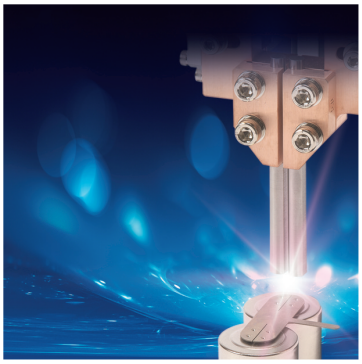
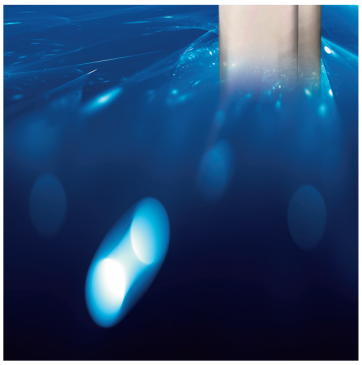
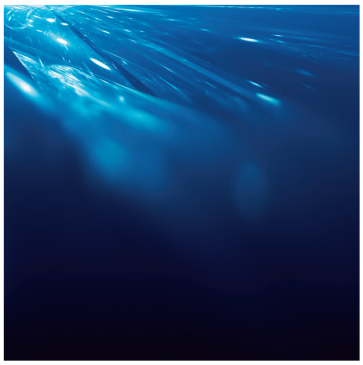
Avio

PRODUCT CATALOG



Micro Resistance Welder Series

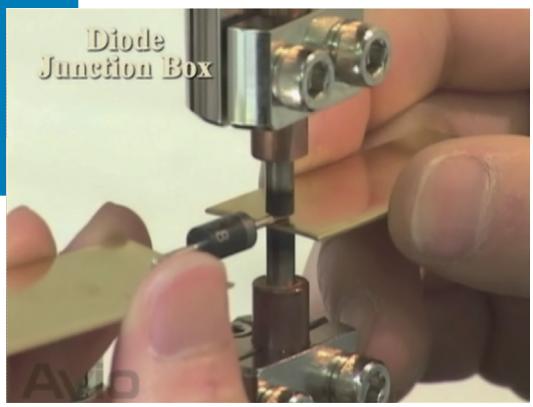


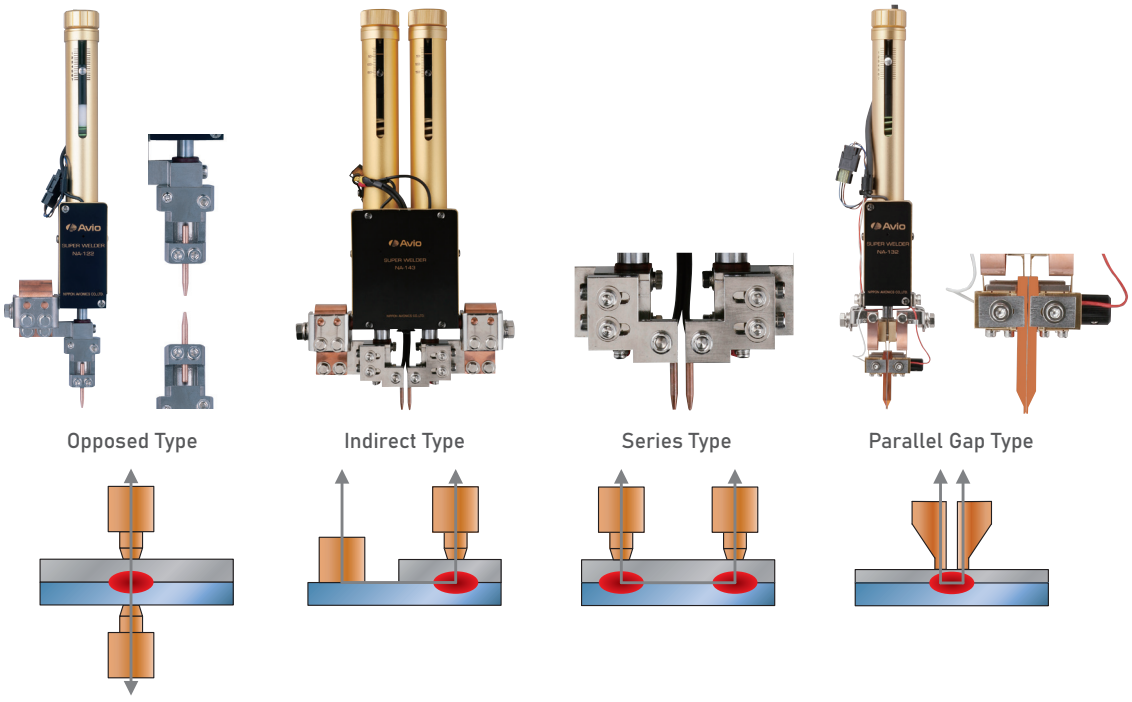


NIPPON AVIONICS CO.,LTD.

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.





Opposed Type | Indirect Type | Series Type | Parallel Gap Type

Welding head & welding electrode

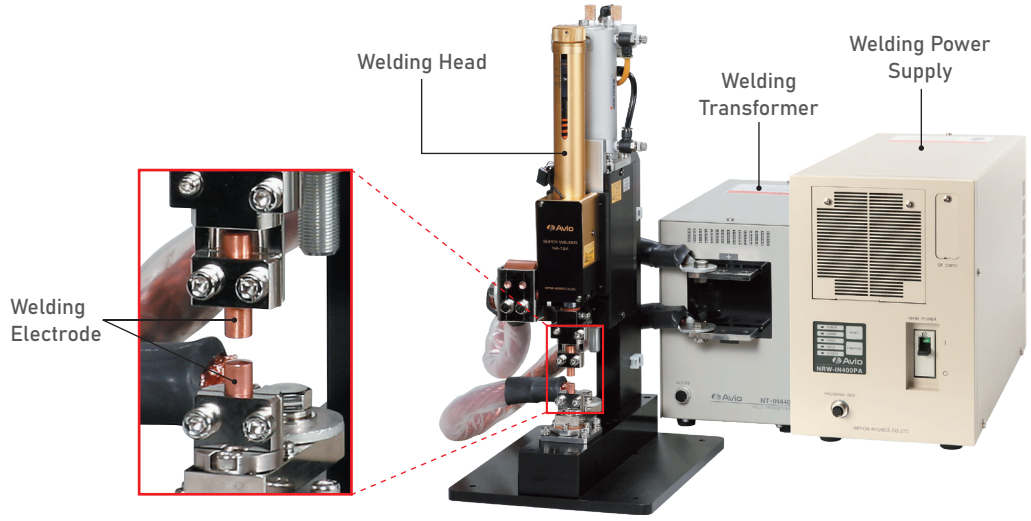
How to contact electrodes (how to apply welding current) is determined according to the shape and structure of the welding object. In addition, the shape and material of the electrodes and the value of pressure force are also important factors for the resistance welding.

Basic configuration of resistance welder and role of each part

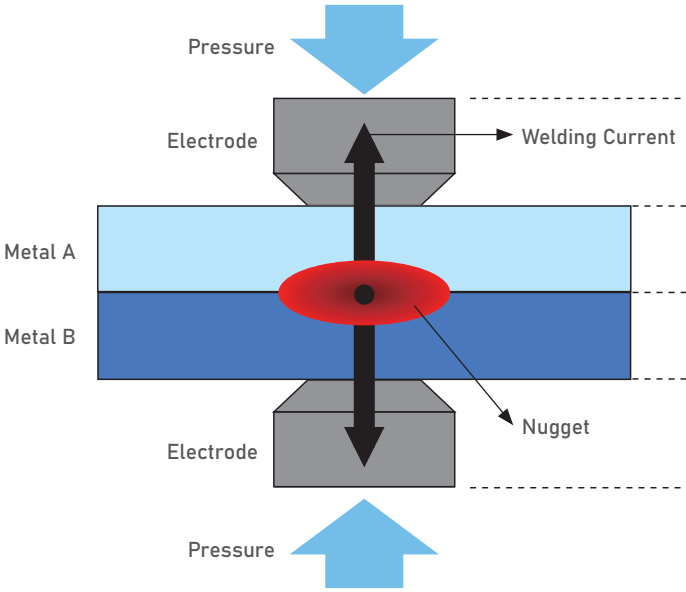
Resistance welder sandwiches an object to be welded by the welding electrodes, and applies electric current while applying a pressure.

