New

OMRON

Clean Sensing System

ZN Series

Advanced Clean-Monitoring for the Manufacturing Field

realizing

Is that booth really clean?

Is clean air with a filter enough to maintain a clean environment?

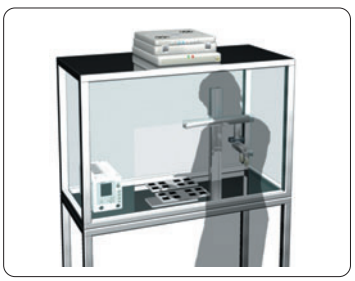
Clean measures are not perfect unless they are tied to quality.

Localized Continuous Clean-Monitoring Systems by OMRON provide many ways to improve quality and enable perfect reporting of production process monitoring.

Applications

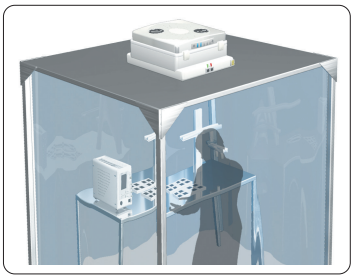
Electronic Component Production Processes
Multi-Clean Control

Cell Production Processes
Direct Clean Control



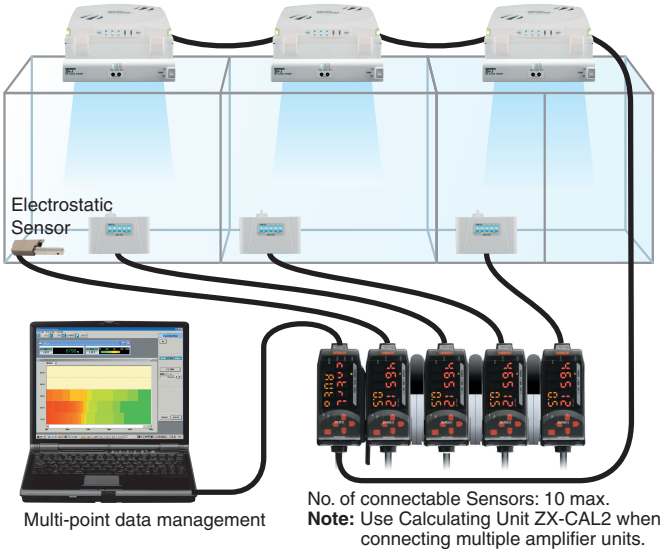
Storage and Test Environments
Storage of Precision and Optical Components

Clean-monitoring of Inspection and Measurement Environments



Total Sensing for Clean Booths

OMRON provides the optimum clean environment with constant monitoring of continuously changing production environments. Sensing and control with up to 9 Air Clean Units. The degree of cleanliness in each production stage can be controlled in relation to quality.

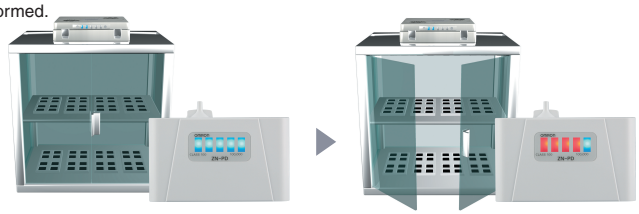


Multi-point data management

No. of connectable Sensors: 10 max.
Note: Use Calculating Unit ZX-CAL2 when connecting multiple amplifier units.

Continuous Sensing of Particles

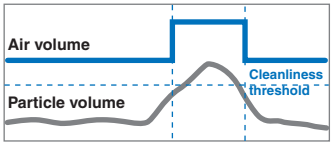
Clean environments change during the production process due to the various work operations performed.



The particle volume inside booths is constantly sensed by an Air Particle Sensor. Optimum clean environments are maintained by controlling air volume based on particle volume — from rapid ventilation to energy-conserving gradational air volume control.

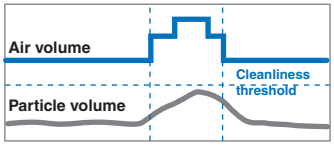
Rapid Feedback

The maximum and minimum air volume and feedback time can be set to any desired values. Once a cleanliness threshold has been exceeded, the level of cleanliness can be increased in a short time by applying the maximum air volume.



Constant Feedback

Constant feedback is provided so that the cleanliness threshold is not exceeded. A constant level of cleanliness is always maintained and energy is conserved.



Ionized Clean Environments

An Ionizer is needed to remove dust attached to particles by static electricity. OMRON provides a new style for discharging and dust removal, with the first Ionizers in the industry that can be combined with Air Clean Units.

Compact but High-Performance Air Clean Unit

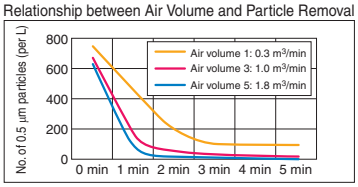
Slimmest in the industry: 97.5 mm

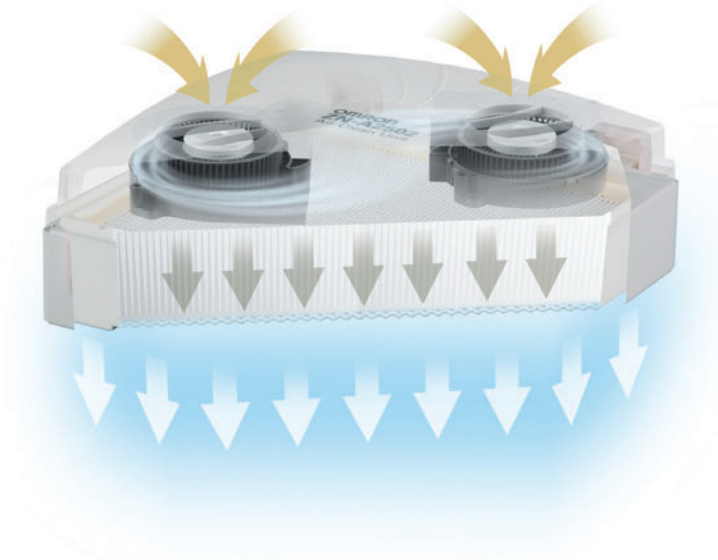
High-Speed Dust Control

Unique Twin-fan Construction

A unique ZNA2502 Twin-Fan construction enables both a slimmer body and a greater air volume. Downsizing is possible with a greater level of capacity than previous models.

