Dedicated remote input port × 1 (Remote IN), Output port × 1 (Remote OUT) Connection to NR-X100W master data collection unit or other NR-XR01 remote units using a remote unit cable Daisy-chain connections of multiple remote units allowed*[1]
Number of connectable measurement units	Max. 8 units*[2]
Continuous acquisition speed	Max. 100 kHz for all acquisition channels*[3]
Synchronization between measurement units	±1 μs or less*[4]
Operating ambient temperature	0 to +40°C 32°F to 104°F
Operating ambient humidity	10 to 85% RH (no condensation)
Power supply	Supplied from NR-U5 AC adapter or NR-X100W master data collection unit (operation with no AC adapter)
Power consumption	Approx. 2.9 W
Weight	Approx. 210 g 7.41 oz

*1 Remote unit cables can be extended by connecting a remote extension cable. The total length of remote cables used in the system should be no more than 100 m 328.1'. The distance between the master data collection unit and remote units or between remote units should be no more than 60 m 196.9'. *2 Use is permitted only if the total power consumption of all connected measurement units is 20 W or less. However, if the remote units are not connected to the NR-U5 AC adapter, the total power consumption must be 10 W or less. The total number of measurement units and remote units for a system varies depending on the system configuration. Refer to "Number of connectable measurement units" in the master data collection unit for more information. *3 The continuous acquisition speed varies according to the system configuration. Refer to "Continuous acquisition speed" in the master data collection unit for more information. *4 The sampling cycle and timing vary depending on the connected measurement unit. When using the NR-CA04 in combination with other unit types, a sampling delay may occur between the NR-CA04 and the other units with some setting configurations.

▌NR-XW1: Wireless LAN unit for **NR-X**

Model		NR-XW1
Applicable devices		NR-X100W*[1]
Wireless LAN	Wireless standard	IEEE 802.11b/g/n
	Radio frequency	2.4 GHz
	Security	WPA-PSK (AES)
	Network type	Access point mode (main unit)
Countries in compliance with Radio Act		USA, Japan, China, Europe*[2]
Operating ambient temperature		0 to +40°C 32°F to 104°F
Operating ambient humidity		10 to 85% RH (no condensation)
Power supply		Supplied from NR-X100W
Power consumption		1.2 W or less
Weight		Approx. 40 g 1.41 oz

• Do not use the NR-XW1 in countries that are not in compliance with the Radio Act.
*1 Cannot be used when using the LAN port on the NR-X100W master data collection unit. When acquiring data from a PC (using WAVE LOGGER X software), acquisition may stop depending on the wireless LAN communication environment and the acquisition rate. Use the main unit's automatic saving function to save data to the SD card in the main unit as well when using the acquisition function.
*2 Refer to the CE Marking section in the NR-XW1 instruction manual for more information for Europe.

▌NR-XU1: AC adapter for **NR-X100W/NR-XJ1**

Model	NR-XU1
Input	100 to 240 VAC (50/60 Hz), 1.5 A
Output	24 VDC, 3.75 A (90.0 W)
Average effective efficiency	89.0% or more
Low load efficiency (10%)	79.0% or more
Power consumption with no load	0.15 W or less
Operating ambient temperature	0 to +40°C 32°F to 104°F
Operating ambient humidity	10 to 85% RH (no condensation)
Weight	Approx. 460 g 16.24 oz

▌NR-U5: AC adapter for **NR-500/NR-XR01**

Model	NR-U5
Input	100 to 240 VAC (50/60 Hz), 1.2 A
Output	7.6 VDC, 4.0 A (30.4 W)
Average effective efficiency	87.75% or more
Low load efficiency (10%)	77.7% or more
Power consumption with no load	0.075 W or less
Operating ambient temperature	0 to +40°C 32°F to 104°F
Operating ambient humidity	10 to 85% RH (no condensation)
Weight	Approx. 280 g 9.88 oz

▌NR-500: Interface unit

Model		NR-500
PC interface		USB Revision 2.0 High-speed–compliant (USB 1.1 compatible), Simultaneous USB connection from one PC to up to four units (switchable by ID switch)
Continuous acquisition speed		Max. 100 kHz for all acquisition channels
Number of connectable measurement units		8 units or less (not exceeding 20 W total measurement unit power)
Synchronization between measurement units		±1 μs or less*[1]
Time axis accuracy		±50 ppm (23°C ±3°C 73.4°F ±5.4°F)
I/O	Trigger input: TRG IN	Voltage input: 10 to 30 VDC, Min. pulse duration: 2 ms, Effective pulse width: 1 ms or more
	Synchronized input: SYNC IN	Voltage input: 5 VDC ±10%, Min. pulse duration: 20 μs, Effective pulse width: 10 μs or more
	Trigger output: TRG OUT	NPN open collector output: 1 ch, Maximum current: 100 mA (30 V or less), Residual voltage: 1 V or less, One-shot output
Withstand voltage	Between I/O and USB/DC IN/system bus	1500 VAC (50/60 Hz) for 1 minute
	Between trigger input and output	125 VAC (50/60 Hz) for 1 minute
Operating ambient temperature		0 to +40°C 32°F to 104°F
Operating ambient humidity		10 to 85% RH (no condensation)
Power supply		NR-U5 AC adapter or USB bus power (NR-TH08, NR-C512, NR-EN16 (no power output): when connecting one unit)
Power consumption		0.9 W or less
Weight		Approx. 110 g 3.88 oz (including OP-51581: NR-500 5-pole terminal block)

*1 When using the NR-CA04 in combination with other unit types, the maximum sampling period is 40 ms or 1 sampling cycle, depending on the setting.

▌NR-XH1W: High-performance PC software (system environment)

Model		NR-XH1W
Applicable models		NR-X100W/NR-500
Supported languages		English, Chinese (Simplified), Japanese
Packaged software		WAVE LOGGER X, LAN TOOL X, File Viewer X
Programming interface		Automation server (WAVE LOGGER X)
Communication interface	USB	Equipped with a USB 2.0 host (Type-A) interface*[1]
	Ethernet*[2]	Equipped with a 100 Base-TX interface
	Wireless LAN*[2]	IEEE 802.11b/g/n (with NR-XW1)
OS		Windows 11 Home/Pro, Windows 10 Home/Pro/Enterprise or Windows 7 SP1 Home Premium/Professional/Ultimate (pre-installed)*[3]
CPU		Intel® Core™ i3 processor (2.0 GHz) or equivalent
Memory capacity		Windows 11: 4 GB or more, Windows 10, Windows 7: 2 GB or more
Required capacity for installation		1 GB or more
Monitor		Resolution: 1280 × 1024 pixels or higher, Display color: High Color (16 bit) or higher
When using the Excel transfer function		Excel 2010 or later must be installed

*1 Connect the USB directly to the USB port on the PC. Do not use a USB hub or a repeater cable. *2 Only compatible with the NR-X100W. *3 32-bit and 64-bit versions supported.
* Windows and Excel are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Specifications

▌NR-TH08: High-accuracy temperature/voltage measurement unit

Model	NR-TH08		
Input method	Floating unbalanced input, channels insulated from each other, CH inputs insulated from other units (PC), channels not insulated from each other for resistance thermometers		
Number of channels*1	Input: 8		
Measurement cycle	Fastest sampling cycle: 100 ms (A/D integration time: 2 ms) to 1 h		
A/D conversion method	Delta-sigma method		
A/D resolution	24 bit		
A/D integration time	2 ms, 16.7 ms, 20 ms		
Input type	Voltage: ±50 V, ±10 V, ±5 V, ±1 V, ±0.5 V, ±0.1 V; Thermocouple: K, J, E, T, R, S, B, N, C; Resistance thermometer: Pt100, JPt100 3-line type; Specified current: 1 mA		
Reference junction compensation	Switchable between internal and external (individual unit setting, 0°C 32°F for external)		
Reference junction compensation accuracy	±0.7°C ±1.3°F (23°C ±2°C 73.4°F ±3.6°F, at input terminal temperature equilibrium)		
Maximum input voltage (rated)	±60 V		
Input impedance — Thermocouple, 5 V range or less	10 MΩ or more		
Input impedance — 50 V, 10 V voltage range	Approx. 1 MΩ		
Withstand voltage — Between measurement input terminal and system bus	1500 VAC (50/60 Hz) for 1 minute		
Withstand voltage — Between measurement input terminals	120 Vp-p AC/DC		
Input signal source resistance — Voltage, thermocouple	2 kΩ or less		
Input signal source resistance — Resistance thermometer	10 Ω or less per line (three lines must be equal)		
Thermocouple burnout	Wire breakage detected in the thermocouple range by applying 1 µA of current		
Burnout detection cycle	Detected in the measurement cycle		

