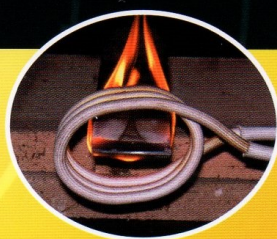


晶體式 高週波加熱機

Solid State High-Frequency-Heater

高频加热机

低用電量 Energy Saving 任何金屬可熱 Heating Any Metal



大憲光學 企業股份有限
東莞市電友實業有限公司
泰國大憲企業股份有限公司

www.phonor.net

中週波加熱機 30~50KHz Medium Frequency Induction Heater M-Cube

適用於焊接，熱鍛，熔煉，回火軟化，或較大物件加熱。
Brazing, Forging, Melting, Annealing, or any bigger pieces heating.

高週波加熱機簡述:

高週波加熱機乃以電磁效應原理，非接觸性之感應加熱，可穿透非金屬容器而對任何金屬(鐵、銅、鋁、金...)加熱。採用晶體技術及極小而堅固之機體設計。(異於其他廠牌。此整體密閉設計無須外部空氣冷卻，是故免受外部，酸氣、油煙、及粉塵污染，確保機件壽命)。由微電腦自我診斷控制，確保於作業中能自動調適，最穩定的輸出功率，及最適宜的頻率。在最高效率情況下，可持續性作業。比傳統式更省電，無真空球，無耗材，待機時不耗電，不干擾通訊。基於加熱物件，大小，熱透層深淺，局部加熱，及各種不同領域須要，依頻率高低，分別有：**中週波加熱機(頻率30-50KHz)**，**中高週波加熱機(頻率30-100KHz)**，**高週波加熱機(頻率150-250KHz)**，**超高週波加熱機(頻率700-1100KHz)**，及**再超高週波加熱機(頻率1100-2200KHz)**所有機台均適合配備於自動化生產設備，如用於：回火，正常化，奧氏體化，硬化，擠壓，熔煉，鍛造，焊接，壓力清除，蒸鍍，除碳素，氮化，緊縮配件，錫焊，瓶口封蓋，極小範圍加熱，玻璃金屬密封，塑膠管導角。

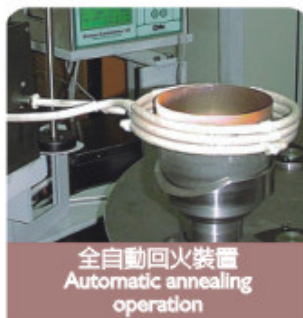
High Frequency Induction Heating Specification:

An Efficiency Frequency Induction Heating Machine Is The Solid-state New Generation. Heating Comes From Electro Magnetism, No Needs To Contact The Induction Coil. Thanks To A Low Operation Voltages, Very Small Heating Head Solution With Powerful Continuous-duty Rated Compact Generator. Ideal For Any Kind Metal (Iron, Brass, Aluminum, Alloy, Gold...) On Automatic Production Systems. It Is Against On Heated Piece Dimension, Depth, Area, And Different Kinds Application. Also Depending On Frequency Grade, Herewith Have Many Systems:
Medium Frequency (30-50KHz)
Medium-High Frequency (30-100KHz)
High Frequency (150-250KHz)
Higher-ER Frequency (700-1100KHz)
and High-EST Frequency (1100-2200KHz).
All Machines Can Be Equipped With High Efficiency Pyrometer To Control The Temperature.

Typical Applications:

Annealing, Forging, Normalizing, Brazing, Austenizing, Stress Relieving, Hardening, Carburizing, Quenching, Decarburizing, Melting, Nitro Carburizing, Shrink Fitting, Curing, Tin Soldering, Localized Heating, Tempering, Metal Glass Sealing, Plastic Reflow, Cap Sealing, Hot Forming, Carbon Restoration.

		M-Cube 6kw	M-Cube 12kw	M-Cube 24kw	M-Cube 48kw
Dimensions (mm)	Generator	195x304x426 mm		480x520x760 mm	600x650x1350 mm
	Heating head	120x200x280 mm		170x260x220 mm	186x359x310 mm
Weight	Generator	21 kg		90 kg	135 kg
	Miniaturised heating head	12 kg		18.5 kg	30 kg
Power Supply	Voltage	400 Vac ± 10% 3Ph, 50/60 Hz without neutral			
	Maximum absorbed power	6.0 kw	12.0 kw	24.0 kw	48.0 kw
	Water cooling	Pressure: 300 kPa-flow: 2.5 ℓ/min		Pressure: 300 kPa flow: 3.0 ℓ/min	Pressure: 300 kPa flow: 5.0 ℓ/min