- 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.

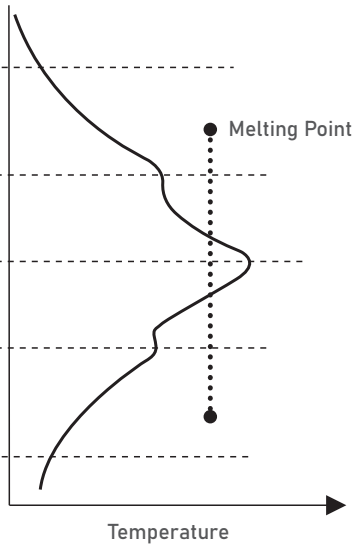
* In addition, various monitors that measure electric current and applied pressure and etc., are available.



Resistance Welding Model



Temperature Distribution at the Welding



Line-up of Resistance Welder

P7-16 Welding Power Supply

Inverter Type

Transistor Type

Capacitor (DC) Type

P17-19 Welding Monitor

Welding Monitor

Digital Force Gauge

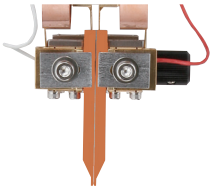
P20-24 Welding Head

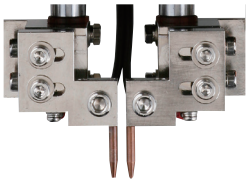
System Head

Integrated Type Head

Hand Piece Type

P25-26 Welding Electrode



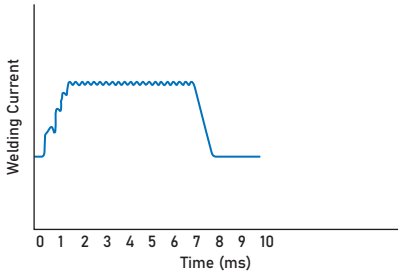
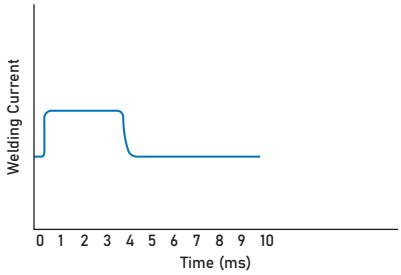
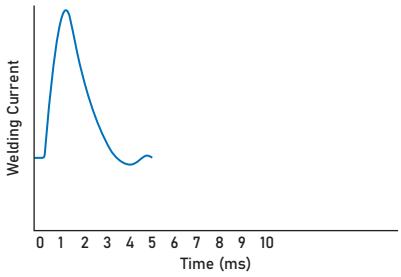


Drive Unit

Accessory

Welding Power Supply: Welding Method

An appropriate welding power supply must be selected based on the material or shape of the object to be welded and required welding quality. There are three different types of welding controllers based on the type of controlling electric current. Proper selection can be made by taking advantage of their features.

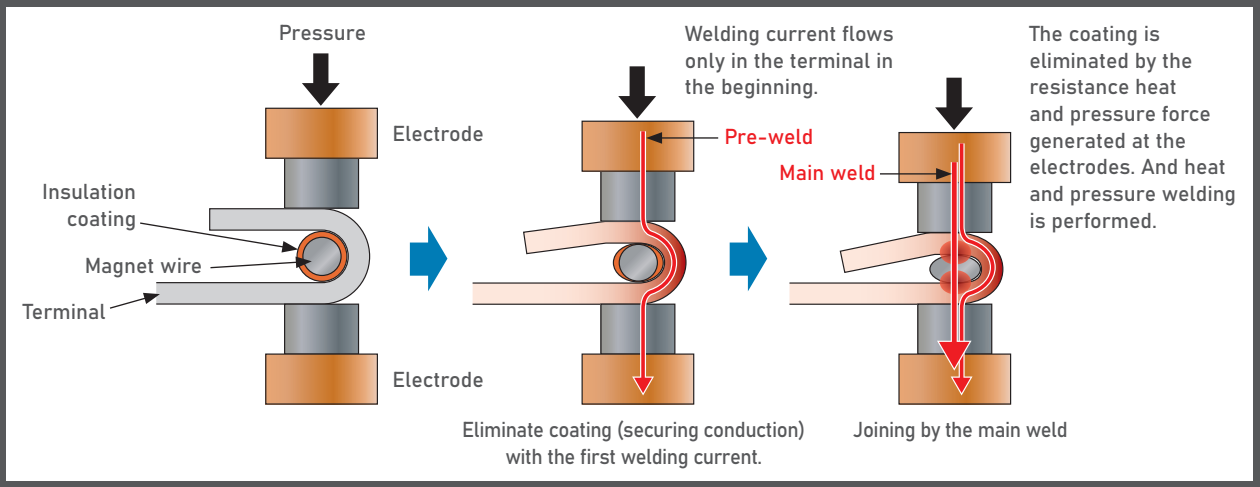
Basic System	Welding Current Waveform	Feature
Inverter Type 		The current is controlled in a cycle of several kHz (milliseconds) using an inverter circuit. Avio inverter type welding power supply is suitable for precision welding becuase it is DC type with good thermal efficiency and has a fast control cycle. Stable welding quality is achieved by current and voltage feedback control. Since the capacitor is not charged, welding time can be set longer (up to 3 seconds *), and flexiblity of welding waveform setting is high. * When welding time is set long, restrictions are applied for the maximum current value and the duty cycle.
Transistor Type 		The electricity charged in the capacitor is directly controlled by the transistor. Since the control speed is extremely fast, every 0.01 milliseconds, it is suitable for ultra-precision welding of very small components and ultrafine wires. Stable welding quality can be obtained by current and voltage feedback control.
Capacitor (DC) Type 		It controls the electricity (energy) charged in the capacitor, and releases the charged electricity all at once for welding. Since a large current can be applied in a short time (several milliseconds), it is used for welding materials such as aluminum and copper that have high heat dissipation and difficult to weld. It is also used for welding small parts that need to avoid heat influence by taking advantage of a large current-short time welding capability.

Welding Power Supply: Welding Current Capacity

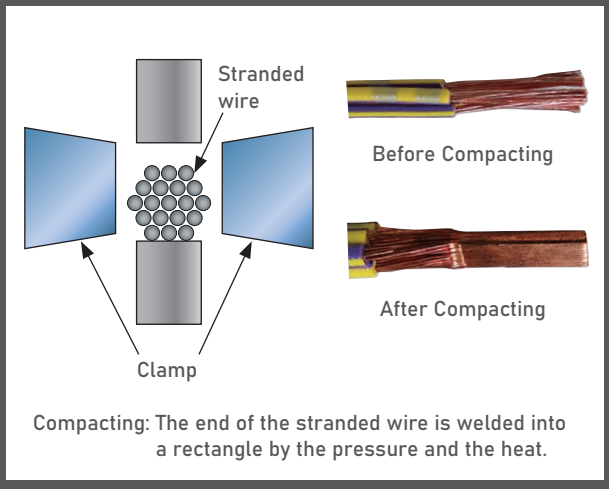
Select a welding power supply with an appropriate welding capacity according to the size and thickness of the object to be welded.

