# *Micro Resistance Welder Series*

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

## Outline of Avio Micro Resistance Welder

# Avio Offers Welding Solutions Based on Our Wide Product Portfolio and Welding Know-how.

Nippon Avionics Co., Ltd. has been engaged in the technology for joining part to part which is indispensable in “MONOZUKURI (art of manufacturing)” for electronic components, electronic equipment and automobile. Among other things, our resistance welding technology and products which “join metal to metal” that we have accomplishments and experiences over a half century are being used and highly appreciated in various industries. Furthermore, the recent trend for miniaturization, higher performance and clean energy of the electronic equipment, represented by mobile gears, is accelerated, and as a result, material, shape and size of object for resistance welding are being diversified.

Avio will continue to offer most suitable joining solutions satisfying the customers’ requirement in a timely manner in the manufacturing industry where technical innovation is phenomenal.

## ■ What is Resistance Welding?

What is resistance welding which “joins metal to metal”? How can two metals be joined together?

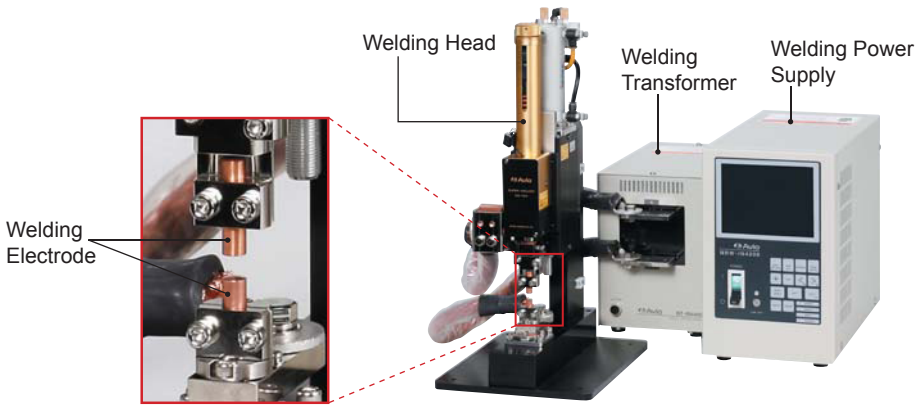
The word “resistance” in “resistance welding” means to resist against certain movement forward. It is associated with heating as in the case of friction heat when a brake is applied.
As seen in the resistance welder model, figure on the right page, electric current is applied while a pressure is applied.
When the electric current tries to advance in a metal, a heat is generated by the resistance of the metal itself and the resistance at the joining section.
The joining section between two metals, in particular, will generate more heat because of higher resistance, and as a result, the two metals are melted and joined together.
This method of joining two metals utilizing resistance heat is called resistance welding.

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Table of Contents

## • Basic Configuration of a Resistance Welder and the Role of Each Part.

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

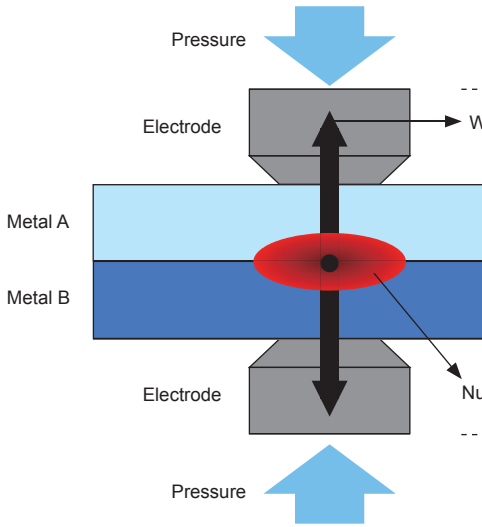



- Welding Power Supply: It controls the magnitude, time and waveform of electric current.
- Welding Transformer: It converts the electric current from the power supply to a larger current.
- Welding Head: It controls the pressure to be applied.
- Welding Electrode: It contacts the object to be welded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

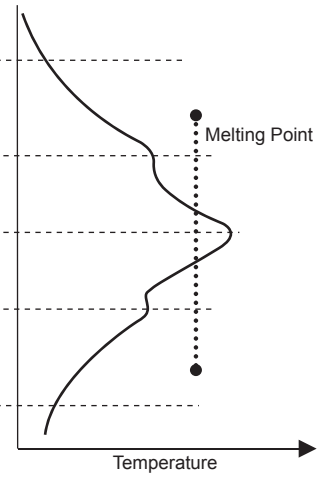
* In addition to the above, we have various monitors which measure electric current or applied pressure.



## • Resistance Welding Model




## • Temperature Distribution at the Welding



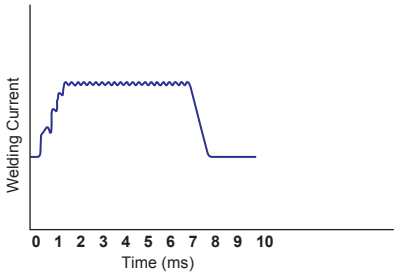
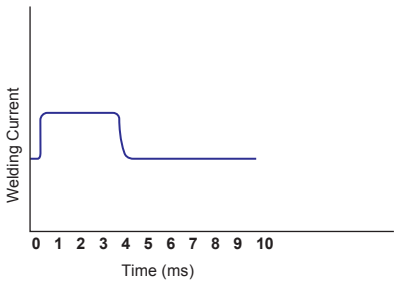
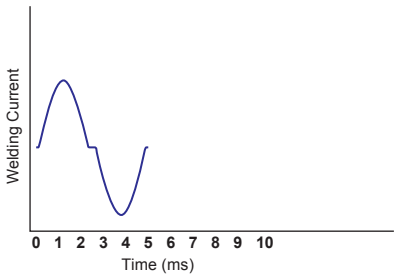
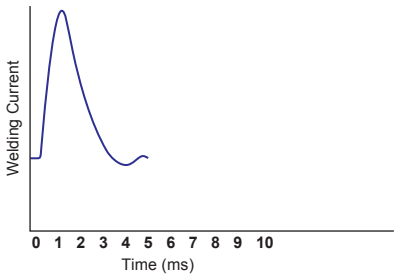
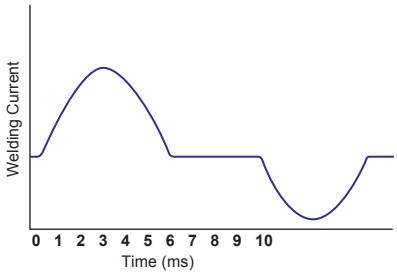


Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Lineup of Resistance Welder

*Welding Power Supply : Control Method*

An appropriate welding power supply must be selected based on the material or shape of the object to be welded and the required welding quality.There are five different types in our welding power supplies based on the type of control of the welding current, and each type is selected in a way to best demonstrate its characteristic in welding.

| Basic System Feature | Welding Current Wave Form | Feature |
|---|---|---|
| Inverter Type  |   | AC current is rectified into DC current. Because of high frequency, heat efficiency is good and suitable to precision welding. Furthermore, stable welding quality can be expected because of the electric current and voltage feedback control. As high speed repetitive welding can be made, it is suitable for use in automated systems. |
| Transistor Type  |   | Electric current is directly controlled by a transistor. Because the control speed is fast and the waveform can be controlled, it is suitable to ultra high precision welding of very small components or extremely ne wires. Stable welding quality can be obtained by the electric current and voltage feedback control. |
| Hybrid Type  |   | Polarity of a large current is switched in high speed by a power transistor. It is called hybrid type because it has a high speed feature of DC and polarity switching feature of AC power supplies. It is suitable for welding of battery tabs where different types of metal are series welded. |
| Capacitor (DC) Type  |   | Electric is charged into a capacitor and discharged at once. Because a large current can be applied, it is used for material which has good heat dissipation characteristic and difficult to weld, such as aluminum or copper. Furthermore, because of the short welding duration, heat impact is minimized, and as a result, it is suitable for welding of small components. |
| Single Phase (AC) Type  |   | Welding current is controlled by a thyristor. Because the welding duration can be made long, it has a broad application, and it is suitable to a material which is relatively easy to weld, such as iron. |