全自動回火裝置
Automatic annealing operation



一線圈加熱不同馬達
One coil heating for different motors



青銅管擠壓配合
Brass pipe fitting



鋁品加熱
Aluminium heating

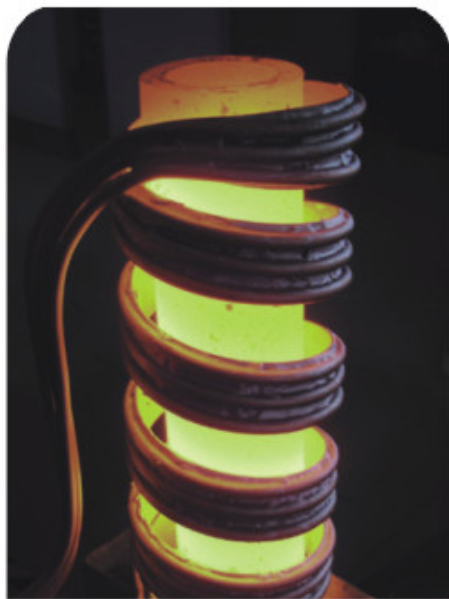
中週波加熱機 中頻加熱機

- M-Cube 6kw
- M-Cube 12kw
- M-Cube 24kw
- M-Cube 48kw



中頻加熱機 24kw, 48kw

中頻加熱機 6kw, 12kw



加熱處理
Heat treating



大物件加熱
Heating for big piece



圓長棒熱鍛
Bar heating for forging



多鋼管一次焊接
Tubes soldering at the same time



回火裝置
Annealing operation

中高週波加熱機 30~100KHz

Medium High Frequency Induction Heater HP-Cube



適用於焊接，熱鍛，熔煉，回火軟化，淬火硬化熱處理。(硬化層較深者適用)
 Brazing, Forging, Melting, Annealing, Or any hardening in more depth.

- **數位式控制**：為國產機台唯一使用數位式控制。可程式化(HP-CUBE-8015, 8025系列)。可與PLC自動系統配合。比傳統類比式，精度更高，不會隨機台自然溫升使溫度、功率、時間產生漂移。
- 隨時可更換為：手動、全自動生產。
- 標準內建，全自動2階段式加熱(可選配為4階段加熱)。可使加熱過程更趨於恆溫。
- 可調整各階段加熱不同之功率、時間。
- 自我診斷顯示故障因素(如：缺水，缺相，過載)；並配合有警報聲。
- 可顯示加熱過程中之功率、時間。
- 可外接外部功率調整器(1-5V/DC)。加熱過程中，可任意改變輸出功率。
- 可外接鐳射定位紅外線溫控385-1600°C(或熱偶金屬溫控器)。是加熱過程中，保持恆溫必須設備。
- 堅固、耐高溫、抗高壓之感應接頭及電纜線。
- 雙感應頭之雙感應線圈，同時對同一物件加熱(只限HP-CUBE-50TT/ 8025)。
- 信號輸出、輸入端子：可供自動化設備使用。
- Built in self-diagnosis.
- Manual and auto control can changeable.
- Built in water temperature, pressure control.
- Built in two (or more is available) steps power control and working timer.
- Can be equipped with optical pyrometer or thermal couple temperature control.
- Remote control (1-5V/DC) is available
- Continue working and match with auto system are available.
- Frequency changeable by Current CTL & Power CTL.(only in HP-CUBE 35KW).
- One generator with two heads simultaneous working is available. (only in HP-CUBE 50KW)

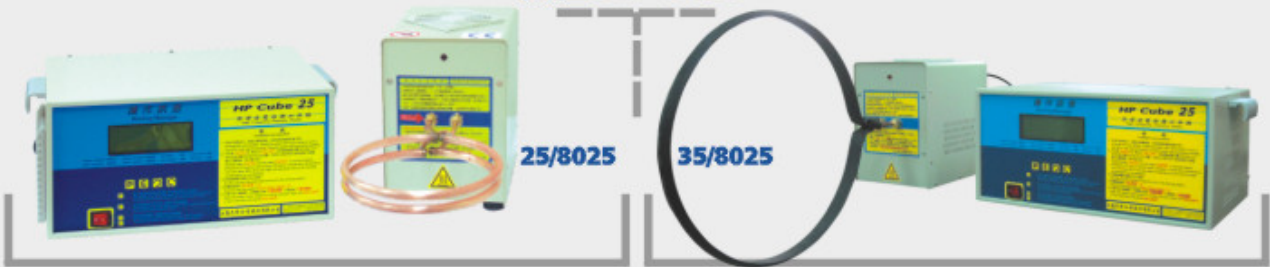
	數位HP-Cube 7/8015 , 15/8015	數位HP-Cube 25/8025 , 35/8025	HP-Cube 45/8035 60/8035	HP-Cube 50TT/8025
Dimension (mm)	Generator 470x300x235 (H)	Generator 470x300x235 (H)	Generator 460x440x470 (H)	Generator 470x300x470 (H)
	Heating Head 162x146x159 (H)	Heating Head 250x200x290 (H)	Heating Head 305x540x380 (H)	Heating Head 305x465x380 (H)
	250x200x290 (H)			
Weight	Generator/ 18kgs	Generator/ 20kgs	Generator/ 46kgs	Generator/ 41kgs
	Heating Head/ 12kgs	Heating Head/ 14kgs	Heating Head / 39kgs	Heating Head/ 43kgs
Power Supply	220V single-phase 50/60 Hz	380V three-phase 50/60 Hz	380V three-phase 50/60 Hz	380V three-phase 50/60 Hz
Water Cooling	Pressure 200 kPa/ 2 bar	Pressure 300 kPa/ 3 bar	Pressure 300 kPa/ 3 bar	Pressure 300 kPa/ 3 bar
	Consumption 16~18 ℓ/min	Consumption 16~18 ℓ/min	Consumption 20~22 ℓ/min	Consumption 24~26 ℓ/min