Relationship between Air Volume and Particle Removal





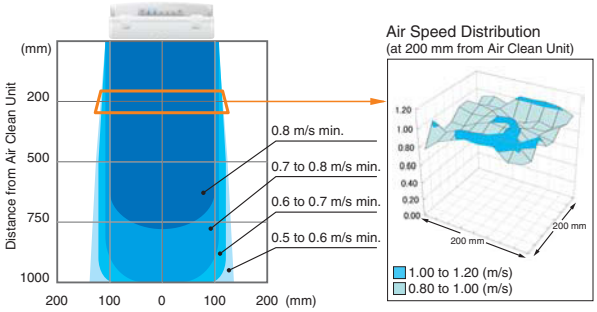
HEPA Filter with High Filtration

The HEPA filter used with the ZN Series has the capacity to filter 99.99% of 0.3 μm particles.

Laminar Airflow Design

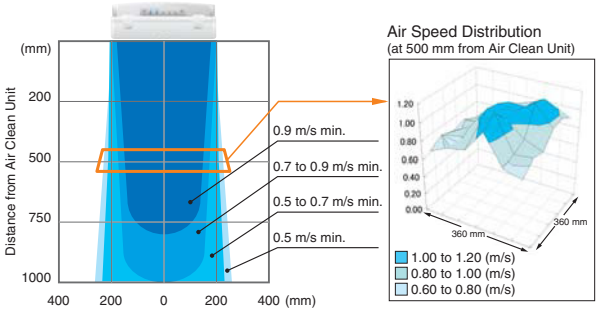
The smaller fan section and the unique ventilation construction design provides a more uniform laminar airflow. Uniform air is provided over a wide area.

■ ZN-A2502



Measurement conditions: Maximum air volume

■ ZN-A4105



Measurement conditions: Maximum air volume

Airflow Switching Function

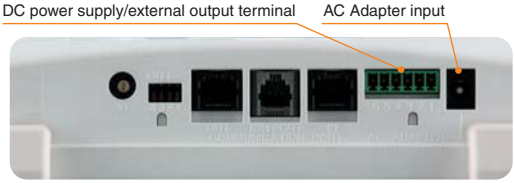
The air volume can be set to 5 different levels, from 0.3 to 1.8 m^3/min for the ZN-A2502 and 1.0 to 5.0 m^3/min for the ZN-A4105. The air volume can be checked with the large indicators in the middle.

Self-diagnosis Function

Two LED indicators indicate operation errors (e.g., stopped fans) and when HEPA filter replacement is required. Located on two corners of the Unit, the LED indicators are visible from many angles.

External I/O

An I/O interface is built in.
An AC adapter or 24-VDC input can be selected for the power supply.
An alarm signal is output if the self-diagnosis function indicates HEPA filter replacement or error operation.



Ultra-Easy Maintenance

HEPA filters can be replaced without tools thanks to the use of buckles. Onsite maintenance time is reduced because filters can be replaced in a one-step operation.

Unique and Easy
Ionizer for Air Clean Unit

Industry First

Patent pending

Ionizer That Can be Combined with Air Clean Units

Previous Model

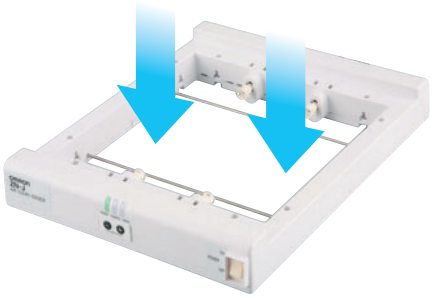
Laminar airflow can be disrupted with bar-type Ionizers, depending on where the Ionizer is installed, and too much installation work is required.

When Using an Air Clean Unit

The Ionizer can be mounted directly to the Air Clean Unit.

Opening Constructed Not to Obstruct Laminar Airflow

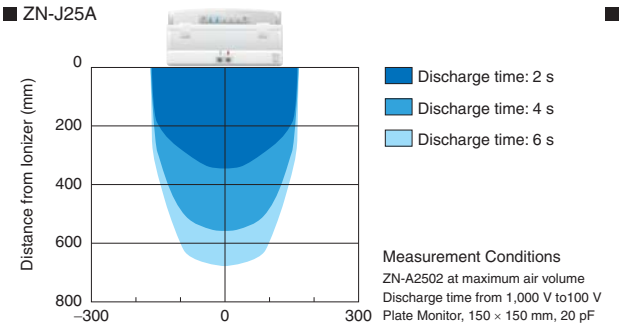
The opening does not obstruct the airflow from the Air Clean Unit eliminating worries about disrupting the laminar airflow.



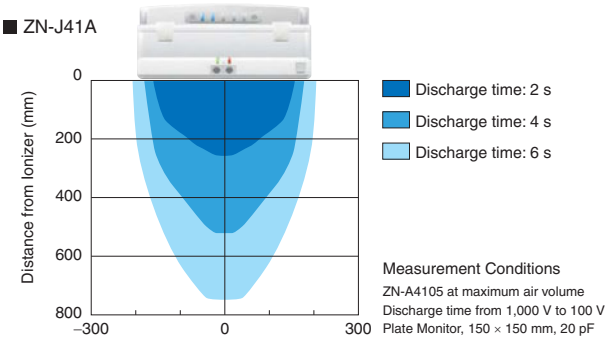
Wide Discharge Area by Adopting Variable DC Ionization Method

Variable DC ionization is used to discharge over a wide area.

■ ZN-J25A

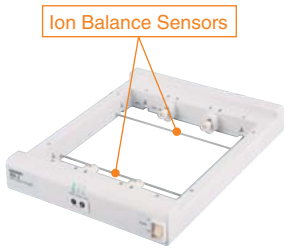


■ ZN-J41A



Automatic Ion Balance

Two Sensors provide constant feedback on the ion balance to maintain uniform discharging.



Self-diagnosis and Display Functions

LED indicators and external outputs provide notification when discharge needles require cleaning or discharge errors occur. Cleaning outputs are made at two levels: warnings and alarms.

Ozone Buildup Prevention

Patent Pending

Discharging is stopped when a signal indicating that the Air Clean Unit fan has stopped is received. This function prevents ozone from remaining due to discharging.