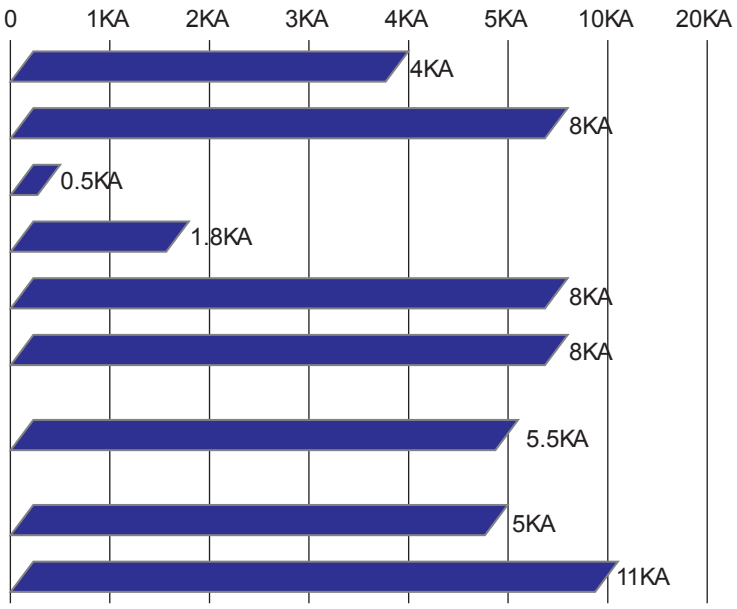
Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Lineup of Resistance Welder

## Welding Power Supply : Welding Current Capacity

After the consideration for control method, select a suitable welding power supply having the appropriate current carrying capacity depending on the size and thickness of the object to be welded.

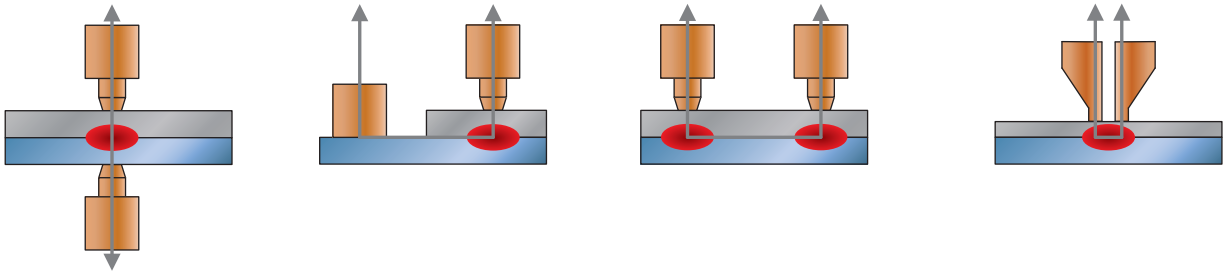
| Type | Power Supply/Transformer |
|---|---|
| Inverter Type | NRW-IN4200/NT-IN4400 |
| | NRW-IN8400/NT-IN8400 |
| Transistor Type | MCW-700/Built-in |
| | MCW-750/Built-in |
| Hybrid Type | NRW-PS300/NT-PS300 |
| | NRW-PS300/NT-PS1500 |
| Capacitor (DC) Type | NRW-DC150/ Built-in |
| Single Phase AC Type | NRW-5A/NT-5A |
| | NRW-25A/ NT-8A |




## Welding Head & Electrode

How the electrode contacts the object to be welded (how to apply the current) is determined by the shape or structure of the object. Furthermore, shape and material of the electrode and the applied pressure are also important factors in resistance welding.

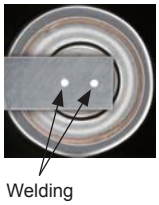
Opposed Type | Indirect Type | Series Type | Parallel Gap Type

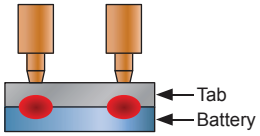


Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

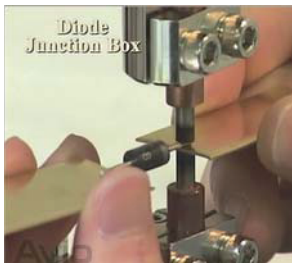
# Applications

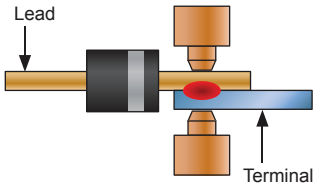
## Battery Pack (Rechargeable Battery + Tab)