中高週波熱機 ■ 中高频加热机

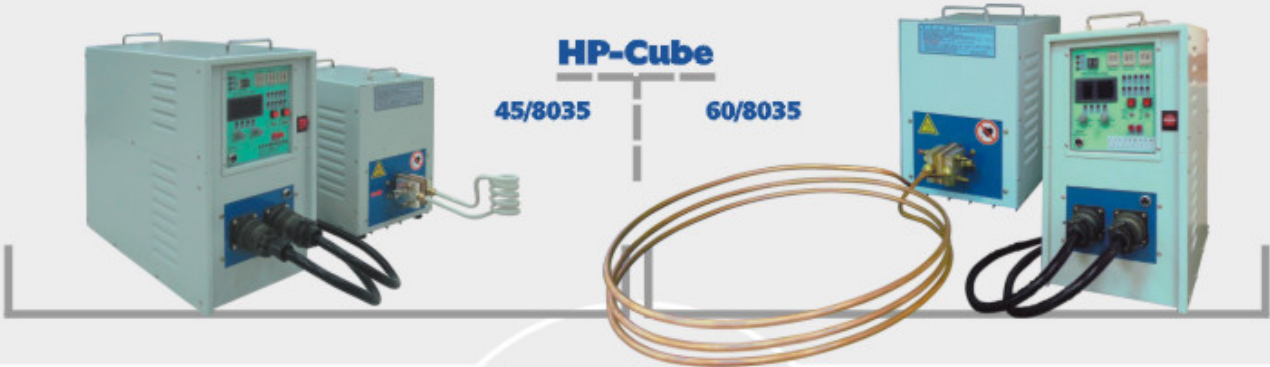
數位 HP-Cube



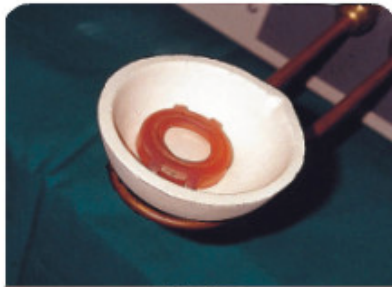
數位 HP-Cube



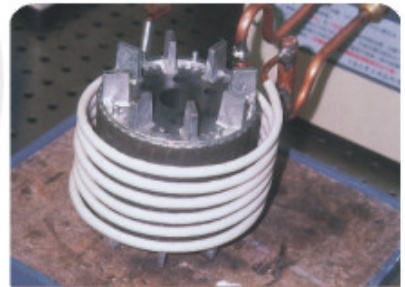
HP-Cube



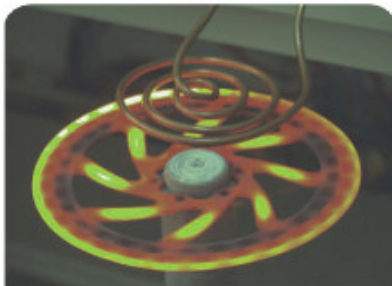
HP-Cube 50TT/8025



鍍殼熱鍛
Stainless watch case warm pressing



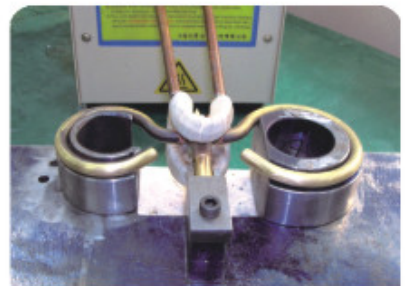
馬達擴縮蓋入 Heating for fastener
(Gear, Bearing, Motor & Shaft)



煞車輪板硬化處理
Bicycle brake plate harden



二機加熱線材
Two heaters in one line



青銅焊接
Brazing for brass

高週波加熱機 150~250KHz High Frequency Induction Heater H-Cube

適用於焊接，淬火硬化熱處理。(硬化層較淺者使用)
Brazing, melting, annealing. Or any hardening in thinner depth.

高週波加熱機 高频加热机

H-Cube 6kw
H-Cube 12kw
H-Cube 24kw
H-Cube 48kw



高頻加熱機 24kw, 48kw

高頻加熱機 6kw, 12kw

		H-Cube 6kw	H-Cube 12kw	H-Cube 24kw	H-Cube 48kw
Dimensions (mm)	Generator	195x304x426 mm		480x520x760 mm	600x650x1350 mm
	Heating head	120x175x200 mm		120x280x200 mm	188x360x310 mm
Weight	Generator	21 kg		90 kg	190 kg
	Heating head	8.4 kg		10.5 kg	37 kg
Power Supply	Voltage	400 Vac \pm 10%, 3~50/60 Hz			
	Maximum absorbed power	6.0 kw	12.0 kw	24.0 kw	48.0 kw
	Water cooling	Pressure: 300 kPa-flow: 2.5 ℓ /min			Pressure: 300 kPa-flow: 5 ℓ /min