Measurement range		Measurable range	Measurement accuracy (A/D integration time: 16.7 ms, 20 ms)	Display resolution
	±50 V	−55.00 to +55.00 V	±0.05% of rdg ±2 digits	10 mV
	±10 V	−11.000 to +11.000 V	±0.05% of rdg ±2 digits	1 mV
	±5 V	−5.500 to +5.500 V	±0.05% of rdg ±2 digits	1 mV
	±1 V	−1.1000 to +1.1000 V	±0.05% of rdg ±2 digits	0.1 mV
	±500 mV	−550.0 to +550.0 mV	±0.05% of rdg ±2 digits	0.1 mV
	±100 mV	−110.00 to +110.00 mV	±0.05% of rdg ±2 digits	0.01 mV
	K*2	−100 to +1372°C -148°F to +2501.6°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.9°C ±1.6°F	
	J*2	−100 to +1200°C -148°F to +2192°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.8°C ±1.4°F	
	E*2	−100 to +1000°C -148°F to +1832°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.8°C ±1.4°F	
	T*2	−100 to +400°C -148°F to +752°F	±0.05% of rdg ±0.5°C ±0.9°F	0.01°C 0.02°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.8°C ±1.4°F	
	N*2	0 to 1300°C 32°F to 2372°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
	C*2	1500 to 2315°C 2732°F to 4199°F	±0.05% of rdg ±1.1°C ±2.0°F	0.05°C 0.09°F
		0 to 1500°C 32°F to 2732°F	±0.05% of rdg ±0.8°C ±1.4°F	
	R*2	300 to 1768°C 572°F to 3214.4°F	±0.05% of rdg ±0.8°C ±1.4°F	0.05°C 0.09°F
		0 to 300°C 32°F to 572°F	±0.05% of rdg ±1.6°C ±2.9°F	
	S*2	300 to 1768°C 572°F to 3214.4°F	±0.05% of rdg ±0.9°C ±1.6°F	0.05°C 0.09°F
		0 to 300°C 32°F to 572°F	±0.05% of rdg ±1.6°C ±2.9°F	
	B*2	400 to 600°C 752°F to 1112°F	±0.05% of rdg ±1.7°C ±3.1°F	0.05°C 0.09°F
		600 to 1820°C 1112°F to 3308°F	±0.05% of rdg ±1.0°C ±1.8°F	
	Pt100*3	−200 to +660°C -328°F to +1220°F	±0.1% of rdg ±0.3°C ±0.5°F	0.02°C 0.04°F
	JPt100*3	−200 to +510°C -328°F to +950°F	±0.1% of rdg ±0.3°C ±0.5°F	0.02°C 0.04°F

Buffer memory	200k data		
Warm-up time	30 minutes or more*4		
Power consumption	1.2 W or less		
Operating ambient temperature	0 to +40°C 32°F to 104°F		
Operating ambient humidity	10 to 85% RH (no condensation)		
Weight	Approx. 230 g 8.12 oz (including approx. 100 g 3.53 oz for the OP-51582 (NR-TH08 terminal block))		

*1 Max. expansion: 576 ch (with 72 units connected, using NR-X100W), 64 ch (with 8 units connected, using NR-500)   *2 Does not include reference junction compensation accuracy.
*3 Specified current: 1 mA   *4 45 minutes or more when 5 or more units are added.   * The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌NR-HA08: High-speed analog measurement unit

Model	NR-HA08	
Input method	Single-ended input / Balanced differential input selection Channels not insulated from each other, input channels insulated from other units (PC)	
Number of channels*1	Single-end: 8 ch*2 (Differential: 4 ch) / Current: 4 ch	
Measurement cycle	Maximum sampling cycle: 1 µs (1 MHz) to 60 s	
A/D conversion method	Successive approximation	
A/D resolution	14 bit	
Input frequency band	250 kHz (−3 dB typ.)	
Input type — Voltage	±10 V, ±5 V, ±2.5 V, ±1 V, ±0.5 V, ±0.25 V	
Input type — Current	±20 mA	
Maximum rated input — Voltage range	±30 V	
Maximum rated input — Current range	±30 mA	
Input impedance — Voltage	1 MΩ ±1%	
Input impedance — Current	250 Ω ±1%	
Withstand voltage — Between input and system bus	300 VAC (50/60 Hz), 1 minute	

Measurement range		Measurable range	Display resolution
	±10 V	−11.000 to +11.000 V	1 mV
	±5 V	−5.500 to +5.500 V	1 mV
	±2.5 V	−2.7500 to +2.7500 V	0.1 mV
	±1 V	−1.1000 to + 1.1000 V	0.1 mV
	±500 mV	−550.0 to +550.0 mV	0.1 mV
	±250 mV	−275.00 to +275.00 mV	0.01 mV
	±20 mA	−22.000 to +22.000 mA	1 µA

Measurement accuracy — Zero-point accuracy	±0.03% of F.S.	
Measurement accuracy — DC amplitude accuracy	±0.1% of F.S. (10 V/5 V/2.5 V/20 mA range at 16 averages, 1 V/0.5 V/0.25 V range at 128 averages)	
Buffer memory	4M data*3	
Warm-up time	15 minutes or more	
Power consumption	3.3 W or less	
Operating ambient temperature	0 to +40°C 32°F to 104°F	
Operating ambient humidity	10 to 85% RH (no condensation)	
Weight	Approx. 150 g 5.30 oz	

*1 Max. expansion: 432 ch (with 54 units connected, using NR-X100W), 48 ch (with 6 units connected, using NR-500)   *2 Voltage input is 4 ch max. when current input is used.   *3 Limited by the NR-X100W buffer memory when using the NR-X100W.   * The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌NR-TH08P: High-accuracy temperature measurement unit (Thermocouple connectors)

Model	NR-TH08P		
Input method	Floating unbalanced input, channels insulated from each other, inputs insulated from other units (PC)		
Number of channels*1	Input: 8		
Measurement cycle	Fastest sampling cycle of 100 ms (A/D integration time: 2 ms) to 1 h		
A/D conversion method	Delta-sigma method		
A/D resolution	24 bit		
A/D integration time	2 ms, 16.7 ms, 20 ms		
Input type	Thermocouple: K, J, E, T, R, S, B, N, C		
Input connector	Miniature thermocouple connector (Universal Cu/Cu type) × 8 ports		
Reference junction compensation	Switchable between internal and external (individual unit setting, 0°C 32°F for external)		
Reference junction compensation accuracy	±0.5°C ±0.9°F (23°C ±3°C 73.4°F ±5.4°F, at input terminal temperature equilibrium)		
Maximum input voltage (rated)	±60 V		
Input impedance	10 MΩ or more		
Withstand voltage	Between measurement input terminal and system bus	1500 VAC (50/60 Hz) for 1 minute	
	Between measurement input terminals	120 Vp-p AC/DC	
Input signal source resistance	2 kΩ or less		
Thermocouple burnout	Wire breakage detected by applying 1 µA of current		
Burnout detection cycle	Detected in the measurement cycle		

Measurement range		Measurable range	Measurement accuracy (A/D integration time: 16.7 ms, 20 ms)	Display resolution
	K*2	−100 to +1372°C -148°F to +2501.6°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.9°C ±1.6°F	
	J*2	−100 to +1200°C -148°F to +2192°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.8°C ±1.4°F	
	E*2	−100 to +1000°C -148°F to +1832°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.8°C ±1.4°F	
	T*2	−100 to +400°C -148°F to +752°F	±0.05% of rdg ±0.5°C ±0.9°F	0.01°C 0.02°F
		−200 to −100°C -328°F to -148°F	±0.05% of rdg ±0.8°C ±1.4°F	
	N*2	0 to 1300°C 32°F to 2372°F	±0.05% of rdg ±0.6°C ±1.1°F	0.05°C 0.09°F
	C*2	1500 to 2315°C 2732°F to 4199°F	±0.05% of rdg ±1.1°C ±2.0°F	0.05°C 0.09°F
		0 to 1500°C 32°F to 2732°F	±0.05% of rdg ±0.8°C ±1.4°F	
	R*2	300 to 1768°C 572°F to 3214.4°F	±0.05% of rdg ±0.8°C ±1.4°F	0.05°C 0.09°F
		0 to 300°C 32°F to 572°F	±0.05% of rdg ±1.6°C ±2.9°F	
	S*2	300 to 1768°C 572°F to 3214.4°F	±0.05% of rdg ±0.9°C ±1.6°F	0.05°C 0.09°F
		0 to 300°C 32°F to 572°F	±0.05% of rdg ±1.6°C ±2.9°F	
	B*2	400 to 600°C 752°F to 1112°F	±0.05% of rdg ±1.7°C ±3.1°F	0.05°C 0.09°F
		600 to 1820°C 1112°F to 3308°F	±0.05% of rdg ±1.0°C ±1.8°F	

Buffer memory	200k data		
Warm-up time	30 minutes or more*3		
Power consumption	1.2 W or less		
Operating ambient temperature	0 to +40°C 32°F to 104°F		
Operating ambient humidity	10 to 85% RH (no condensation)		
Weight	Approx. 250 g 8.83 oz (including approx. 120 g 4.24 oz for the OP-88519 (NR-TH08P thermocouple connector terminal block))		

*1 Max. expansion: 576 ch (with 72 units connected, using NR-X100W), 64 ch (with 8 units connected, using NR-500)   *2 Does not include reference junction compensation accuracy.
*3 45 minutes or more when 5 or more units are added.
* The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌NR-HA08P: High-speed analog measurement unit (Push-type terminal block)

Model	NR-HA08P	
Input method	Single-end input / Balanced differential input selection Channels not insulated from each other, input channels insulated from other units (PC)	
Number of channels*1	Single-end: 8 ch*2 (Differential: 4 ch) / Current: 4 ch	
Measurement cycle	Maximum sampling cycle: 1 µs (1 MHz) to 60 s	
A/D conversion method	Successive approximation	
A/D resolution	14 bit	
Input frequency band	250 kHz (−3 dB typ.)	
Input type	Voltage	±10 V, ±5 V, ±2.5 V, ±1 V, ±0.5 V, ±0.25 V
	Current	±20 mA
Maximum rated input	Voltage range	±30 V
	Current range	±30 mA
Input impedance	Voltage	1 MΩ ±1%
	Current	250 Ω ±1%
Withstand voltage	Between measurement input terminal and system bus	300 VAC (50/60 Hz), 1 minute