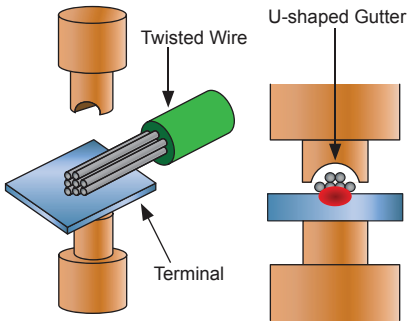




## Lead of Electric Part + Terminal Plate

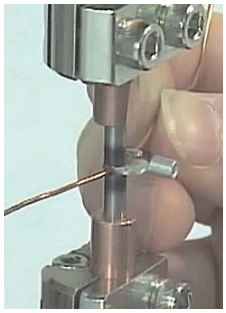


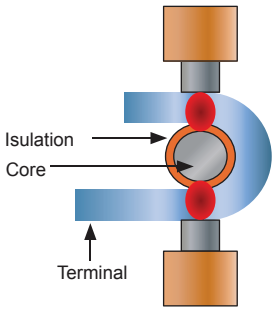




## Twisted Wire + Terminal Plate

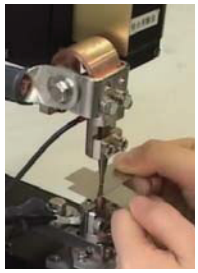


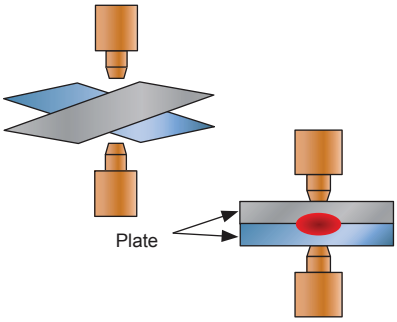

## Insulation Wire + U-Shaped Terminal



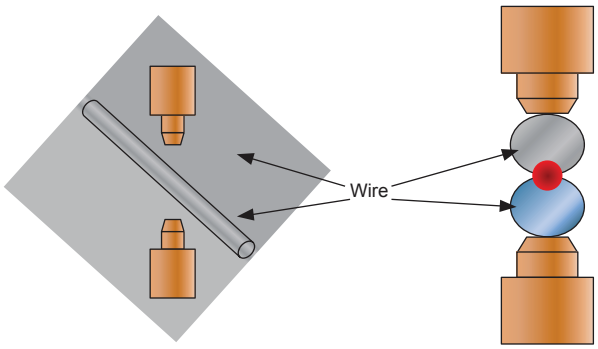



## Plate + Plate





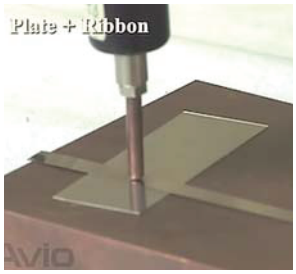

## Wire + Wire

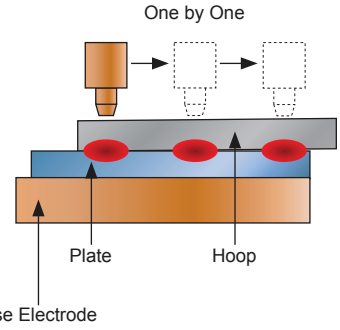



Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

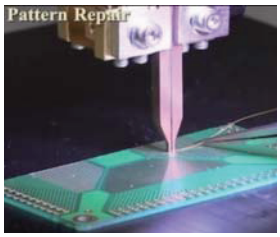
# Applications

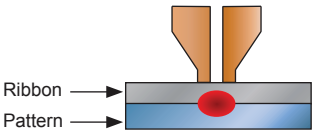
## Plate + Hoop Material



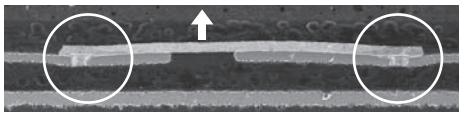




## Pattern Repair

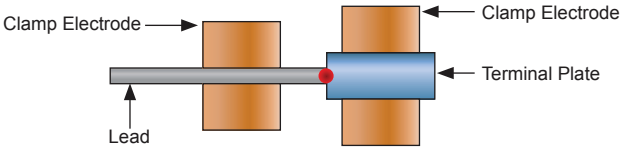


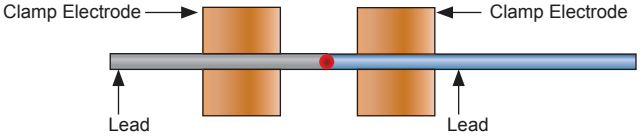

Welding Welding



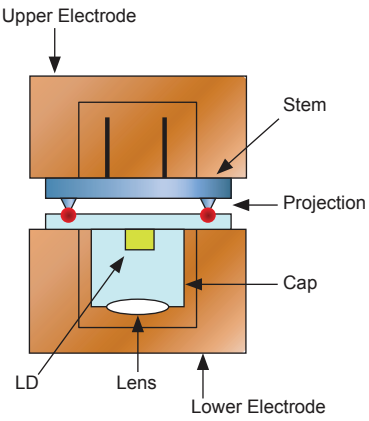
## Lead +Terminal Plate




## Lead + Lead



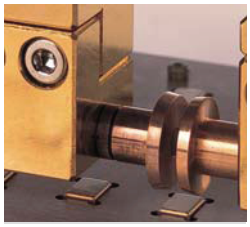

## Can Seal Welding

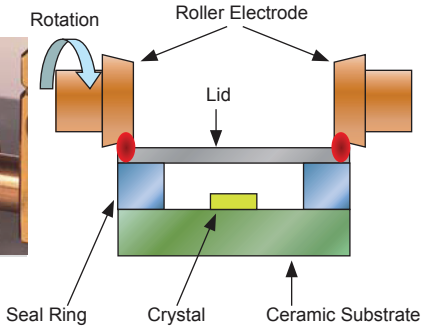



## Lead-frame + Lead-frame




## Seam Welding : Parallel






Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Inverter Type

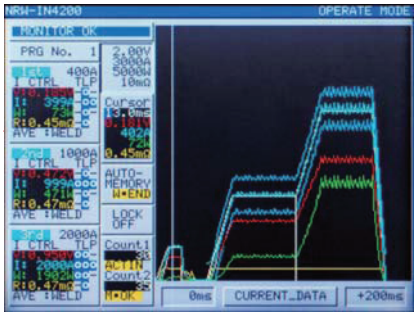
*High Productivity by High Speed Welding!*

This model is the highly efficient welding power supply that adopted an inverter. It responds to the change during welding at real time by fast feedback. The highly stabilized welding current generated by the power supply is optimal to the resistance welding for precision electronic parts.

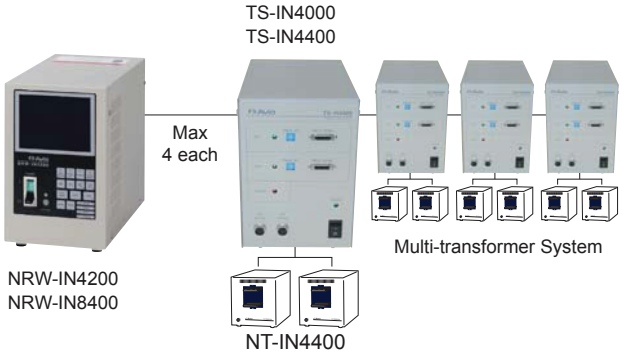
NRW-IN4200/
NRW-IN8400

NT-IN4400/
NT-IN8400

*Graphic Display of Welding Wave Form*




## Multi-transformer System




- Multi control mode (constant-current, voltage, power)
- Pre-weld check function
- Long-time welding (maximum 3sec)
- Support 400V (NRW-IN8400)
- Graphic display of welding wave form on large LCD
- Multi monitoring function
- Welding wave form-Memory function

| Items | NRW-IN4200 | NRW-IN8400 |
|---|---|---|
| Welding Transformer | NT-IN4400 | NT-IN8400/NT-IN4400 |
| Maximum Current | 4000A | 8000A/4000A |
| Control Frequency | 2KHz | |
| Control Mode | Constant Current, Constant Voltage, Constant Power, Fixed Pulse Width | |
| Range of Timer Setting | Pre, 1st, 2nd, UP, WELD, DOWN<br>Total Time 0.5~3000ms | |
| Setting Range for Weld Type | Current : 0.4~4.1KA<br>Voltage : 0.4~4.1V<br>Power : 0.2~8.2KW | Current : 0.4~8.2KA / 0.4~4.1KA<br>Voltage : 0.4~6.2V / 0.4~4.1V<br>Power : 0.2~24.6KW / 0.2~8.2KW |
| Current, Voltage, Power, Resistance, Monitoring | Average / Peak/ Profile | |
| Trace Monitoring | Current, Voltage, Power, Resistance | |
| Display of Wave Form | Current, Voltage, Power, Resistance | |
| Number of Condition | 31 | |
| Interface | RS232C | |
| Power Source | AC200~230V 3φ | AC380~415V<br>Option : AC200~230V 3φ |
| Dimension / Mass | W170×D350×H265mm ≒14Kg | W186×D490×H265mm ≒19Kg |

| Items | NT-IN4400 | NT-IN8400 |
|---|---|---|
| Dimension / Mass | W150×D267×H210mm ≒12Kg | W210×D342×H210mm ≒18Kg |

| Items | TS-IN4000 | TS-IN4400 |
|---|---|---|
| Dimension / Mass | W150×D245×H210mm ≒5Kg | W200×D260×H210mm ≒10Kg |


Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Transistor Type

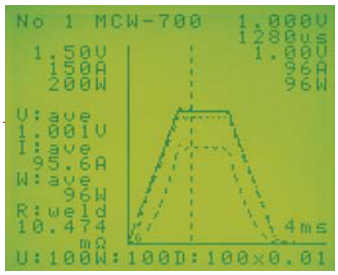
*The Favorite of Precise Welding!*

Transistor type welding power supply is suitable for precise welding of superfine wires and micro components.