Simple Mounting and Wiring

The Ionizer can be installed easily by inserting it between the Air Clean Unit and the top of the Clean Booth and securing it with screws. Wiring work is greatly reduced by the connectors used for connection to the Air Clean Unit.

Simple Maintenance

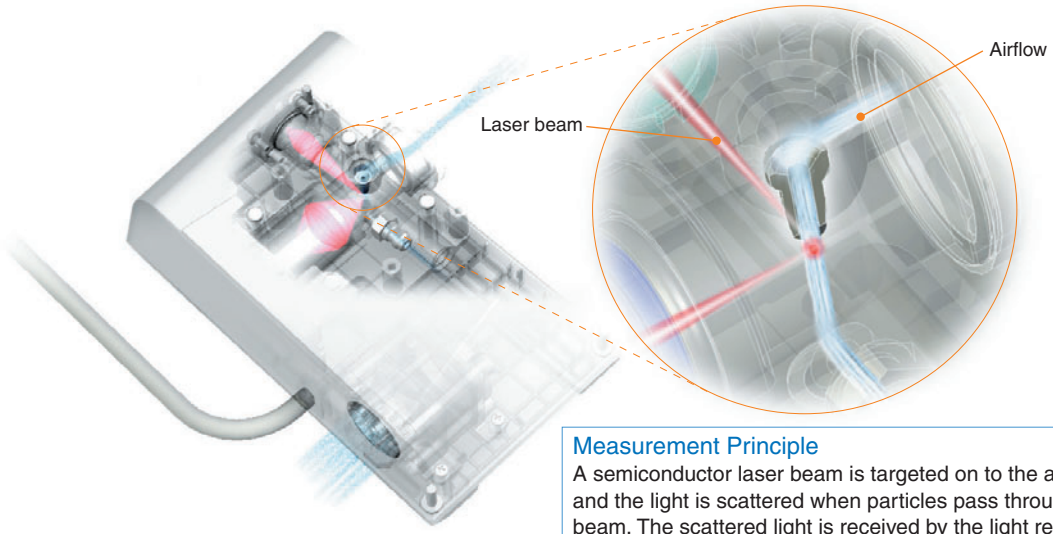
Discharge needles are modular and can be easily replaced.

Small Size, Continuous Measurement In-line Air Particle Sensor

Smallest in the Industry

Air Particle Sensor for In-line Measurement

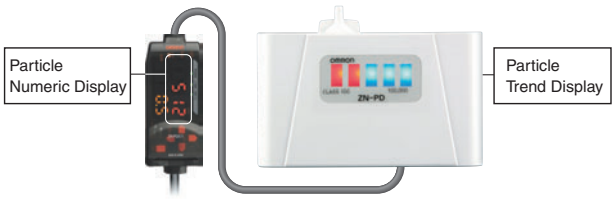
A high-performance fan for external air suction enables constant measuring over long periods. Semiconductor lasers and high-sensitivity optical design in the sensing section enable measurement of 0.3-μm particles.



Measurement Principle
A semiconductor laser beam is targeted on to the air intake and the light is scattered when particles pass through that beam. The scattered light is received by the light receiving element and converted to an electrical signal.

Particle Trend Indicator

The sensing section has a particle trend display for quick visual confirmation of the degree of cleanliness. The Amplifier provides numeric indication of the number of 0.3-, 0.5-, and 1.0-μm particles.
A signal can be output at any level of particles if a threshold has been set.

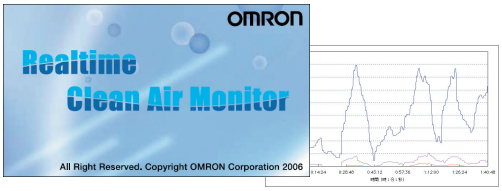


On-screen Indication and Data Logging of Particle Amount

Measurement values can be easily logged on a personal computer by using the Interface Unit and special software (sold separately).
Data from sequential sensing of particles can be used to improve quality.

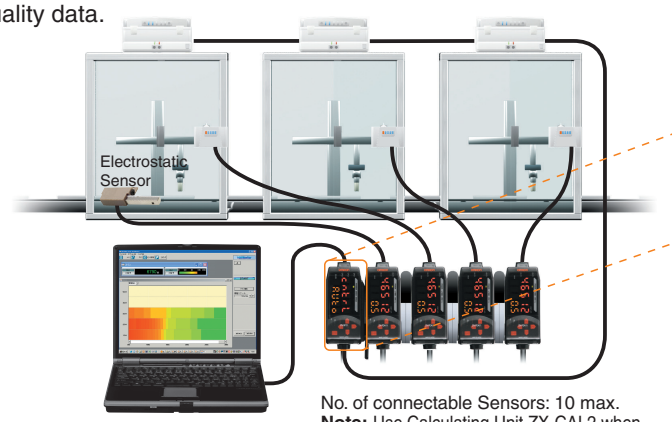
Realtime Clean Air Monitor

A variety of displays (including color graphs for visual confirmation by color of particle densities, indication of the number of particles, and trend graphs) can be set. Particle Sensors and Interface Units can also be set from the personal computer. Measurement data is logged in realtime and can be manipulated in CSV-format files using spreadsheet software.



Quality Control with Multi-point Measurement Patent Pending

Up to ten Particle Sensors and up to nine Air Clean Units can be controlled through one Interface Unit and Real Time Clean Air Monitor. There are no time-consuming restrictions, such as the order that power is turned ON. The level of cleanliness can be controlled for each process and constant monitoring is possible in relation to quality data.



Multi-point data output

No. of connectable Sensors: 10 max.
Note: Use Calculating Unit ZX-CAL2 when connecting multiple amplifier units.

Air Clean Unit air volume settings, operation, and errors can be checked on the Amplifier or Interface Unit.

