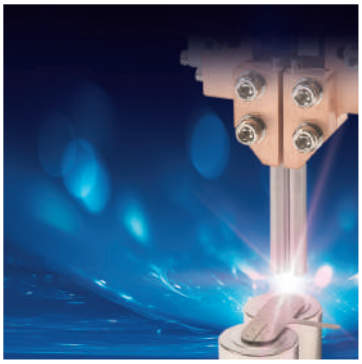
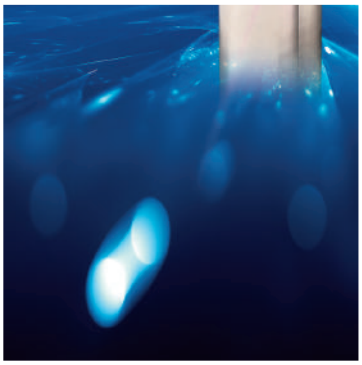
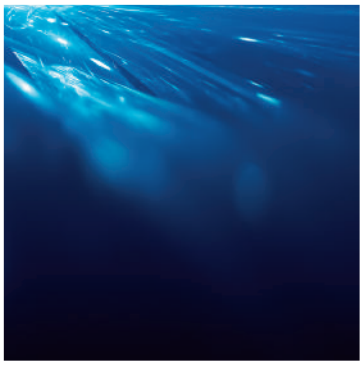
PRODUCT CATALOG



Micro Resistance Welder Series

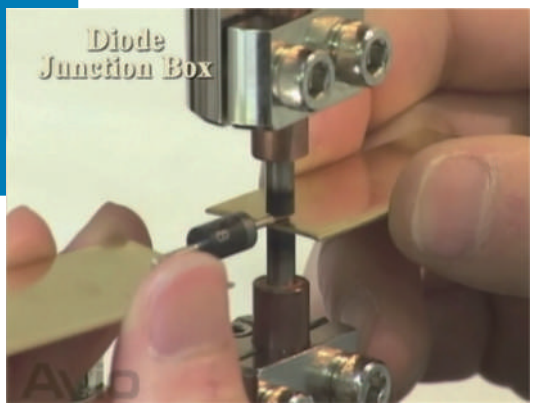


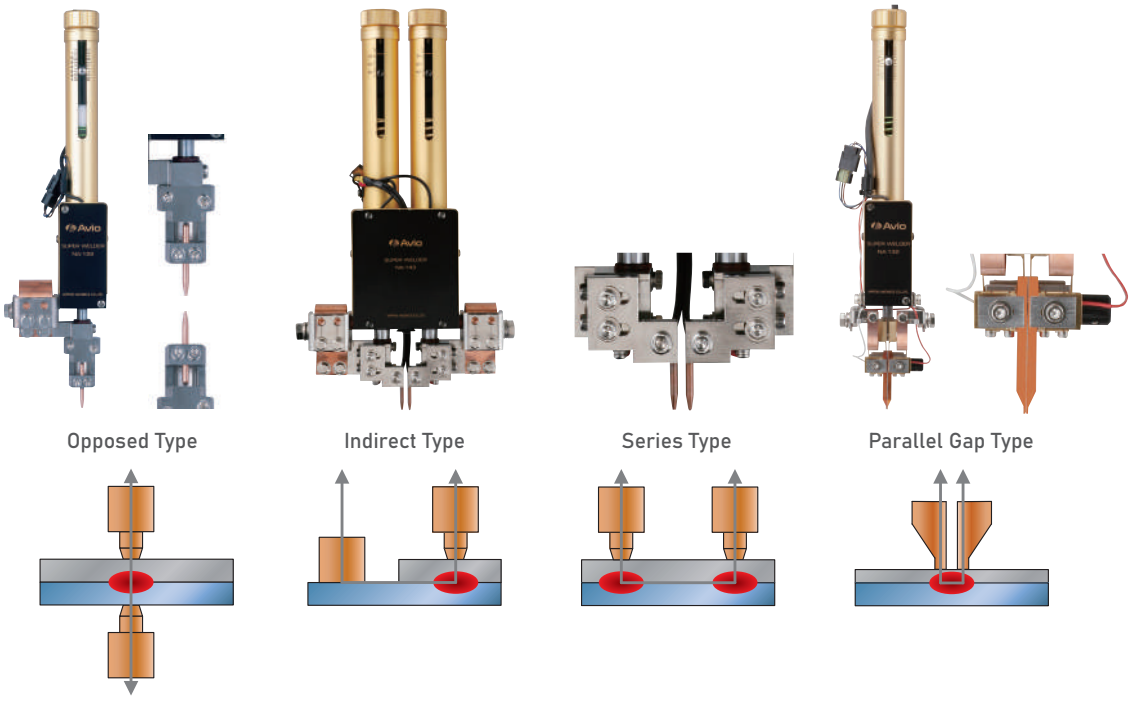


NIPPON AVIONICS CO.,LTD.

What is resistance welding?

It is a joining method in which an object to be welded (work pieces) are sandwiched between electrodes, pressed appropriately, and melted and welded by the "resistive heat" generated while electric current is passing through.
As the total cost is low and the welding time is short compared to other joining methods, it is widely used in various applications.





Welding head & welding electrode

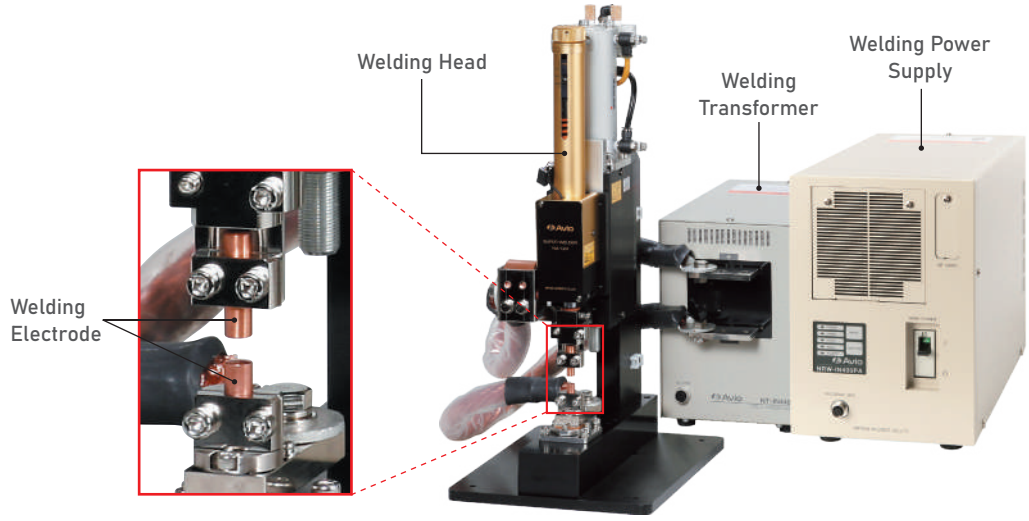
How to contact electrodes (how to apply welding current) is determined according to the shape and structure of the welding object. In addition, the shape and material of the electrodes and the value of pressure force are also important factors for the resistance welding.