Measurement range		Measurable range	Display resolution
	±10 V	−11.000 to +11.000 V	1 mV
	±5 V	−5.500 to +5.500 V	1 mV
	±2.5 V	−2.7500 to +2.7500 V	0.1 mV
	±1 V	−1.1000 to +1.1000 V	0.1 mV
	±0.5 V	−550.0 to +550.0 mV	0.1 mV
	±0.25 V	−275.00 to +275.00 mV	0.01 mV
	±20 mA	−22.000 to +22.000 mA	1 µA

Measurement accuracy	Zero-point accuracy	±0.03% of F.S.	
	DC amplitude accuracy	±0.1% of F.S. (10 V/5 V/2.5 V/20 mA range at 16 averages, 1 V/0.5 V/0.25 V range at 128 averages)	
Buffer memory	4M data*3		
Warm-up time	15 minutes or more		
Power consumption	3.3 W or less		
Operating ambient temperature	0 to +40°C 32°F to 104°F		
Operating ambient humidity	10 to 85% RH (no condensation)		
Weight	Approx. 170 g 6.00 oz (including approx. 20 g 0.71 oz for the OP-88521 (NR-HA08P terminal block))		

*1 Max. expansion: 432 ch (with 54 units connected, using NR-X100W), 48 ch (with 6 units connected, using NR-500)   *2 Voltage input is 4 ch max. when current input is used.   *3 Limited by the NR-X100W buffer memory when using the NR-X100W.   * The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌**NR-HV04**: High-speed, high-voltage measurement unit

Model		NR-HV04	
Input method		Insulated single-end input, channels insulated from each other, input channels insulated from other units (PC)	
Number of channels*¹		4 ch	
Measurement cycle		Maximum sampling cycle: 1 μs (1 MHz) to 60 s	
A/D conversion method		Successive approximation, simultaneous sampling of all channels	
A/D resolution		14 bit	
Digital filter		Averaging rate: 1 to 128 (automatically selected)	
Input frequency band		250 kHz (−3 dB or more)	
Input type		±1000 V, ±500 V, ±200 V, ±100 V, ±50 V, ±20 V, ±10 V, ±5 V, ±2 V	
Maximum input voltage*²		[When using OP-35409 1:1 voltage-resistant probe] 1000 V peak and 700 Vrms, or 700 VDC; [When using OP-84266 1:1 voltage-resistant probe] 300 VDC + AC peak; [When using OP-88998 10:1 voltage-resistant probe] 1000 VDC + AC peak; [Direct input] 60 VDC + AC peak	
Maximum allowable voltage to ground*²		[When using OP-35409 1:1 voltage-resistant probe] Measurement terminal, GND terminal: 300 Vrms (CAT II); [When using OP-84266 1:1 voltage-resistant probe] Measurement terminal, GND terminal: 300 Vrms (CAT II); [When using OP-88998 10:1 voltage-resistant probe] Measurement terminal: 700 Vrms (CAT II), GND terminal: 300 Vrms (CAT II); [Direct input] Measurement terminal, GND terminal: 42.4 Vpeak and 30 Vrms, or 60 VDC	
Input impedance		1 MΩ ±1%, approx. 30 pF	
Withstand voltage	Between input and system bus/ground	2200 VAC (50/60 Hz) for 1 minute	
Insulation resistance		500 VDC, 10 MΩ or more	
Connector type		Insulated BNC connector	
Input coupling		AC/DC/AC-RMS/DC-RMS	
Common mode noise reduction ratio		80 dB or more (at max. 60 Hz DC) (typ.)	
Low-pass filter		PASS, 7 Hz, 500 Hz, 50 kHz (−12 dB/oct)	
Measurement range		Measurable range	Display resolution
	±1000 V	−1000.00 to +1000.00 V	50 mV
	±500 V	−550.00 to +550.00 V	20 mV
	±200 V	−220.00 to +220.00 V	10 mV
	±100 V	−110.000 to +110.000 V	5 mV
	±50 V	−55.000 to +55.000 V	2 mV
	±20 V	−22.000 to +22.000 V	1 mV
	±10 V	−11.0000 to +11.0000 V	0.5 mV
	±5 V	−5.5000 to +5.5000 V	0.2 mV
	±2 V	−2.2000 to +2.2000 V	0.1 mV
Measurement accuracy		±0.1% of F.S.	
RMS measurement function	Number of channels	4 ch	
	Accuracy	Sine wave: 20 Hz to 1 kHz, ±0.5% of F.S.; 1 to 20 kHz, ±1.5% of F.S.; Crest factor: 4 or less; Response time: 500 ms	
Residual noise level		0.01% of F.S., LPF: 500 Hz (200 μs/S, digital filter: ON) (typ.); 0.05% of F.S., LPF: PASS (typ.)	
Calculation function		CH1 to CH2, CH3 to CH4 (Single-channel usage not possible when using the calculation function)	
Buffer memory		16M data*³	
Warm-up time		30 minutes or more	
Power consumption		3 W or less	
Operating ambient temperature		0 to +40°C 32°F to 104°F	
Operating ambient humidity		10 to 85% RH (no condensation)	
Weight		Approx. 270 g 9.53 oz	

*1 Max. expansion: 216 ch (with 54 units connected, using NR-X100W), 24 ch (with 6 units connected, using NR-500)   *2 At a frequency of 40 kHz or less   *3 Limited by the NR-X100W buffer memory when using the NR-X100W. * The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌**NR-ST04**: Strain measurement unit

Model		NR-ST04	
Input method		Balanced differential input, channels not insulated from each other, input channels insulated from other units (PC)	
Number of channels*¹		4 ch	
Measurement cycle		Maximum sampling cycle: 20 μs (50 kHz) to 60 s	
A/D conversion method		Successive approximation, simultaneous sampling of all channels	
A/D resolution		16 bit	
Input type	Strain input	±1000 μST, ±2000 μST, ±5000 μST, ±10000 μST, ±20000 μST	
	Voltage input	±2 mV, ±5 mV, ±10 mV, ±20 mV, ±50 mV	
Maximum rated input		±1.0 V	
Input impedance		1 MΩ or more	
Withstand voltage	Between input and system bus/ground	1500 VAC (50/60 Hz) for 1 minute	
Applicable gauge resistance		Quarter bridge / half bridge system: 120 Ω (A 350 Ω strain gauge requires an external bridge box.); Full bridge system: 120 Ω to 1 kΩ	
Applied voltage		2 VDC (±0.4%)	
Balanced adjustment	Method	Electronic balancing (auto-balancing)	
	Balancing accuracy	±0.1% of F.S. (with low-pass filter of 8 Hz and 50 Hz sampling averaged 20 times)	
	Balancing range	±29000 μST (during strain input), ±29 mV (during voltage input)	
Measurement accuracy	Gain accuracy	±0.2% of F.S. (with low-pass filter of 8 Hz and 50 Hz sampling averaged 20 times)	
Gauge factor		2.0 (fixed)	
Common mode noise reduction ratio		80 dB or more (60 Hz DC max.)	
Input frequency band		5 kHz DC max. (−3 dB)	
Low-pass filter	Cutoff frequency	Auto, 5 kHz, 3.5 kHz (3 kHz), 2 kHz (1.5 kHz), 1 kHz (750 Hz), 500 Hz (370 Hz), 250 Hz (200 Hz), 120 Hz (100 Hz), 60 Hz (50 Hz), 30 Hz (25 Hz), 15 Hz (12 Hz), 8 Hz (6 Hz), 4 Hz (3 Hz); Value in parentheses is for 20 kHz sampling.	
	Damping characteristics	5th order Bessel filter, −30 dB/oct	
Measurement range		Measurable range	Display resolution
	±50 mV	−55.00 to +55.00 mV	10 μV
	±20 mV	−22.000 to +22.000 mV	1 μV
	±10 mV	−11.000 to +11.000 mV	1 μV
	±5 mV	−5.500 to +5.500 mV	1 μV
	±2 mV	−2.2000 to +2.2000 mV	0.1 μV
	±20000 μST	−22000 to +22000 μST	1 μST
	±10000 μST	−11000.0 to +11000.0 μST	0.5 μST
	±5000 μS	−5500.00 to +5500.00 μST	0.25 μST
	±2000 μST	−2200.0 to +2200.0 μST	0.1 μST
	±1000 μST	−1100.00 to +1100.00 μST	0.05 μST
Zero point stability*²	Temperature characteristics	±2 μST/°C, ±2 μV/°C	
	Change over time	±1.5 μST/8 h, ±3 μV/8 h	
Gain stability*²	Temperature characteristics	±0.05% of F.S./°C	
	Change over time	±0.3% of F.S./8 h	
Buffer memory		4M data*³	
Warm-up time		30 minutes or more	
Power consumption		3.0 W or less	
Operating ambient temperature		0 to +40°C 32°F to 104°F	
Operating ambient humidity		10 to 85% RH (no condensation)	
Weight		Approx. 230 g 8.12 oz (including two OP-51584: NR-ST04 10-pole terminal blocks)	