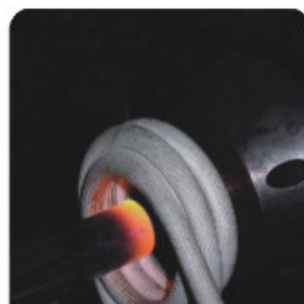
內孔加熱
Heating for insert



鏈條回火
Chains



打石工具硬化
Cutting tool for stones



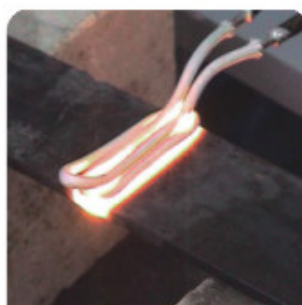
圓棒端面熱沖
Hot forming



圓筒鈦具焊接
Carbide tipped
for circular drill



鑄碳鋼鈦具焊接
Carbide tipped for drill



鋼板加熱
Steel plate



鐵鎚硬化處理
Harden treatment



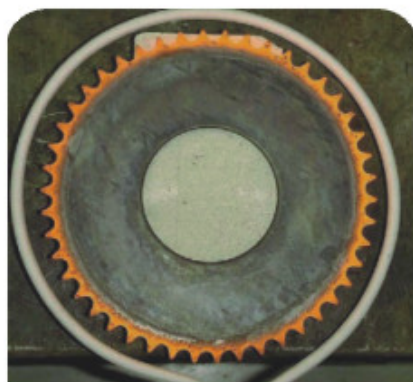
水泥鈦具焊接
Carbide tipped for circular drill



鐵器硬化處理
Harden treatment



雙感應線圈同時加熱
Twin coils for one piece



鏈齒輪熱處理
Sprocket tooth hardening



引擎汽門硬化
Engine valve hardening



鑄碳鋼鋸片焊接
Soldering for saw blade

超高週波加熱機 Power Cube 700~1100KHz 及再超高週波加熱機 Power Cube 1100~2200KHz High-ER Frequency Induction Heater & High-EST Frequency Induction Heater Power-Cube

特別專注於極精細物件，瞬間局部加熱用。
Specialize in very small and precision pieces heating use.

(再) 超高週波加熱機
(再) 超高频加热机



(再) 超高频加熱機
Power-Cube 3.2kw



超高频加熱機4.5kw
Power-Cube 4.5kw



超高频加熱機6.4kw
Power-Cube 6.4kw

特別專注於極精細物件，瞬間局部加熱用。

體積小如傳真機(265x272x140mm)，220V單相電源，輸出功率3.2kw
(另有加強一型4.5kw，加強二型6.4kw)。

如有需要，標準設備下，可裝設2個分離式感應頭，或可擴充
為多個感應頭(但只限於單一使用)。

Specialize in Very Small and Precision Pieces Heating Use.

No large heating generator and heads (Generator : 265x272x140 mm
+ Stand head: 123x62x95 mm, Mini head: 107x52x77 mm).

One generator with two induction heads in alternative use.

Or equip with switcher can be extend to more heads).

Built in self-diagnose and power arrangement.

With Power Controller can be more advantage use, i.e.

temperature control, protection gas, timing,
with automatic field PLC or RS232 system
of heating cycles...etc.



多頭開關 Power-Switcher



極小感應頭
Mini Head

高週波加熱機配件

Accessories of High Frequency Induction Heater

必要配備：

Absolutely Needed By Cooling Water :

所有高頻加熱機必須以水冷卻，而且對水質，水溫度，水壓力，水流量，極度重視。(防止碳酸鈣化、銹化、微生物化、粉塵、堵塞)。是故水冷卻機必須為密閉性循環加過濾系統，及避免冷露現象。因機內各個部件，冷卻溫度及流量需求不等，是故必須用高頻機專用管路設計冷水機，以達最佳冷卻效果。且又因依使用功率大小，工作時間，氣候環境須要而選擇適確，不同冷卻量冷卻機。

我公司備有氣冷式水冷機：No. 1. 2. 3
及防冷露冰水機：No. 5. 6. 7. 8。

防冷凝冰水機
Water Chiller
※可選用 No. 5, 6, 7, 8



High Frequency Generator Inductor Heaters should be equipped with water cooler for cooling the whole units, especially on the induction head with the coils. It should be take care in the water quality, water following, water pressure, and avoid condensation water's temperature. Owing to it is also depending on how strong power and working time, the water cooler not only have many kinds styles, but also the cooler's pipes should be in special construction.

水冷卻機
Water Cooler
※可選用 No. 1, 2, 3



焊接必要配備材料：

Absolutely Needed For Brazing Application :

高頻加熱機，只是一種快速加熱源。於焊接過程中，極大多數均須補充焊料，及助焊劑。(此助焊劑亦可為氣體)。因依焊接本體之不同，所使用焊劑、助焊劑亦應有別。我公司備有各式保證成份及重量之焊劑、助焊劑。使高頻機自動化更方便。

- 銀基焊劑。
- 鎢碳鋼專用焊劑
- 鋁焊條(內已含助焊劑)
- 液性焊膏(內已含助焊劑)

Induction heater is only one kind energy saving source that can fast to heating small places. For normal brazing, it needs soldering material with flux of which also subject to different heating pieces needs different soldering material and flux.

Herewith We Can Supply:

- Silver basic soldering material,
- Tungsten Carbide+ Steel special soldering material
- Aluminum Alloy Soldering wire or coils (inside contains flux),
- Soldering paste (contains flux already).