Basic configuration of resistance welder and role of each part

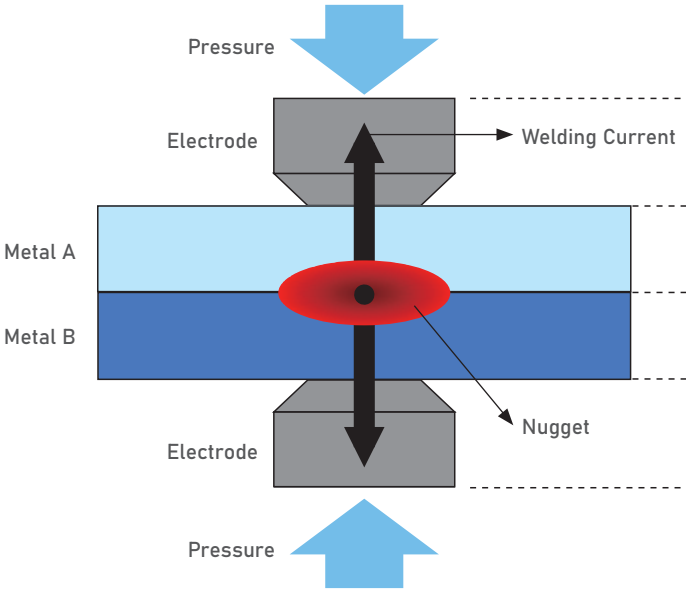
Resistance welder sandwiches an object to be welded by the welding electrodes, and applies electric current while applying a pressure.

- Welding Power Supply controls the amount, time, and waveform of the electric current.
- Welding Transformer converts the current from the power supply into a larger current.
- Welding Head controls the pressure to be applied.
- Welding Electrode contacts the object to be welded to apply pressure and electric current.

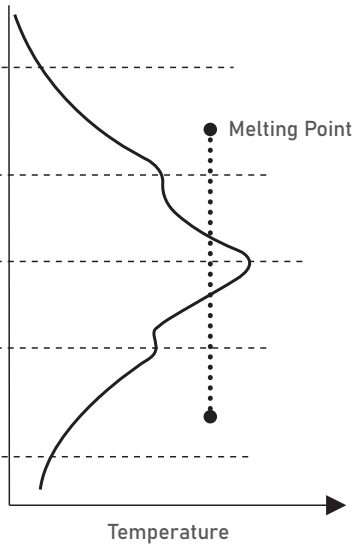
* In addition, various monitors that measure electric current and applied pressure and etc., are available.