Type	Power Supply/Transformer	0	1kA	2kA	3kA	4kA	5kA	10kA	20kA	30kA	40kA
Inverter Type	NRW-IN4200/NT-IN4474						4kA				
	NRW-IN400PA/NT-IN4474A						4kA				
	NRW-IN400PA/NT-IN8444B							8kA			
	NRW-IN400PA/NT-IN8444							8kA			
	NRW-IN8400A/NT-IN8400							8kA			
	NRW-IN8400A/NT-IN8444							8kA			
	NRW-IN900P/NT-IN32K444										32kA
Transistor Type	MCW-700/Built-in		0.5kA								
	MCW-750/Built-in			1.8kA							
Capacitor (DC) Type	NRW-DC150/Built-in							5.5kA			

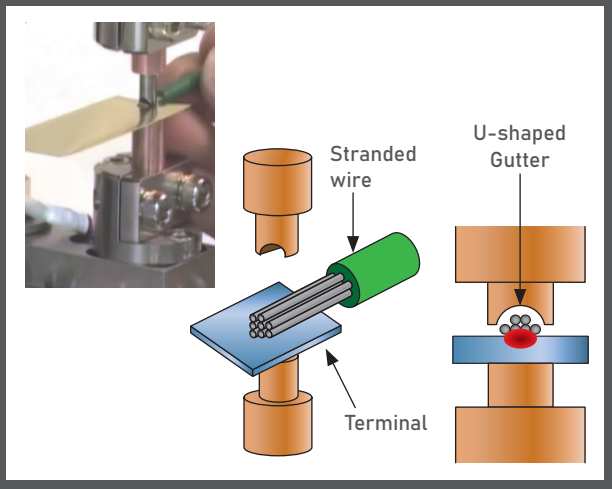
Applications



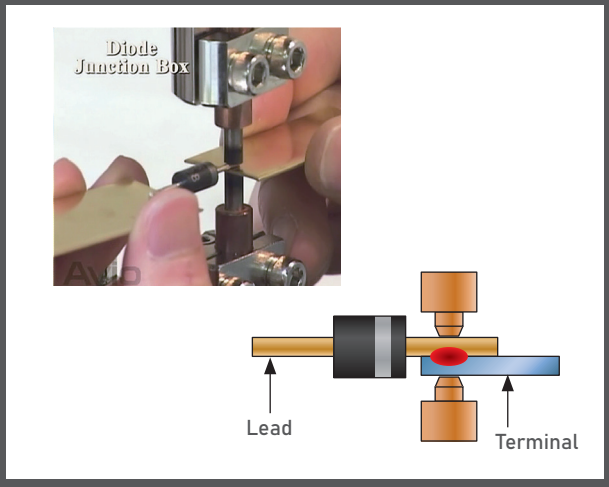
Insulation Wire + U-shaped Terminal (Fusing)



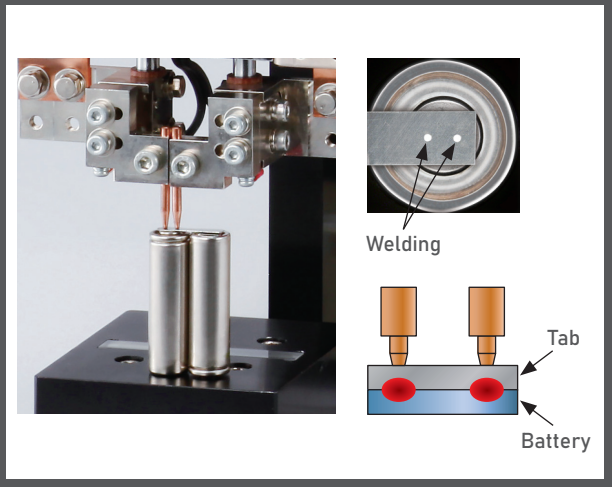
Stranded Wire (Compacting)



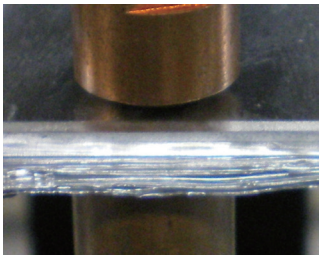
Stranded Wire + Terminal Plate

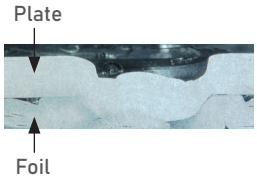


Lead of Electric Part + Terminal Plate

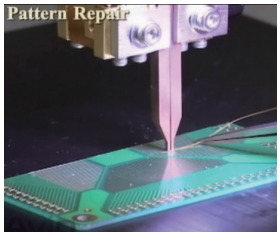


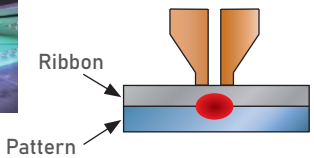
Battery Pack (Rechargeable Battery + Tab)

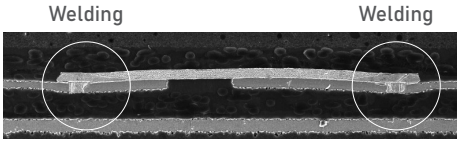




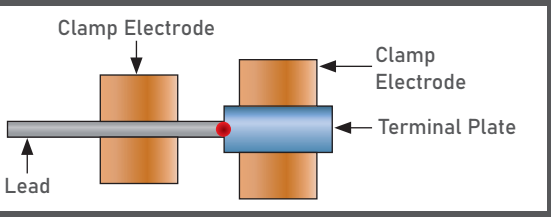
Laminated Foil + Plate (Cu, SUS)



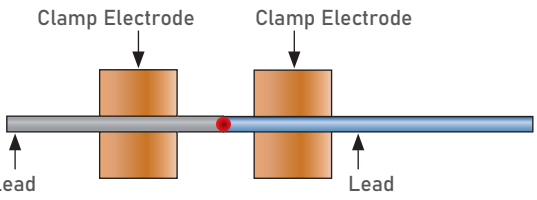




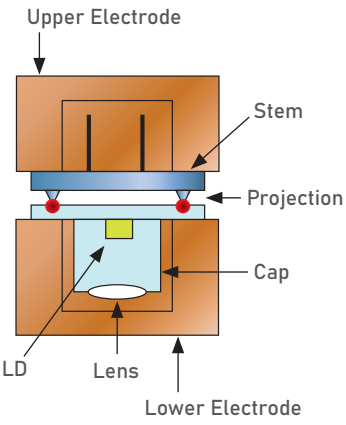
Pattern Repair



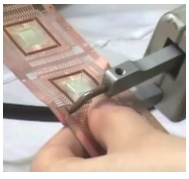
Lead +Terminal Plate

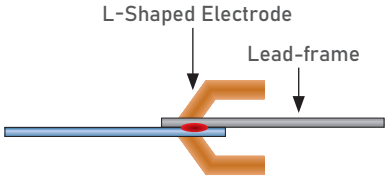


Lead + Lead

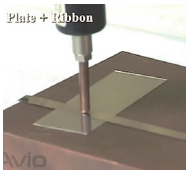


Can Seal Welding





Lead-Frame + Lead-Frame



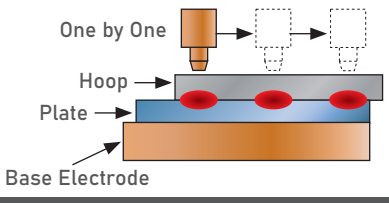
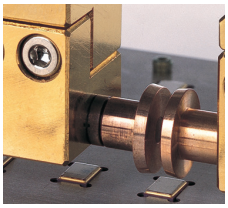
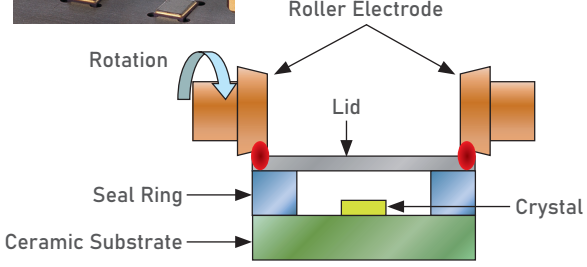