金、銀、銅 液性焊劑
Gold, Silver Soldering Paste



高週波加熱機配件 Accessories of High Frequency Induction Heater

可擇性配備：(A) Optional Accessories：

綜合副(主)控制機V3 Specification of the Power Controller

綜合副(主)控制機V3，為一電腦程式化控制器，裝於堅固白鐵盒內，適合於半自動，及全自動之自動化加熱生產過程所需。控制機內部為兩獨立系統，(可分別控制兩台單感應頭高頻機，或一台雙感應頭高頻機)。並可程式化控制及聯結所有高頻發生器之高、中、低溫，非接觸性，鐳射定位，紅外線溫控儀，或外接熱偶金屬測溫儀，及抗氧化保護氣體噴射系統。

其他功能：

- 測量，並顯示感應棒製做尺寸之正確性及可否使用。
- 自我診斷水溫、電流、線圈長度、失誤控制。
- 保溫，及加熱時間，功率，系統程式控制。
- 保護氣體，及加熱、冷卻時間控制。
- 自動校正顯示，及選配發生器、感應頭參數。
- 搭配RS232介面，可配合自動化PLC，或其他外部程式。
- 內建儲存100種以上程式容量。
- 輔助輸入類比式主機變換功率。
- 輔助輸出類比測溫器同步測溫。
- 18組輸出/輸入介面程式。
- 顯示鍵：可即刻觀看主機正進行中操作情況。
- 速顯鍵：操作員可快速更換程式。
- 廣泛及其他多用圖的顯示屏。

Programming and Management of Up to Two Independent Sections, Each Controlling：

- Power Cube generators.
- SH/SL series non-contact temperature pyrometers or external thermocouples and sensors.
- An antioxidant gas diffuser.
- High-definition graphic display.
- Internal memory with up to 100 work programs capability.
- Automatic check of the correct matching of the generator inductor.
- Auxiliary analogy inputs to control the power supplied by the generators.
- Auxiliary analogy outputs proportional to the temperature by the pyrometers.
- RS-232 serial inter face for connecting to PLC or external logic.
- Large interfacing capability: 18 inputs and 18 outputs overall
- " ATATUS" key for direct reading of Generator working parameters.
- "QUICK ACCESS" key for fast programming of user parameters.

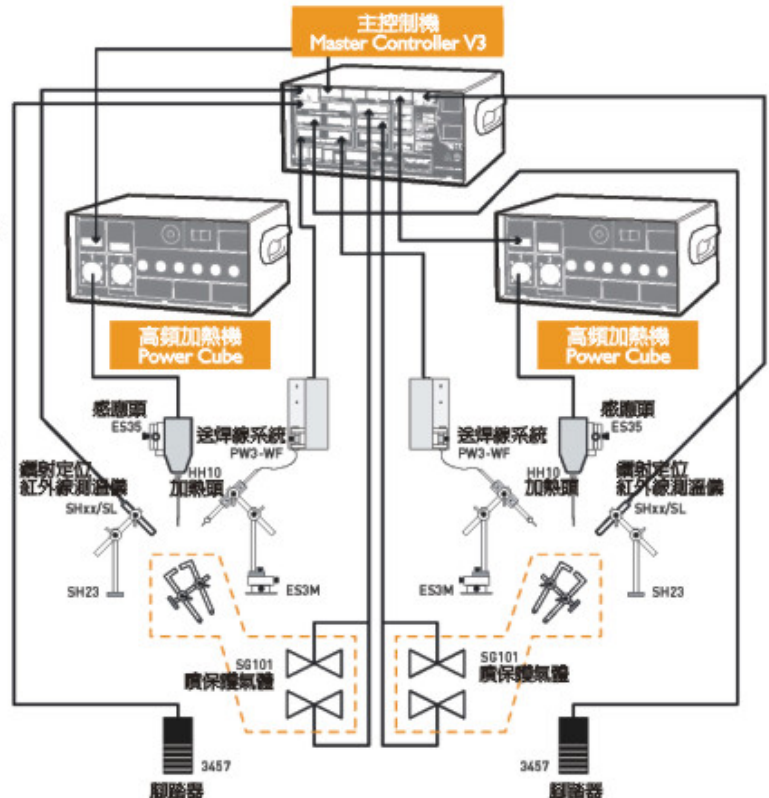


1) T = 500,0°C S L
WIRE = 0,0mm POW = 10%

2) T = 175,5°C S L
WIRE = 3,2mm POW = 83%

PARAMETERS GEN 1

U_{SUPPLY} = 230V
P_{IN} = 99%
U_{COIL} = 53%
T_{H₂O} = 26°C
F_{H₂O} = HLN HMAX
HEADS TUNING
1) S L
2) S L



高週波加熱機配件 Accessories of High Frequency Induction Heater

可擇性配備：(A+B) Optional Accessories：

必須配合副(或主)控制機V3共同使用
It has to be Matched with Parameter

- 高、中、低溫，高敏感度，鐳射定位、紅外線溫控。
- 自動噴保護氣體。
- 自動送焊線系統：可為錫絲系統，銀絲系統，或同時兩只系統。(必須配合主控制機共同使用)
- 副控制機：連結成一完善自動加熱系統。
主控制機：連結成一完善自動加熱及送焊料系統。
- Optical pyrometer: many kinds high efficiency infra red temperature sensors with laser lighter pointed.
- Automatic protective gas spray;
- Automatic soldering wire feeders: Tin wire material, Silver wire material, Soldering paste. (It has to combine with Master Controller V3).
- Power Controller V3: Integrated controller of heating cycles
Master Controller V3: Integrated controller of heating and soldering cycles

高敏感度鐳射定位紅外線溫控測量儀： Specification of Pyrometer：

測溫範圍，低溫 SH15/SLE 80~700°C，
中溫 SH15/SLE 120~900°C，
高溫 SH15/SLE 200~1600°C, SH60/SL 500-2000°C