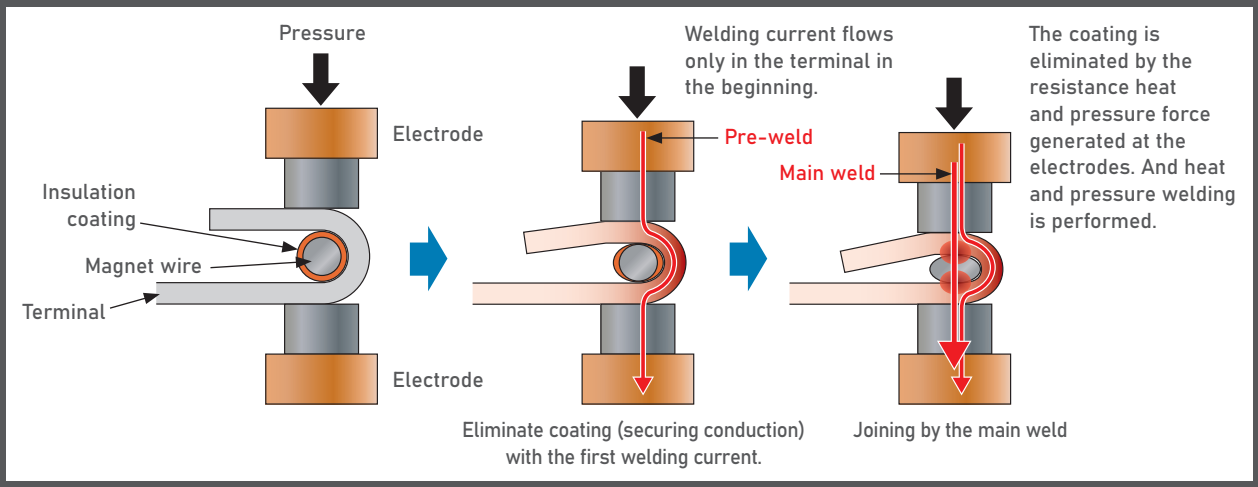
Resistance Welding Model



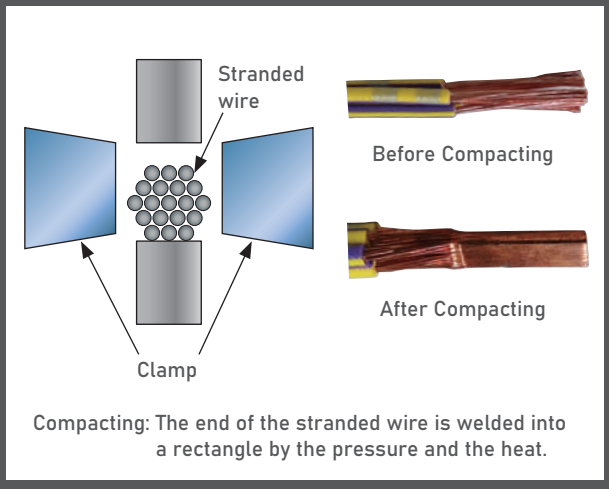
Temperature Distribution at the Welding



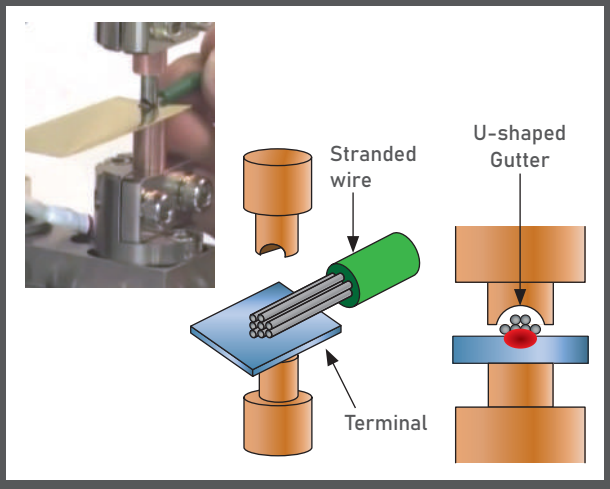
Applications



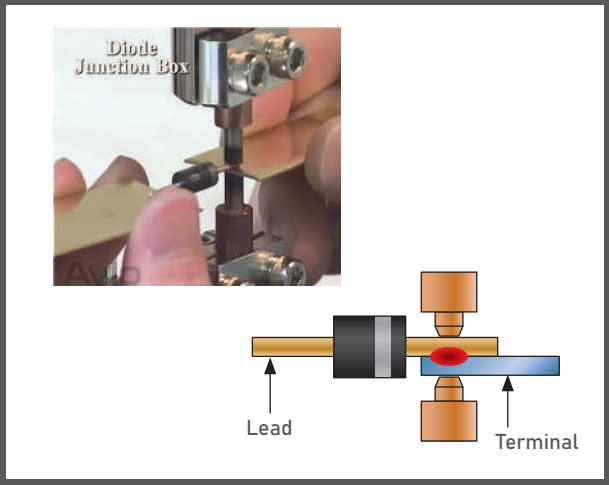
Insulation Wire + U-shaped terminal (Fusing)



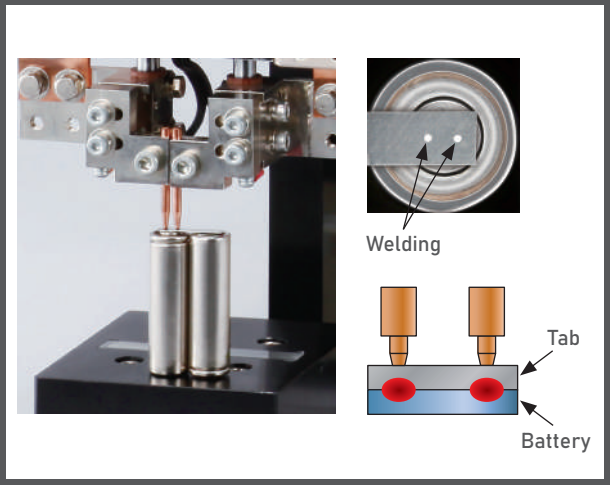
Stranded wire (Compacting)



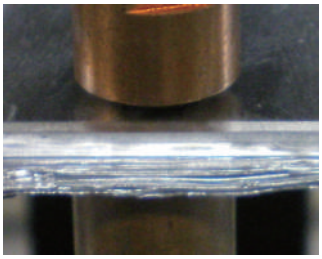
Stranded wire + Terminal Plate

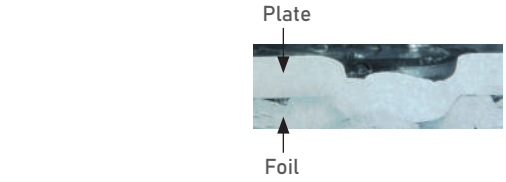


Lead of Electric Part + Terminal Plate

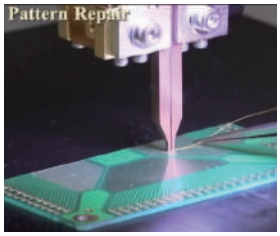


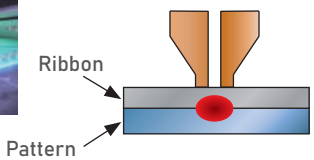
Battery Pack (Rechargeable Battery + Tab)



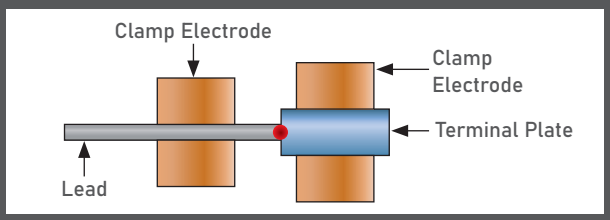


Laminated Foil + Plate (Cu, SUS)

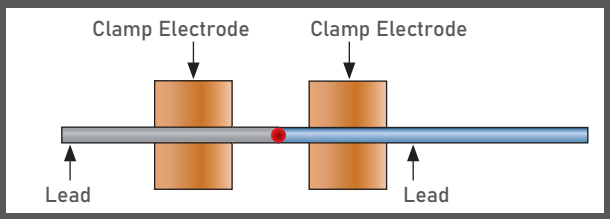




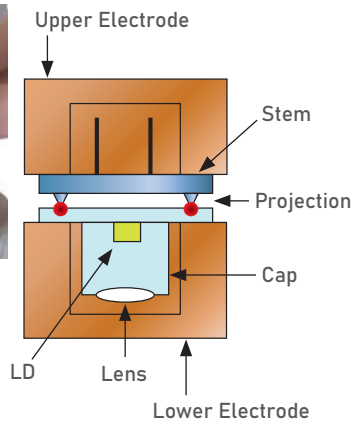
Pattern Repair



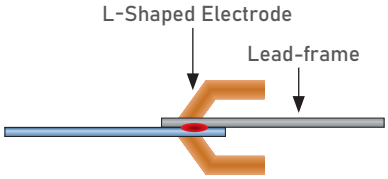
Lead +Terminal Plate



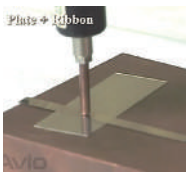
Lead + Lead



Can Seal Welding



Lead-frame + Lead-frame



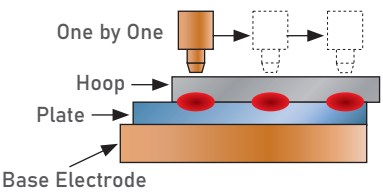
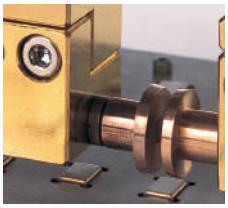
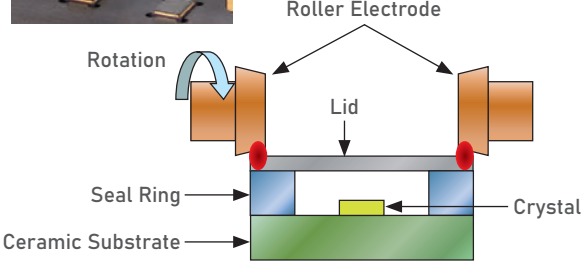