*1 Max. expansion: 216 ch (with 54 units connected, using NR-X100W), 24 ch (with 6 units connected, using NR-500)   *2 Does not include temperature characteristics and changes over time of built-in bridge resistors. Built-in bridge resistor stability: ±5 ppm/°C or less, ±50 ppm/year   *3 Limited by the NR-X100W buffer memory when using the NR-X100W.   * The above specifications are the values when auto-balancing is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.   * ST = strain / μ = 10-6

❚ NR-CA04: Acceleration measurement unit

Model		NR-CA04
Input method		Charge output sensor input / Single-end input, channels not insulated from each other; input channels switchable between insulated and not insulated from other units (PC)
Number of channels*[1]		4 ch
Measurement cycle		Maximum sampling cycle: 10 μs (100 kHz) to 60 s
A/D conversion method		Delta-sigma method, simultaneous sampling of all channels
A/D resolution		24 bit
Anti-aliasing filter		fc = Sampling frequency × 49%, −100 dB at sampling frequency * With a sampling frequency of 1 kS/s or more
Input type	Sensor input	±50000 m/s² ±164042.0 ft/s², ±20000 m/s² ±65616.8 ft/s², ±10000 m/s² ±32808.4 ft/s², ±5000 m/s² ±16404.2 ft/s², ±2000 m/s² ±6561.7 ft/s², ±1000 m/s² ±3280.8 ft/s², ±500 m/s² ±1640.4 ft/s², ±200 m/s² ±656.2 ft/s², ±100 m/s² ±328.1 ft/s², ±50.0 m/s² ±164.0 ft/s², ±20.0 m/s² ±65.6 ft/s², ±10.0 m/s² ±32.8 ft/s², ±5.00 m/s² ±16.4 ft/s², ±2.00 m/s² ±6.6 ft/s², ±1.00 m/s² ±3.3 ft/s² (with acceleration (unit setting: m/s² ft/s²))
	Voltage input	±10 V, ±5 V, ±2 V, ±1 V, ±500 mV, ±200 mV, ±100 mV, ±50 mV
Maximum input charge		±50,000 pC
Maximum rated input		±25 V
Input impedance		100 kΩ ±1%, approx. 38 pF
Connector type		Charge output sensor input: Miniature (10-32UNF); Voltage input/output (built-in pre-amplifier) Sensor input: Non-insulated BNC connector
Input coupling	Sensor input	Charge output / Voltage output (built-in pre-amplifier) / Charge output - RMS / Voltage output (built-in pre-amplifier) - RMS
	Voltage input	AC/DC/AC-RMS/DC-RMS
Withstand voltage	Between input and system bus/ground	300 VAC (50/60 Hz) for 1 minute
Common mode noise reduction ratio		80 dB or more (at max. 60 Hz DC) (typ.)
Crosstalk noise reduction ratio		100 dB or more (typ.)
Input frequency band	Charge output models	1.5 Hz (−3 dB typ.) to 45 kHz (±0.5 dB)
	Voltage output (built-in pre-amplifier) models AC/AC-RMS	1.0 Hz (−3 dB typ.) to 45 kHz (±0.5 dB)
	DC/DC-RMS	45 kHz DC max. (±0.5 dB)
High-pass filter		PASS, 10 Hz (−12 dB/oct)
Low-pass filter		PASS, 100 Hz, 1 kHz, 10 kHz (−12 dB/oct)
Sensor input sensitivity setting range	Charge output models	0.01000 to 999.9 pC/(m/s²)
	Voltage output (built-in pre-amplifier) models	0.01000 to 999.9 mV/(m/s²)
Disconnection detection function		Available (voltage output (built-in pre-amplifier) models only)
Disconnection detection cycle		Approx. 200 ms

		Measurable range	Display resolution
Measurement range*[2]	±10 V	−11.0000 to +11.0000 V	0.5 mV
	±5 V	−5.5000 to +5.5000 V	0.2 mV
	±2 V	−2.2000 to +2.2000 V	100 μV
	±1 V	−1.1000 to +1.1000 V	50 μV
	±500 mV	−550.00 to +550.00 mV	20 μV
	±200 mV	−220.00 to +220.00 mV	10 μV
	±100 mV	−110.000 to +110.000 mV	5 μV
	±50 mV	−55.000 to +55.000 mV	2 μV
	±50000 m/s² ±164042.0 ft/s²	−55000 to +55000 m/s² -180446.2 ft/s² to +180446.2 ft/s²	2 m/s² 6.6 ft/s²
	±20000 m/s² ±65616.8 ft/s²	−22000 to +22000 m/s² -72178.5 ft/s² to +72178.5 ft/s²	1 m/s² 3.3 ft/s²
	±10000 m/s² ±32808.4 ft/s²	−11000 to +11000 m/s² -36089.2 ft/s² to +36089.2 ft/s²	0.5 m/s² 1.6 ft/s²
	±5000 m/s² ±16404.2 ft/s²	−5500 to +5500 m/s² -18044.6 ft/s² to +18044.6 ft/s²	0.2 m/s² 0.7 ft/s²
	±2000 m/s² ±6561.7 ft/s²	−2200 to +2200 m/s² -7217.8 ft/s² to +7217.8 ft/s²	0.1 m/s² 0.3 ft/s²
	±1000 m/s² ±3280.8 ft/s²	−1100 to +1100 m/s² -3608.9 ft/s² to +3608.9 ft/s²	0.05 m/s² 0.16 ft/s²
	±500 m/s² ±1640.4 ft/s²	−550 to +550 m/s² -1804.5 ft/s² to +1804.5 ft/s²	0.02 m/s² 0.07 ft/s²
	±200 m/s² ±656.2 ft/s²	−220 to +220 m/s² -728.1 ft/s² to +728.1 ft/s²	0.01 m/s² 0.03 ft/s²
	±100 m/s² ±328.1 ft/s²	−110 to +110 m/s² -360.9 ft/s² to +360.9 ft/s²	0.005 m/s² 0.0164 ft/s²
	±50 m/s² ±164.0 ft/s²	−55 to +55 m/s² -180.4 ft/s² to +180.4 ft/s²	0.002 m/s² 0.0066 ft/s²
	±20 m/s² ±65.6 ft/s²	−22 to +22 m/s² -72.2 ft/s² to +72.2 ft/s²	0.001 m/s² 0.0033 ft/s²
	±10 m/s² ±32.8 ft/s²	−11 to +11 m/s² -36.1 ft/s² to +36.1 ft/s²	0.0005 m/s² 0.0016 ft/s²
	±5 m/s² ±16.4 ft/s²	−5.5 to +5.5 m/s² -18.0 ft/s² to +18.0 ft/s²	0.0002 m/s² 0.0007 ft/s²
	±2 m/s² ±6.6 ft/s²	−2.2 to +2.2 m/s² -7.2 ft/s² to +7.2 ft/s²	0.0001 m/s² 0.0003 ft/s²
	±1 m/s² ±3.3 ft/s²	−1.1 to +1.1 m/s² -3.6 ft/s² to +3.6 ft/s²	0.00005 m/s² 0.000164 ft/s²

Measurement accuracy	Charge output models	±0.9% of F.S. at [Sensor sensitivity] × [Setting range] ≥ 20 pC
	Voltage output (built-in pre-amplifier) models	±0.25% of F.S. at [Sensor sensitivity] × [Setting range] ≥ 200 mV
	Voltage	±10 V to ±100 mV range: ±0.1% of F.S. ±50 mV range: ±0.15% of F.S.
RMS amplitude accuracy		Sine wave: 20 Hz to 1 kHz, ±0.5% of F.S. Crest factor: 4 or less; Response time: 2600 ms
Residual noise level	Charge output models	±0.01% of F.S. (typ.) at [Sensor sensitivity] × [Setting range] ≥ 50 pC With low-pass filter of 1 kHz
	Voltage output (built-in pre-amplifier) models	±0.05% of F.S. (typ.) at [Sensor sensitivity] × [Setting range] ≥ 200 mV With low-pass filter of 1 kHz
	Voltage	10 to 200 mV range: ±0.01% of F.S. (typ.) 100 mV/50 mV range: ±0.02% of F.S. (typ.), with low-pass filter of 1 kHz
Sensor supply power		22 V ±10% / 4 mA ±20%
Calculation function		Single integration (velocity conversion), Double integration (displacement conversion)
TEDS information		Read sensor information
Buffer memory		16M data*[3]
Warm-up time		30 minutes or more*[4]
Power consumption		3.8 W or less
Operating ambient temperature		0 to +40°C 32°F to 104°F
Operating ambient humidity		10 to 85% RH (no condensation)
Weight		Approx. 270 g 9.53 oz

*1 Max. expansion: 180 ch (with 45 units connected, using NR-X100W), 20 ch (with 5 units connected, using NR-500) *2 Sensor input with acceleration (unit setting: m/s² ft/s²) *3 Limited by the NR-X100W buffer memory when using the NR-X100W. *4 60 minutes or more when the measurement range is ±50 mV / ±100 mV. * The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌NR-FV04: Pulse measurement unit