For In-line Applications

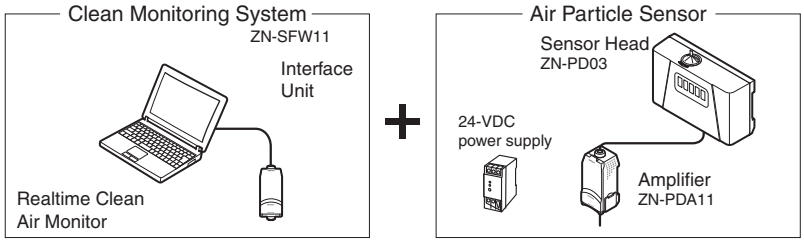
Installation is simple with DIN Track mounting.
The In-line Air Particle Sensor was developed for in-line applications, with a 24-VDC power supply.
External outputs can be at two levels: warnings and alarms.
Suitable for in-line trend management applications.

System Connection Diagram

There are four ways of using the In-line Air Particle Sensor, depending on the application.

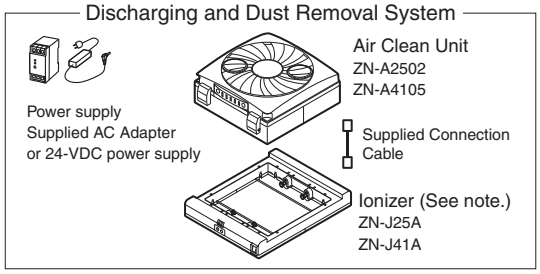
Measurement and Logging of Particle Volumes

• Particle volumes are logged and warnings or alarms are output for set thresholds.



Clean Air Supply and Discharging

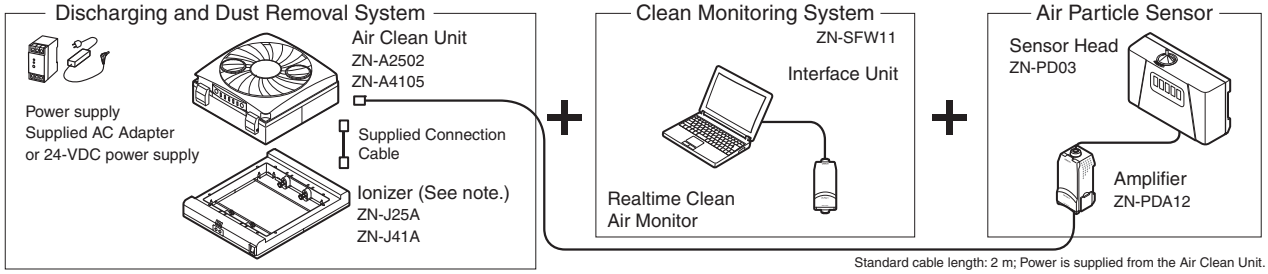
• Discharging can be performed with the downflow from the Air Clean Unit.



Note: When using the Ionizer in combination with an Air Clean Unit, be sure to specify an applicable model (e.g., ZN-J25A).

Direct Clean Sensing Systems

• The air volume of the Air Clean Unit is automatically adjusted while the particle volume is measured and logged.



Note: When using the Ionizer in combination with an Air Clean Unit, be sure to specify an applicable model (e.g., ZN-J25A).

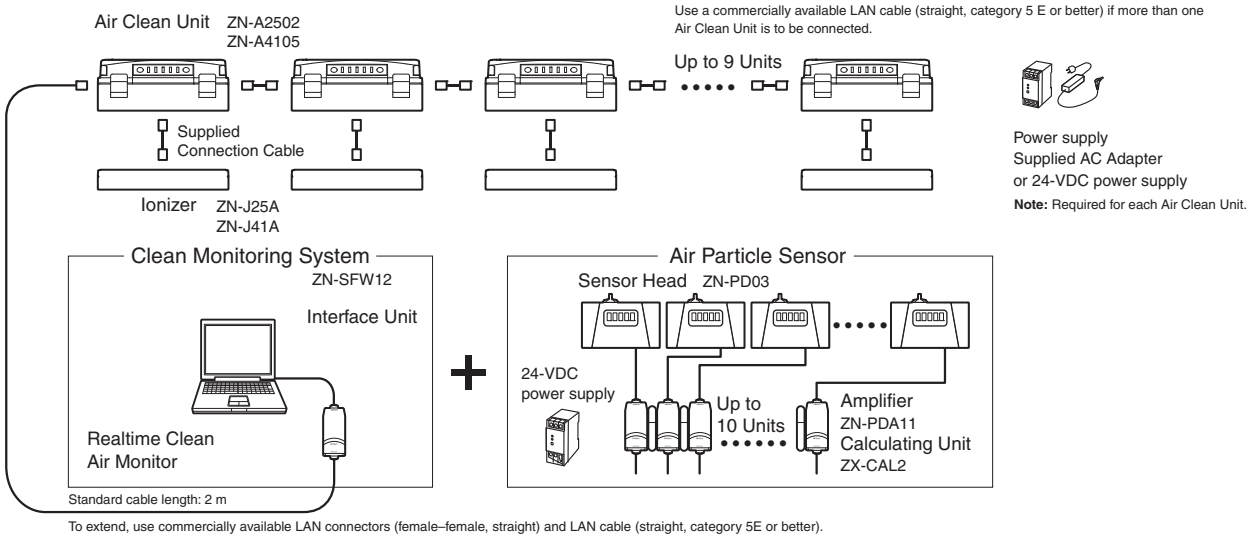
Standard cable length: 2 m; Power is supplied from the Air Clean Unit.

To extend, use commercially available LAN connectors (female–female, straight) and LAN cable (straight, category 5 E or better).

Multi-Clean Sensing Systems

• The air volume of the Air Clean Unit is automatically adjusted while the particle volume is measured and logged.

• The level of cleanliness can be managed and feedback controlled for more than one production process.



Standard cable length: 2 m

To extend, use commercially available LAN connectors (female–female, straight) and LAN cable (straight, category 5E or better).

Ordering Information

Air Clean Units

Air Clean Units

Appearance	Application	Power supply	Model
	250 × 250 mm	24 VDC	ZN-A2502D *
	410 × 410 mm		ZN-A4105D *
			ZN-A6112
	610 × 610 mm		ZN-A6112P *

* Type with filter clogging detection.