可調式紅外線反射率，從0.1~1.0。

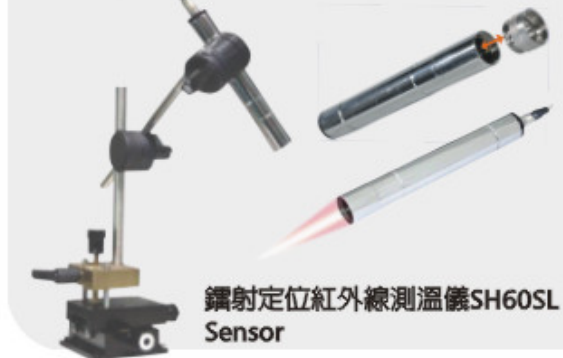
極小0.5mm和4.0mm探測點，
探測距離為60,120,240,400mm，加鏡頭蓋可變更探測距離。
高敏感度，以配合高頻機急速昇溫速度，
(反應時間0.0001秒)。
高抗干擾，可不受高頻機磁波干擾。
內部數位式自動距離修正。
內部溫度跟蹤的垂距更正。備有可替換測量儀防護鏡頭罩。
耐用快速連結器。白鐵結構。
高精度溫度公差0.1°C (999.9°C內)，或1°C(1000°C以上)。
必須配合控制器使用。

Compact direct-reading pyrometer for non-contact measure between SH15/SLE 80-700°C, SH15/SLE 120-900°C, SH15/SLE 200-1600°C, SH60 /SL 500-2000°C

- Emissivity adjustment from 01.-1.
- Very Compact.
- Small Reading Spot.
- High-Speed Reading.
- High /definition Red Beam Aiming.
- Internal Digital Memory for Calibration Parameters Storage.
- Offset Correction with Internal Temperature Tracking.
- Very high Immunity in Induction Heating application.
- High-Reliability Polarized Push-Pull Connector.

自動送焊線(錫線)系統
Solder Dispenser

搭配噴保護氣體
Diffusore Gas



鐳射定位紅外線測溫儀SH60SL
Sensor

感應圈尺寸·正確性最優化測量圖
Assistant Software for Coil Optimization

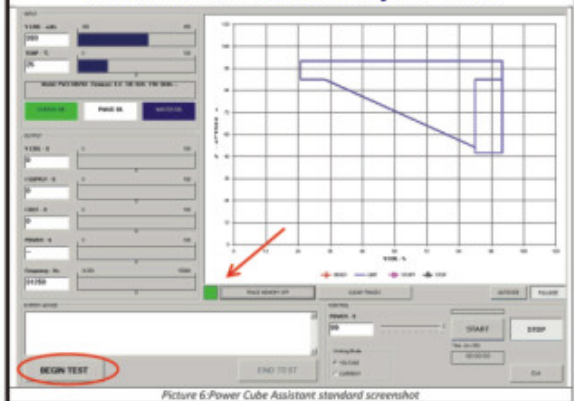


Figure 6: Power Cube Assistant standard screenshot



鐳射定位紅外線測溫儀
Optical Sensor

中週波加熱機
高週波加熱機

中高週波加熱機
(再)超高週波加熱機

使用實例

基於商業道德、與私密，特殊實例不予登錄，如有個案另請逕洽。*本公司另備有各類全自動化使用實例光碟影片備索*

焊接 Brazing



散熱板焊接
Coolers brazing



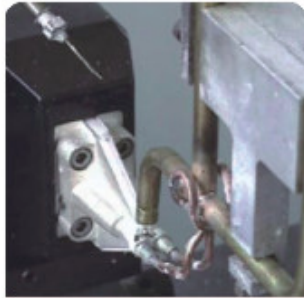
鎢碳鋼銑刀焊接
Carbide tip soldering on
milling cutter



雙感應線圈同時加熱
Twin heating heads for one piece



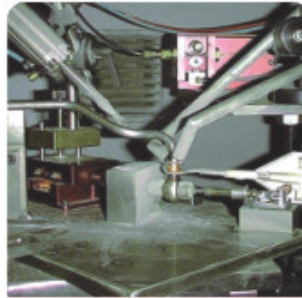
鋁合金焊接
Aluminum brazing



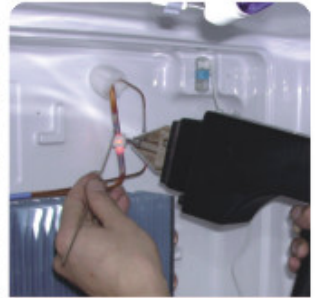
全自動銅管件焊接
Fully automatic brazing



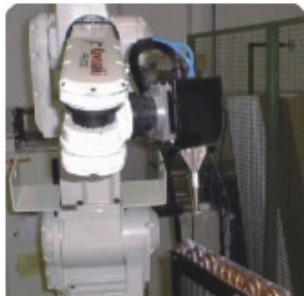
鎢碳鋼車刀焊接
Carbide tipped for cutting tool



全線自動焊接
Fully automatic brazing



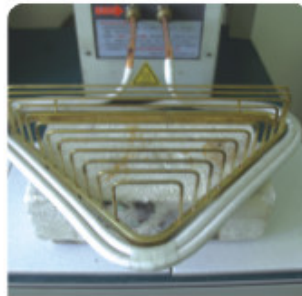
可手持感應焊接
Induction head hold by hand



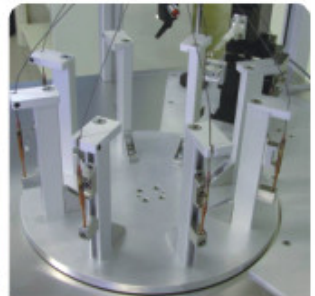
結合機械人自動焊接
Heating head installed by robot