Plate + Hoop Material





Seam Welding: Parallel

Highly Reliable Inverter Type Welding Power Supply

NRW-IN400PA

DC inverter welding power supply ideal for mounting on automated machines

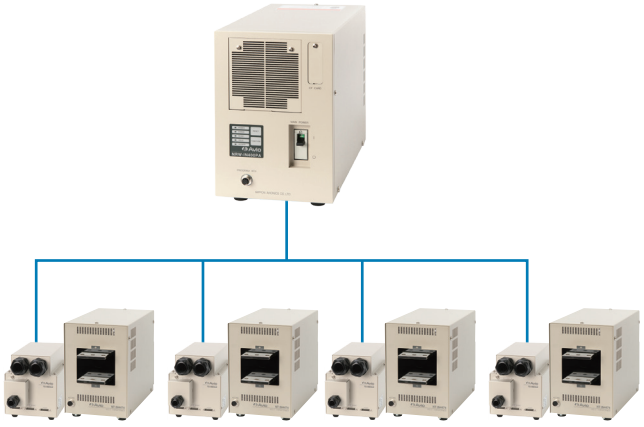
DC inverter welding power supply suitable for mounting on automated machines. It has selections of 6 types of control modes and 3 types of frequencies by which high quality welding is performed by the optimum mode depending on objects to be welded. In addition, it has a built-in welding monitor function, 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

TS-IN044A

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.



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

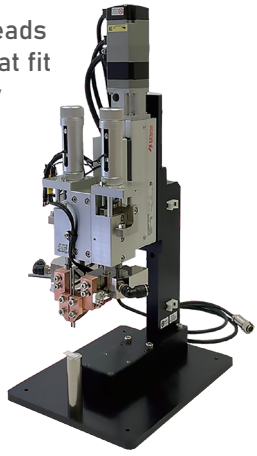
Program Box NA-PB100

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.

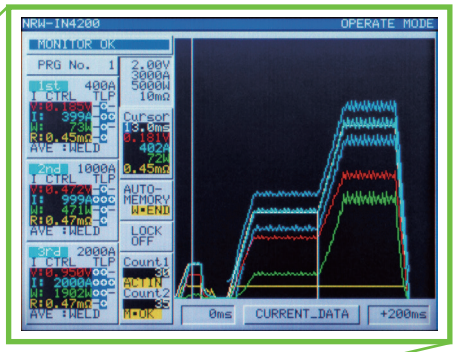
Battery Tab Welding Head (built-to-order)

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



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

High-performance welding power supply with built-in welding monitor. Real-time response is possible with high-speed feedback.



NT-IN4474

NRW-IN4200

Inverter Type Welding Power Supply

NRW-IN4200

DC inverter welding power supply with built-in welding monitor

- Multi-control mode (Constant current, constant voltage, constant power)
- Pre-weld judgement function
- Long welding time (maximum 3 sec.)
- Graphical display of welding waveform on color LCD
- Multi-monitoring function
- Welding waveform memory function compares with non-defective waveform

Item	NRW-IN4200
Control Frequency	2kHz
Control Mode	Secondery current effective value control, Secondery voltage effective value control, Secondary power effective value control, Fixed pulse width control
Range of Output Setting	Current: 400 - 4100A Voltage: 0.400 - 4.100V Power: 200 - 8200W Pulse width: 0.0 - 90.0%
Range of Timer Setting (ms)	0.0-3000.0 (Total time of UP TIME, WELD TIME, DOWN TIME, COOL TIME)
Limit Monitoring Function	Avarage value/peak value monitoring of current, voltage, power, resistance respectively
Other Monitoring Functions	Profile monitor, Trace monitor
Waveform Image Memory	Available to save 8 images (Including the last welding result)
Number of Conditions	31
Interface	RS-232C, I/O, Analog output
Cooling Method	Air
Power Source	3ϕ AC200-230V ±10% 50/60Hz
Dimensions (mm)	W170 × D350 × H265 (Excluding protrusions)
Weight	≒15kg
Welding transformer	NT-IN4448, NT-IN4474, NT-IN4436

Inverter Type Welding Power Supply

NRW-IN8400A

DC inverter welding power supply with color LCD. Equipped with functions suitable for mounting on automated machines.

NT-IN8444 *NRW-IN8400A*

This resistance welding power supply realizes stable welding quality by controlling the primary current peak value. It is a multifunctional welding power supply with pulsation welding function, actuate stop function, and etc.

Item	NRW-IN8400A
Control Frequency	2kHz
Control Mode	Primary curent peak 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	Current: 400 – 8200A, Voltage: 0.400 – 6.200V, Power: 200 – 24,600W, Pulse width: 0.0 – 90.0%
Range of Timer Setting (ms)	0.0-3000.0 (Total time of UP TIME, WELD TIME, DOWN TIME, COOL TIME)
Limit Monitoring Function	Avarage value/peak value monitoring of current, voltage, power, resistance respectively
Other Monitoring Function	Profile monitor, Trace monitor
Other Function	Pulsation welding function
Waveform Image Memory	Available to save 8 images (Including the last welding result)
Number of Conditions	255
Interface	RS-232C, I/O, Analog output
Cooling Method	Air
Power Source	3ϕ AC200-240V ±10% 50/60Hz (Option: 3ϕ AC380-440V ±10%)
Dimensions (mm)	W186 × D490 × H265 (Excluding protrusions)
Weight	≒18kg
Welding transformer	NT-IN8400, NT-IN8444, NT-IN4474, NT-IN4436, NT-IN4448

Easy operation, equipped with 5.7 inch TFT color LCD

Multi-control mode

In addition to the conventional PID current feedback control, a control method that aligns with the current waveform peak value is equipped.

Multi-functional pulsation function

Up to 24 stages of welding are possible. All output and time can be set arbitrarily.

255 types of welding conditions can be registered

Actuate stop function

The high-speed response circuit realizes a variation of welding stop less than 1 ms after inputting a stop signal. In combination with a displacement sensor, it controls crush amount welded object.

Input / output signal monitor function

Status of the input / output signal (I / O) can be checked offline. Because the output signal can be forcibly turned ON / OFF, it enables to reduce significant amount of time to check wiring when installing the equipment.

Target compensation function

The next welding output value can be increased or decreased at any step by using external sensor signals such as displacement data and temperature data.

Various monitoring functions

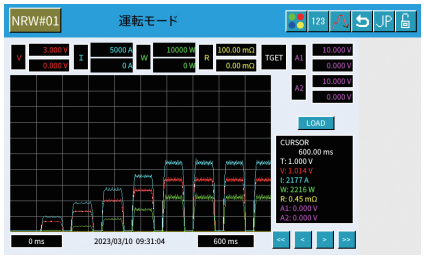
Graphically displays/monitors the current, voltage, power, and resistance of the secondary side without using an external monitor device.

High-reliability Inverter Type Welder

NRW-IN900P

Resistance Welding Utilizing a DC Inverter Power Supply with Maximum 32,000A Current

The flexible NRW-IN900P is designed to support a variety of fusing weld processes with it's DC inverter resistance welding power supply designed for motor fusing. The pulse function allows up to 8 phases, with 24 second maximum duration and 127 step arbitrary waveforms. In addition, the redesigned weld time and phase monitors enable compensation functions during the weld which contributes to improved bond quality.