Model		NR-FV04	
Input method		Insulated single-end input, channels insulated from each other, input channels insulated from other units (PC)	
Input impedance		1 MΩ ±1%, approx. 30 pF	
Number of channels*[1]		4 ch	
Measurement cycle		Maximum sampling cycle: 1 μs (1 MHz) to 60 s	
A/D conversion method		Successive approximation, simultaneous sampling of all channels	
A/D resolution		14 bit	
Input frequency band		250 kHz (−3 dB or more)	
Low-pass filter		PASS, 1.5 kHz, 15 kHz, 50 kHz	
Pulse input	Input type	Pulse frequency, pulse count (Single-phase input)	
	Maximum input voltage*[2]	±700 V	
	Threshold voltage	+100 V, +50 V, +20 V, +10 V, +5 V, +2.5 V, +1 V, +500 mV, +250 mV, +100 mV, +50 mV, 0 V	
	Minimum pulse duration	2 μs or more for both ON and OFF	
	Hysteresis	AUTO, 100 mV, 500 mV, 5 V	
	Pulse divisions	1 to 64 (Can be set to units of 1 division)	
	Input coupling	DC rising edge, DC falling edge, AC rising edge, AC falling edge	
	Digital filter	Pulse frequency: Averaging rate of 1 to 32768 (automatically selected), Pulse count: None	
	Predictive functions	Predictive calculation, Stop prediction (OFF, ×1.5, ×3, ×5, ×8, ×16)	
	Sensor power output	Dedicated connectors for OP-88003 (AUX POWER) × 2 when using OP-88003; +12 V, 50 mA or +5 V, 50 mA NPN open-collector output connectable, sensor power supply not insulated from system bus	
Voltage input	Input type	±100 V, ±50 V, ±20 V, ±10 V, ±5 V, ±2 V	
	Maximum input voltage*[2]	±700 V	
	Digital filter	Averaging rate: 1 to 128 (automatically selected)	
	Input coupling	DC, AC	
	Common mode noise reduction ratio	80 dB or more (at up to 60 Hz DC)	
	Residual noise level	0.02% of F.S., LPF: 1.5 kHz (200 μs/S, digital filter: ON); 0.05% of F.S., LPF: PASS	
Measurement range		Measurable range	Display resolution
	Pulse frequency	0.05 to 16000.00 Hz	0.01 to 1.00 Hz (selected automatically according to frequency)
	Pulse count	0 to 65,000 counts/sampling cycle	1 count
	±100 V	−110.000 to +110.000 V	5 mV
	±50 V	−55.000 to +55.000 V	2 mV
	±20 V	−22.000 to +22.000 V	1 mV
	±10 V	−11.0000 to +11.0000 V	0.5 mV
	±5 V	−5.5000 to +5.5000 V	0.2 mV
	±2 V	−2.2000 to +2.2000 V	0.1 mV
Measurement accuracy	Pulse frequency	±0.07% of rdg, ±0.01 Hz (20 Hz to 15 kHz, 20 ms/S, with digital filter ON)	
	Voltage input	±0.1% of F.S.	
Maximum allowable voltage to ground*[2]		[When using OP-35409 1:1 voltage-resistant probe] Measurement terminal, GND terminal: 300 Vrms (CAT II); [When using OP-84266 1:1 voltage-resistant probe] Measurement terminal, GND terminal: 300 Vrms (CAT II); [When using OP-88998 10:1 voltage-resistant probe] Measurement terminal: 700 Vrms (CAT II), GND terminal: 300 Vrms (CAT II); [Direct input] Measurement terminal, GND terminal: 42.4 Vpeak and 30 Vrms, or 60 VDC	
Withstand voltage	Between input and system bus/ground	2200 VAC (50/60 Hz) for 1 minute	
Insulation resistance		500 VDC, 10 MΩ or more	
Connector type		Insulated BNC connector	
Buffer memory		16M data*[3]	
Warm-up time		30 minutes or more	
Power consumption		4 W or less (including OP-88003 sensor power supply)	
Operating ambient temperature		0 to +40°C 32°F to 104°F	
Operating ambient humidity		10 to 85% RH (no condensation)	
Weight		Approx. 270 g 9.53 oz	

*1 Max. expansion: 180 ch (with 45 units connected, using NR-X100W), 20 ch (with 5 units connected, using NR-500)   *2 At a frequency of 40 kHz or less   *3 Limited by the NR-X100W buffer memory when using the NR-X100W.
* The above specifications are the values when zero point adjustment is performed after the warm-up period in an environment with a temperature of 23°C ±3°C 73.4°F ±5.4°F.

▌NR-C512: CAN data collection unit

Model		NR-C512
Supported protocol		CAN Ver. 2.0B
	Supported physical layer	High speed: ISO 11898 Single wire: SAE J2411
	Communication speed	High speed: 60 kbps to 1 Mbps Single wire: 20 to 83.3 kbps
Ports		9-pin D-sub male, 1 port*[1]
Maximum number of messages / Maximum number of signals		128 messages/port, 512 signals (ch)/port
Acquisition cycle		Maximum sampling cycle: 200 μs
CAN bus power supply		High speed: 5 V internal supply Single wire: +6.5 to +18 V, 100 mA external power supply required
Built-in termination resistor		High speed: 120 Ω × 2 (enabled/disabled with DIP switch) Single wire: 9.1 kΩ
Manual transmission/reception		Transmission/reception by specifying message ID and data
Withstand voltage	Between measurement input terminal and system bus	300 VAC (50/60 Hz) for 1 minute
Power consumption		1.6 W or less
Operating ambient temperature		0 to +40°C 32°F to 104°F
Operating ambient humidity		10 to 85% RH (no condensation)
Weight		Approx. 150 g 5.30 oz

* High speed and Single wire modes cannot be used at the same time.
*1 Max. expansion: 8 ports (with 8 units connected, using NR-X100W), 4 ports (with 4 units connected, using NR-500). Up to 4 units can be connected for each NR-X100W and NR-XR01 group (or 2 units for each group when using 5 or more NR-XR01 devices), with up to 8 units for all groups.

▌NR-EN16: Ethernet data collection unit

Model	NR-EN16
Connection target devices	DL-EN1 (Connected sensor: GT2 Series, GT Series, IL Series, IG Series, IB Series, IX Series, SK Series)*[1]NQ-EP4L (Connected sensor: FD-Q Series, FD-R Series, FD-X Series, FD-G Series, FD-EP Series, FD-EC Series, LR-T Series, FI-1000+FI-T Series, GP-M Series)*[1] ; LK-G5000 Series, CL-3000 Series, LJ-V7000 Series, LJ-X8000 Series, LS-9000 Series; Connection of one of the above devices per NR-EN16 allowed
Connection target device identification	Automatic identification or manual identification by specifying the IP address
Communication protocols	Ethernet TCP/UDP communication, BOOTP/DHCP client supported (compatible with the above connection target devices)
Interface	Ethernet 100Base-TX (AUTO-MDI/MDIX-compatible), 1 port*[2]
Number of channels	16 ch max. (varies depending on connected devices)
Acquisition cycle	Maximum sampling cycle: 1 ms (1 kHz) to 60 s With effective rate display function for communication between connected sensors*[3]
Buffer memory	8M data*[4]
Sensor power output function	• Output from power supply output connector (4-pole terminal block) (switchable between output ON and OFF) • Output voltage: 24 VDC ±10% • Rated current: Max. 0.6 A (switchable between 0.3 A and 0.6 A) • Built-in overcurrent protection function: Automatic recovery, switchable between 0.35 A (typ.) and 0.70 A (typ.) protection current • Class 2 power supply (CSA C22.2 No. 223 / UL 1310 compliant) • Sensor power supply not insulated from system bus
Power consumption	1.6 W or less*[5]
Operating ambient temperature	0 to +40°C 32°F to 104°F
Operating ambient humidity	10 to 85% RH (no condensation)
Weight	Approx. 150 g 5.30 oz (including approx. 10 g 0.35 oz for the OP-88513 (NR-EN16 power supply terminal block))

*1 Multiple sensors can be connected to each DL-EN1/NQ-EP4L. The number of connectable sensors depends on the DL-EN1/NQ-EP4L.   *2 Max. expansion: 18 ports (with 18 units connected, using NR-X100W), 4 ports (with 4 units connected, using NR-500). Up to 4 units can be connected for each NR-X100W and NR-XR01 group when using the NR-X100W, with up to 18 units for all groups.
*3 The effective rate may vary depending on the connected sensor and the communication conditions.   *4 Limited by the NR-X100W buffer memory when using the NR-X100W.   *5 When using the power supply output function, the unit power consumption is calculated as follows regardless of the actual power output (load). Set to 0.3 A output = 10.0 W; Set to 0.6 A output = 20.0 W. The power supply output function can be set using a switch on the unit body.