## MCW-700 & MCW-750

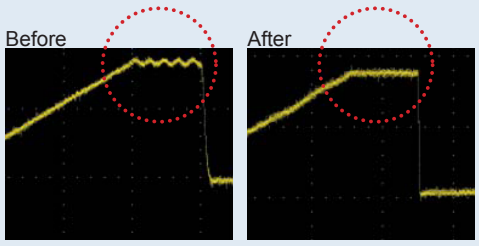
*MCW-700*

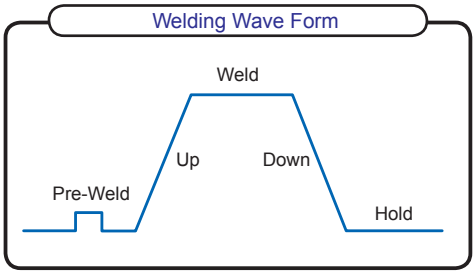
Real Time Welding Wave Form Display




*MCW-750*

■ PID PID Adjustment




- Consistent and precise welding by high speed linear control.
- 3 control modes:constant current, voltage, and power.
- High productivity by high speed welding : 5 shots/sec
- Pre-weld check function reduces spark problem.
- Simultaneous graphic display of V, I and W wave form

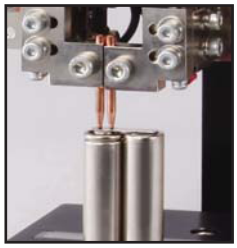
| Items | MCW-700 | MCW-750 |
|---|---|---|
| Maximum Current | 500A | 1800A |
| Maximum Voltage | 2V | 4V |
| Constant Current Mode | 10~500A (1A STEP) | 10~1800A (1A STEP) |
| Constant Voltage Mode | 0.001~2V (1mV STEP) | 0.01~4V (10mV STEP) |
| Constant Power Mode | 10~500W (1W STEP) | 10~3600W (1W STEP) |
| Weld Time : Up | 0~999×0.01ms or ×0.1ms | |
| Weld Time : Weld | 0~999×0.01ms or ×0.1ms | |
| Weld Time : Down | 0~999×0.01ms or ×0.1ms | |
| Weld Time : Squeeze & Hold | 9.99s (maximum) | |
| Pre-check | Resistance / Current | Resistance / Current |
| Shot / Sec | 5shots/sec : 500W 2ms | 5shots/sec : 3600W 2ms |
| Monitor : Wave form | Current / Voltage / Power | Current / Voltage / Power |
| Monitor : Current | Average/Peak | Average/Peak |
| Monitor : Voltage | Average/Peak | Average/Peak |
| Monitor : Power | Average/Peak | Average/Peak |
| Number of Conditions | 15 | 15 |
| Interface | RS-232C, I/O, analog output | RS-232C, I/O, analog output |
| Power Source (Option) | AC100~120V (AC200~240V) 1φ | AC100~120V (AC200~240V) 1φ |
| Dimension | W200×D350×H300mm | W200×D350×H400mm |
| Mass | ⊠20Kg | ⊠27Kg |


Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Hybrid Type

Suitable for Battery Tab Welding with Advanced Functions.

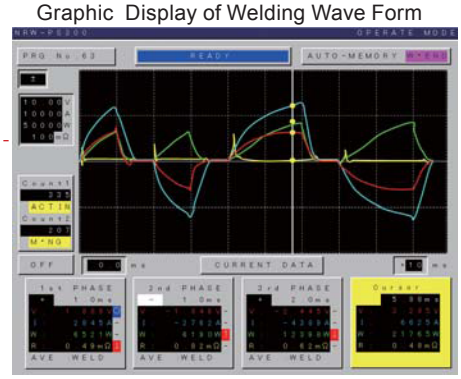
## NRW-PS300 / NT-PS300



Welding Power Supply
NRW-PS300

Welding Transfomer
NT-PS300

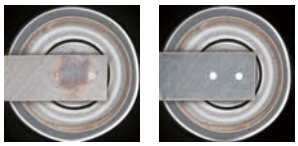
Graphic Display of Welding Wave Form



### ■ Good Welding Appearance and Well-formed Welding

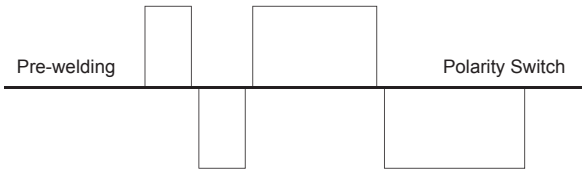
Polarity Switch Function

(without) (with)



### ■ Variety of Welding Modes for Stable Welding

Example for 4CH Welding




- Fast Welding: Good welding performance and less thermal effect with high speed rising time and polarity switch
- Polarity Switch: Well-uniformed welding and improvement of longer electrode lifetime
- 4 Pulse: Pre-weld and other variety of welding modes suitable for many applications
- Energy Monitoring: High quality welding with automatic welding stop function to prevent over-energy
- Welding Waveform Memory: Easy setting of welding condition with welding waveform shown on LCD

| Items | Specifications | |
|---|---|---|
| Welding Power Supply | NRW-PS300 | |
| Welding Transformer | NT-PS300 | |
| Control Method | IGBT Control (Polarity Switch) | |
| 2ndary Short-Circuit Current | 8000A | |
| Maximum Output Power | 300WS • Considerable | |
| Setting Range | Weld Time<br>Transformer Tap | Total 0.0~60.0ms<br>2.5V, 5.0V, 7.1V, 10.0V |
| Number of Condition | 63 | |
| Monitoring | V, I, W, R (Average, Peak) W • S (Phase Shift) | |
| I/O Interface | I/O connector (50pin), EXT_ I/O (12pin) | |
| Communication | RS232C | |
| Dimension / Mass | Power Supply: W186×D490×H265mm, ☐19Kg<br>Transformer: W210×D300×H210mm, ☐28Kg | |
| Power Source | 3φ AC380~415V±5%<br>(Option: 3φ AC200~230V±10%) | |

The Other Transformer

| Items | NT-PS1500 | NT-PS1500H |
|---|---|---|
| 2ndary Short-Circuit Current | 8000A | 8000A |
| Maximum Output Power | 1500WS • Considerable | 1500WS • Considerable |
| Transformer Tap | 2.5V, 5.0V, 7.1V, 10.0V | 10.0V, 14.1V, 20.0V, 28.3V |
| Dimension / Mass | W230×H240×D380mm ☐52Kg | W230×H240×D380mm ☐53Kg |

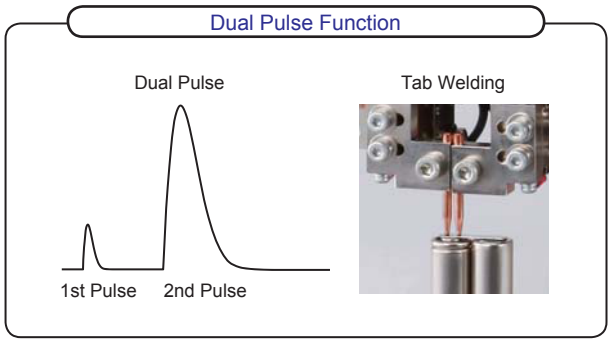
Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

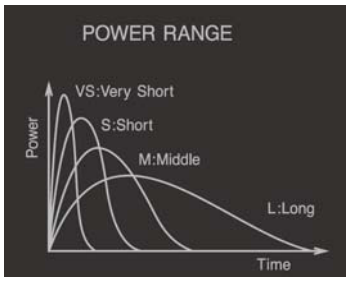
# Capacitor (DC) Type

*Suitable for Welding of Battery Tab, Aluminum and Copper.*

## NRW-DC150


NRW-DC150




■ Rapid Release of Energy Using High Capacitance Energy Storage

- Dual Pulse Function Minimizes Welding Spark and Improves Welding Quality
- Suitable for Aluminum, Copper, as well as other Welding Materials
- Deformation and Burning is Minimized due to Short, Concentrated Energy Burst
- Fast charging time improves productivity (Welding Speed 75W • S 120Shots/min)
- VS(Very Short) mode allows to obtain peak welding current same as 200W • S type

| Items | Specifications |
|---|---|
| Type | NRW-DC150 |
| Welding Transformer | (Buil-in Type) |
| Stored Energy | 1-150W • S (0.1Step) |
| Maximum Output Power | VS Pulse5500A 2.1ms<br>S Pulse4500A 3.2ms<br>M Pulse3600A 4.3ms<br>L Pulse2600A 6.2ms |
| Duty Cycle | 25W • S200 shots/min<br>75W • S120 shots/min<br>150W • S80 shots/min |
| Dual Pulse Function | Standard Specification |
| Squeeze Time | 0.01~9.99sec |
| Hold Time | 0.01~9.99sec |
| Dimension / Mass | W220×D400×H347mm / 31kg |
| Power Source | AC200~230V ±10% 1φ<br>Option AC100V |

■ Step Up Transformer

| Items | ST-U200 |
|---|---|
| Rated capacity | 2KVA |
| Input | AC100V 1Φ 50Hz/60Hz 20A |
| Output | AC200V 1Φ 50Hz/60Hz 10A |
| Dimension / Mass | W140×H181×D230mm 16Kg |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Single Phase (AC) Type

## *Most Suitable for Welding Large Parts!*

A single-phase AC type welding machine suits the welding to thick plate and copper stranded cable as it can adjust weld time more wide range than an electrostatic stored energy type. Its characteristic of low peak current gets little effect of dirt or stain on the surface of the work-piece, accordingly it is effective welding process when the derivation of the weld spattering and burrs, that are produced especially in the weld schedule of preheating or up slope welding, cause troubles. Power is demonstrated.