Plate + Hoop Material





Seam Welding: Parallel

Highly reliable inverter type welding power supply

NRW-IN400PA

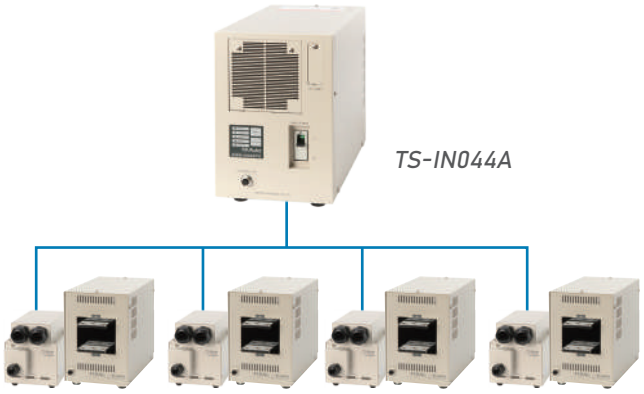
DC inverter welding power supply ideal for mounting on automated machines

DC inverter welding power supply suitable for mounting on automated machines. It has selections of 6 types of control modes and 3 types of frequencies by which high quality welding is performed by the optimum mode depending on objects to be welded. In addition, it has a built-in welding monitor function, and can output monitor values and judgment results to external devices via Ethernet communication. It is effective for strengthening welding quality control.

- **3 types of frequencies (2kHz, 4kHz, 5kHz) can be selected.**
  The optimum frequency for the work can be selected for each program number.
- **Multi control mode**
  Constant current, constant voltage, constant power, primary peak value, primary current average, fixed pulse width.
- **Arbitrary waveform (freestyle) function**
  "UP", "WELD", "DOWN" and "COOL" can be set arbitrarily in a maximum of 127 steps.
  It supports various welding waveforms such as multi-stage slope welding and arbitrary waveform pulsation.
- **Welding condition compensation function (target value compensation function)**
  It is fine-tuning of the welding waveform target value with the IO signal. Adjustment is made in a short time (10 ms or less) because the welding condition (Program_No.) is not changed.
- **Built-in welding monitor function**
  The average and peak values of current, voltage, power, and resistance, and the limit monitor judgment result are displayed.
- **Variation of power stop signal within 1ms**
  High-speed processing from the welding stop command reduces the error in the displacement of the work
- **Reinforced dustproof structure**
  Designed to be hard to break under the harsh environments (dust, oil mist)
- **Others**
  Multi-transformer, Ethernet communication

Multi-transformer system

Up to 4 transformers can be connected to one welding power supply, and multiple welding processes can be handled by one unit. Equipment installation costs can be reduced. Also, by switching the welding conditions with an external signal, it is possible to operate under different welding conditions for each transformer.



TS-IN044A

Item	TS-IN044A
Dimensions (mm)	W148 × D261 × H180
Weight	≒4.3kg

Program box NA-PB100

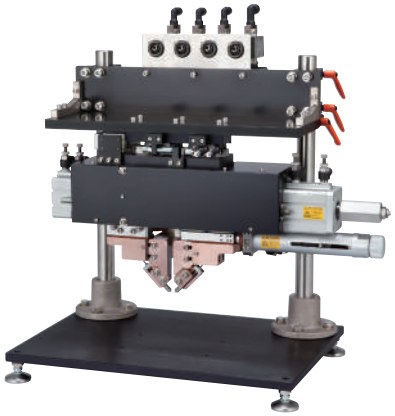
Program box allows remote operation

It is possible to operate multiple inverter power supplies with one unit.
When installed in an automated machine, it gives flexible layout of welding power supply.

Item	NRW-IN400PA
Control Frequency	Selectable from 2kHz, 4kHz, 5kHz (Select for each PRG No)
Control Mode	Primary curent peak value control, Primary curent average value control, Secondery current effective value control, Secondery voltage effective value control, Secondary power effective value control, Fixed pulse width control
Range of Output Setting	400A (Duty Cicle 5%), 200A (Duty Cycle 20%)
Range of Timer Setting (ms)	0.0-3000.0 (Total time of UP TIME, WELD TIME, DOWN TIME, COOL TIME)
Number of Conditions	255
User Interface (Setting Tool)	Program box
Monitoring Function	Avarage value/peak value monotor, pulse width monitor of current, voltage, power, resistance respectively
Multi-stage Welding Fnction	3-phase mode (slope, weld, cool)/ free style mode (Max. 127 step)
Cooling Method	Air
Interface	Ethernet
Power Source	220V specification: 3ϕ AC200-240V±10% 50/60Hz, 400V specification: 3ϕ AC380-480V±10% 50/60Hz
Dimensions (mm)	W200 × D501 × H298 (Excluding protrusions)
Weight	≒19kg
Welding transformer	NT-IN8444B, NT-IN4474A

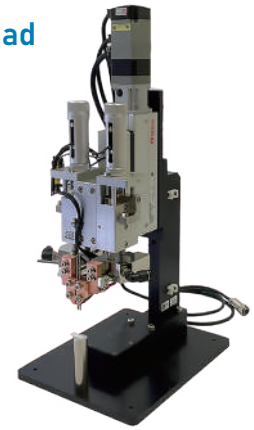
Horizontal pressure type head NA-184

Stable welding is realized by a high-rigidity head in which the left and right electrodes are driven independently.



Battery tab welding head (custom-made)

Variety of weld heads can be created that fit to various battery tabs.



