



**Instruction and operating manual
for
Stork Cooperheat**

Twin Heat Module
Model Number: 13004

Manufactured in The United Kingdom

Serial Number:

Date of manufacture: June 2008



CONTENTS

| <i>Chapter</i> | <i>Page</i> |
|---|-------------|
| Specifications | 3 |
| Introduction | 4 |
| Functions | 5 |
| Pre commissioning checks | 6 |
| Installation and commissioning | 6 |
| General operation of components | 7 |
| General operating instructions | 10 |
| Temperature controller operating instructions | |
| Maintenance | 14 |
| Fault finding | 14 |
| Ordering replacement parts and spares | 15 |
| Replacement parts list | 16 |
| Warranty | 16 |

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SPECIFICATIONS

The Twin Heat module is used for control of pre and post weld heat treatment of pipework and weldments, using one or two 300A welding units as low voltage power sources.

The Twin Heat module has fitted, for each circuit:-

- 180A AC contactor, controlled by a temperature controller.
- One heater circuit 'ON' lamp.
- One twin thermocouple socket for work piece and temperature recorder.
- Two safe locking sockets for heating element connections.
- Power on lamp.

Secondary Current : 180A Per output channel.



EC declaration of conformity available upon request.

(See contact details on page 13)

INTRODUCTION

The parameters appertaining to post weld heat treatment are clearly defined in the appropriate USA, British and European Standards. Postweld heat treatment to these codes may be affected by electrical resistance methods and the following represents the fundamental requirements for effective heat treatment.

- The system must be fully capable of reaching and correctly recording the specific temperatures.
- Heating conditions must allow for various component thicknesses such that uniform temperatures result. Special provision often has to be made to control temperature gradients away from a heated zone in order to minimize additional stress.
- The operation has to be recorded and controlled within the limits of specification.

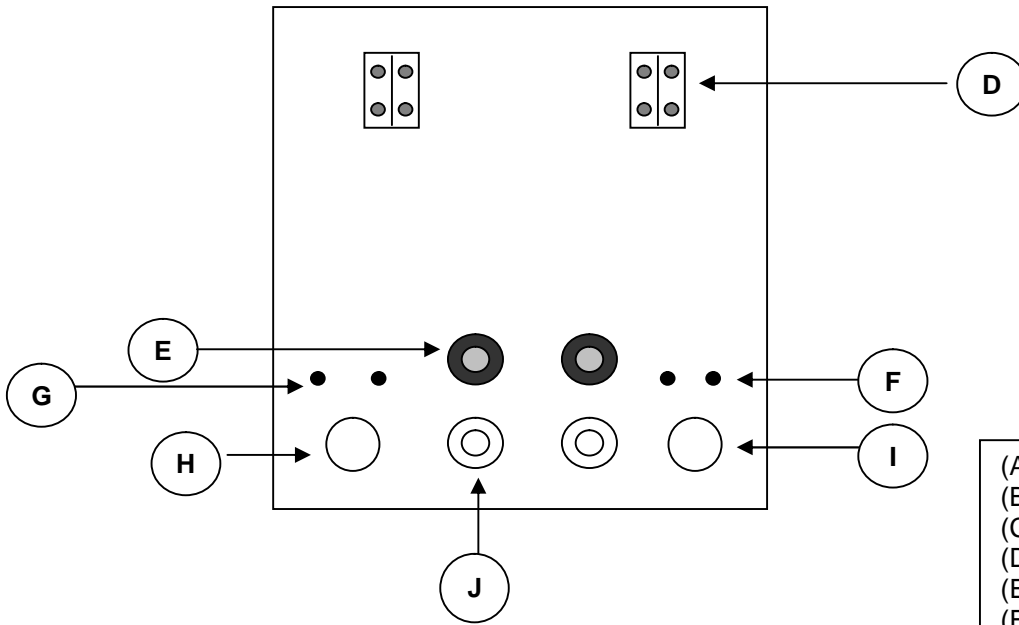
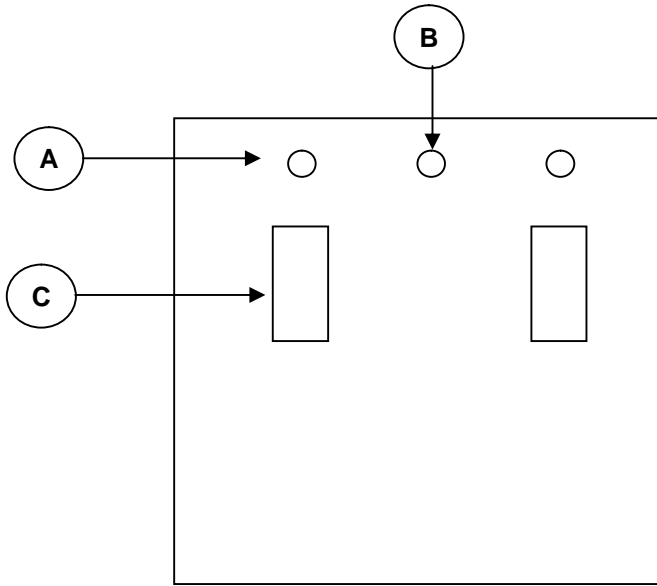
The oil refinery, petrochemical and power plant industries all utilise vast quantities of tubing and pipework, a substantial proportion of which has a preheat and/or postweld heat treatment requirement and this can be successfully achieved by the use of Stork Cooperheat Twin Heat module.