Welding waveform display function

Program Box
NA-PB100

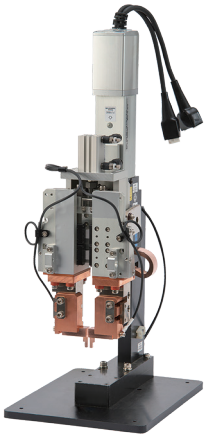
- **Three selectable frequencies (2kHz, 4kHz and 5kHz)**
- **Extended weld time of 5 seconds maximum (in normal mode)**
- **Pulse mode improves fusing bond results:**
  Capable of up to 8 phases with UP/DOWN slope transition of 24 seconds- contributes to a wide application variety of fusing weld processes
- **Includes multiple control modes:**
  Constant current, constant voltage, constant power, primary current peak value, primary current average and fixed pulse width output control
- **Welding stop control within 1ms or less using the phase shift function**
- **Analog input control mode:**
  Real-time PLC control available.
- **Compensation function during welding:**
  Instantaneously control output value change with external signal input during welding
- **Various monitoring functions:**
  Weld time, phase, welding waveform, primary source power
- **Others:**
  Use with multiple power sources, dustproof and reinforced structure, ethernet communication

Item	NRW-IN900P
Control Frequency	Selectable from 2kHz, 4kHz, 5kHz (Select for each PRG No.)
Control Mode	Primary current peak value control, Primary current average value control, Secondary current average value control, Secondary voltage average value control, Secondary power average value control, Fixed pulse width control.
Maximum Welding Current	900A (Duty Cycle 5%)
Range of Timer Setting	Nomal mode: 0.0-5000.0ms (Total of UP TIME, WELD TIME, DOWN TIME, COOL TIME) Pulsation mode: 0.0-24000.0ms (Total of PULSE TIME, COOL TIME)
Number of Conditions	Normal mode: 255 Pulsation mode: 15
Welding Waveform Setting	Normal mode: 3-phase (slope, weld, cool), free style (Max. 127 step, 8-phase) Pulsation mode: (Max. 120 wave, 10000 pulse, 8-phase) Analog input control mode: (8-phase)

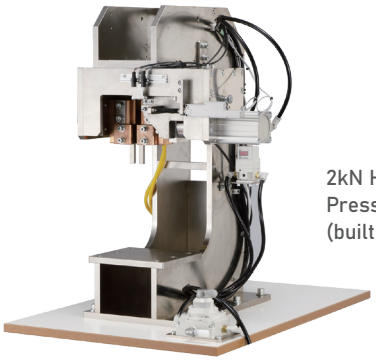
Item	NRW-IN900P
User Interface (Setting Tool)	Program box
Monitoring Function	Average value/?peas? value monitor of current, voltage, power resistance respectively. Pulse width, welding time monitor, phase monitor, Source voltage monitor. Waveform display
Cooling Method	Water cooling (Water Volume 3.0l/min)
Interface	Ethernet
Power Source	220V: 3ϕ AC200-240V ±10% 50/60Hz, 400V: 3ϕ AC380-480V ±10% 50/60Hz
Dimensions (mm)	W250 × D651 × H428 (Excluding protrusions)
Weight	30.4kg
Welding Transformer	NT-IN32K444

Resistance Welding System Components

Our support engineers will design a custom head and system to optimize the user's application



Small Horizontal Pressure Head (built-to-order)



2kN Horizontal Pressure Head (built-to-order)

PCB Repair

10kN Head

20kN Head

Parallel Seam Sealer

Can Sealing

Transformer Line-up

Tramsformer Connection Chart

Photo	Welding Power Supply	Transformer	
		4000A Class	
		NT-IN4474	NT-IN4474A
	NRW-IN4200	OK	NG
	NRW-IN8400A	OK	NG
	NRW-IN400PA	NG	OK
	NRW-IN900P	NG	NG

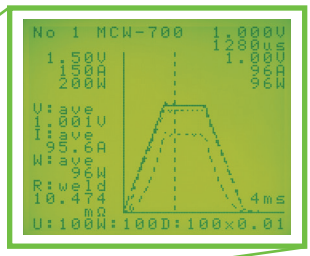
Note 1: Connecting via the junction box NA-TA100
Note 2: For multi-transformer system of NRW-IN400PA.
Maximum number of connecting transformer is 4.

Model	4000A Class					
	NT-IN4474/A		NT-IN4436		NT-IN4448	
Power Supply Voltage	220V	400V	220V	400V	220V	400V
Cooling Method	Air		Air		Dual Use of Air or Water	
Frequency	2kHz (400PA: 2/4/5kHz)		2kHz (400PA: 2/4/5kHz)		2kHz (400PA: 2/4/5kHz)	
Rated Capacity	11kVA	10kVA	8.8kVA	8.8kVA	23kVA	23kVA
Transformer Turns Ratio	37:1	74:1	18:1	36:1	24:1	48:1
No Load Secondary Voltage	8.4V	7.6V	17.2V	15.7V	12.9V	11.7V
Maximum Output Current	4000A		4000A		4000A	
Maximum Duty Cycle	5%		5%		5%(Air, 10%(Water)	
External Dimensions (mm) (Excluding Protrusions)	W150 × D337 × H222		W150 × D267 × H250		W170 × D312 × H235	
Weight	≒14kg		≒13kg		≒19kg	

	Transformer						TransSwitch
	4000A Class		8000A Class			32000A	4000A/8000A
	NT-IN4436	NT-IN4448	NT-IN8400	NT-IN8444	NT-IN8444B	NT-IN32K444	TS-IN044A
	OK	OK	NG	NG	NG	NG	NG
	OK	OK	OK	OK	NG	NG	NG
	NG	OK Note 1	NG	OK Note 1	OK	NG	OK Note 2
	NG	NG	NG	NG	NG	OK	NG

	8000A Class							32000A	
	NT-IN8400		NT-IN8444		NT-IN8444B		NT-IN8444B (High Voltage)	NT-IN32K444	
	220V	400V	220V	400V	220V	400V	400V	220V	400V
	Air		Dual Use of Air or Water		Air			Water	
	2kHz (400PA: 2/4/5kHz)		2kHz (400PA: 2/4/5kHz)		2kHz (400PA: 2/4/5kHz)			2/4/5kHz	
	30kVA	30kVA	50kVA	50kVA	36kVA	33kVA	33kVA	89 kVA	130 kVA
	22:1	44:1	22:1	44:1	22:1	44:1	22:1	22:1	44:1
	14.1V	12.8V	14.1V	12.8V	14.1V	12.9V	25.8V	14.1V	12.9V
	8000A		8000A		8000A			19800A	32000A
	5%		5%(Air), 10%(Water)		5%		1.25%	5.0%	
	W210 × D342 × H210		W190 × D322 × H275		W200 × D370 × H214			W280 × D475 × H330	
	≒18kg		≒26kg		≒24kg			≒43kg	

Real time welding wave form display



MCW-700

MCW-750

- High-speed linear control realizes welding waveform with less switching noise
- 3 control modes
  Constant current, constant voltage, constant power
- High speed welding of 5 shots per second
- Pre-weld check function reduces spark problem
- Simulators graphic display of V, I, and W waveform

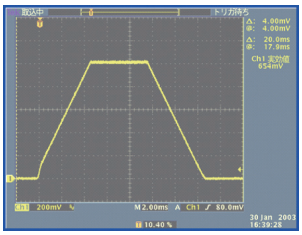
Transistor Type Welding Power Supply

MCW-700 & MCW-750

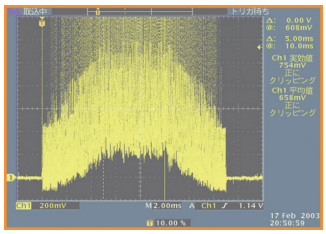
High-quality welding with smooth waveform by high-speed linear control method.
Ideal for welding ultra-fine wires and micro components.

■ Linear control method

The high-speed linear control method achieves stable welding waveform with little switching noise.