Major transformers to be connected

Item	NT-IN4474A		NT-IN8444B	
Power Source	220V specification	400V specification	220V specification	400V specification
Meximum Welding Current	4000A (Duty cycle 5%)		8000A (Duty cycle 5%)	
Rated Capacity (Duty Cycle 50%)	11 kVA	10 kVA	36 kVA	33 kVA
Primary Input Voltage	300V	600V	300V	600V
Secondary Open-circuit Voltage	8.4V	7.6V	14.1V	12.9V
Transformer Turns Ratio	37: 1	74: 1	22: 1	44: 1
Input Frequency	2kHz/4kHz/5kHz		2kHz/4kHz/5kHz	
Cooling Method	Air		Air	
Dimensions (mm)	W150 × D337 × H222 (Excluding protrusions)		W200 × D370 × H214 (Excluding protrusions)	
Weight	≒14kg		≒23.4kg	

High performance welding monitor

QC-450

"Visualize" the welding process and improve joining quality

- **Simultaneous measurement and judgment of up to 10 items**
  Current (RMS / PEAK), voltage (RMS / PEAK), weld time, displacement, pressure, conduction angle, external analog x 2
- **2 analog inputs**
  Analog signal input such as temperature sensor can be utilized
- **2 divisional measurement**
  2-stage welding is also measured and judged respectively
- **Maximum sampling frequency 50kHz**
  Weld time resolution 0.02ms. It also supports transistor type welding power supply
- **Process control output function**
  Hi, Lo setting and alarm output can be performed for up to 6 types of sensor input signals.
- **Displacement and pressure can be measured at the same time. Signal output is available based on set threshold.**
- **Ethernet communication function is equipped as standard**

Item		QC-450
Current	Measuring Range	Troidal coil x1 (COIL13):0.50-20.00kA/1.00-100.00kA Troidal coil x10 (COIL12):0.050-2.000kA Current sensor 10kA: 0.10-10.00kA, Current sensor 20kA: 0.50-20.00kA
	Measuring Item	Effective value / Peak value
Voltage	Measuring Range	0.01-10.00/0.20-20.00V
	Measuring Item	Effective value / Peak value
Displacement	Measuring Range	0.1-3000μm, 0.5-15000μm, 1-30000μm, 10-300000μm *Maximum measurement range varies by the resolution
	Measuring Item	Before welding, after welding
Pressure	Measuring Range	0.00-10.00N (TJ/TJS-1A), 0.0-196.1N (TJ/TJS-20A/R), 0.0-980.7N (TJ/TJS-100A/R), 0-4903N (TJ/TJS-500A/R), 0-9806N (TJ/TJS-1000A)
	Measuring Item	Before welding, after welding
External Analog Input		±10V (Dual system: Scaling, unit setting available)
Range of Measuring Time		0.00-3000.00ms, 0.0-150.0CYC
Weld Angle		0-180°
Pulse Width		0.00-100.00%
Other Monitoring Items		Power: 00.00-999.9kW, Resistance: 00.00-999.9mΩ
Display, Operation		5.7 color LCD touch panel
Number of Conditions		255
Counter		0-9999999 (Dual system: Up count setting, Notice setting)
Interface	I/O	Applicable to DC24V　NPN, PNP, external power source Judgement output: 10 system, process control output: 6 systems
	Analog Output	Current, voltage, displacement, pressure, analog input 1, analog input 2
	Communication	Ehternet
	Memory Card	CF card
Power Source		1φ AC100-240V±10%　50/60Hz
Dimensions (mm)		W170×D338×H265 (Excluding protrusions)
Weight		≒5.6kg

■ Option

Toroidal coil (x1)

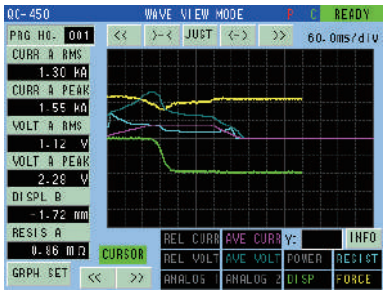
Toroidal coil (x10)

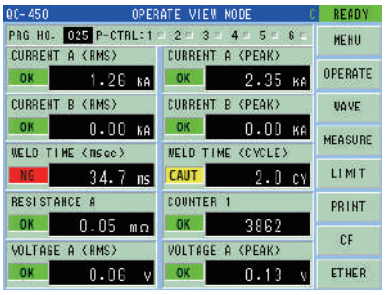
Versatile monitor functions

Visualization of welding process

● WAVE VIEW Mode

Measurement results (waveforms) of up to 10 items such as current, voltage, power, resistance, displacement, and pressurization are displayed.



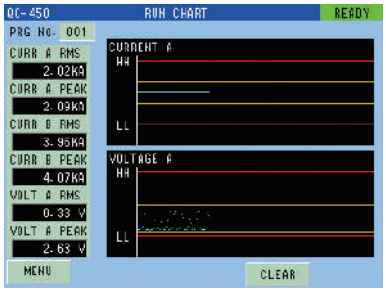


● OPERATE VIEW Mode

Measurement results (numerical values) of up to 10 items such as measured values, judgment results, and calculated values are displayed.

● RUN CHART Mode

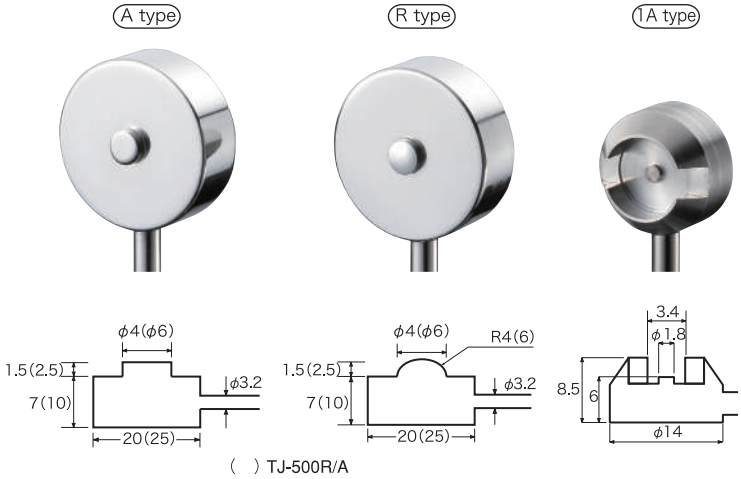
2 items from the measurement data are selected and displayed 200 RBI continuous graphs (dots).



● HISTORY Mode

History is displayed up to the latest 100.

Sensor tip shape



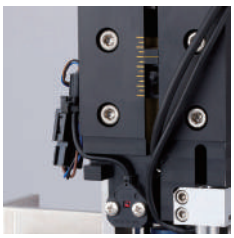
( ) TJ-500R/A

Pressure sensor

TJ series

■ Pressure sensor for incorporation into the system head

Example of integration



NA-125, NA-126

NA-12X series,
NA-13X series,
NA-14X series

Item	TJS-1R	TJS-20R	TJS-100R	TJS-100A-NA124	TJS-500A-NA126
Measuring Range	0 - 10N	0 - 196N	0 - 980N	0 - 980N	0 - 4900N
Critical Load	20N	294N	1470N	1470N	7350N
Accuracy	±3% (Range full scale)				
Applicable System Head	NA-121, 122, 123, 124, 131, 132, 141, 142			NA-124, NA-125, NA-143	NA-126

* A separate pusher is required to install in the system head.