* Burr: Aprotrusion shaping like hair spring produced during welding. Fin.

**Welding Power Supply**

*NRW-5A*

*NRW-25A*

**Welding Transformer**

*NT-5A*

*NT-8A*

*NT-5M*

- Most suitable for the automatic machines because small size and various welding function. (pre-heating, up-slope, cooling time)
- The actuation control for the welding head is available by squeeze and holding functions.
- Automatic switching function for 2 kinds of setting conditions is provided.
- A compensation circuit for the power source voltage is built-in.

| Items | NRW-5A | NRW-25A |
|---|---|---|
| Control System | Synchronized | |
| Range of Heat Control | 40-100% | |
| Welding Time | 0.5-99 cycles | |
| Squeeze, Hold Time | 0-99 cycles | |
| Welding Function | pre-heating, up slope, cool time, channel switching function | |
| Rated Capacity | 3KVA (50% duty cycle)<br>9.5KVA (5% duty cycle) | 6KVA (50% duty cycle)<br>19KVA (5% duty cycle) |
| Power Source | AC200V±10% 50/60Hz 1φ (OP : AC100-120V. 220-240V) | |
| Dimensions/Mass | W110×D315×H227mm ⊠6kg | W150×D315×H227mm ⊠7.8kg |

| Items | NT-5A | NT-8A | NT-5M |
|---|---|---|---|
| Primary Input Voltage | 200V | 200V | 200V |
| Rated Input capacity (duty cycle 50%) | 3KVA | 6KVA | 2.8KVA |
| Secondar Short-circuit Current | 5000A | 11000A | 2400A |
| Secondary Open-circuit Voltage | 1.1, .8, 3, 5 (V) | 1.8, 3,5 (V) | 6, 6.5, 7, 7.5 (V) |
| Dimensions / Mass | W200×D350×H265mm ⊠29kg | W230×D566×H335mm ⊠47kg | W200×D350×H265mm ⊠28kg |


■ Step Down Transformer

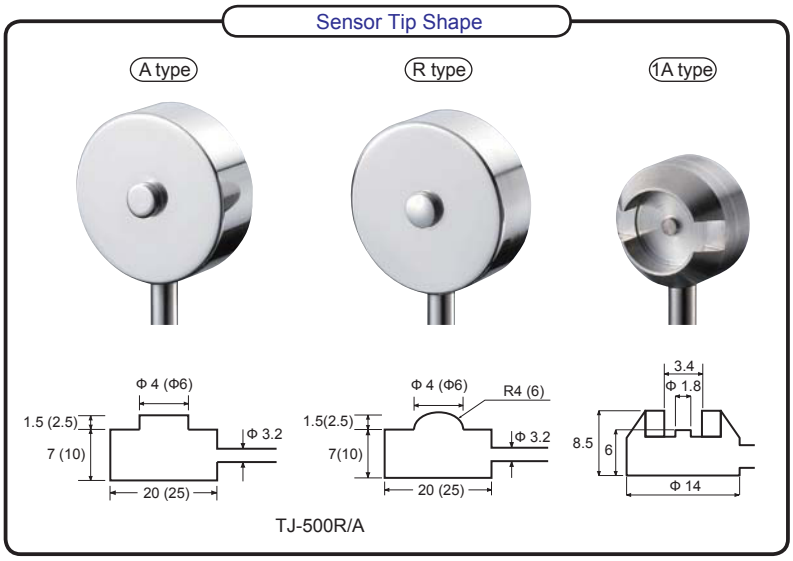
| Items | ST-100 | ST-200 |
|---|---|---|
| Primary Input Voltage | 115V / 230V | 220V / 230V |
| Rated Input Capacity | 1KVA | 6KVA |
| Secondary Open-circuit Voltage | 100V | 200V |
| Dimensions / Mass | W130×D230×H193mm ⊠11kg | W130×D260×H193mm ⊠12kg |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Digital Force Gauge

*Compact, Light Weight and Handy Type*

## FG-400 & TJ series


FG-400 and TJ series are sold separately.

- Compact, Light weight.
- 3Way power supply
- Display hold function is equipped.
- Easy zero adjustment function.
- Automatic recognition of the type of sensor.
- Judgement function (Hi&Low) is equipped.

| Items | FG-400 |
|---|---|
| Display | 4 digit (0000-9999) N:newton |
| Zeroing Adjustment | Automatic regulation by switching |
| Hold Function | sample/peak |
| Interface | RS-232C |
| Power Source | 1φ (AC100V~240V) Use by AA type buttery, Ni-H type buttery or Dedicated AC adapter |
| Dimension / Mass | W77×D140×H27mm 300g |

| Items | TJ-1A | TJ-20R or TJ-20A | TJ-100R or TJ-100A | TJ-500R or TJ-500 |
|---|---|---|---|---|
| Measuring Range | 0~10N | 0~196N | 0~980N | 0~4900N A |
| Critical Load | 20N | 294N | 1470N | 7350N |
| Accuracy | ±2% (of full scale) | | | |

■ Pressure Sensor for Incorporation into Equipment.

| Items | Force Sensor TJS-1R | Force Sensor TJS-20R | Force Sensor TJS-100R |
|---|---|---|---|
| Measurement Range | 0~10N | 0~196N | 0~980N |
| Critical Load | 20N | 294N | 1470N |
| Accuracy | ±3%(of full scale) | | |

Pressure sensor for NA-124 will be treated as a custom order.

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Welding Monitor

*Monitoring of Welding Current*

## Welding Monitor


*QC-440*

■ Toroidal-coil

×1(option)

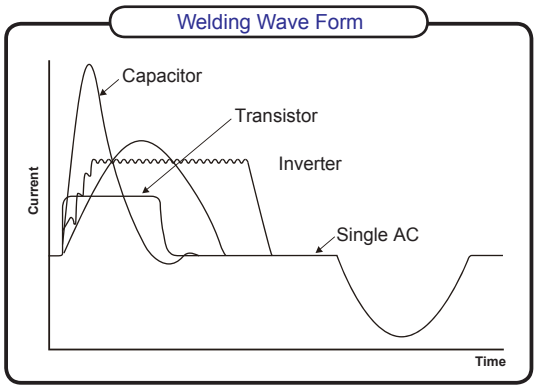
*Coil 9*

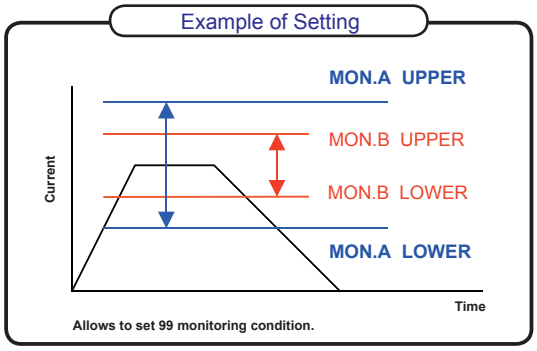
×10(option)

*Coil 10*

■ Powerful Functions for Quality Management.

