

# Stainless Steel Thermocouple Welding Unit (TWU) Fixed Output 25 Joule

THE THERMAL SYSTEMS

## INSTRUCTION MANUAL

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Ref: 350010

Fixed Output

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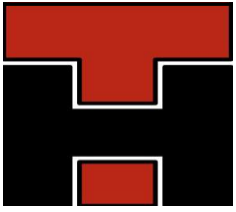
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## Stainless Steel Thermocouple Welding Unit (TWU) Fixed Output 25 Joule

### SECTION 1

#### 1.1 Technical Description

The thermocouple welding unit is an extremely robust capacitor discharge type welding module which enables rapid attachment of thermocouple wires directly to the work piece. Using a simplified solid state circuit, a rechargeable battery charges a capacitor to a level (25joule) suitable to spot weld the normal thermocouple wires (0.711mm) used at stress relieving temperatures (I.e.-Type `K` Ni Cr /Ni Al, 0.711 mm dia.). The capacitor is discharged through a SCR device via the thermocouple wire held on the work piece surface, the return circuit is completed by a magnetically held lead back to the unit.

The unit can be discharged via a manual button press, or automatically when the thermocouple wire is placed on the work piece.

#### 1.2 Specification

Capacitance:	10,000 $\mu$ f
Battery:	Rechargeable 12 Volt
Mains supply for recharging battery:	100/125 V ac or 215/240 V (350011)
Weight:	3.58 Kgs
Dimensions:	178mm (H) x 252mm (W) x 97 mm (D)
Construction:	Stainless Steel

#### 1.3 Working Environment

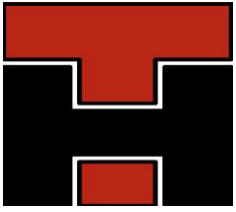
The unit is designed to be used in site conditions worldwide.

The equipment should only be used by appropriately trained personnel and must only be used for its intended purpose, and in the manner specified in the instruction manual.

### SECTION 2

#### 2.1 – Inspection

1. After unpacking the unit, check for any damage to the casing.
2. Check all cables for any damage to the insulation.



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### SECTION 3

#### 3.1 Operating Instructions

- 1 Remove loose scale and rust from the area the wires are to be attached. (Do not clean to brightness, as the process requires a certain amount of resistance in order to initiate the spark)  
Dress a small area no more than 100 mm from the attachment point to bright metal for the return magnet.
- 2 Push back the insulation on the T/C wire to expose 5 mm of bare wire.
- 3 The output is pre-set to 25 Joules which is ideal for 0.711mm Thermocouple wire.

#### MANUAL MODE

Press and hold the charge button until the 'READY' light illuminates.

Grip the conductor 4 mm from the end with the pliers and firmly touch the wire end to the attachment point at 90°

Press the discharge button.

#### AUTO MODE

Wait until the 'READY' light illuminates

Grip the conductor 4 mm from the end with the pliers and firmly touch the wire end to the attachment point at 90°

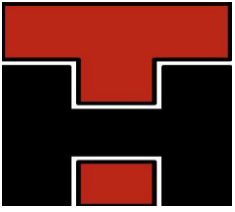
Wait until the unit discharges.

Repeat the process for the second conductor wire.

Gently bend the thermocouple wire through 90° 3-4 mm above the surface of the work piece to check if the weld is sound.

#### 3.2 Tips for achieving a good weld

1. If the work piece is brightly polished. A smear of dirty grease or oil should provide enough resistance to initiate the arc.
2. Do not flinch as the discharge button is pressed. The relaxation in pressure on the wire will not make a good weld
3. Listen for a sharp crack as the wire welds. This normally means a good weld.



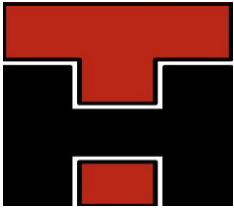
## Stainless Steel Thermocouple Welding Unit (TWU) Fixed Output 25 Joule

WARNING: DO NOT LOOK DIRECTLY AT THE ARC, AND WARN ONLOOKERS OF YOUR INTENTION TO WELD  
WARNING: DO NOT ATTEMPT TO WELD A THERMOCOUPLE THAT IS ATTACHED TO A CONTROLLER OR RECORDER. SERIOUS DAMAGE TO THE INSTRUMENT CAN RESULT.

Avoid allowing the battery to discharge completely. When the battery charge level becomes low the 'LOW BATT' light will illuminate.