System head opposed type

NA-12X series

Stable pressurizing by the small and high performance head is suitable for micro joining

NA-121

NA-122

NA-124

NA-125

NA-126

Item	NA-121	NA-122	NA-123	NA-124	NA-125	NA-126
Pressure Range	0.7 - 5N	5 - 65N	20 - 150N	40 - 300N	100 - 600N (0.4MPa)	300 - 1800N (0.4MPa)
Pressure Method	Spring	Spring	Spring	Spring	Spring	Spring
Configration	System head only	System head only	System head only	System head only	Welding head set (Including air drive, base, upper and lower electrode)	Welding head set (Including air drive and base. Electrodes are not included)
Drive Method	—	—	—	—	Air Supply air pressure: 0.4MPa (Max. 0.6MPa)	
Applicable Drive Unit (Separately Sold)	Electric slider: NA-201PB-B Air: NA-221 Foot pedal: NA-231			Electric slider: NA-202PB-B Air: NA-222	—	—
Diameter of Electrode	ϕ1.6mm	ϕ3.2mm	ϕ6.4mm	ϕ8.0mm	Dedicated electrode (EH-F-02)	Dedicated electrode (EH-200)
Dimensions (mm)	W74 × D48 × H285	W82 × D50 × H301	W82 × D50 × H301	W98 × D57 × H326	W213 × D204 × H795	W309 × D315 × H908
Weight	≒0.6kg	≒0.8kg	≒0.8kg	≒1.5kg	≒21.5kg	≒60kg

System head parallel gap type

NA-13X series

Item	NA-131	NA-132
Pressure Range	0.7 - 5N	5 - 65N
Pressure Method	Spring	Spring
Configration	System head only	System head only
Applicable Drive Unit (Separately Sold)	Electric slider: NA-201PB-B Air: NA-221 Foot pedal: NA-231	
Diameter of Electrode	□3.2mm	□3.2mm
Dimensions (mm)	W76 x D51 x H299	W76 x D51 x H299
Weight	≒0.7kg	≒0.7kg

NA-131

NA-132

System head series type

NA-14X series

NA-142

NA-143

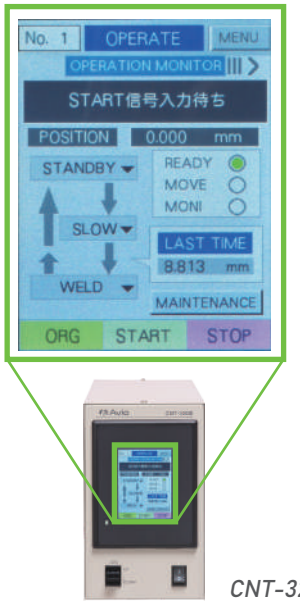
Item	NA-141	NA-142	NA-143
Pressure Range	0.5 - 5N	5 - 65N	40 - 150N
Pressure Method	Spring	Spring	Spring
Configration	System head only	System head only	System head only
Applicable Drive Unit (Separately Sold)	Electric slider: NA-201PB-B Air: NA-221 Foot pedal: NA-231 *It requires twice the thrust of the maximum pressure range of one side		Electric slider: NA-202PB-B Air: NA-222 *One side 150N, Total 300N thrust is required.
Diameter of Electrode	ϕ3.2mm	ϕ3.2mm	ϕ3.2mm
Dimensions (mm)	W136 × D50 × H268	W153 × D50 × H268	W175 × D62 × H302
Weight	≒1.3kg	≒1.6kg	≒2.7kg

Drive unit

Electric slider & controller

CNT-320B & NA-201PB-B, NA-202PB-B

Touch panel display



CNT-320B

NA-201PB-B

- 1µm motor drive resolution supports precision welding
- In order to reduce impact on the work, it is available to switch to low-speed motion during the descent.
- Auto teaching function is equipped to set each registration position semi-automatically.
- Color touch panel and lever type jog switch provide intuitive operation.
- Simplified work presence / absence judgment is available by the position of contacting the work and detecting the pressure (pre-welding judgement function).
- 7 operating conditions can be saved

Item	CNT-320B & NA-201PB-B	CNT-320B & NA-202PB-B
Drive Method	Electric slider	
Thrust	Max. 150N	Max. 300N
Stroke	Max. 50mm	
Resolution of motion	1µm	
Range of Setting Speed	0.1mm/s - 100mm/s	
Power Source	CNT-320B: DC24V ±5%　4A (Option: AC adapter AC100 - 240V)	
Dimensions (mm)	CNT-320B: W120 × D316 × H207	
	NA-201PB-B: W58 × D83 × H312	NA-202PB-B: W74 × D104 × H369
Weight	CNT-320B: ≒3.7kg	
	NA-201PB-B: ≒ 2.0kg	NA-202PB-B: ≒ 4.5kg

Air drive

NA-221, NA-222

Item	NA-221	NA-222
Drive Method	Air	
Thrust	Max. 150N (0.4MPa)	Max. 300N (0.4MPa)
Stroke	Max. 50mm	
Speed Control	With speed controller (Tube ϕ4mm)	With speed controller (Tube ϕ6mm)
Air Pressure	0.4MPa (Max. 0.6MPa)	
Dimensions (mm)	W78 × D83 × H280	W86 × D85 × H289
Weight	≒1.3kg	≒2.2kg

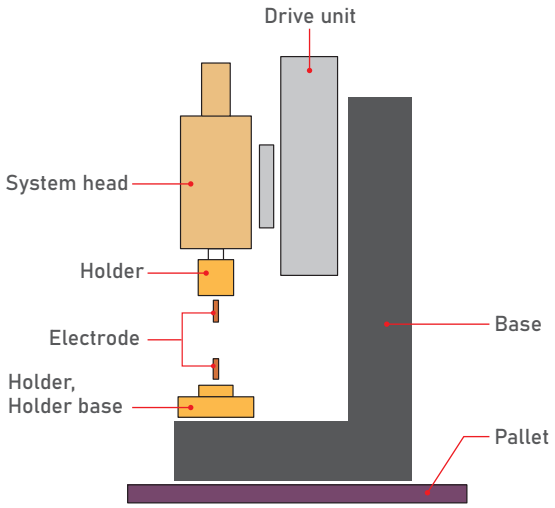
Manual drive

NA-231

Item	NA-231
Drive Method	Foot pedal
Thrust	Max. 150N
Stroke	Max. 10mm　+Height control range 40mm
Dimensions (mm)	Drive unit: W51 × D79 × H192 Foot pedal: W124 × D268 × H125
Weight	Drive unit: ≒1.0kg Foot pedal: ≒2.2kg