Accessories

	Applicable Air Clean Unit	Model	Qty.
Replacement HEPA Filters	For 250 × 250 mm	ZN9-AHP25	1
	For 410 × 410 mm	ZN9-AHP41	1
	For 610 × 610 mm	ZN9-AHP61	1
Replacement Prefilters	For 250 × 250 mm	ZN9-APF25	2
	For 410 × 410 mm	ZN9-APF41	1
	For 610 × 610 mm	ZN9-APF61	1

Ionizers

Ionizers

Appearance	Application	Power supply	Model
	250 × 250 mm	Supplied from Air Clean Unit.	ZN-J25A
	410 × 410 mm		ZN-J41A

Accessories

	Model	Qty.
Replacement Discharge Needles	ZN9-JH04	4 per pack

Single-sided Connector Cables (for DC power supply or I/O connection)

Cable length	Model	Qty.
2 m	ZN9-JC02	1

Air Particle Sensors

Sensor Head

Appearance	Measured particle diameter	Model
	0.3, 0.5, and 1.0 μm	ZN-PD03

Amplifiers

Appearance	Power supply	Connection method	Model
	24 VDC	Cable connection	ZN-PDA11 2M
	Supplied from the Air Clean Unit.	Connector connection (Air Clean Unit feedback connection)	ZN-PDA12 2M

Calculating Unit

Appearance	Model
	ZX-CAL2

Note: Be sure to use when connecting amplifier units.

Clean Monitoring Systems

Appearance	Contents	Connection method	Model
	ZN-SF11 Interface Unit + Realtime Clean Air Monitor	For RS-232C connection with personal computer only	ZN-SFW11
	ZN-SF12 Interface Unit + Realtime Clean Air Monitor	For RS-232C connection with personal computer or Air Clean Unit feedback connection	ZN-SFW12

An Interface Unit is not available by itself.

Double-sided Connector Cable (for extension between Sensor Head and Amplifier)

Cable length	Model	Qty.
1 m	ZX-XC1A	1
4 m	ZX-XC4A	1
8 m	ZX-XC8A	1

	Model	Qty.
Sensor Head Replacement Filter Set	ZN9-PF1	1
Cleaning Filter	ZN9-PC1	1
Head Attachment Tool	ZN9-PB1	1

Specifications

Air Clean Units

Item / Model	ZN-A2502D	ZN-A4105D	ZN-A6112	ZN-A6112P
Air outlet dimensions	225 × 205 mm	360 × 360 mm	578 × 568 mm	
Main filter/Removal rate	HEPA filter/99.99% of particles 0.3 μm and larger			
Air volume	0.3 to 1.8 m^3/min (TYP.)	1 to 5 m^3/min (TYP.)	4 to 12 m^3/min (TYP.)	
Power supply voltage	24V DC ±10%, ripple(p-p) 10% max.			
Current consumption	Airflow level 5: 2.1 A max. (RMS value)/(Peak: 3 A)	Airflow level 5: 3.5 A max. (RMS value)/(Peak: 5.5 A)	Airflow level 5: 24V DC: 4.3 A max. (RMS value)/(Peak: 8 A)	
Airflow levels	5 levels • Settable by button operation • Settable by serial (RS-422 or RS-485 *1) communications		5 levels • Settable by button operation • Settable by serial (RS-422 or RS-485 *1) communications • Settable by ON/OFF signal input (3 levels) *2	
Running noise	Airflow level 3: 53 dB (TYP.)		Airflow level 3: 58 dB (TYP.)	
Fan motor	Compact DC brushless centrifugal blower × 2	DC brushless turbo fan × 1	DC brushless turbo fan × 1	
Indicator lamps	Operating status: Green/Red Air volume: Blue			
Filter clogging detection	Yes		No	Yes
External output	Alarm output 1: Alarm output 1 turns OFF when one of the following events occurs. (Normally alarm output 1 is ON.) (Check indicator to find out which event occurred.) • Filter is clogged. • Fan error • Cleaning alarm for discharge needle (when ZN-J-series Ionizer (sold separately) is connected) • Discharge error (when ZN-J-series Ionizer (sold separately) is connected) Alarm output 2: Enabled only when ZN-J-series Ionizer (sold separately) is connected. • Alarm output 2 turns OFF to indicate that cleaning is necessary for ZN-J Series discharge needles. (Normally alarm output 2 is ON.)		Fan operation alarm output Alarm output OFF in below cases (ON during normal operation) • Fan not rotating (Including when power is OFF or on standby) • Trouble • Clogged filter (ZN-A6112P only)	
	30 VDC, 50 mA max. Residual voltage: 1 V max. with load current of 10 mA, 2 V max. with load current of 50 mA.			
Applicable Ionizer Unit (Optional)	ZN-J25A	ZN-J41A	None	
Ambient temperature range	Operating and storage: 0 to 40°C (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35 to 85% (with no icing or condensation)			
Applicable contamination degree	2			
Material	Top: Antistatic plastic, Bottom: SECC		Top: ABS, HEPA filter frame: Aluminum	
Outer dimensions (mm)	250 (W) × 250 (D) × 97.5 (H)	410 (W) × 410 (D) × 129.5 (H)	714.4 (W) × 654.4 (D) × 174.3 (H) (Height off installation surface: 117.3)	
Weight (Packaged)	Approx. 2 kg (Approx. 3.3 kg)	Approx. 5.2 kg (Approx. 8.6 kg)	Approx. 12.5 kg (Approx. 17 kg)	
Accessories	Instruction Sheet, Sealing parts, Mounting screws, I/O connector (XW4B-06B1-H1)		Instruction Sheet, Sealing parts, Mounting screws, I/O connector (XW4B-10B1-H1)	

*1 Use the dip switches on the unit surface (connector surface) to switch between RS-422 and RS-485.
*2 Contact input: 5 mA max. ON current. Use input device of 30 V or higher withstand voltage.