Linear control method



Switching control method

Item	MCW-700	MCW-750
Maximum Current	500A	1800A
Maximum Voltage	2V	4V
Constant Current Mode	10 - 500A	10 - 1800A
Constant Voltage Mode	0.001 - 2.000V	0.01 - 4.00V
Constant Power Mode	10 - 500W	10 - 3600W
Welding Time: UP	0 - 999 × 0.01ms/0.1ms	
Welding Time: Weld	0 - 999 × 0.01ms/0.1ms	
Welding Time: Down	0 - 999 × 0.01ms/0.1ms	
Welding Time: Squeeze & Hold	0.00 - 9.99s	
Pre-check	Resistant / Current	
Shot / Sec.	5 shots/sec. (500W 2ms)	5 shots / sec. (3600W 2ms)
Limit Monitoring Function	Average value/Peak value of current, voltage, and power	
Waveform Display	Current, voltage and power	
Number of Conditions	15	
Interface	RS-232C, I/O, Analog output	
Power Source	1φ AC100 - 120V ±10% 50/60Hz (Options: 1φ AC200 - 240V ±10%)	
Dimensions (mm)	W200 × D350 × H300 (Excluding protrusions)	W200 × D350 × H400 (Excluding protrusions)
Weight	≒20kg	≒27kg

Capacitor (DC) Type Welding Power Supply

NRW-DC150A

Suitable for welding of battery tab, Aluminum and Copper

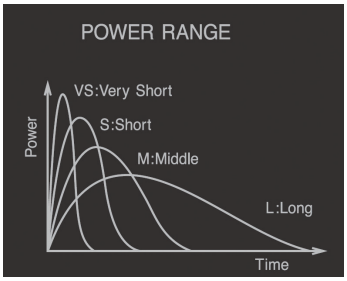
Dual pulse function
It realizes to minimize welding spark and improve welding quality.

Short and concentrated energy burst
Precision welding of small component is achieved with minimized deformation and burning.

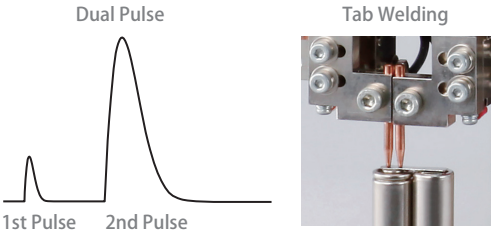
High speed charging
Welding speed 75 W / sec, maximum welding 120 times / min

VS (Very Short) mode is equipped
Achieves a peak current of 200 W / sec class at 150 W / sec

Rapid release of energy using high capacitance energy storage.



Dual Pulse Function



Item	NRW-DC150
Welding Transformer	Built-in
Stored Energy	1.0-150.0 W·s
Maximum Output Power (Peak Current Value)	VS Pulse 5500A (Welding time: ≒2.1ms) S Pulse 4500A (Welding time: ≒3.2ms) M Pulse 3600A (Welding time: ≒4.3ms) L Pulse 2600A (Welding time: ≒6.2ms)
Maximum Duty Cycle	25W·s: 200 shots / min.
	75W·s: 120 shots / min.
	150W·s: 80 shots / min.
Dual Pulse Function	Equipped as a standard specification
Squeeze Time	0.00 - 9.99s
Hold Time	0.00 - 9.99s
Power Source	1φ AC200 - 230V ±10% 50/60Hz
Dimensions (mm)	W220 × D400 × H347
Weight	≒31kg

■ Step-up Transformer

Item	ST-U200
Rated Capacity	2kVA
Input Voltage, Current	1φ AC100V, 20A
Output Voltage, Current	1φ AC200V, 10A
Dimensions (mm)	W140 × D230 × H181 (Excluding protrusions)
Weight	≒16kg

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)

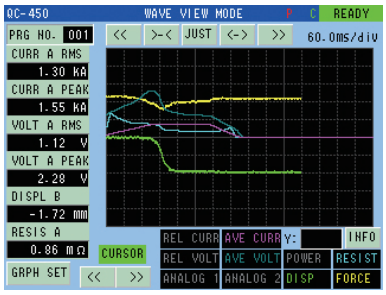
Toroidal Coil (x10)

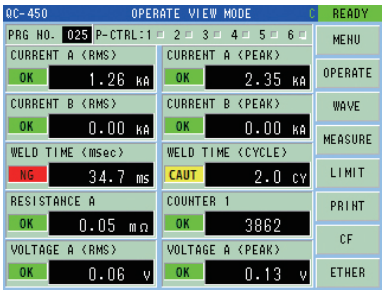
Versatile monitor functions

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.



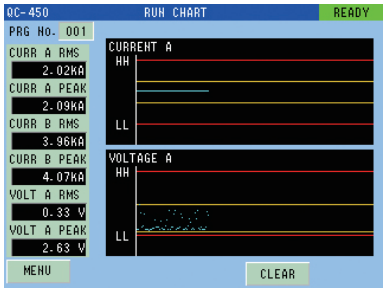


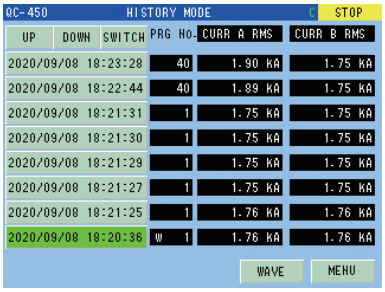
● OPERATE VIEW Mode

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

● RUN CHART Mode

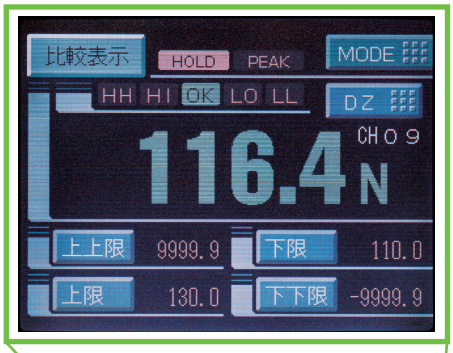
2 items from the measurement data are selected and displayed 200 RBI continuous graphs (dots).





● HISTORY Mode

History is displayed up to the latest 100.



■ **High reliability - Ideal for quality control**

Welding Monitor

QC-100A Force monitor

Real-time monitoring of the force

- Switchable between digital display and graphic display
- Easy line management with enhanced communication functions
  (It outputs measured values and comparison judgment results)
- Waveform analysis is available with graphic display
  (High-speed sampling of 2000 times per second)
- Welding process is measured and judged under 2 conditions
  (Measure and judge under A condition before welding and under B condition after welding)
- Output when reaching the preset pressure can be used as a welding start trigger

Item	Force Monitor QC-100A
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)
Accuracy	±3% (of full scale)
Sampling Time	0.5ms (2000 times/sec)
Squeeze, Hold Time	0 - 0.9 sec
Interface	RS-232C, I/O, Analog output
Power Source	DC24V ±10% 2A
Dimensions (mm)	W170 x D210 x H150
Weight	≒3.0kg

Digital Force Gauge

FG-400 & TJ series

Compact, lightweight, and handy type

* FG-400 and TJ series are separately sold.

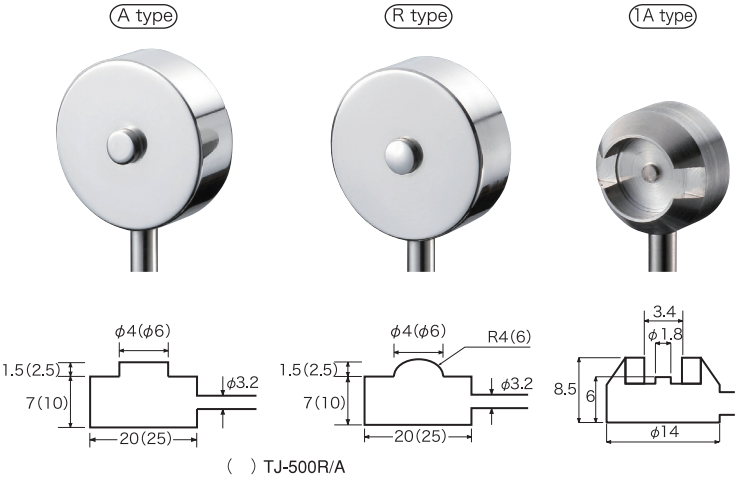
- Compact and lightweight
- 3 ways power supply
- Display hold function is equipped.
- Easy zero adjustment function
- Automatic recognition of sensor types
- Judgement function (Hi & Low) is equipped.