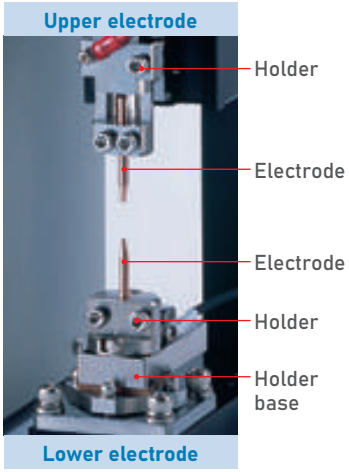
Accessory
System head accessory

■ System head basic configuration

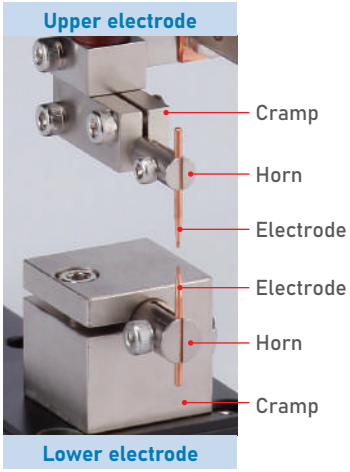


■ Electrode part configuration (Name of each part)

Straight type



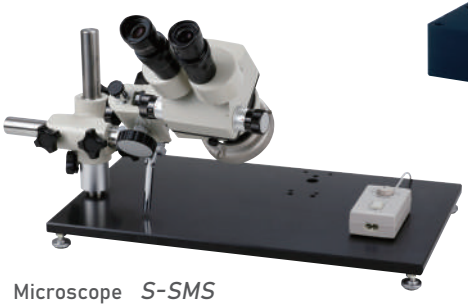
Shift type



Base, Palette, and Microscope set

Palette
S-MP,
S302-MP

Base
NA-301, 302P



Microscope *S-SMS*
Microscope mounting stand *S-SMS-MS*
LED Light *S-SMS-LED*

Weld cable

Length: 100mm Step Terminal shape: D, L, DP

Ex: SFC - 60 - 500 - DD - 99

Material:
SFC, WRC, FMC, EFC

Square: 22, 60, 66, 120mmSQ

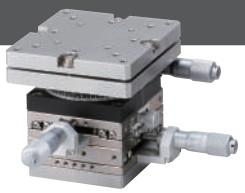
Hole size: 7, 9mmϕ

Lower stage

Leveling stage
11X-BS-F

Lower electrode stage
143-BS

Standard stage
11X-BS



Fine adjustment stage
11X-BS-F-MM

Welding Electrode
Weldability by Resistance Welding for Each Material

* This table is intended to be a guideline only, and it should not be interpreted as guaranteeing the welding result. Please feel free to consult with us as we will be pleased to test samples for you.

	W Mo		Ni alloy		Ni		SUS		Fe (Ni)		Fe (Zn)		Fe (Sn)		Fe		PB		Cu-Zn-Ni		Cu-Ni		Bs		Cu		Al alloy		Al		Ti	
Titanium																															A	II
																															II	1
Aluminium			E	II	E	II	H	II	H	II	D	II	D	II	E	II	D	II					E	II	H	V	C	II	C	II		
			II	5 2	II	3 2 10	II	3 4 2	II	3 8	II	3 4 9	II	3 4 9	II	3 4	II	5 2					II	2	II	2	II	1	II	1		
ex. Duralumin			E	II	E	II	H	II	H	II	D	II	D	II	E	II	D	II					E	II	E	V	D	II				
			II	2	II	3 2 10	II	3 4 2	II	3 8	II	3 4 9	II	3 4 9	II	3 4	II	5 2					II	2	II	2	II	1				
Copper	H	II	E	II	E	II	H	II	H	II	H	II	H	II	H	II	D	II	D	II	D	II	E	II	K	V						
	V	3	V		V	3 6 10	V	3 4 2	V	3 4	V	3 4 9	V	3 4 9	V	3 4	V	5 6	V	6	V	6	V	6	V	2						
Brass			D	II	D	II	H	II	H	II	E	II	E	II	E	II	C	II	C	II	C	II	C	II								
			IV	6	II	6 10	IV		IV		IV	6	IV	6	IV	3 4	IV	1	IV	1	IV	1	II	1								
Cupronickel			C	II	C	VI	E	II	E	II	E	II	E	II	E	II	C	II	C	II	B	II										
			II		II		II	2	II	8 2	II	2	II	2	II	3	II	1	II		II	1										
German Silver			C	II	C	VI	E	II	E	II	E	II	E	II	E	II	C	II	B	II												
			II		II		II	2	II	8 2	II	2	II	2	II	3	II	1	II	1												
Phospher Bronze			D	II	D	II	E	II	E	II	E	II	E	II	D	II	B	II														
			II		II	10	II		II	8	II		II		II	3	II	1														
Steel	D	II	D	II	D	II	B	II	B	II	C	II	C	II	A	II																
	II	3	II	3	II	3 10	III		II	8	II		II	6	II	1																
Sn Plating	E	II	D	II	D	II	C	II	C	II	C	II	D	II																		
	II	9	II	3 9	II	9	II		II	8	II	6 9	II	6 9																		
Zn Plating	E	II	D	II	D	II	C	II	C	II	C	II																				
	II		II	3	II	9	II		II	8	II	6																				
Ni Plating	D	II	D	II	D	II	B	II	B	II																						
	II	8	II	8	II	8	II	8	II	8																						
Stainless Steel	D	II	D	II	D	III	A	II																								
	II	5 2	II		II	10	II	1																								
Nickel	D	II	C	II	B	II																										
	II	5 2 10	II	1	II	1																										
ex.Monel Metal	D	II	B	II																												
	II	5 2 10	II	1																												
Molybdenum Tungsten	D	II																														
	II	5 2																														

Weldability	Electrode
Electrode	Special Note

Weldability

A	Excellent
B	Very good
C	Good
D	Acceptable
E	No good
H	Very bad
K	Unacceptable

Alloy Components of Electrode

II	Cu-Cr-Zr (equivalent to RWMA-2)
III	Cu-Ni-Be (equivalent to RWMA-3)
IV	Cu30%-W70% (equivalent to RWMA-11)
V	W100% (equivalent to RWMA-13) Mo100%