Stork Cooperheat equipment is manufactured incorporating ISO 9001:2000 quality controlled designs. These designs are based upon the results of third party testing for compliance with European Safety Directives and Stork Cooperheat 's extensive experience in the field of heat treatment engineering.

The Stork Cooperheat Twin Heat module has been developed to meet the real needs of the heat treatment engineering industry. Our design is based on almost 50 years experience as the worldwide market leader in the field of heat treatment.

FUNCTIONS

FRONT VIEW



REAR VIEW

- | | |
|-----|------------------------------|
| (A) | Channel power on neons |
| (B) | Power 'ON' neon |
| (C) | Temperature controller |
| (D) | Thermocouple sockets |
| (E) | DC outputs to heaters |
| (F) | 10A auxillary fuses |
| (G) | 5A auxillary fuses |
| (H) | 110V auxillary input socket |
| (I) | 110V auxillary output socket |
| (J) | DC input sockets |

PRE COMMISSIONING CHECKS

You should ensure that an electrically competent person carries out the pre-commissioning checks.

Check:-

- General condition of the Twin Heat module.
- Check all connections are tight as vibration during shipment may cause some slackening which could result in overheating and failure during normal service.

INSTALLATION AND COMMISSIONING

You should ensure that an electrically competent person carries out installation and commissioning of the Twin Heat module.



WARNING

To prevent contact with hazardous voltages inside the Twin Heat module, which may result in electrical shock or burns, never carry out any work inside the Power Source Unit until the unit has been isolated from the incoming supply.

- This Twin Heat module is designed for general usage. However, as use on construction sites exposes electrical equipment, to damage from falling objects and the general movement of steelwork on the site, it is preferable to place the Twin Heat Module in a protected position. Also protect the equipment from adverse weather conditions and, in tropical situations, from the direct effects of the sun, as overheating could result under normal loading conditions.
- Connect 110V supply to the input socket .
- Connect the Twin Heat module to the welding set.
- Check incoming power supply for correct voltage.
- Once the pre-commissioning checks have been satisfactorily completed, the supply has been connected the incoming supply from the welding set can be energised.
- Connect a wire link between the positive and negative pins in six thermocouple plugs and insert one into each thermocouple socket. This is completely safe, as the thermocouple sockets are not connected to an electrical supply. Shorting out the thermocouple sockets will cause the temperature controllers to receive a signal equivalent to the ambient air temperature.
- Set the temperature controller so that the control temperature is set to a temperature above the ambient air temperature (for example 100°C).
- For each output, use an d.c.. voltage test meter to measure the voltage between the output camlok socket and 0V on the welding machine. Readings of approximately 85 volts should be obtained.