Item	FG-400
Display	7 segment display (0000 - ±9999)
Zero Point Adjustment	Automatic regulation by switching
Hold Function	Sample hold (by external input signal)/Peak hold
Interaface	RS-232C
Power Source	AA type battery, Ni-H type battery, or dedicated AC adaptor (1φ AC100 - 240V)
Dimensions (mm)	W77 x D140 x H27
Weight	≒300g

* A calibration certificate will be issued separately for a fee.

Item	TJ-1A	TJ-20R or TJ-20A	TJ-100R or TJ-100A	TJ-500R or TJ-500A
Measuring range	0 - 10N	0 - 196N	0 - 980N	0 - 4900N
Limit load	20N	294N	1,470N	7,350N
Accuracy	±2% of full scale			

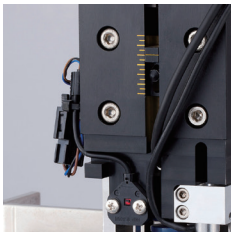
Sensor tip shape



( ) TJ-500R/A

■ 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

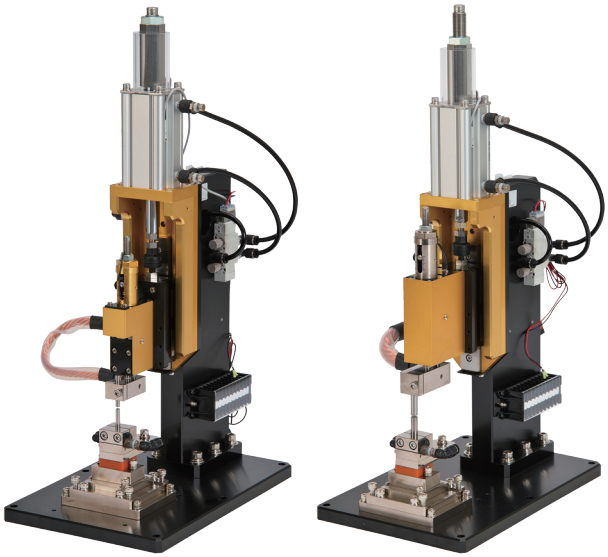
Item	NA-141	NA-142	NA-143
Pressure Range	0.5 - 5N	5 - 65N	40 - 150N
Pressure Method	Spring	Spring	Spring
Configration	System head only	System head only	System head only
Applicable Drive Unit (Separately Sold)	Electric slider: NA-201PB-B Air: NA-221 Foot pedal: NA-231 *It requires twice the thrust of 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

System Head

High Rigidity Series

Double Shaft Mechanism Design Ideal for Automotive Industry Applications

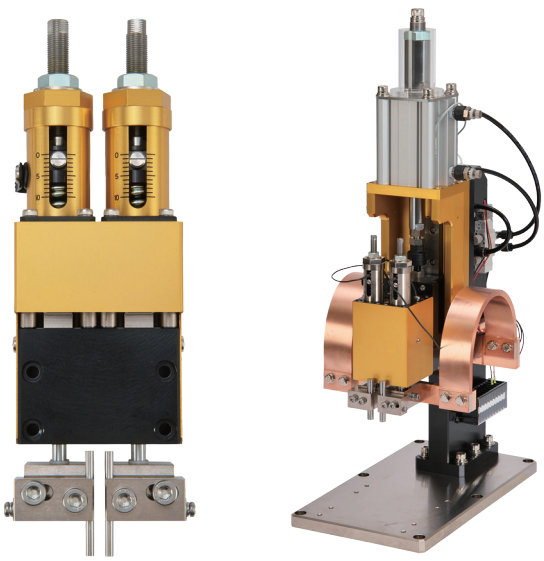
Opposed Type Weld Functionality



Item	150N type	300N type
Pressure Range	5 - 150N	40 - 300N
Pressure Method	Spring	Spring
Configration	System head only	System head only
Applicable Drive Unit (Separately Sold)	Electric slider: NA-201PB-B, Air: NA-221	
Diameter of Electrode	□3/5/8mm	□5/8mm
Dimensions (mm)	W33.5 × D44.5 × H176	W41.5 × D67 × H200
Weight	≒0.5 kg	≒1.1 kg

Series Type Weld Functionality

	150N type	300N type
Pressure Range	5 - 150N	40 - 300N
Pressure Method	Spring	Spring
Configration	System head only	System head only
Applicable Drive Unit (Separately Sold)	Electric slider: NA-201PB-B, Air: NA-221	
Diameter of Electrode	ϕ3/5mm	ϕ5mm
Dimensions (mm)	W61.5 × D44.5 × H180	W77.5 × D67 × H207
Weight	≒1.0 kg	≒2.22 kg



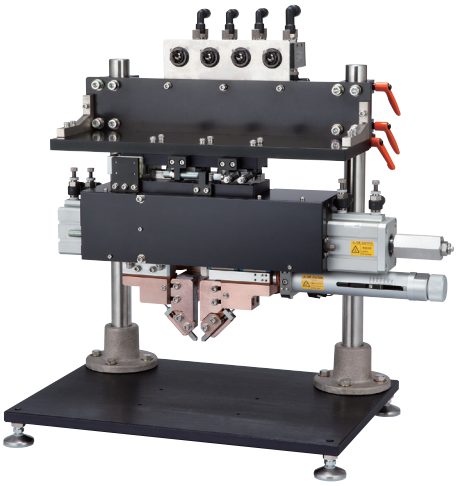
Opposed Type Head

NA-60A

General-purpose opposed welding head with integrated drive unit

Item	NA-60A	NA-184
Pressure Range	9.8 - 132.3N	30 - 350N (0.4MPa)
Electrode Stroke	Max. 12mm	Main electrode Max. 25mm, Sub electrode Mex. 15mm
Depth Dimention of Pocket	98mm	—
Drive Method	Foot pedal Air *1	Air Air supply method: 0.4MPa (Max. 0.6MPa)
Diameter of Electrode	ϕ6.4mm/ϕ3.2mm	Dedicated electrode
Dimensions (mm)	W72 × D175 × H285	W550 × D150 × H205
Weight	≒2.8kg	≒15kg (Excluding preset holder)

*1: When CYU-60 (Sold separetey) is used.



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.

Hand Piece Type Head

NA-54A, NA-54LA, NA-57A

Handy type models are available for welding in complicated positions or for welding difficult by the fixed heads.

NA-54LA

NA-54A

NA-57A

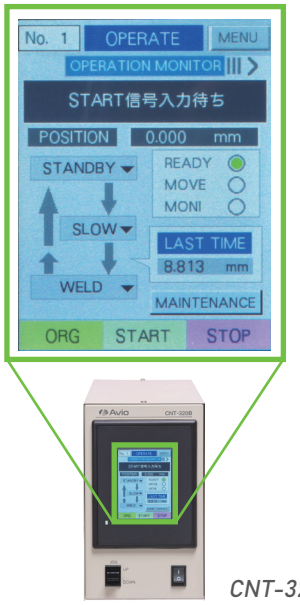
Item	NA-54A	NA-54LA	NA-57A
Pressure Range	7.8-44.1N	7.8-44.1N	9.8-49N
Electrode Stroke	Max. 10mm	—	—
Depth Dimention of Pocket	50mm	—	—
Drive Method	Manual	Manual	Manual
Electrode	EL-125 series	Dedicated for EL-54L	Dedicated for EL-57A
Dimensions (mm)	W30 × D195 × H47	W30 × D195 × H47	ϕ36 × D207
Weld Cable	1500mm	1500mm	1500mm