❙NR-XTH08T: Environment-resistant temperature measurement unit

Model	NR-XTH08T			
Input method	Insulated single-end input, channels insulated from each other, input channels insulated from the case and other units (system)			
Number of input channels	8*1			
Input type	Thermocouple: K, J, E, T, R, S, B, N, C			
Input connector type	Miniature thermocouple connector (Universal type)			
Measurement cycle	Maximum sampling cycle: 10 ms (100 Hz) to 1 h			
A/D conversion method	Delta-sigma method			
A/D resolution	24 bit			
A/D integration time (noise filter)	AUTO (Automatic configuration according to sampling cycle), 2.5 ms (400 Hz), 16.7 ms (60 Hz), 20 ms (50 Hz), 100 ms (10 Hz)			
Low-pass filter	PASS / 200 Hz / 20 Hz			
Averaging	Switchable between ON/OFF, Averaging rate: 2 to 128 (moving average)			
Reference junction compensation	Switchable between internal and external			
Reference junction compensation accuracy	±0.5°C ±0.9°F (23°C ±3°C 73.4°F ±5.4°F at input terminal temperature equilibrium)			
Maximum rated input	±30 V*2			
Maximum allowable input ground voltage	Dry locations: 30 VAC and 42.4 Vpeak, or 60 VDC Wet locations: 16 VAC and 22.6 Vpeak, or 35 VDC			
Withstand voltage	Between measurement input terminal and case/other units (system): 1000 VAC (50 Hz / 60 Hz) for 1 minute Between measurement input terminals: 1000 VAC (50 Hz / 60 Hz) for 1 minute			
Input impedance	10 MΩ or more			
Input signal source resistance	2 kΩ or less			
Thermocouple burnout detection	Switchable between ON/OFF, When ON: Approx. 10 µA current detection*3			

Measurement range		Measurable range	Measurement accuracy*4	Display resolution
	K	−100 to +1372°C -148°F to +2501.6°F	±0.04% of rdg ±0.4°C ±0.7°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.43% of rdg ±0.1°C ±0.2°F	
	J	−100 to +1200°C -148°F to +2192°F	±0.03% of rdg ±0.3°C ±0.5°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.30% of rdg ±0.1°C ±0.2°F	
	E	−100 to +1000°C -148°F to +1832°F	±0.03% of rdg ±0.3°C ±0.5°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.27% of rdg ±0.1°C ±0.2°F	
	T	−100 to +400°C -148°F to +752°F	±0.4°C ±0.7°F	0.01°C 0.02°F
		−200 to −100°C -328°F to -148°F	±0.34% of rdg ±0.1°C ±0.2°F	
	N	−100 to +1300°C -148°F to +2372°F	±0.02% of rdg ±0.6°C ±2.1°F	0.05°C 0.09°F
		−200 to −100°C -328°F to -148°F	±0.63% of rdg ±0.1°C ±0.2°F	
	C	1500 to 2315°C 2732°F to 4199°F	±0.10% of rdg ±0.2°C ±0.4°F	0.05°C 0.09°F
		0 to 1500°C 32°F to 2732°F	±0.04% of rdg ±0.8°C ±1.4°F	
	R	300 to 1768°C 572°F to 3214.4°F	±0.01% of rdg ±1.2°C ±2.2°F	0.05°C 0.09°F
		0 to 300°C 32°F to 572°F	±2.0°C ±3.6°F	
	S	300 to 1768°C 572°F to 3214.4°F	±0.02% of rdg ±1.2°C ±2.2°F	0.05°C 0.09°F
		0 to 300°C 32°F to 572°F	±2.0°C ±3.6°F	
	B	400 to 600°C 752°F to 1112°F	±2.2°C ±4.0°F	0.05°C 0.09°F
		600 to 1820°C 1112°F to 3308°F	±1.6°C ±2.9°F	

| Common mode noise reduction ratio*4	135 dB or more (up to 60 Hz DC) (typ.)			
Warm-up time	30 minutes or more			
Buffer memory	16M data*5			
Remote connection	Dedicated environment-resistant remote unit input port × 1 (Remote IN), output port × 1 (Remote OUT) Connection to NR-X100W master data collection unit or other NR-XR01 remote units using environment-resistant unit cable Connectable to multiple environment-resistant measurement units*6			
Synchronization accuracy between remote connection units	±1 µs*7			
Power supply	Supplied from NR-X100W master unit			
Power consumption	5.0 W max.			
Operating ambient temperature	−40 to +85°C -40°F to +185°F*8			
Operating ambient humidity	Max. 100% RH*9			
Vibration resistance	100 m/s² 328.1 ft/s²; 5 to 2000 Hz; 2 hours in each of the X, Y, and Z directions (IEC 60068-2-6)*10 Equivalent to JIS D1601 Stage 45 (Class 1, Class 2, and Class 3; equivalent to Class B) automotive vibration standard			
Shock resistance	1000 m/s² 3280.8 ft/s²; 3 times in each of the X, Y, and Z directions (18 times in total) (IEC 60068-2-27)			
Enclosure rating	IP65/IP67 (IEC 60529) Enclosure Type 4X (UL 50E, CSA C22.2 No. 94.2, NEMA 250) Indoor/outdoor use			
Material	Main unit case: Aluminum die-casting (coated) / PBT+PC / PC, Display: Reinforced glass, Connectors: Brass (chromate processing), Connector protection cap: PBT+PC			
Weight	Approx. 660 g 23.30 oz			

*1 Max. expansion: 64 ch (with 8 units connected, using NR-X100W)   *2 Protection rating against temporary overvoltage. Do not apply voltage directly from an external source.   *3 The time until detection is confirmed varies depending on the acquisition setting and the input signal source resistance. Detection may be disabled depending on the low-pass filter and sampling cycle settings. For details, see P. 5–29.   *4 Does not include reference junction compensation accuracy. Specified with an A/D integration time of 20 ms (50 Hz) / 16.7 ms (60 Hz), the low-pass filter set to PASS, averaging set to 2 times, and after the warm-up time has passed and the temperature has stabilized (23°C ±3°C 73.4°F ±5.4°F).   *5 The buffer memory that can be used by the entire system is limited by the NR-X100W buffer memory.   *6 Environment-resistant unit cables can be extended by connecting an environment-resistant unit extension cable. The total length of cables used in the system should be no more than 100 m 32.8'. The distance between the NR-X100W (or NR-XR01) and environment-resistant measurement units or between environment-resistant remote measurement units should be no more than 60 m 196.9'.   *7 The sampling cycle and timing vary depending on the various measurement units used in the system. *8 Install the product on the specified mounting sheet metal (OP-88613) for use with ambient temperatures of 80°C 176°F or higher. *9 Use the product under the condition that the absolute humidity is 85°C 185°F with 90% RH or less. Avoid sudden temperature and humidity changes to prevent significant condensation and freezing.   *10 Testing with a 50 mm 1.97" p-p displacement limit used for 5 to 10 Hz.

**❚ NR-XHA08T**: Environment-resistant analog measurement unit

Model	NR-XHA08T		
Input method	Insulated single-end input, channels insulated from each other, input channels insulated from the case and other units (system)		
Number of input channels	8*¹		
Input type	Voltage input: ±60 V, ±20 V, ±10 V, ±5 V, ±2 V, ±1 V, ±500 mV, ±200 mV, ±100 mV Current input: ±20 mA		
Input connector type	Dedicated 3-pin connector		
Measurement cycle	Maximum sampling cycle: 100 μs (10 kHz) to 60 s		
A/D conversion method	Delta-sigma method		
A/D resolution	24 bit		
A/D integration time (noise filter)	AUTO (Automatic configuration according to sampling cycle), 25 μs (40 kHz), 208 μs (4.8 kHz), 2.5 ms (400 Hz), 16.7 ms (60 Hz), 20 ms (50 Hz), 100 ms (10 Hz)		
Input frequency band	2 kHz (−3 dB or more)		
Averaging	Switchable between ON/OFF, Averaging rate: 2 to 128 (moving average)		
Maximum rated input	Voltage input: ±60 V, Current input: ±30 mA		
Maximum allowable input ground voltage	120 VAC and 170 Vpeak, or 120 VDC (when using NR-XHA08T protective grounding) The following applies when not using NR-XHA08T protective grounding. Dry locations: 30 VAC and 42.4 Vpeak, or 60 VDC Wet locations: 16 VAC and 22.6 Vpeak, or 35 VDC		
Withstand voltage	Between measurement input terminal and case/other units (system): 1000 VAC (50 Hz / 60 Hz) for 1 minute Between measurement input terminals: 1000 VAC (50 Hz / 60 Hz) for 1 minute		

Input impedance	Voltage input ±2 V range or higher	1 MΩ ±2%		
	Voltage input ±1 V range or higher	10 MΩ ±2%		
	Current input	Approx. 100 Ω		

		Measurable range	Measurement accuracy*²	Display resolution
Measurement range	±60 V	−60.000 to +60.000 V	±0.05% of rdg ±8 mV	2 mV
	±20 V	−22.000 to +22.000 V	±0.05% of rdg ±4 mV	1 mV
	±10 V	−11.000 to +11.000 V	±0.05% of rdg ±2 mV	0.5 mV
	±5 V	−5.5000 to +5.5000 V	±0.05% of rdg ±0.8 mV	0.2 mV
	±2 V	−2.2000 to +2.2000 V	±0.05% of rdg ±0.4 mV	0.1 mV
	±1 V	−1.1000 to +1.1000 V	±0.05% of rdg ±0.2 mV	0.05 mV
	±500 mV	−550.00 to +550.00 mV	±0.05% of rdg ±0.08 mV	0.02 mV
	±200 mV	−220.00 to +220.00 mV	±0.05% of rdg ±0.04 mV	0.01 mV
	±100 mV	−110.000 to +110.000 mV	±0.05% of rdg ±0.02 mV	0.005 mV
	±20 mA	−22.000 to +22.000 mA	±0.08% of rdg ±0.004 mA	0.001 mA

