# Series 5000

The core of the Series 5000 welding control is a high-speed flexible module that can be configured for various welding applications. The Series 5000 is used for robotic, machine, or manual welding welding operations using various I/O options including Ethernet I/P, Device Net, AB RIO, Control Net, Discrete and Serial Integration.

*The Series 5000 has high speed processing capabilites that allows it to process adaptive welding algorithms.*

*Constant Heat Control (CHC) is a new welding algorithm. The weld benefits provided by CHC may be as significant as the benefits provided by Current Regulation was as compared to Automatic Voltage Compensation. WTC is spearheading further research into CHC methods.*

*Thermal Force Feedback (TFF) is a non-destructive monitoring method that allows one to determine if a weld is good. A force sensor on the welding gun is monitored while the weld nugget is growing. Viewing the growth of the weld nugget by means of monitoring thermal forces proves to be the most successful technique to use on factory floors.*

*Servo Gun monitoring and control coupled with CHC and TFF will lead to the next generation of resistance welding control systems for producing quality resistance welds in the automotive industry.*

## Key Features

The Series 5000 welding module is currently in use by many automotive companies in Asia, Europe and North America.

R5000 Model - Transparent Technology Shift can render the Series 5000 to look & feel like the Robotron Series 415 and 435 welding controls.

M5000 Model - Transparent Technology Shift can render the Series 5000 to look & feel like a Medar 3000 Series family including the MedWeld 3003 (Nachi AR, AW, AX), the MedWeld 3004 (Fanuc) and MedWeld 3005 (AB SLC) welding controls.

W5000 Model - Transparent Technology Shift can render the Series 5000 to look and feel like the Weltronic Series welding controls.

# Series 5000 - FRS Welding Control System
## Welding Features & Configurations

### Configurations

## The Series 5000 allows for multiple configurations
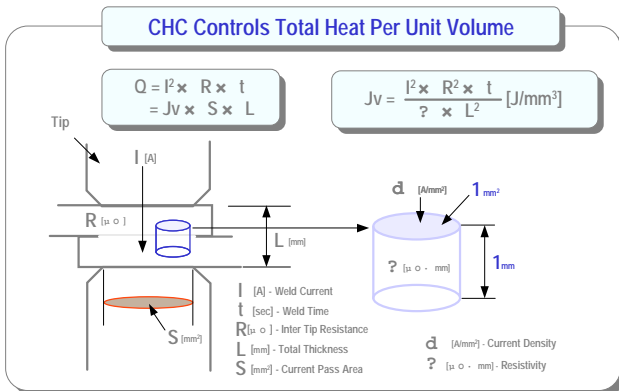


Dual AC Control



Inverter Control

- Single AC
- Multipack AC
- Single Inverter
- Inverter with Cascade Selection

The controls shown to the left are two examples of configurations used by some users of the Series 5000. WTC can customise configurations specific to the needs of the user as directed by central engineering groups.
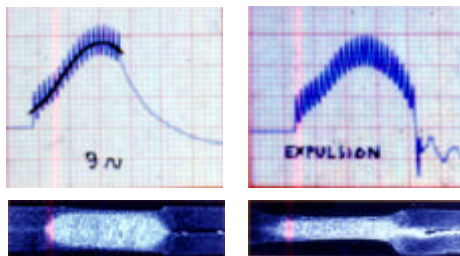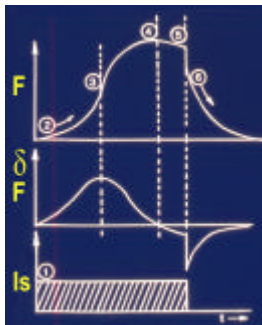
### Available Welding Functions



**CHC Controls Total Heat Per Unit Volume**

$$Q = I^2 \times R \times t = Jv \times S \times L$$

$$Jv = \frac{I^2 \times R^2 \times t}{? \times L^2} \ [J/mm^3]$$

Tip

$I$ [A]

$R$ [µ o ]

$L$ [mm]

$d$ [A/mm²]   1 mm²

$S$ [mm²]

? [µ o - mm]   1 mm

$I$ [A] - Weld Current
$t$ [sec] - Weld Time
$R$ [µ o ] - Inter Tip Resistance
$L$ [mm] - Total Thickness
$S$ [mm²] - Current Pass Area
$d$ [A/mm²] - Current Density
? [µ o - mm] - Resistivity

## Constant Heat Control (CHC)

CHC is an innovative algorithm to control the development of a weld nugget. Using inexpensive tip voltage and primary current sensors, the control uses this information to monitor the build up of weld energy and adapt to conditions to maintain constant heat for the weld. This algorithm may prove to be as significant shift in the method of controlling resistance welding as did current regulation replaced voltage compensation and as did voltage compensation replaced simple phase timing control.

### Monitoring Thermal Forces



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## Thermal Force Feedback (TFF)

*TFF is an innovative way to "feel" the weld grow. The servo actuated welding gun is equiped with a force sensor so that the Series 5000 control can monitor thermal forces as the weld nugget grows. This allows for the control to tell if the weld is good while it is being produced without having to resort to destructive testing. Fast processing from the Series 5000 is required to provide such operation.*

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**Welding Controls Group**
24775 Crestview Court, Farmington Hills, MI USA 48335
Tel: +1 (248) 477-3900  FAX: +1 (248) 477-8897

Email: **sales@weldtechcorp.com**
Web: **http://www.weldtechcorp.com**

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