- Allows to monitor various sorts of wave form of welding current
- Allows to set 2 monitoring criteria for an individual welding.




| Items | Specifications |
|---|---|
| Type | QC-440 |
| Wave Form | Single AC Type, Capacitor Type, Inverter Type, Transistor Type |
| Current | 0.50~45.0KA |
| Time | 0.5~99.5cycle (0.5cycle step) 1~199msec (capacitor mode 1ms Step) |
| Displacement | Measurement Range -99.99 ~ 99.99mm or -9.999 ~ 9.999mm |
| Accuracy | Current ±2% (F.S) Time±0% |
| Judgement Items | Current: over, under (3digits)<br>Time: over, under (Cycle: 2digits msec: 3digits)<br>Displacement: over, under (4digits)<br>* With GOOD or NG Signal Output Function |
| Display Items | Chanel, Current Value (A/B), Time (A/B), Analog Input |
| Number of Monitoring Conditon | 2* 99 Channels |
| Data Strage Capacity | 2000 shoots |
| Counter | 0~99,999 |
| Interface | RS-485-compliant |
| Printer | Interval Printing Function, Memory Printing Function |
| Toroidal-coil | Sensitivity: ×1(Option), ×10 (Option) |
| Power consumption | 80VA |
| Power Source | AC100~240V ±10% 50/60Hz |
| Dimension | W141×H303×D344mm |
| Mass | ≒4.5Kg |


Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Welding Monitor

*Monitoring of Displacement and Force*

## Force Monitor

■ Best for Automation!


*QC-100*


- Selectable display: digital or graphic
- Easy automation by combination with system head.
- Easy QC by enhancement of communication function. (Output of measured value & Monitoring result)
- Easy installation of force sensor

## Displacement Monitor


*QC-200*


- Selectable display: digital or graphic
- High accuracy measurement for displacement of welding material.
- Wave analysis by graphic display. (High speed sampling at 2000 times/sec)
- Measurement & judge by 2 conditions for welding process. (Measurement & judge for before/after welding)

| Items | Force Monitor QC-100 | Displacement Monitor QC-200 |
|---|---|---|
| Measurement Range | 0~1,000N | 0~7.5mm Resolution: 1μm |
| Accuracy | ±3% (of full scale) | ±1% (of full scale) |
| Sampling Time | 0.5ms (2,000times/sec) | |
| Squeeze, Hold Time | 0~0.9sec | |
| Interface | RS-232C, I/O, Analog Output | |
| Power Source | DC24V ±10% 2A | |
| Dimension/Mass | W170×D210×H150mm ≒3.0kg | W170×D210×H150mm ≒3.4kg |

■ Pressure Sensor for Incorporation into Equipment.

| Items | Force Sensor TJS-1R | Force Sensor TJS-20R | Force Sensor TJS-100R |
|---|---|---|---|
| Measurement Range | 0~10N | 0~196N | 0~980N |
| Critical Load | 20N | 294N | 1,470N |
| Accuracy | ±3%(of full scale) | | |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# System Head

*Stable Pressurizing by the Small and High Performance Head*

## Opposed Type

*NA-121*

*NA-122*

*NA-124*

*NA-125*

| Items | Opposed Type | | | | |
|---|---|---|---|---|---|
| | NA-121 | NA-122 | NA-123 | NA-124 | NA-125 |
| Pressure Range (Way) | 0.7-5N (Spring) | 5-65N (Spring) | 20-150N (Spring) | 40-300N (Spring) | 100-600N (Spring) |
| Dimension / Mass | W74×D48×H285mm ≒0.6kg | W82×D50×H301mm ≒0.8kg | W82×D50×H301mm ≒0.8kg | W97.8×D56.6×H326mm ≒1.5kg | W212.2×D204.0×H794.5mm ≒21.5kg |
| Drive Method | Φ1.6 Electrode Option: Motor, Air, Manual | Φ3.2 Electrode Attached Option: Motor, Air, Manual | Φ6.4 Electrode Attached Option: Motor, Air, Manual | Φ6.4 Electrode Attached Option: Air | EH-F-02 Attached |

## Parallel Gap Type

*NA-131*

*NA-132*

## Series Type

*NA-142*

*NA-143*

| Items | Parallel Gap Type | | Series Type | | |
|---|---|---|---|---|---|
| | NA-131 | NA-132 | NA-141 | NA-142 | NA-143 |
| Pressure Range (Way) | 0.7-5N (Spring) | 5-65N (Spring) | 0.5-5N (Spring) | 5-65N (Spring) | 40-150N (Spring) |
| Dimension / Mass | W76×D51×H299mm ≒0.7kg | W76×D51×H299mm ≒0.7kg | W135.2×D49.8×H268mm ≒1.3kg | W152.2×D49.8×H268mm ≒1.6kg | W174.2×D61.8×H302mm ≒2.7kg |
| Drive Method | Electrode Attached Option: Motor, Air, Manual | Electrode Attached Option: Motor, Air, Manual | Φ3.2 Electrode Attached Option: Motor, Air, Manual | Φ3.2 Electrode Attached Option: Motor, Air, Manual | Φ3.2 Electrode Attached |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Drive Unit

*Motor Drive, Air Drive and Manual Drive*

## Motor Drive & Controller

### NA-201 & CNT-310

- Equiped with soft landing & teaching function.
- Operation speed can be switched by 5 step.
- Operation position can be set by 4 points.
- Timing of welding can be confirmed by LED.

*NA-201* *CNT-310*

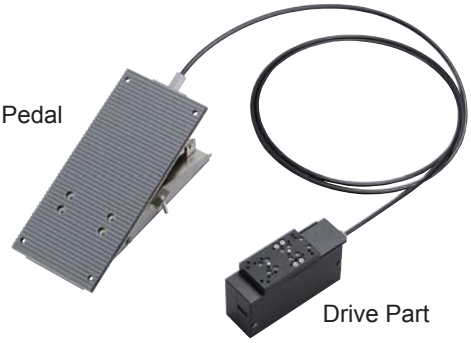
| Items | NA-201 & CNT-310 | |
|---|---|---|
| Drive Method | Pulse Motor | |
| Stroke | Max 50mm, 10μm Step | |
| Power Source | DC24V±10% 2A Option: AC Adapter AC100-240V | |
| Dimension/Mass | NA-201→W50×H320×D82.5mm ≒2Kg | CNT-310→W80×H188×D211mm ≒2Kg |

## Air Drive

### NA-221, 222


## Manual Drive

### NA-231



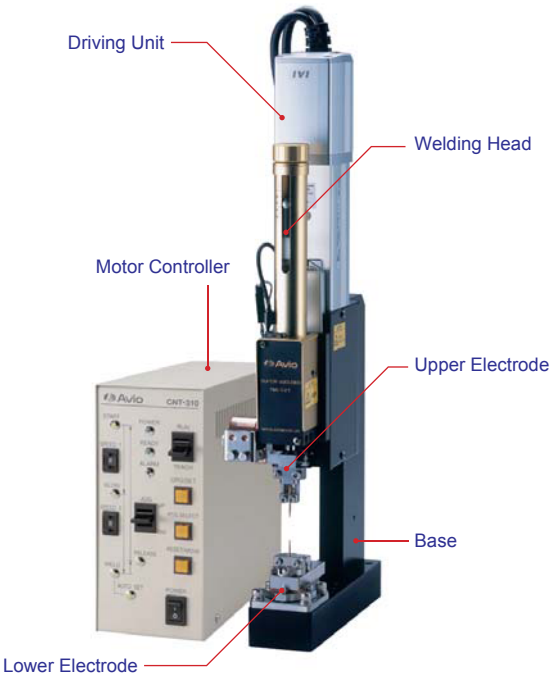

| Items | NA-221 | NA-222 |
|---|---|---|
| Drive Method | Air | Air |
| Stroke | Max 50mm | Max 50mm |
| Speed Control | with Speed Control (Φ4mm Tube) | with Speed Control (Φ6mm Tube) |
| Air Pressure | 0.05 - 0.6MPa | 0.4 - 0.6MPa |
| Dimension/Mass | W78×H280×D83mm ≒1.3Kg | W86×H289×D85mm ≒2.2Kg |

| Items | NA-231 | |
|---|---|---|
| Drive Method | Manual by Foot Pedal | |
| Stroke | Max 10mm | |
| High Control | Range 40mm | |
| Dimension/Mass | Drive Part→W51×H192×D79mm ≒1Kg | Foot Pedal→W124×H125×D268mm ≒2.2Kg |