Special Note

1	Having enough welding strength
2	Possible to weld under a special condition
3	Not enough welding strength
4	Generating a stick instead of a nugget
5	Welding conditions should be adjusted precisely
6	Clean electrode generates no stick
7	Scrubbing before welding
8	Flat electrode to prevent deforming
9	Coating has a chance to melt or burn
10	Pay attention on polarity

Welding Electrode
Materials and Shape of Electrode

■ Materials of Electrode

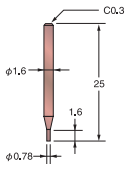
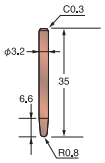
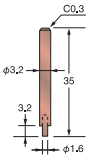
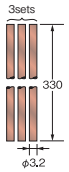
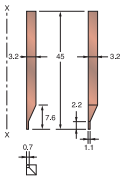
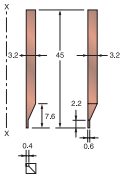
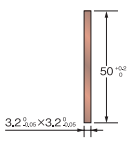
The list below shows rough standards to choose materials for an electrode, though it may be changed according to its surface treatment or dimensions.

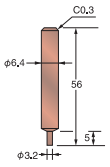
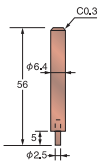
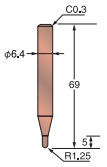
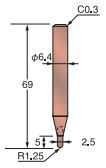
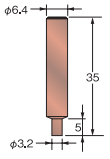
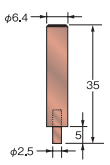
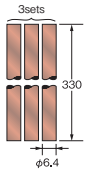
Electrode Number	Alloy Components	Electric Conductivity (IACS%)	Applicable Metal
02 (equivalent to RWMA-2)	Cu-Cr-Zr	around 80%	iron, nickel, chrome and their alloys
03 (equivalent to RWMA-3)	Cu-Ni-Be	around 50%	phosphor bronze, brass
00	pure Mo	around 31%	tinned copper wire, solder plating copper wire
11 (equivalent to RWMA-11)	Cu (30%)-W (70%)	around 46%	noble metal
13 (equivalent to RWMA-13)	pure W	around 32%	copper
20	Cu-Al2O3	around 80%	Battery Tab

RWMA stands for The Resistance Welding Manufacturing Alliance. IACS stands for International Annealed Copper Standard.

■ Shape of Electrode

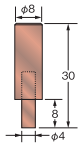
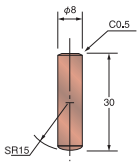
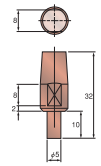
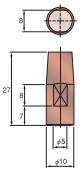
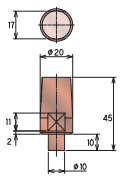
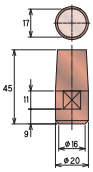
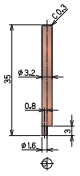
Example : EH - 250 - 02 (Shape - Dimension - Material)

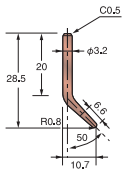
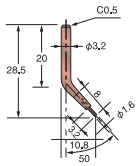
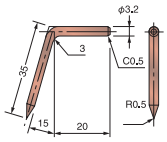
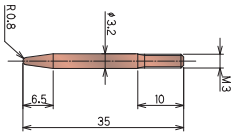
Electrode Number	Shape	Applicable Weld Head
EH-062-02A		NA-121 NA-141
EH-125-02A EH-125-03 EH-125-20		NA-121 NA-122 NA-123 NA-141 NA-142 NA-143 NA-60A
EH-125-00C EH-125-11A EH-125-13C		
CC Alloy (3.2ϕ)		
EP-711-00F EP-711-02F		NA-131 NA-132 NA-141 NA-142
EP-406-00F EP-406-02FA		
Molybdenum Square Bar		

Electrode Number	Shape	Applicable Weld Head
EH-250-02A EH-250-03		NA-122 NA-123 NA-124 NA-142 NA-143 NA-60A NA-43
EH-250-00C EH-250-11A EH-250-13C		
EO-250-02A EO-250-03		
EO-250-00B EO-250-11A EO-250-13C		
EH-250-02S		
EO-250-00SB EH-250-13S		
CC Alloy (6.4ϕ)		

Example : EH - 250 - 02
Shape Dimension Material

■ Shape of Electrode

Electrode Number	Shape	Applicable Weld Head
EH-80-00		NA-124
EH-60C		
EH-F-00		NA-125
EH-F-02		
EH-200-00A		NA-126
EH-200-02A		
EH-125-02E EH-125-20E		NA-141 NA-142 NA-143

Electrode Number	Shape	Applicable Weld Head
EL-125-02A EL-125-03		NA-54A
EL-125-00B EL-125-11A EL-125-13A		
EL-54LA		NA-54LA
EH-57A-02A		NA-57A

Information on sample test

Avio laboratory offers you to perform sample test using actual equipment for welding evaluation and model selection. We also support remote sample test using web conferencing tools. It is also possible to make a test with samples you send, and we return them after the test. Please see our website for details.

Location of laboratories

Shin-Yokohama Plant

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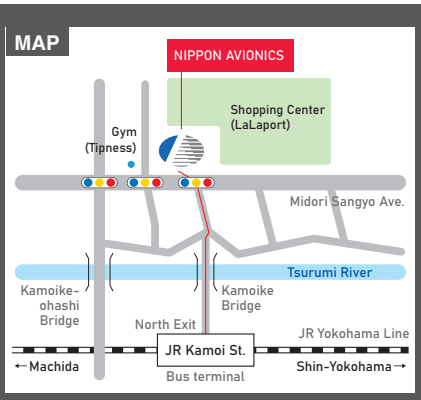
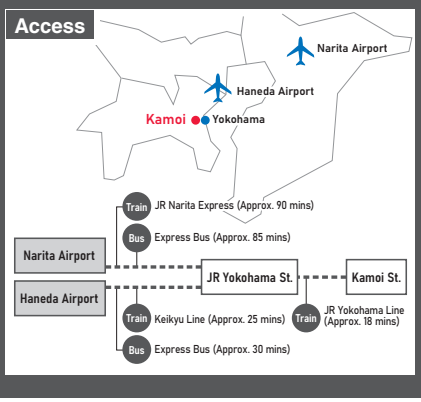
224-0053, Japan

Access
7 minutes on foot from JR Kamoi station





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⚠CAUTION

To operate a unit correctly, read the operation manual carefully. The unit should be situated away from the place filled with water, moisture, steam, dust or soot, which may cause a fire, an electric shock, troubles etc.

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