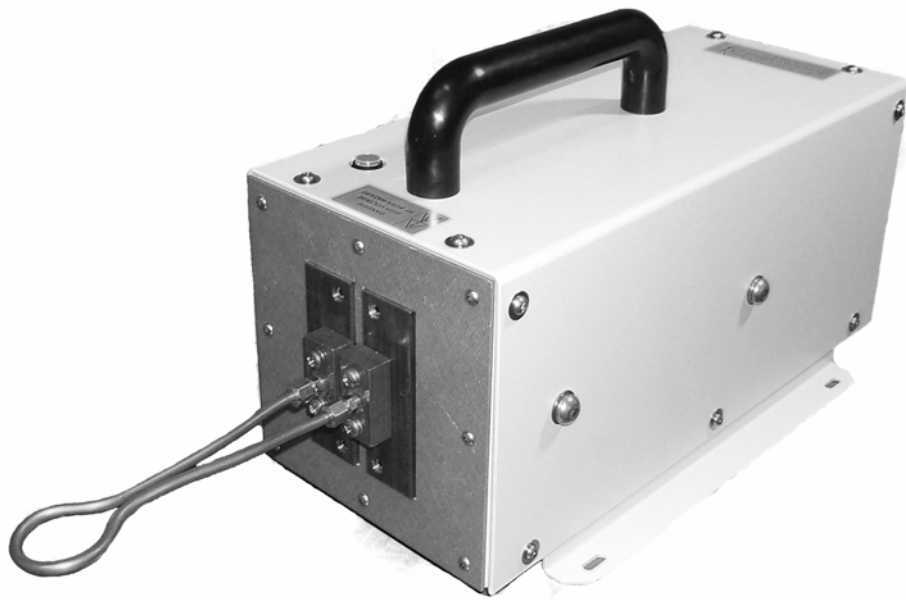


# Remote Heat Station

40kW; 35 – 400kHz

# User's Guide



RHS-40

Rev. A  
1/4/10

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# 1. Specifications and features

## 1.1. Output

Maximum Power	40kW <sup>1</sup>
Duty Cycle	100%
Maximum Voltage	700V rms <sup>2</sup>
Frequency	35kHz to 400kHz
Cable current	400Amps Peak

## 1.2. Physical

Dimensions: Length	18.25in	(463.55mm)
Width	8in	(203.2mm)
Height (box)	8.625in	(219.07mm)
Weight (unloaded box)	41lb	(18.6kg)
Weight (with 10ft cable)	63lb	(28.6kg)

## 1.3. Capacitor Rail

Resonant capacitors	Mounting space provided for eight capacitors. :
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## 1.4. Load

Quality factor of load	Will operate with any load Q (including resistive loads), provided that the output frequency and voltage is within the specifications.
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## 1.5. Cooling water

Maximum pressure	100PSI	(690kPa)
Minimum recommended pressure	30PSI	(207kPa)
Minimum water flow	1GPM	(.064l/s)
O-Ring specification	#014, 5/8" x 1/2" x 1/16"	

<sup>1</sup> 40kW is rated power. Higher power levels may be used if the load and duty cycle are not extreme.


<sup>2</sup> Limited by rating of resonant capacitors.


## 2. Getting started

### 2.1. Safety Warnings

**Have all operation, maintenance and servicing performed by qualified personnel only.**

1. Read this operation manual completely before using the power supply.
2. **Induction heating can be dangerous.** Obey all warnings on unit and in manual.
3. **Do not touch live electrical parts.** In operation, this means the output connectors, the work coil, the work piece, and any buswork or cabling connecting them.