WARNING

Caution should be used whilst taking the measurements, as 8V d.c.. will be present between output sockets on each Channel.

- Upon completion of the foregoing test procedures, switch off the Power Source.

GENERAL OPERATION OF COMPONENTS

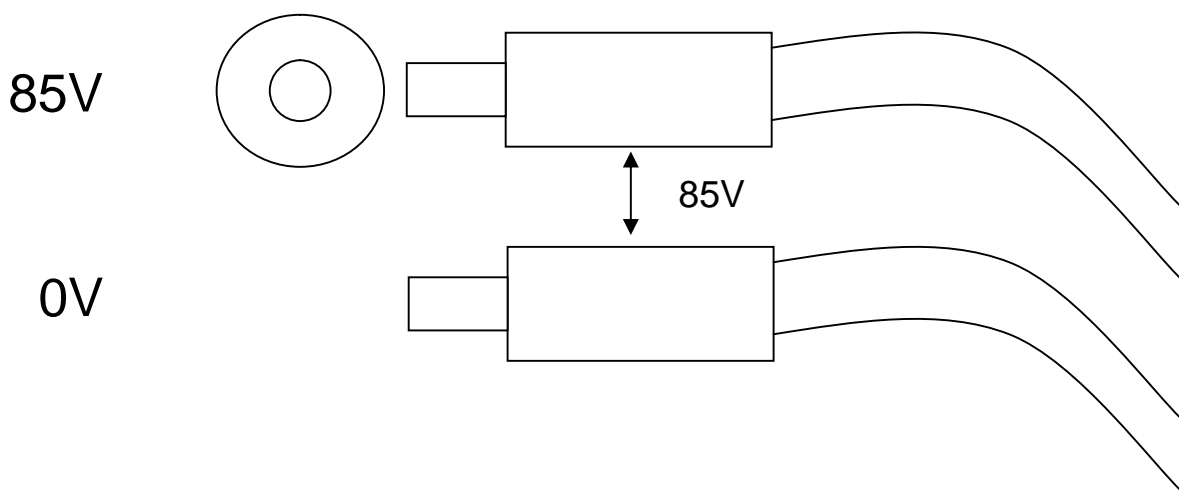
OVERVIEW

Each control channel has its own temperature controller, which requires a thermocouple transducer for automatically controlling the work piece temperature within close limits. Paired thermocouple sockets are provided on each channel to receive a mV signal from the thermocouple in the hot control zone on the workpiece and, if necessary, to allow a parallel connection to a temperature recorder.

The thermocouple extension cables from the work piece to the programmer are plugged into the thermocouple input sockets and if necessary linked out to a temperature recorder. The recorder may be powered from the 110V auxiliary supply sockets located on the rear panel of the Twin Heat module.

The output power for the heaters is by connection via feed and return cables to the output and the 0V output of the power supply

OUTPUT CONNECTIONS FOR USE WITH 80V HEATING ELEMENTS



CONTACTORS

The contactors supplied are adequately rated for the current taken at all permissible loads. They have double breaking main contacts with silver alloy contact tips, which are weld resistant, hard wearing and have excellent conductivity. The contactors are compact in size and are fully serviceable, with a range of spares available.

TEMPERATURE CONTROLLERS

When in Programmer mode, the temperature controller program is entered by means of the of the three facia buttons. The Temperature controller will, via the contactors, control the heating elements and maintain the temperature of the workpiece thermocouple at the temperature, which has been set. Full instructions for the temperature controller are included in this manual.

THERMOCOUPLES

It is of the utmost importance that the polarity of the thermocouple and the compensating cable (thermocouple extension) is connected correctly, as incorrect polarity may result in over heating of the workpiece during the heat treatment.

The two pin polarised plugs and sockets are identified positive/negative with the large pin negative. Always use the special connectors for thermocouple circuits and no other types.