WARNING: THIS UNIT CONTAINS HIGH VOLTAGES EVEN WHEN DISCONNECTED FROM THE MAINS SUPPLY. DO NOT ATTEMPT TO OPEN OR REPAIR THE UNIT UNLESS TRAINED TO DO SO

THERMAL SYSTEMS



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## PENETRATION DATA FOR THERMOCOUPLE ATTACHMENT BY T/C WELD UNIT

AS THE JOINING OF THE THERMOCOUPLE CONDUCTOR WIRES IS A WELDING PROCESS, OBVIOUSLY THERE IS SOME DEGREE OF PENETRATION WHICH TAKES PLACE BY THE WELD POOL INTO THE PARENT MATERIAL

WHERE THE PARENT METAL IS A CARBON OR LOW ALLOY STEEL, METALLURGICAL EXAMINATION BY SECTIONING HAS SHOWN THE DEPTH OF PENETRATION BELOW THE SURFACE TO BE IN THE ORDER OF 0.2MM, FOR 0.72MM CONDUCTOR WIRES

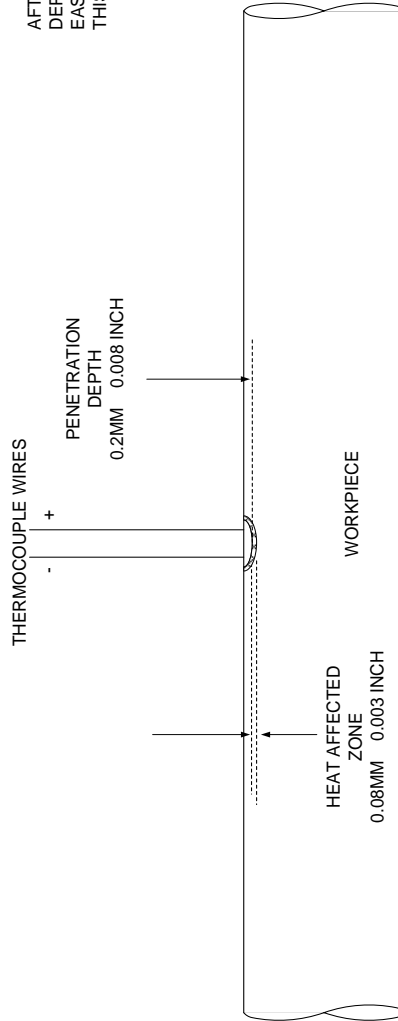
IN ADDITION, MEASUREMENTS OF THE WIDTH OF THE HEAT AFFECTED ZONE HAS BEEN OBSERVED AS IN THE ORDER OF 0.008MM FOR CARBON AND FERRITIC ALLOY STEELS. IN THIS ZONE HIGH HARDNESS LEVELS MAY BE ANTICIPATED. CLEARLY THESE EFFECTS ARE NOT EXCESSIVE, AND THE AFFECT OF THE LOCAL JOIN MAY BE READILY REMOVED FROM THE SURFACE BY SUBSEQUENT LIGHT GRINDING OR FILING.

VISUAL AND MACROSCOPIC EXAMINATION OF THE ATTACHMENT AREA HAS SHOWN NO EVIDENCE OF CRACKS IN THE HEAT AFFECTED ZONE OF THE PARENT METAL. MINOR DEFECTS DO ARISE IN THE CONDUCTOR WIRE ITSELF, SUCH AS PORES AS A RESULT OF THE CAPACITANCE DISCHARGE WELD

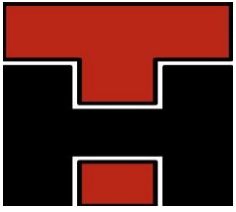
AS THE WELD IS PRIMARILY FOR TEMPERATURE MEASUREMENT PURPOSES ONLY, THESE DEFECTS MAY BE IN NO WAY CONSIDERED DETRIMENTAL.

### NOTE

AFTER DETACHING THE THERMOCOUPLE WIRES, TWO VERY SLIGHT DEPRESSIONS ARE VISIBLE. THESE AFFECTED SPOTS CAN BE EASILY REMOVED BY LIGHT FILING OR GRINDING. THIS SHOULD ALWAYS BE DONE ON PRODUCTION PARTS



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Date	06/07/2009	Title <b>THERMOCOUPLE PENETRATION</b>	
Works Order No.	N/A	THERMAL HIRE LTD THERMAL SYSTEMS DIVISION UNIT 12 PAGEFELD IND ESTATE MIRY LANE WIGAN WNG 7LA +44-(0)1942-620062	
Sheet	1 OF 1	Drawn by	W. ENNIS
Scale	NTS	Drawing No.	E128



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