	<p><b>WARNING:</b> These symbols, placed at the outputs of the power supply, warn of the electric shock hazard there and RF burn hazard at the outputs when the unit is operating.</p>
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	<p><b><u>Disconnect input power before installing or servicing this unit.</u></b> Operation of this unit may be initiated at the power supply without knowledge of service personnel.</p>
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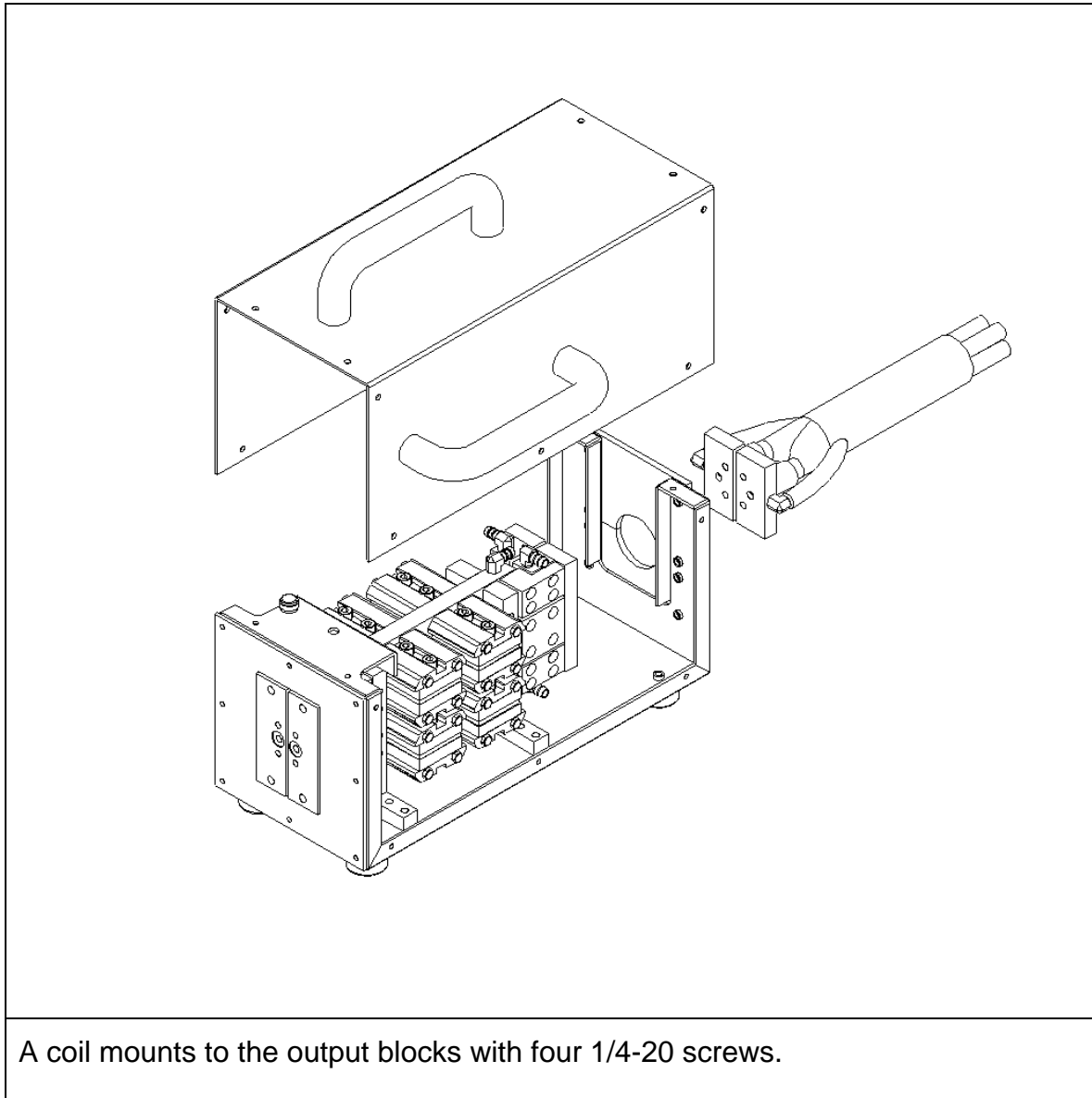
### 2.2. Set-Up

The following is a list of steps describing the required actions to get the power supply set up.