較大物件焊接
Soldering for big pieces



多條銅管一次焊接
Brass rods soldering



旋轉台自動焊接
Rotating table soldering



鋸片手執焊接
Manual for saw blades brazing



青紅銅管結合
Brass pipe fitting

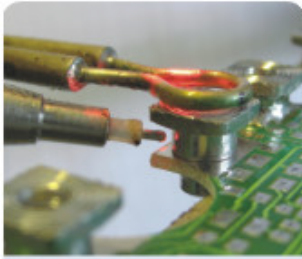


鎢碳鋼水泥孔鈔具焊接
Carbide tip of concrete core drill

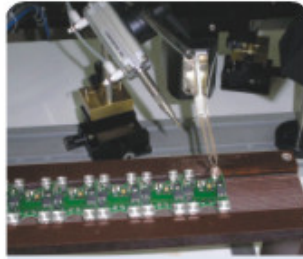


鋁合金焊接
Aluminum brazing

錫焊接 Tin Soldering



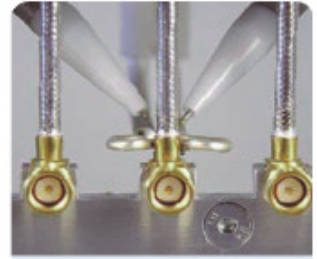
電路板自動焊接
Auto soldering for P.C. boards



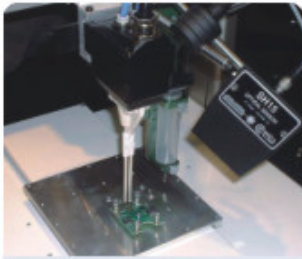
電路板自動焊接
Auto soldering for P.C. boards



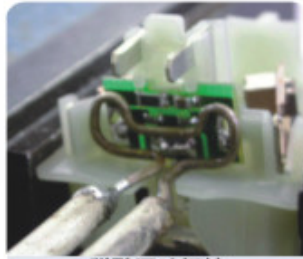
電子元件錫焊
Tin soldering for elements



連結頭錫焊
Tin soldering for connectors



電路板錫焊
Tin soldering for P.C. boards



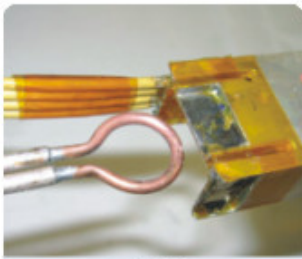
雙點同時錫焊
Simultaneous soldering
for P.C boards



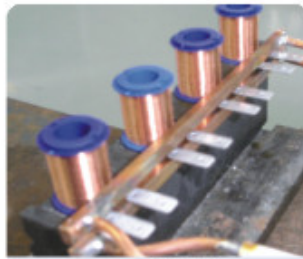
電路板以錫膏自動錫焊
Auto soldering by paste



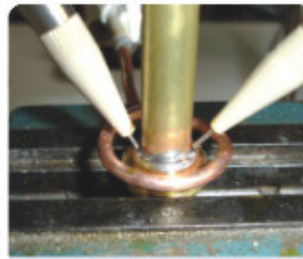
電器盒錫焊
Boxes by tin soldering



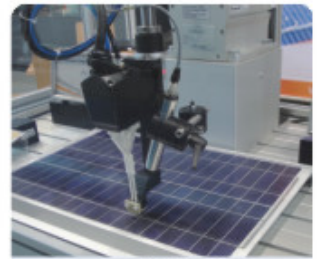
電線錫焊
Wires soldering by tin



電器元件錫焊
Tin soldering for elements



雙自動送錫線
Twin tin wire feeders
for soldering

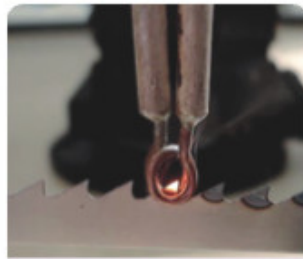


太陽能板錫焊
Solar cell soldering

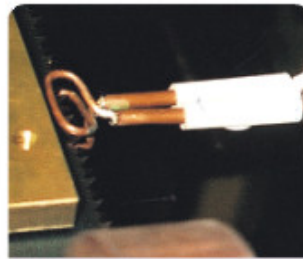
熱處理 Hardening



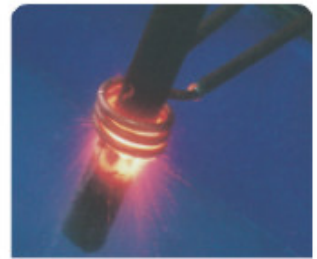
齒輪熱處理
Hardening treatment



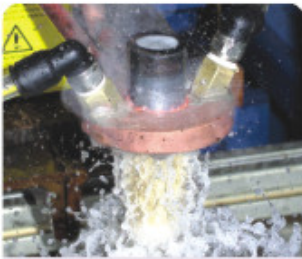
鋸帶熱處理
Hardening for saw, knife belt



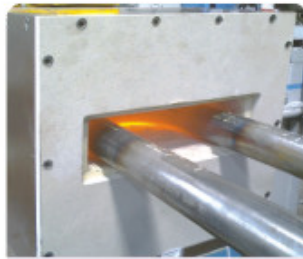
鋸帶、刀板鋒口熱處理
Hardening for saw, knife belt