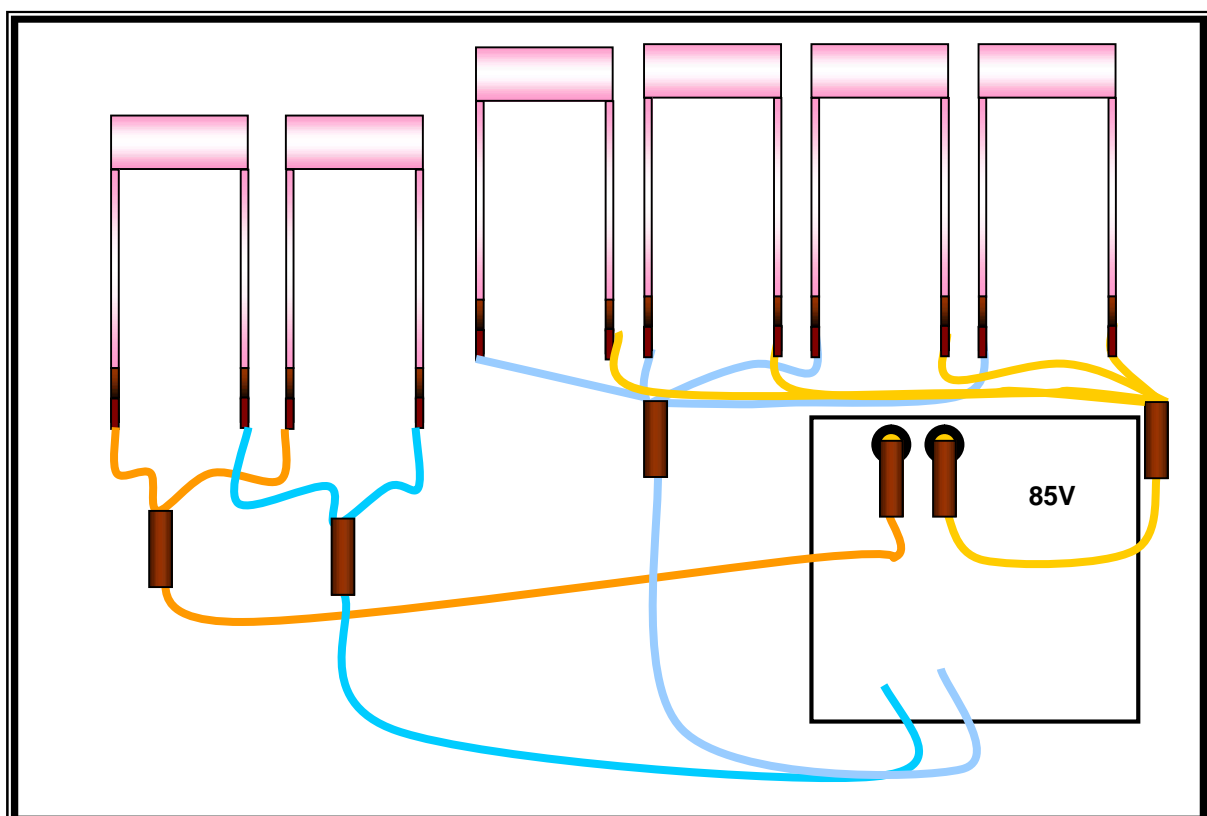
Type 'K', thermocouple wire, as normally supplied by Stork Cooperheat, is of twisted pair pattern with one wire coloured yellow (+) and one wire coloured red (-).

Caution: To avoid serious damage to electronic temperature controlling and recording instruments, thermocouples must be disconnected from the unit whilst using a capacitance discharge unit (thermocouple attachment unit –TAU) to affix the thermocouple wire to the workpiece.