Residual noise level*²	0.005% of F.S. (typ.) when A/D integration time is set to 20 ms (50 Hz) / 16.7 ms (60 Hz) 0.05% of F.S. (typ.) when A/D integration time is set to 208 μs (4.8 kHz)		
Common mode noise reduction ratio*²	105 dB or more (up to 60 Hz DC) (typ.)*²		
Warm-up time	30 minutes or more		
Buffer memory	16M data*³		
Remote connection	Dedicated environment-resistant remote unit input port × 1 (Remote IN), Output port × 1 (Remote OUT) Connection to NR-X100W master data collection unit or other NR-XR01 remote units using environment-resistant unit cable Connectable to multiple environment-resistant measurement units*⁴		
Synchronization accuracy between remote connection units	±1 μs*⁵		
Power supply	Supplied from NR-X100W master unit		
Power consumption	5.8 W or less		
Operating ambient temperature	−40 to +85°C -40°F to +185°F*⁶		
Operating ambient humidity	Max. 100% RH*⁷		
Vibration resistance	100 m/s² 328.1 ft/s²; 5 to 2000 Hz; 2 hours in each of the X, Y, and Z directions (IEC 60068-2-6)*⁸ Equivalent to JIS D1601 Stage 45 (Class 1, Class 2, and Class 3; equivalent to Class B) automotive vibration standard		
Shock resistance	1000 m/s² 3280.8 ft/s²; 3 times in each of the X, Y, and Z directions (18 times in total) (IEC 60068-2-27)		
Enclosure rating	IP65/IP67 (IEC 60529) Enclosure Type 4X (UL 50E, CSA C22.2 No. 94.2, NEMA 250) Indoor/outdoor use		
Material	Main unit case: Aluminum die-casting (coated), Display: Reinforced glass, Connectors: Brass (chromate processing), Connector protection cap: PBT+PC		
Weight	Approx. 690 g 24.36 oz		

*1 Max. expansion: 64 ch (with 8 units connected, using NR-X100W)   *2 Specified with an A/D integration time of 20 ms (50 Hz) / 16.7 ms (60 Hz), averaging set to 2 times, and after the warm-up time has passed and the temperature has stabilized (23°C ±3°C 73.4°F ±5.4°F).   *3 The buffer memory that can be used by the entire system is limited by the NR-X100W buffer memory.   *4 Environment-resistant unit cables can be extended by connecting an environment-resistant unit extension cable. The total length of cables used in the system should be no more than 100 m 32.8'. The distance between the NR-X100W (or NR-XR01) and environment-resistant measurement units or between environment-resistant remote measurement units should be no more than 60 m 196.9'.   *5 The sampling cycle and timing vary depending on the various measurement units used in the system.   *6 Install the product on the specified mounting sheet metal (OP-88613) for use with ambient temperatures of 80°C 176°F or higher.   *7 Use the product under the condition that the absolute humidity is 85°C 185°F with 90% RH or less. Avoid sudden temperature and humidity changes to prevent significant condensation and freezing.   *8 Testing with a 50 mm 1.97" p-p displacement limit used for 5 to 10 Hz.
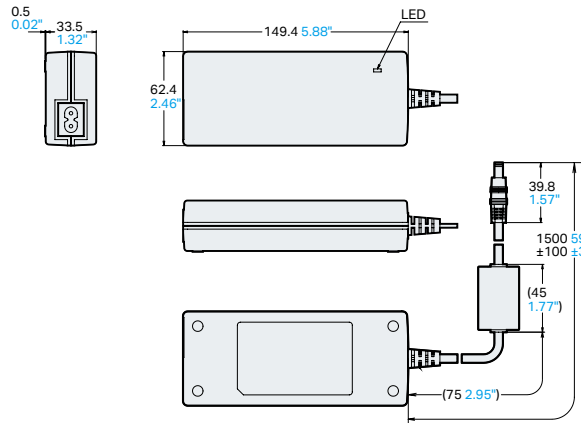
Dimensions

Master data collection unit
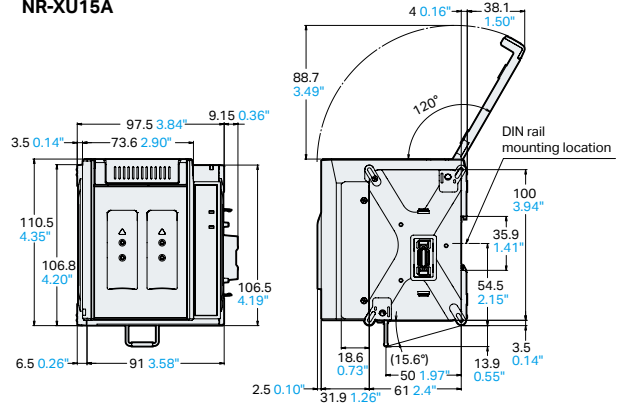**NR-X100W**
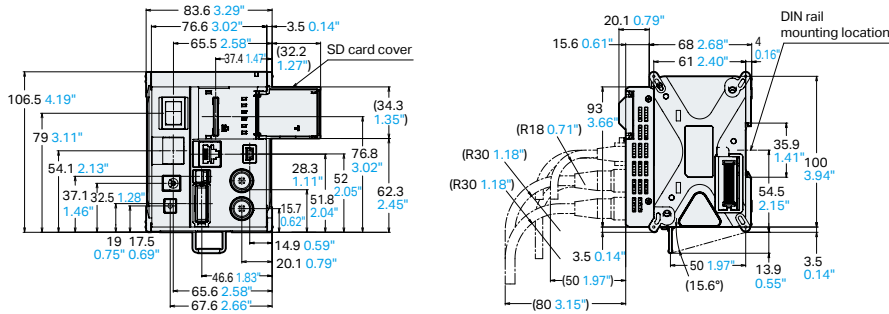
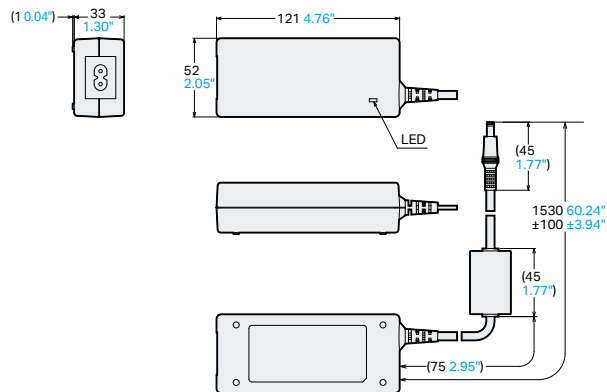Control panel for NR-X
NR-XCP30
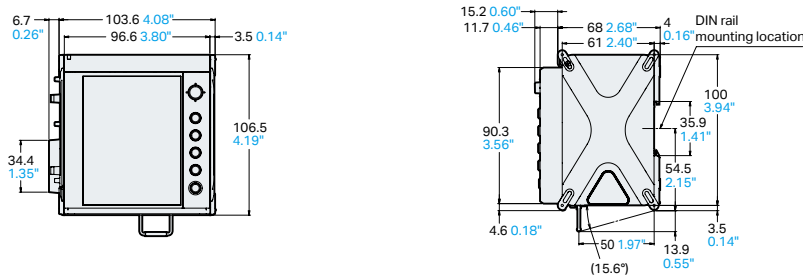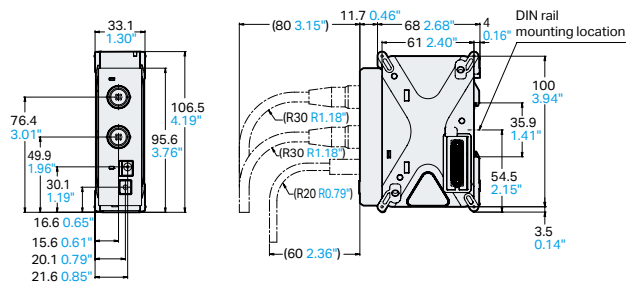

AC adapter for NR-X100W/NR-XJ1
NR-XU1

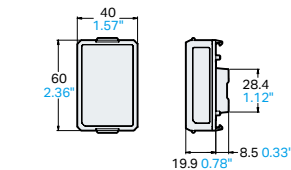Battery power supply unit for NR-X
NR-XU15A

AC adapter for NR-500/NR-XR01
NR-U5

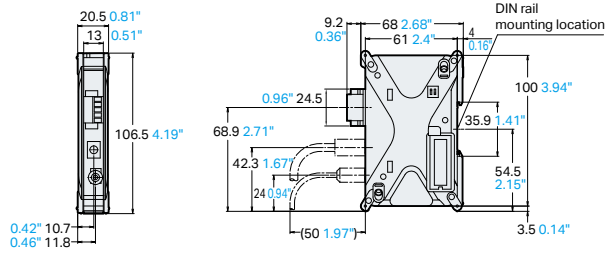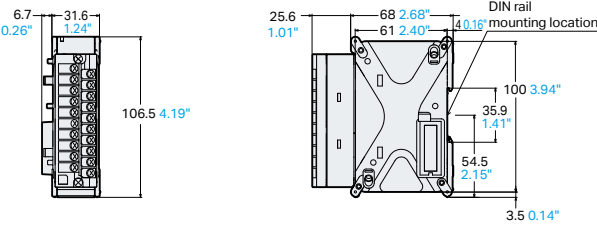Remote unit for NR-X
NR-XR01

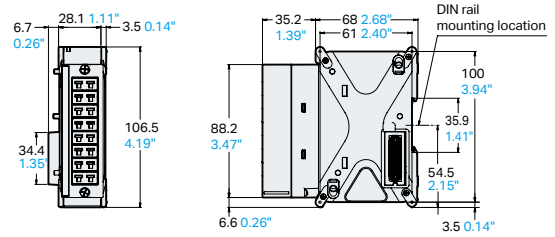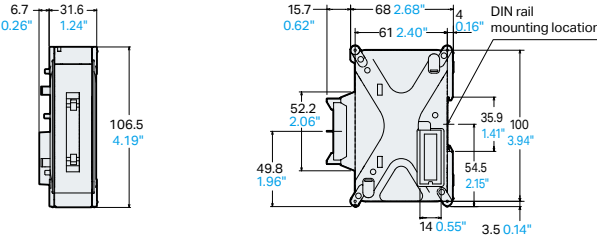Wireless LAN unit for NR-X
NR-XW1