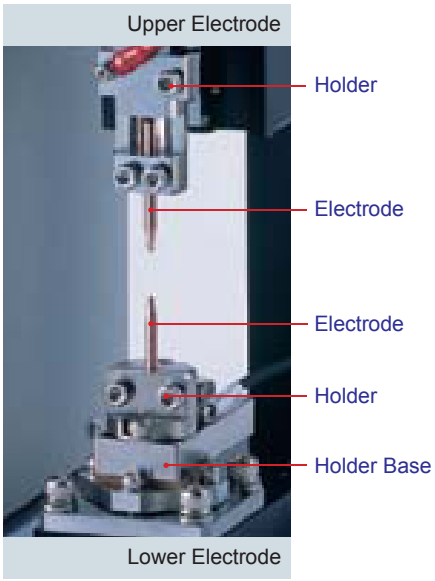
Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

## *Electrode Accessories*

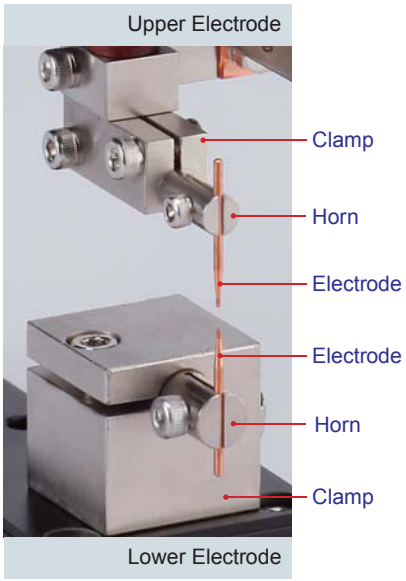
### ■ System Head Basic Configuration




### ■ Straight Type




### ■ Shift Type




### ■ Upper Electrode Accessory

| Head | Electrode(CrCu) | Electrode(Mo) | Type | Holder/Horn | Clamp |
|---|---|---|---|---|---|
| NA-121 | EH-062-02 | - | Straight | S121-16THD* | - |
| | | | Shift | S121-16HORN | S121-CLMP |
| | EH-125-02 | EH-125-00 | Straight | S121-32THD | - |
| | | | Shift | S121-32HORN | S121-CLMP |
| NA-122 | EH-125-02 | EH-125-00 | Straight | S122-32THD* | - |
| | | | Shift | S122-32HORN | S122-CLMP |
| | EH-250-02S | EH-250-00S | Straight | S122-64THD | - |
| | | | Shift | S122-64HORN | S122-CLMP |
| NA-124 | EH-250-02S | EH-250-00S | Straight | S124-64THD | - |
| | EH-60-C | EH-80-00 | Straight | S124-80THD* | - |

* The mark is attached as a part of welding head.

### ■ Lower Electrode Accessory

| Head | Electrode(CrCu) | Electrode(Mo) | Type | Holder/Horn | Holder Base/Clamp |
|---|---|---|---|---|---|
| NA-121 | EH-062-02 | - | Straight | S12X-16BHD | 12X-B-F |
| | | | Shift | S12X-16BHORN | 12X-BS |
| | EH-125-02 | EH-125-00 | Straight | S12X-32BHD | 12X-B-F |
| | | | Shift | S12X-32BHORN | 12X-BS |
| NA-122 | EH-125-02 | EH-125-00 | Straight | S12X-32BHD | 12X-B-F |
| | | | Shift | S12X-32BHORN | 12X-BS |
| | EH-250-02S | EH-250-00S | Straight | S12X-64BHD | 12X-B-F |
| | | | Shift | S12X-64BHORN | 12X-BS |
| NA-124 | EH-250-02S | EH-250-00S | Straight | S12X-64BHD | 124X-B-F |
| | EH-60-C | EH-80-00 | Straight | S12X-64BHD | 124X-B-F |

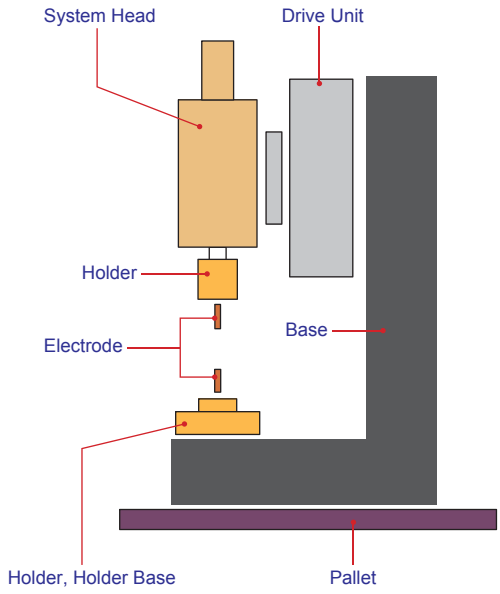
* 1 Leveling type.
* 2 Copper base.

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Accesory

## *System Head Accessories*

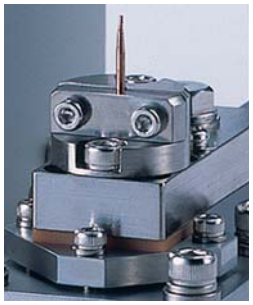
■ System Head Basic Configuration



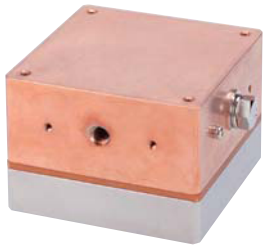

### Lower Holder Accessory

Lower Holder
S12X-16BHD

Lower Holder Base
12X-B-F



Lower Electrode Stage
143-BS



### Lower Stage

Stage 11X-BS

Leveling Stage 11X-B-F

11X-BS-F-MM

## Base, Pallet and Microscope Set

Base
NA-301, 302

Pallet
S-MP, S302-MP

Microscope, Microscope Mounting Stand, LED Light, Pallet

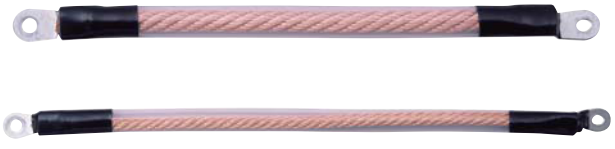
S-SMS,
S-SMS-MS,
S-SMS-LED

## Weld Cable

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

Ex: SFC - 60 - 500 - DD - 99

Square: 22, 60, 120mmSQ  Hole Size: 7, 9mm



■ Example for Repair of PWB

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Welding Head

## *Welding Head*

General Purpose Type

### NA-60A

- NA-60A is general purpose weld head which application is widened from various kinds of electronic parts that require reliability and accuracy, that is, switches, relay contacts, watches, components among camera etc. and various kinds of mechanical parts.

High Pressurization Type

### NA-72

- NA-72 is suited to the welding of the mechanical parts or thick stranded wires that need more strong electrode force.