Ionizers

Item / Model	ZN-J25A	ZN-J41A
Applicable Air Clean Unit	ZN-A2502D	ZN-A4105D
Power supply voltage	24V DC ±10%, Ripple (p-p):10% max.	
Current consumption	300 mA max.	
Discharge voltage	±7 kV max.	
Discharge method	Variable DC discharge	
Static electricity removal time (Typical) *1	5 s max.	
Ion balance (Typical) *2	±30 V max.	
Indicator lamps	Power (green), Cleaning notice (orange flashing), Cleaning alarm (orange), High voltage error (red)	
External output	High voltage error, cleaning outputs: Output from photo MOS relay (30V DC, 300 mA max.)	
Functions	Manual adjustment of ion balance, cleaning required detection, high voltage detection	
Ambient temperature range	Operating and storage: 0 to 40°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 65% (with no condensation)	
Materials	Body: ABS, Needles: Tungsten	
Outer dimensions (mm)	248 (W) × 310 (D) × 45 (H)	408 (W) × 470 (D) × 45 (H)
Weight (Packaged)	Approx. 0.6 kg (Approx. 1.4 kg)	Approx. 1.5 kg (Approx. 2.7 kg)
Accessories	Instruction Sheet, Sealing parts, Mounting screws, Connector cable for Air Clean Unit, English warning label	

*1 Measurement conditions:
Distance: 300 mm
Air Clean Unit: ZN-A Series with airflow level 5 at center of air outlet
Discharging from ±1000 V to ±100 V with a charge plate monitor (150 × 150 mm, 20 pF)
Temperature: 18 to 28˚C, Humidity: 35 to 55%
Performance may not be satisfied if gases such as from solvents are in the measurement area.
*2 Measurement conditions:
Distance: 300 mm
Air Clean Unit: ZN-A Series with airflow level 5 at center of air outlet
Measured for 10 sec by a charge plate monitor (150 × 150 mm, 20 pF)
Temperature: 18 to 28˚C, Humidity: 35 to 55%
Performance may not be satisfied if gases such as from solvents are in the measurement area.

Specifications

Air Particle Sensors

Sensor Head

Item / Model	ZN-PD03
Applicable Amplifier	ZN-PDA11/ZN-PDA12
Measurement method	90° sideways light-scattering method
Light source	Semiconductor laser
Applicable particle size	0.3, 0.5, or 1.0 μm min.
Applicable cleanliness class	Equivalent to Class 100 to 100,000 (FED-STD-209D)
Indicator	Level indicator for Class 100 to 100,000 (FED-STD-209D)
Connection tube	Inner diameter: 4, Length: 1 m max.
Ambient temperature range	Operating: 0 to 40°C, Storage: −15 to 50°C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min
Vibration resistance	10 to 55 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions
Shock resistance	150 m/s² 3 times each in six directions (up/down, left/right, forward/backward)
Connection method	Connector cable (standard cable length: 0.5 m)
Material	ABS
Weight	Approx. 300 g (Packed state: Approx. 450 g)
Accessories	Instruction Sheet, connection tube

Amplifiers

Item / Model	ZN-PDA11	ZN-PDA12
Sampling time	1 to 599 s (selectable)	
Average count setting	1, 2, 4, 8, 16, 32, or 64	
Indicators	Operation indicators: OUT1 (orange), OUT2 (yellow), 7-segment main display (red), 7-segment sub-display (yellow), power (green), wide range display (green), unit selection display (green)	7-segment main display (red), 7-segment sub-display (yellow), power (green), wide range display (green), unit selection display (green)
Status outputs (2 outputs: OUT1/OUT2) (See note.)	NPN open-collector outputs, 30 VDC, 30 mA max., Residual voltage: 1.2 V max.	---
Reset input (See note.)	ON: Short-circuited with 0-V terminal or 1.5 V or less, OFF: Open	---
Functions	Measurement result display, Setting value display, Unit selection, Scaling, Peak hold, Hysteresis setting, Threshold level selection, Wide range display, Key lock, ECO mode, Display reverse, Display digit change, Initialize	Measurement result display, Communications condition display, Unit selection, Scaling, Air Clean Unit automatic control, Air Clean Unit air level change, Threshold level selection, Wide range display, Key lock, ECO mode, Display reverse, Display digit change, Initialize
Communications with Air Clean Unit	---	Unique communications specifications (RJ-45 connector and straight LAN cable)
Power supply voltage	24 VDC ±10%, Ripple (p-p): 10% max.	24 VDC ±10%, Ripple (p-p): 10% max. (Supplied from Air Clean Unit.)
Current consumption	300 mA max.	
Ambient temperature range	Operating: 0 to 40°C , Storage: −15 to 50°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Insulation resistance	20 MΩ min. at 500 VDC	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min	
Vibration resistance	10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions	
Shock resistance	300 m/s² 3 times each in six directions (up/down, left/right, forward/backward)	
Connection method	Cable (standard cable length: 2 m)	Connector cable (standard cable length: 2 m)
Materials	Case: PBT (polybutylene terephthalate), Cover: Polycarbonate	
Weight	Approx. 180 g (Packed state: Approx. 350 g)	
Accessories	Instruction Sheet	

Note: OUT2 and the reset input are switched by using the DIP switch on the bottom of the Amplifier.

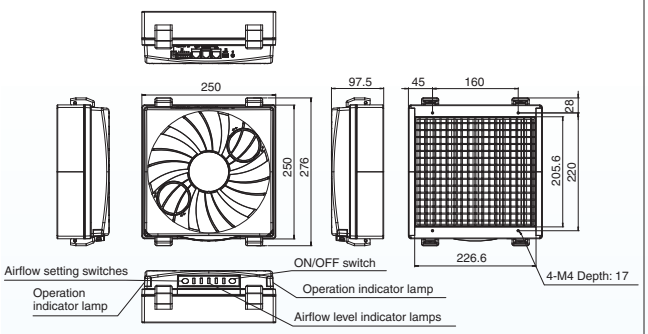
Clean Monitoring Systems

Item / Model		ZN-SFW11	ZN-SFW12
Power supply voltage		Supplied from the ZN-PDA.	
Current consumption		45 mA max. with 24-VDC power supply voltage (excluding current consumption and current output of the Amplifier)	
Applicable Amplifiers		ZX Series, ZJ-SD Series, ZN-PD Series	
Applicable Amplifier Unit software versions		ZX-LDA□□-N V1.000 or higher, ZX-EDA□□ V1.300 or higher, ZX-TDA□□ V1.100 or higher, ZJ-SDA□□ V1.000 or higher, or ZN-PDA□□ V1.000 or higher	
No. of connectable Amplifiers		10 max. (For ZN-PDA)	
Indicator		Power: Green, Sensor communications: Green, Sensor communications error: Red, External terminal communications: Green, External terminal communications error: Red	Power (POWER: Green), Serial communications (STA1: Green) Not clean (OPE1: Orange), Clean (OPE2: Green)
Functions		---	Automatic control for Air Clean Units (multi-unit system control), Air level change for Air Clean Units
Communications	Communications port	RS-232C (9-pin, D-Sub connector)	
	Protocol	CompoWay/F	
	Baud rate	38,400 bps	
	Data configuration	Data bits: 8, Parity: None, Start bits: 1, Stop bits: 1, Flow control: None	
	For external device 2	---	Unique communications specifications (RJ-45 connector and straight LAN cable)
Ambient temperature range		Operating: 0 to 40°C, Storage: −15 to 50°C (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Insulation resistance		20 MΩ min. at 500 VDC	
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min	
Vibration resistance		10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions	
Shock resistance		300 m/s² 3 times each in six directions (up/down, left/right, forward/backward)	
Connection method		---	Connector cable (standard cable length: 2 m)
Materials		Case: PBT (polybutylene terephthalate), Cover: Polycarbonate	
Weight		Approx. 100 g (Packed state: Approx. 480 g)	Approx. 200 g (Packed state: Approx. 550 g)
Accessories		Instruction Sheet, Two clamps	