GENERAL OPERATING INSTRUCTIONS

CONTROL ZONES

When using a Twin Heat module for either preheating or post weld heat treatment, the Ceramic Pad Heaters are connected in groups of one, two, three or four per control channel (output). If there is more than one heater in a heater control group, the heaters in the control group are connected together in parallel across one of the output channels of the Twin Heat Module. (see example diagram below)



- As shown in the above diagram 80V heating elements are connected, using splitters where necessary, into groups of one, two, three or four heaters. The heater groups are then connected to the Twin Heat module.
- The control thermocouple for each group of heaters is connected to a compensating lead which is in turn connected to a thermocouple input socket on the power source, temperature controller or programmer unit. Ensuring that the channel corresponds to the output supply channel associated with that control thermocouple. i.e. thermocouple connected to channel one thermocouple input with channel one output supply camlocks.
- If a temperature recorder is being used to record the preheat then a thermocouple compensating cable link will be connected from the second of each pair of thermocouple socket inputs on the power source, temperature controller or programmer unit to the corresponding thermocouple input socket on the temperature recorder. i.e. thermocouple input channel number one on power source, temperature controller or programmer unit to thermocouple input channel number one on the temperature chart recorder.
- Connect a 110V supply, from a 110V auxiliary output on the power source, to any recorders or separate temperature controller or programmer units being used
- Switch all controllers ON.
- Set all controllers to **programmable control** mode.
- Enter programs in temperature controllers
- The temperature controllers will energise the contactors as necessary to apply sufficient heating power to each zone of heaters to achieve and maintain the set temperature.

ADVANTAGE 3 OPERATING INSTRUCTIONS

Operating Modes

The Advantage 3 has 3 modes of operation;

- OFF (Indicator only)
- PROGRAMMER (master)
- CONTROLLER (slave)



OFF

Display toggles between thermocouple load temperature reading (°C) and OFF.

Heat output remains off (no control action).

Previous operation as programmer or controller is indicated by LED arrow.

If previous mode was controller then any Set Point received on S.P. IN connector (from Master) is re-transmitted on S.P. OUT connector (to slave).

CONTROLLER

To select this mode from **OFF**, use **SET** button to toggle display to show **CONt**, push **ENTER**.

The unit is now set in controller mode with the display continuously showing load temperature.

The unit will now receive incoming set point; this value can be viewed by holding down **CHECK** button.

If set point is **0000** then no control action is performed.

Once the unit receives a set point between **0001-1200** control action commences.

Relay output on/off action is indicated by **HEAT** LED.

Perform **RESET** operation to end controller action and return to **OFF** mode.
Following manual reset operation, unit continues to pass incoming set point value to the next slave controller until programme is ended.

PROGRAMMER

Set mode display to **PROG**, push **SET** and **START** LED is lit with previous **START** temperature value flashing on display.

To keep this value push **ENTER** or change this value by pushing **SET**.

Value is changed one digit at a time using **SET** to increment a digit and **ENTER** to move to the next digit.

After entering the final digit the whole value flashes.

The value can be set to **0000** by pushing **RESET** button, then setting a new value digit by digit.

Once correct value is flashing push **ENTER** to store this setting.

Continue this procedure to enter new values for **UP** rate, **SOAK** temperature, **SOAK** time, **DOWN** rate and **OFF** temperature.

Once **OFF** temperature is stored, the display shows **run**.

To commence the program cycle, push **RUN** button.

Programmer unit (master) now runs the stored program and transmits Set Point value for additional slaves, with current programme segment LED lit and **HEAT** LED showing output relay condition.

Display shows actual load temperature, but will flash **HELD** if this unit's temperature or any slave channel's temperature is lower than the set point by a value exceeding the stored **HOLD-BACK** value.

When program cycle is completed, the master and slave units switch to the **OFF** mode.

Viewing Set Point Value during programme cycle

To show the set point on a programmer unit, push the **CHECK** button once. The display flashes the set point value 5 times (alternating between **SP** and value).

For a controller unit push and hold the **CHECK** button.

The set point value is displayed until the button is released.

Program Check/ Alter

While viewing set point on programmer unit (master), further pushes of **CHECK** button will display each program segment value in turn; **START**, **UP**, **SOAK**, **TIME**, **DOWN** and **OFF**. While any value is flashing (except **START**) pushing the **SET** button allows this value to be altered.