Horizontal Pressurization Type

### NA-43

- NA-43 is also used for automation machines due to adoption of a floating system, which rarely does not produce dislocation, and an air drive unit as standard equipment.

| Items | NA-60A | NA-72 | NA-43 |
|---|---|---|---|
| Pressure Range | 9.8-132.3N | 98-588N | 88.2-294N |
| Electrode Stroke | max12mm | max30mm | max12mm |
| Depth Dimesion of Pocket | 98mm | 160mm | - |
| Driving Method | Foot *1/Air *3 | Air *2 | Air *2 |
| Diameter of Electrode | φ6.4mm/φ3.2mm | φ10mm | φ6.4mm |
| Dimension/Mass | W72×D175×H285mm ≒2.8kg | W107×D240×H615mm ≒19kg | W248×D240×H319mm ≒11kg |

*1 A foot-operation pedal is option.
*2 Applicable hose:internal diameterΦ9mm
*3 Air drive operatio n is option.

Hand Piece Type

### NA-54A, NA-54LA, NA-57A, NA-58A

- The welding machine series of various handy types are arranged to weld a difficult object to weld by a fixed type weld head like at a jamming area. No side-to-side rocking motion of electrodes. Operable with light power due to its compact and lightweight size.

*NA-54A*

*NA-54LA*

*NA-57A*

*NA-58A*

| Items | NA-54A | NA-54LA | NA-57A | NA-58A |
|---|---|---|---|---|
| Pressure Range | 7.8-44.1N | 7.8-44.1N | 9.8-49N | manual |
| Electrode Stroke | max 10mm | - | - | max1mm |
| Depth Dimension of Pocket | 50mm | - | - | 75mm |
| Driving Method | manual | manual | manual | manual |
| Applicable Electrode | EL-125 series | EL-54L | EL-57A Specialized for NA-57A | EL-58A Specialized for NA-58A |
| Dimensions | W30×D195×H47mm | W30×D195×H47mm | 36φ×D207mm | W24×D16×H157mm |
| Weld Cable | 1500mm | 1500mm | 1500mm | 1100mm |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# 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 sample test for you.
* RWMA for the electrode material indicates the specifications by The Resistance Welding Manufacturing Alliance.

| | W Mo | | Ni alloy | | Ni | | SUS | | Fe (Ni) | | Fe (Zn) | | Fe (Sn) | | Fe | | PB | | Ni-Ag | | 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 | II | 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 | II | 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 | | | | | | |
| | II | 3 | II | | II | 3 6 10 | II | 3 4 2 | II | 3 4 | II | 3 4 9 | II | 3 4 9 | II | 3 4 | II | 5 6 | II | 6 | II | 6 | II | 6 | II | 2 | | | | | | |
| Brass | | | D | II | D | II | H | II | H | II | E | II | E | II | E | II | C | II | C | II | C | II | C | II | | | | | | | | |
| | | | II | 6 | II | 6 10 | II | | II | | II | 6 | II | 6 | II | 3 4 | II | 1 | II | 1 | II | 1 | II | 1 | | | | | | | | |
| Cupronickel | | | C | II | C | II | 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 | II | 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 | II | | 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 | II | 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**

| | |
|---|---|
| I | Cu-Cr-Zr (RWMA-2) |
| II | Cu-Ni-Be (RWMA-3) |
| III | Cu30%-W70% (RWMA-11) |
| IV | W100% (RWMA-13) |
| V | Cu30%-W70% (RWMA-11) |
| VI | W100% (RWMA-13) |

**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. |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

# Welding Electrode

## Materials and Shape of Electrode

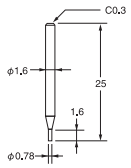
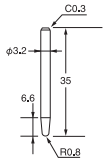
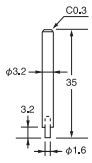
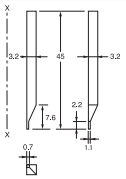
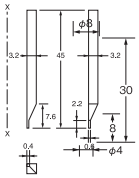
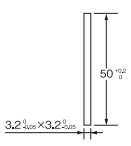
■ Materials of Electrode

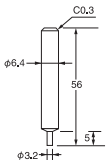
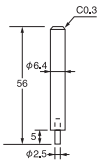
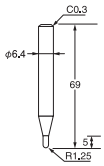
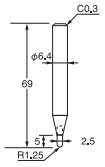
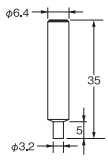
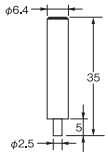
| Electrode Number | Alloy constituent | (IACS%) |
|---|---|---|
| 02 (RWMA-2) | Cu-Cr-Zr | 80% |
| 03 (RWMA-3) | Cu-Ni-Be | 50% |
| 00 | Mo | 31% |
| 11 (RWMA-11) | Cu(30%) - W(70%) | 46% |
| 13 (RWMA-13) | W | 32% |
| 20 | $Cu\text{-}Al_2O_3$ | 80% |

RWMA: The Resistance Welding Manufacturing Alliance
IACS: International Annealed Copper Standard

Example EH - 250 - 02
Shape / Dimension / Material

■ Shape of Electrode

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

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

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

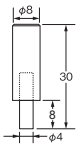
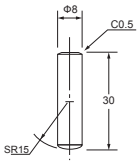
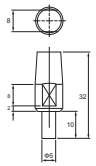
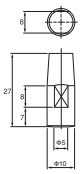
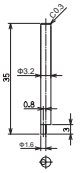
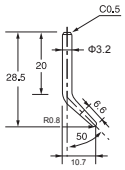
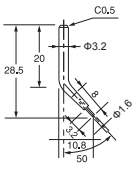
# Welding Electrode

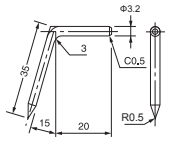
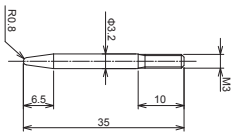
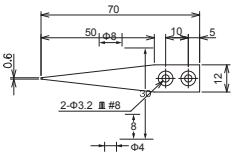
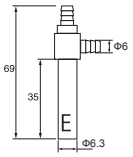
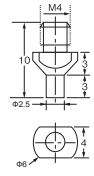
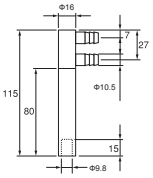
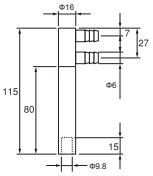
## ■ Materials of Electrode

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-$Al_2O_3$ | around 80% | Battery Tab |

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

| Electrode Number | Shape | Applicable Weld Head |
|---|---|---|
| EH-80-00 |  | NA-124 |
| EH-60C |  | |
| EH-F-00 |  | NA-125<br>NA-72 |
| EH-F-02 |  | |
| EH-125-02E<br>EH-125-20E |  | NA-141<br>NA-142<br>NA-143 |
| EL-125-02A<br>EL-125-03 |  | NA-54A |
| EL-125-00A<br>EL-125-11A<br>EL-125-13A |  | |

| Electrode Number | Shape | Applicable Weld Head |
|---|---|---|
| EL-54LA |  | NA-54LA |
| EH-57A-02A |  | NA-57A |
| EH-58A-02 |  | NA-58A |
| EHC-250M4 |  | NA-60A |
| WT-M25M4-00<br>WT-M25M4-02 |  | Water Cooling Shank |
| EHC-F |  | NA-72<br>Water Cooling Shank |
| EHM-72 |  | NA-72<br>Water Cooling Shank Set |

Contact: Soltec Corporation • 12977 Arroyo Street • San Fernando, CA 91340-1548
Tel: (800) 423-2344 Ext. 411 • (818) 365-0800 Ext. 411 • Fax: (818) 365-7839
Sales@SoltecCorp.com • www.SoltecCorp.com

Manufactured by: Nippon Avionics Co., Ltd. (AVIO)

Contact:
SOLTEC Corporation
12977 Arroyo Street
San Fernando, CA 91340
Tel (800 423-2344 ext. 411
(818) 365-7839 ext. 411
Fax: (818) 365-7839
Email: Sales@SoltecCorp.com
www.SoltecCorp.com

⚠ 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 fire, an electric shock, trouble etc.