Dimensions

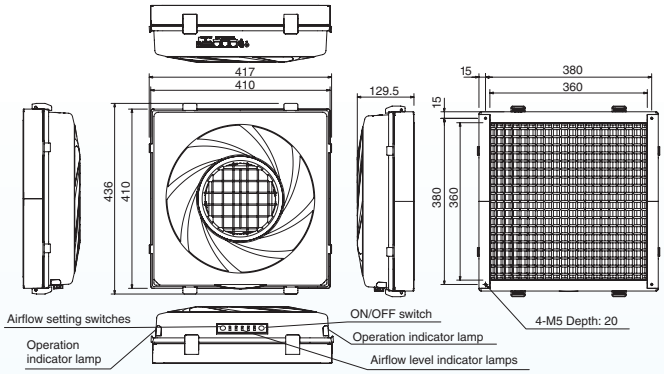
Air Clean Units

ZN-A2502D

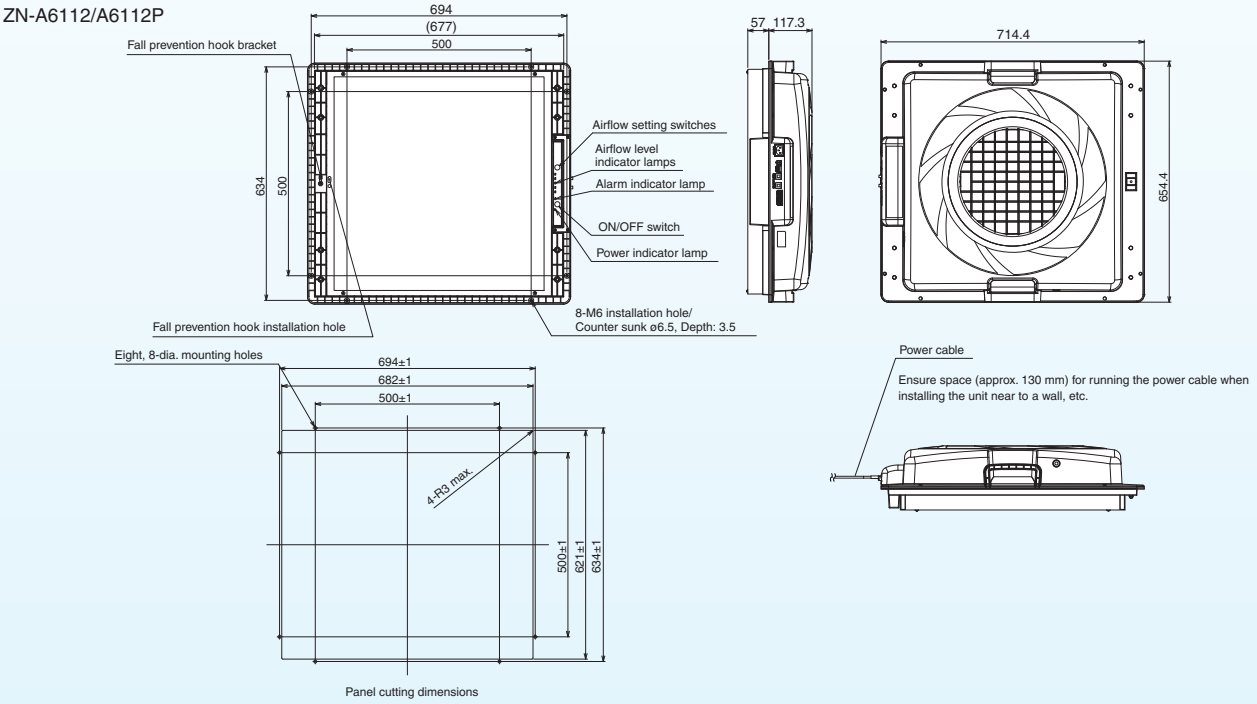


ZN-A4105D

(Unit: mm)