1. Remove the fourteen ¼-20 screws from the cover and remove the cover.
2. Connect the heating coil to the output of the unit (see section 3.1. on page 5).
3. Connect and test the cooling water supply, as described in section 3.3. on page 6.
4. Load capacitors onto the capacitor bus as described in 4.1. on page 8.
5. Connect control wiring plug to power supply as described on 3.4 on page 6.
6. The unit is now ready for operation,.

### 3. Connections

This section gives a description of the required steps to connect the Remote Heat Station to an induction power supply, load, and cooling water.



**Figure 1: Load connections.**

#### 3.1. Load

Mount the heating coil to the front of the unit using four 1/4-30 non-magnetic (e.g. brass) screws. Install O-Rings to prevent water leakage.

### **3.2. Power supply connection**

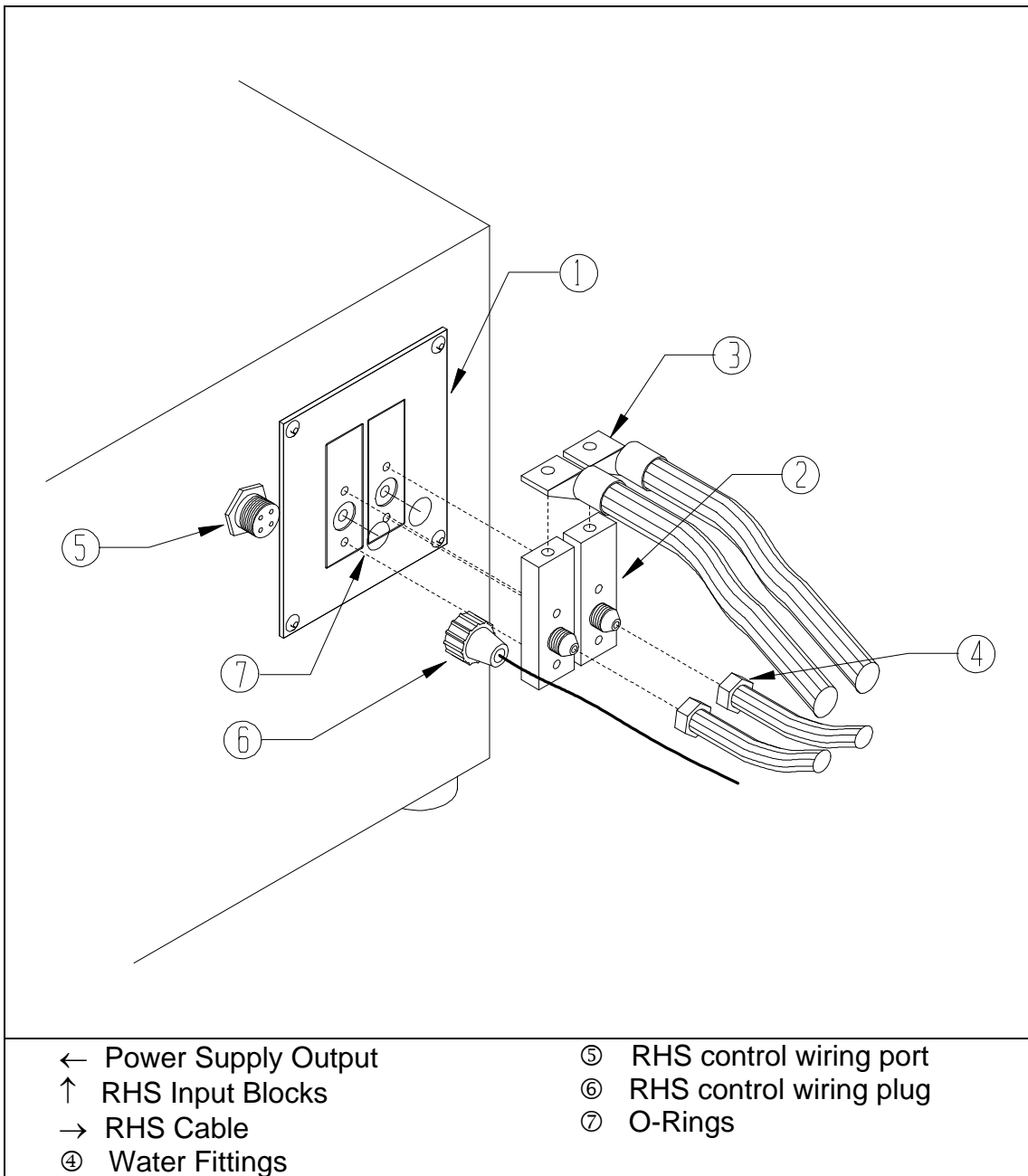
The input blocks of the Remote Heat Station should be bolted onto the output of an Induction Heating power supply. The RHS is rated for up to 40kW at up to 400kHz. Consult the manufacturer for use beyond those limits.