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

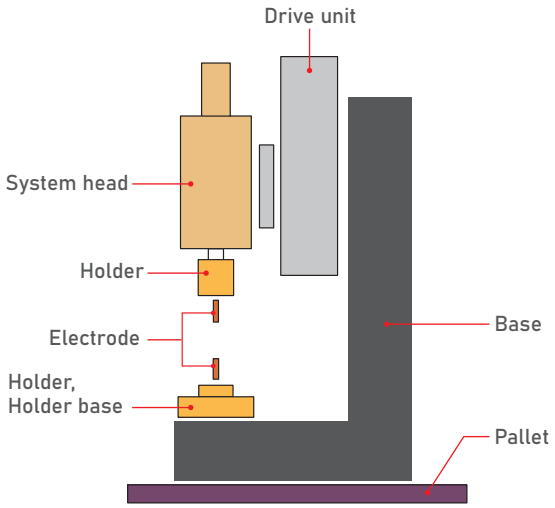
Manual Drive

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

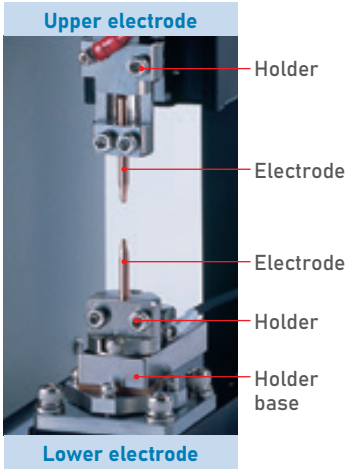
Accessory
System Head Accessory

■ System head basic configuration

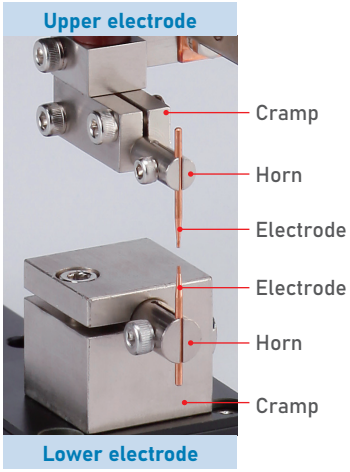


■ Electrode part configuration (Name of each part)

Straight type



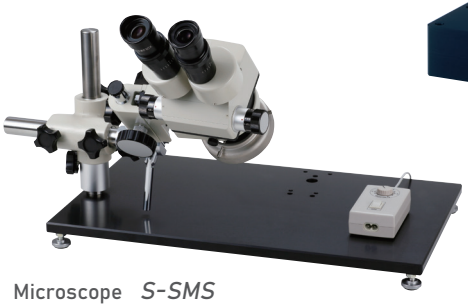
Shift type



Base, Palette, and Microscope set

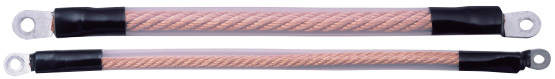
Palette
S-MP,
S302-MP

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

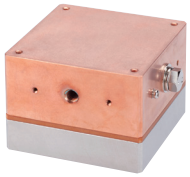
Ex: SFC - 60 - 500 - DD - 99

Material:
SFC, WRC, FMC, EFC

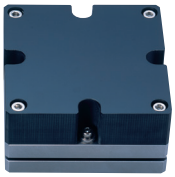
Square: 22, 60, 66, 120mmSQ

Hole size: 7, 9mmϕ

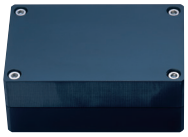
Lower stage



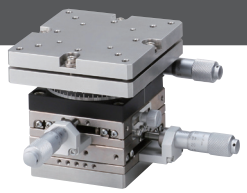
Lower electrode stage
143-BS



Leveling stage
11X-BS-F



Standard stage
11X-BS



Fine adjustment stage
11X-BS-F-MM

Welding Electrode
Materials and Shape of Electrode
Weldability by Resistance Welding for Each Material

■ Materials of Electrode

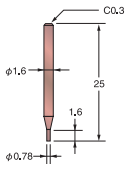
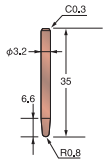
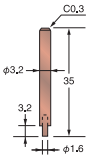
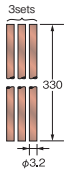
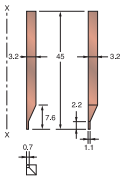
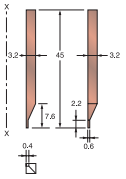
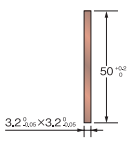
The list below shows rough standards to choose materials for an electrode, though it may be changed according to its surface treatment or dimensions.

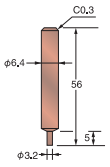
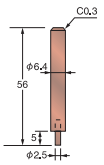
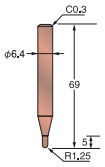
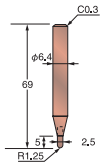
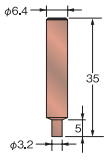
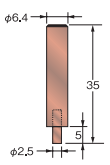
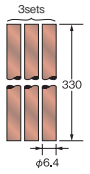
Electrode Number	Alloy Components	Electric Conductivity (IACS%)	Applicable Metal
02 (equivalent to RWMA-2)	Cu-Cr-Zr	around 80%	iron, nickel, chrome and their alloys
03 (equivalent to RWMA-3)	Cu-Ni-Be	around 50%	phosphor bronze, brass
00	pure Mo	around 31%	tinned copper wire, solder plating copper wire
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-250-00SC EH-250-13SC		
CC Alloy (6.4ϕ)		

■ 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												
Phosphor 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

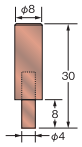
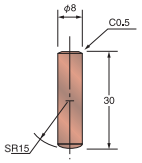
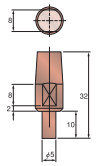
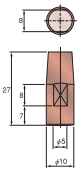
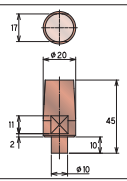
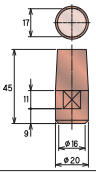
II Cu-Cr-Zr (equivalent to RWMA-2)
III Cu-Ni-Be (equivalent to RWMA-3)
IV Cu30%-W70% (equivalent to RWMA-11)
V W100% (equivalent to RWMA-13)
Mo100%

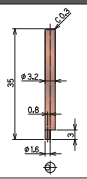
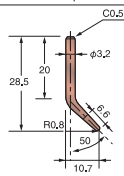
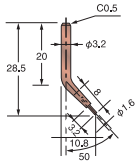
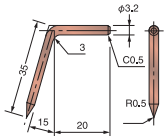
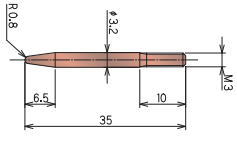
Special Note

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

■ Shape of Electrode

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

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

Electrode Number	Shape	Applicable Weld Head
EH-125-02E EH-125-20E		NA-141 NA-142 NA-143
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

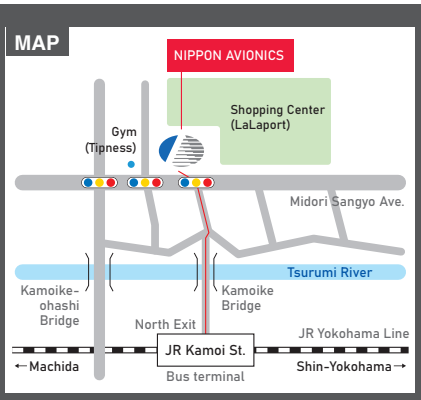
Avio laboratory offers you to perform sample test using actual equipment for welding evaluation and model selection. We also support remote sample test using web conferencing tools. It is also possible to make a test with samples you send, and we return them after the test. Please see our website for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

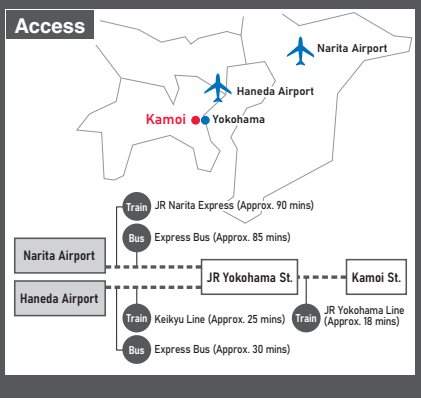
Location of Laboratories

Shin-Yokohama Plant

4206, Ikonobe-cho, Tsuzuki-ku, Yokohama,
224-0053, Japan

Access
7 minutes on foot from JR Kamoi station





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URL https://www.avio.co.jp/english/

⚠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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