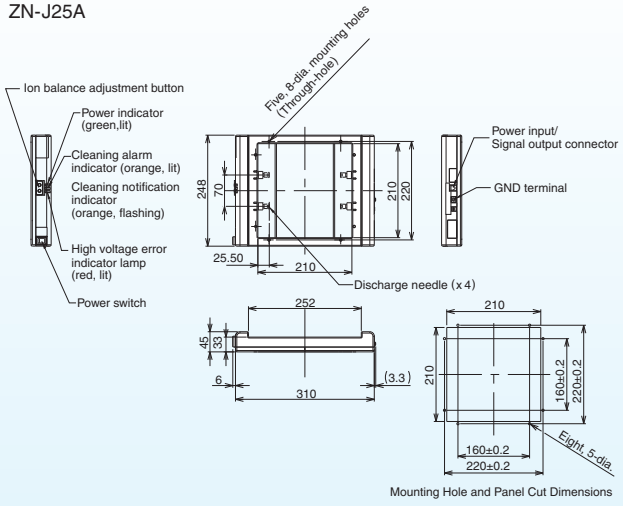


ZN-A6112/A6112P



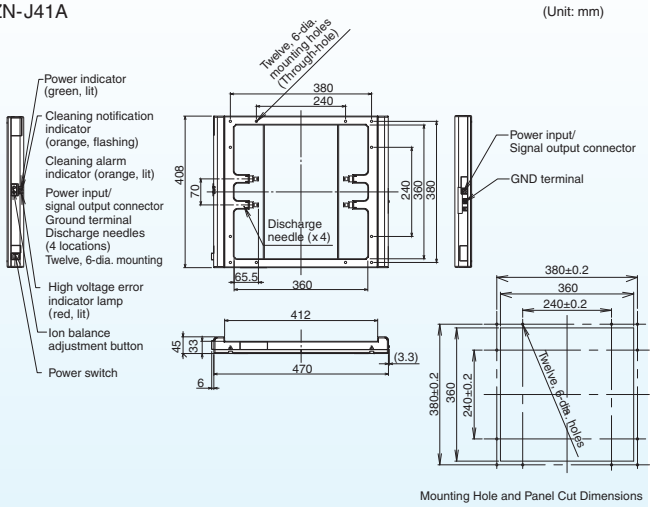
Ionizer Unit

ZN-J25A



ZN-J41A

(Unit: mm)

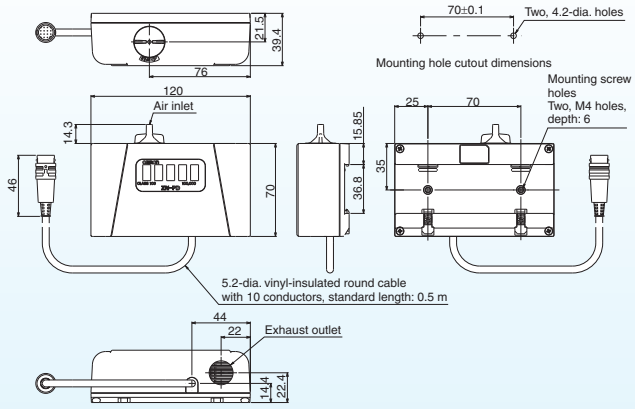


Dimensions

Air Particle Sensors

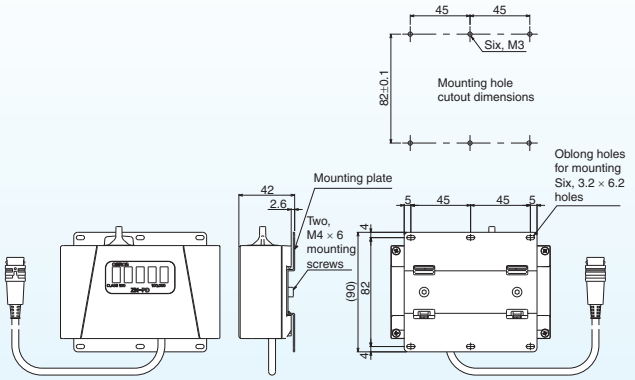
ZN-PD03

(Unit: mm)



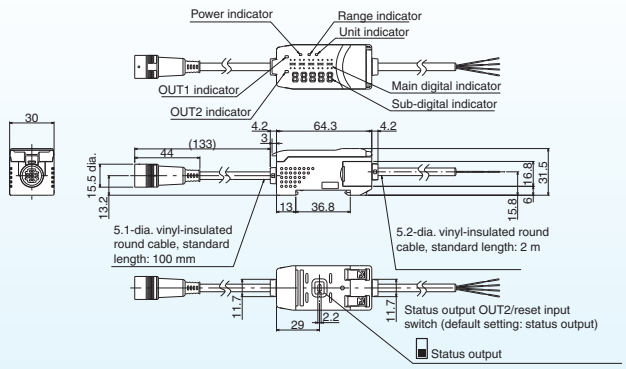
Sensor Head Mounting Tool
When ZN9-PB1 is used (sold separately)

(Unit: mm)



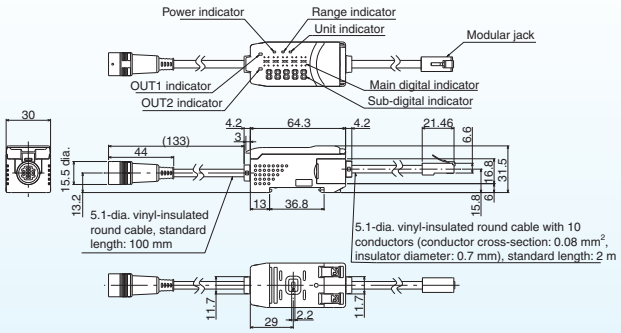
ZN-PDA11

(Unit: mm)



ZN-PDA12

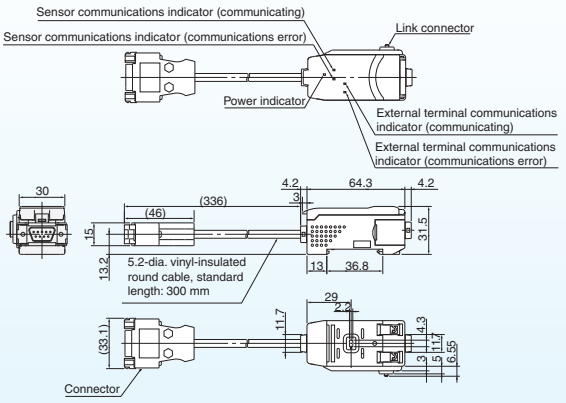
(Unit: mm)



Interface Unit

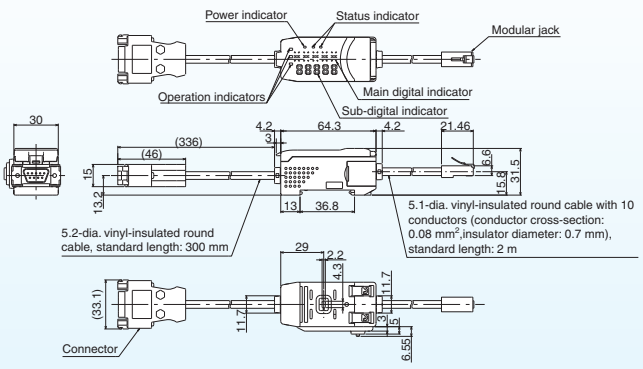
ZN-SF11

(Unit: mm)



ZN-SF12

(Unit: mm)



This document provides information mainly for selecting suitable models. Please read the document System Manual (Z267) carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

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CSM_1_9
Cat. No. E383-E1-03
Printed in Japan

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