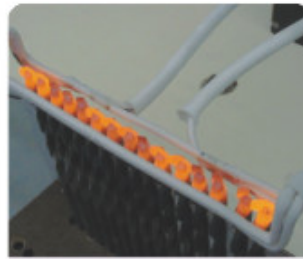
軸心熱處理
Hardening treatment



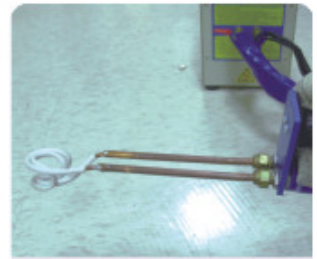
機械元件處理
Hardening for machine's devices



白鐵管件回火處理
Annealing for stainless tubers

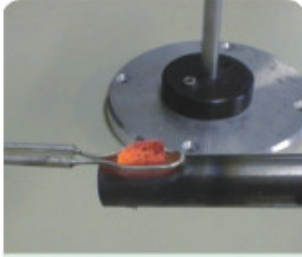


鑽頭熱處理
Hardening for drillers



可移動式感應棒
Flexible coil

熱處理 Hardening



尖端熱處理
Hardening for small point



螺絲熱處理
Hardening for screws



刀板熱處理
Hardening for knife edge



螺絲熱處理
Hardening for screws
or spray powder

熱鍛 Forging



連續加熱鍛造
Continues heating for forging



加熱壓曲
Heating for bending

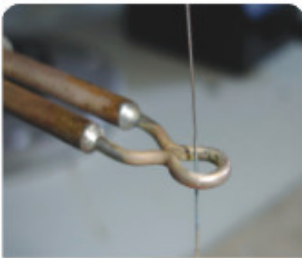


兩端同時加熱鍛造
Heating two ends same time



鋼筋條棒加熱鍛造
Heating for pressing

加熱 Heating



細線加熱回火
Metal wire for annealing



塑膠被覆金屬線加熱
Metal wire coated plastic



鋁罐加熱
Heating for aluminum



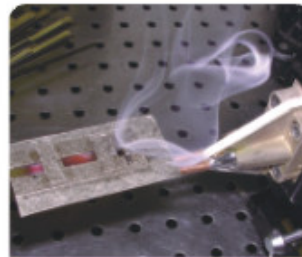
金屬環加熱
Metal plate for annealing



雙層圓棒熔接
Heating for double layers tubers



內孔加熱
Heating for insert



薄片加熱
Heating for thin belts



玻璃瓶內加熱
Heating pieces inside
glass volume

熔煉 Melting



石墨鉗鍋加熱
Heating for carbon crucibles



黃金、白銀熔融
Melting for gold, silver



黃金熔融
Melting for gold

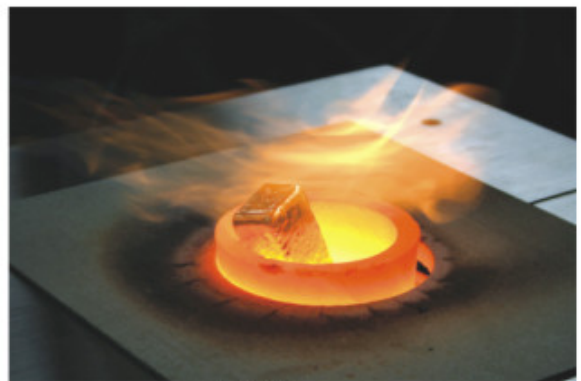
專業貴金屬熔爐 (中週波熔爐) Medium-Frequency Induction Melting Machines

此機乃以電磁效應原理，非接觸性之中週波感應加熱，對任何貴金屬(白金、黃金、銀、紅銅)加熱熔煉。採用晶體技術，及極小而堅固之機體設計。由微電腦自我診斷控制，並由語音告知，確保於作業中，能有最穩定的輸出功率，及最適宜的頻率。本機備有輸出及可指示之功率調整器，可擇性之紅外線溫度控制器(或熱偶金屬)，自動調適輸出功率，確保加熱物件恆溫(可防止物件材質質變)，及保護氣體噴嘴(防止氧化)。全機為不鏽鋼外殼。本機有熔黃金量2kg, 4kg, 6kg, 10kg, 12kg等機型。

- 所有系統以微電腦控制
 - 操作方便
 - 數位化控制及顯示
 - 高效率晶體式發生器
 - 錯誤、不當操作自動診治語音系統
 - 不鏽鋼結構體
 - 可擇性熱偶或紅外線溫控設備
 - 防氧化噴氣管嘴
- All function are microcomputer controlled.
 - Extremely quit operation.
 - Digital power adjustment and indicator.
 - High efficiency using a solid state generator.
 - Self-diagnostics including fault and mis-operation voice messages.
 - Stainless steel construction.
 - Control of the temperature (option) with thermocouples or optical sensor.
 - Gas below pipe to prevent oxidization.



小型低週波熔煉爐
F5-D, F12-D



熔煉爐 Melting



可噴保護氣體 Gas Spray



各類型坩鍋 Crucibles