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Dimensions

Interface unit
NR-500

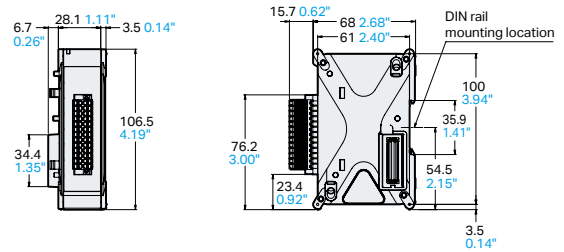High-accuracy temperature/voltage measurement unit
NR-TH08
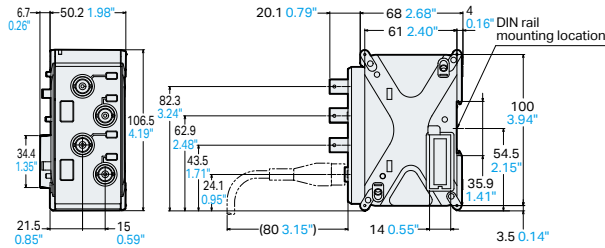

High-accuracy temperature measurement unit (Thermocouple connectors)
NR-TH08P

High-speed analog measurement unit
NR-HA08

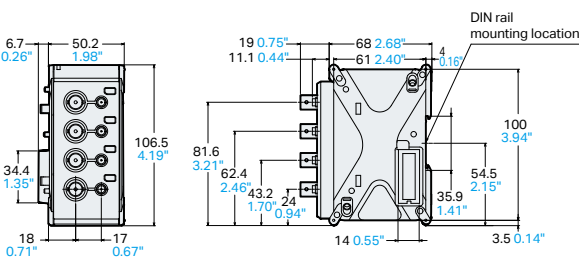High-speed analog measurement unit (Push-type terminal block)
NR-HA08P

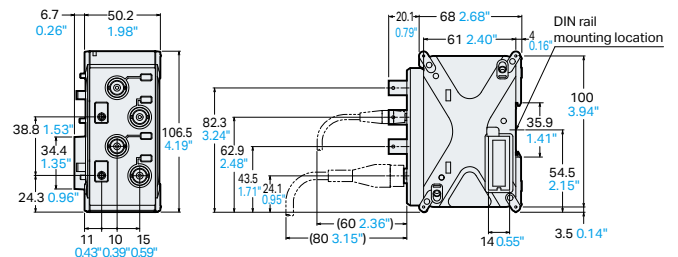High-speed, high-voltage measurement unit
NR-HV04

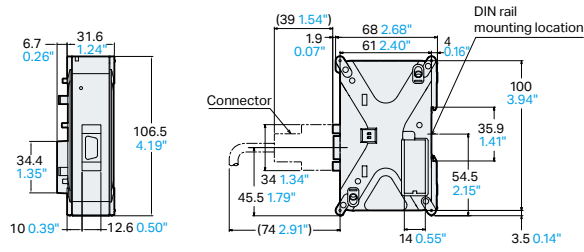Strain measurement unit
NR-ST04
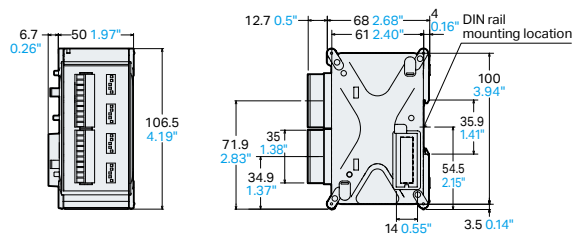
Acceleration measurement unit
NR-CA04

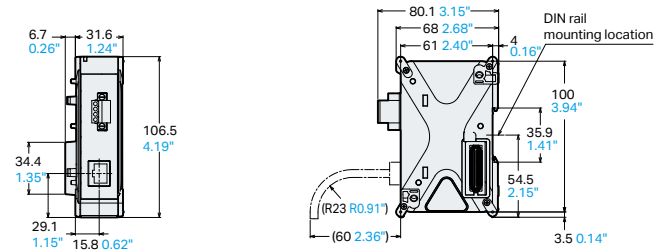Pulse measurement unit
NR-FV04

CAN data collection unit
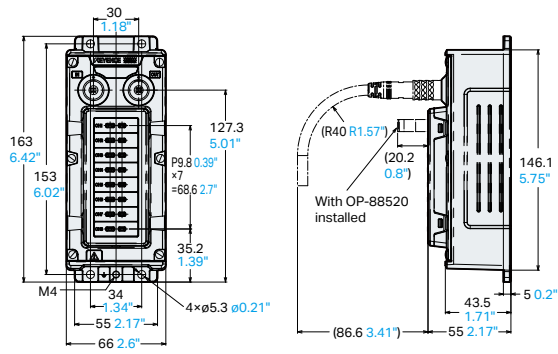**NR-C512**

Connector

6.7 0.26"
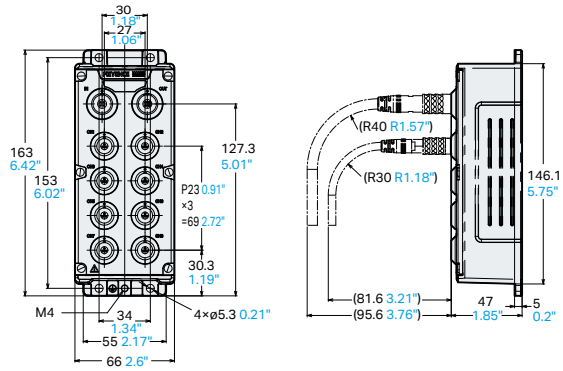31.6 1.24"
106.5 4.19"
34.4 1.35"
10 0.39"
12.6 0.50"

(39 1.54")
1.9 0.07"
68 2.68"
61 2.40"
4 0.16"
100 3.94"
35.9 1.41"
54.5 2.15"
34 1.34"
45.5 1.79"
(74 2.91")
14 0.55"
3.5 0.14"

DIN rail mounting location

Ethernet data collection unit
NR-EN16

6.7 0.26"
31.6 1.24"
106.5 4.19"
34.4 1.35"
29.1 1.15"
15.8 0.62"

80.1 3.15"
68 2.68"
61 2.40"
4 0.16"
100 3.94"
35.9 1.41"
54.5 2.15"
(R23 R0.91")
(60 2.36")
3.5 0.14"

DIN rail mounting location

Environment-resistant temperature measurement unit
NR-XTH08T

30 1.18"
163 6.42"
153 6.02"
127.3 5.01"
P9.8 0.39"
×7
=68.6 2.7"
35.2 1.39"
M4
34 1.34"
55 2.17"
66 2.6"
4×ø5.3 ø0.21"

(R40 R1.57")
(20.2 0.8")
With OP-88520 installed
146.1 5.75"
43.5 1.71"
5 0.2"
55 2.17"
(86.6 3.41")

Environment-resistant analog measurement unit
NR-XHA08T

30 1.18"
27 1.06"
163 6.42"
153 6.02"
127.3 5.01"
P23 0.91"
×3
=69 2.72"
30.3 1.19"
M4
34 1.34"
55 2.17"
66 2.6"
4×ø5.3 0.21"

(R40 R1.57")
(R30 R1.18")
146.1 5.75"
(81.6 3.21")
(95.6 3.76")
47 1.85"
5 0.2"

Connected to **NR-X100W**

19.4 0.76"
83.6 3.29"
31.6 1.24"
50.2 1.98"
50.2 1.98"
50 1.97"
50.2 1.98"
31.6 1.24"
31.6 1.24"
103.6 4.08"
28 1.10"
60 2.36"
106.5 4.19"

NR-XW1　NR-X100W　NR-EN16　NR-FV04　NR-CA04　NR-ST04　NR-HV04　NR-HA08　NR-TH08　NR-XCP30

Connected to **NR-500**

20.5 0.81"
31.6 1.24"
50.2 1.98"
50.2 1.98"
50 1.97"
50.2 1.98"
31.6 1.24"
31.6 1.24"
106.5 4.19"

NR-500　NR-C512　NR-FV04　NR-CA04　NR-ST04　NR-HV04　NR-HA08　NR-TH08

Connected to **NR-XR01**

33.1 1.3"
31.6 1.24"
50.2 1.98"
50.2 1.98"
50 1.97"
50.2 1.98"
31.6 1.24"
31.6 1.24"

NR-XR01　NR-EN16　NR-FV04　NR-CA04　NR-ST04　NR-HV04　NR-HA08　NR-TH08
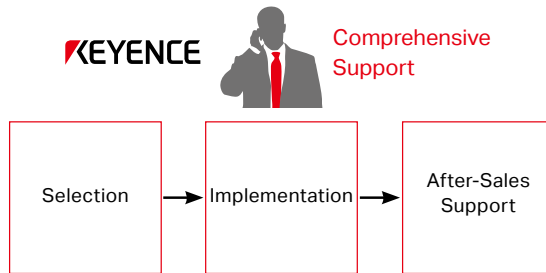
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