### **3.3. Cooling water**

Cooling water for the Remote Heat Station is often supplied through the input blocks from an induction power supply. If this is not the case, remove the hoses from the input blocks and connect them to a water supply such as a recirculating cooler.


### **3.4. Control wiring**

The Remote Heat Station comes with control wires to light the LED when the heat cycle is on. These wires connect to a plug on the side of the power supply. It is not necessary to use this control wiring. For many operations, initiating the heat cycle from the power supply controls is more convenient.



**Figure 2 Typical RHS connection**

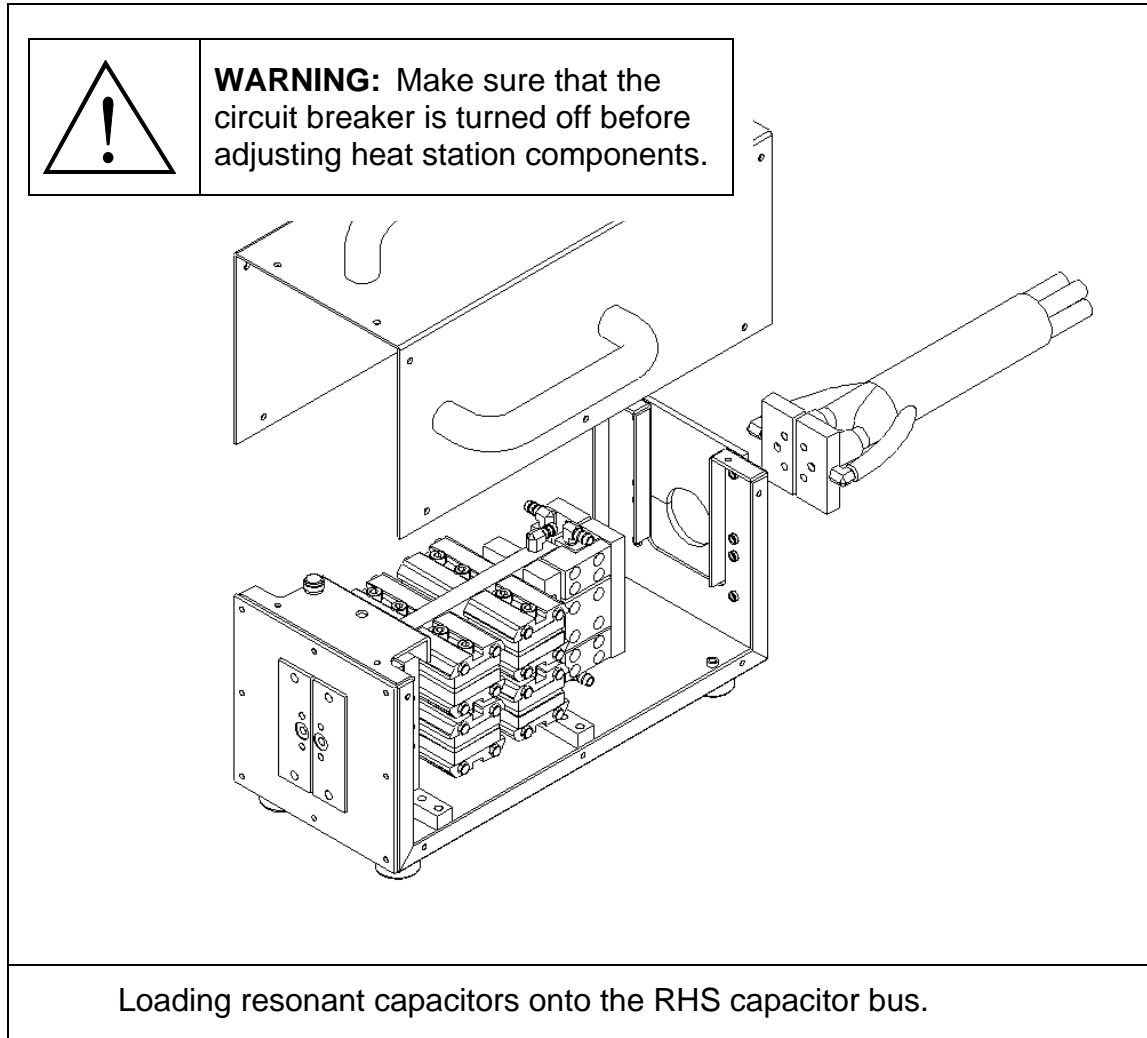
#### 4. Load station tuning.

	<p><b>WARNING:</b> Make sure that power supply is turned off before adjusting heat station components.</p>
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This section describes the procedures for tuning the heat station so that full power will be obtained at the desired frequency. It is very important to match the resonant frequency of the Remote Heat Station to that of the power supply. This gives minimum current in the RHS cable, and highest power delivered to the load.

## 4.1. Loading capacitors.

Apply thermal grease to both tabs of each capacitor and install as indicated in Figure 3 on page 8. Insert and tighten the mounting screws (four per capacitor). Capacitors can be mounted to both sides of the capacitor rails, and optimum current sharing is achieved when capacitors are directly opposing each other on the capacitor rail. This is particularly important for the two capacitors closest to the work coil.



**Figure 3: Changing the capacitors**

## 4.2. Tuning.

This section provides the procedures required for the final tuning of the heat station for a specific heating coil and load. The aim of this exercise is to have the unit operating at full power at the desired frequency.

1. With the coil connected to the output and capacitors loaded in the RHS, remove one of the cable connections from an input block. Connect an oscilloscope to the output of the Remote Heat Station. Momentarily touch a DC voltage source (about 85VDC) to the two leads of the RHS. The scope should show the voltage “ringing” down. Measure the frequency of this ringing. If this frequency is higher than the induction power supply can



function, add more capacitance in the RHS. If the frequency is lower than the induction power supply can function, lessen the capacitance in the RHS.

2. Once the frequency is acceptable, reconnect the cable lead to the input block. Install a smaller capacitance on the capacitor rail of the power supply and adjust the series induction to a middle position. Turn on the power supply at low power.
3. It is necessary during tuning to measure the current in the RHS cable using the oscilloscope with a Rogowski coil. The cable current can not be above 300amps.
4. It is also useful to measure with an oscilloscope the voltage at the RHS capacitor rail. Using a differential voltage probe monitor the Voltage across the RHS capacitor rail and compare it to the unit display. The voltage on the RHS capacitor rail should be equal and in phase to that of the unit.
  - As the power is increased the power supply should run at a frequency that is near (within 10kHz) of the resonance frequency of the Remote Heat Station.
  - If the frequency is lower than the RHS resonance frequency, then the capacitance in the Power Supply can be lowered, or the series inductor can be adjusted for lower inductance.
  - If the frequency is higher than the load frequency, the capacitance in the power supply can be increased, or the series inductance can be made larger.
  - If a frequency limit is reached, then series inductance should be made smaller. The power supply capacitance may have to be increased to maintain a good match in frequency.
  - If a current limit is reached, the series inductor should be adjusted for more inductance. Capacitance may have to be removed from the power supply to maintain a good match in frequency.
  - The cable current should be less than 300Apk . 100A would be optimal. If a current measurement is not available. Monitor the temperature of the RHS cable to see that it is not overheating during operation.