Firstly, value flashes (fast) along with **Programmer** LED (arrow) to indicate **ALTER** mode. During this stage, program is paused, with all channels controlling at present set point.

To change value, use **SET** and **ENTER** routine.

To ignore **Alter** and resume program cycle push **ENTER**.

Program Halt

The program cycle can be paused at any time using **HALT** function.

This is set by keeping **HALT** button pushed for 3 seconds (display shows - - - -) until display flashes **HALT**.

To end **HALT** function push **HALT** button once.

Prop-Band and Hold Back setting

With unit in **OFF** mode push **ENTER** and **RUN** switches together until display blanks.

Upon release, display shows **Pb** (Prop-band) setting.

Use **SET** button to select values; 10, 20 or 40.

Pushing **ENTER** stores desired value.

Display now shows **Hb** (Hold-Back) setting.

Use **SET** button to select; 10, 20, 40 or 60.

Pushing **ENTER** stores desired value. Unit returns to **OFF** mode.

Reset function

To exit **PROGRAMMER** or **CONTROLLER** mode push **RESET** button once then, while display showing **rst**, push and hold **RESET** and release when display blanks.

This procedure ensures that the program is not ended accidentally.

MAINTENANCE



WARNING

To prevent contact with hazardous voltages inside the Twin Heat module, which may result in electrical shock or burns, never carry out any work inside the Twin Heat module until the unit has been isolated from the incoming supply.

- All electrical apparatus in constant use, particularly that subject to cyclic loading, must receive regular maintenance inspection in order to maintain trouble-free operation.
- The frequency of inspection will depend upon the operating conditions and the length of time that the equipment is in use. Under average conditions, inspections should be made every month to ensure the components are operating correctly, contacts are in good condition, camlok sockets are free from the effects of over-heating or arcing, due to improper locking of the plugs and that there is no visible sign of a fault developing.
- Inadequate attention to the connectors fitted to the heating units can only result in service difficulties during the heat treatment work. Contacts should be renewed before they become excessively worn and springs replaced.

ORDERING REPLACEMENT PARTS AND SPARES

When ordering any spare parts it is recommended that you refer to:-

- a) Type of unit described herein.
- b) Cooperheat Works Order reference number –
- c) Date supplied –
- d) Your original order reference –
- e) Your organisation full name –
- f) Unit Serial number –

All orders should be marked for the attention of 'Equipment Sales Department' at the following address:

Stork Technical Services (STS) Ltd
Unit 21-24
Slaidburn Crescent
Southport
Merseyside
PR9 9YF
United Kingdom
Tel. No. +44 (0)1704 215600
Fax No. +44 (0)1704 215601

REPLACEMENT PARTS LIST

| <u>Components</u> | <u>Part Number</u> |
|--|--------------------|
| 300 Amp Panel Mounted Female Camlocks | 508-001 |
| 300A recessed Male camlok. | 508-003 |
| 110V, 15 A, Auxiliary Supply Socket P/M. | 516-002 |
| Panel Mounted Thermocouple Socket | 516-125 |
| 250A contactor c/w magnetic blow out. | 526-050 |
| Panel Mounted Fuse Holders | 530-001 |
| 5 Amp 1.25" Glass Fuse | 530-053 |
| 10 A 1.25" Glass Fuse | 530-054 |
| Power 'on' neons | 538-017 |
| Temperature Controller | 548-055 |

WARRANTY

The specific unit supplied under this contract should be identified by Model Number and Serial Number in all correspondence with Stork Cooperheat.

GENERAL

When Stork Cooperheat equipment is properly installed and used, our warranty covers all parts for a period of six months from the date of shipment against defects in material and workmanship. Our warranty and liability is to the extent of our furnishing F.O.B. from place of manufacture, new parts for any found defective. No damages or charges for labour and expenses in making repairs will be allowed. Any units or parts returned to our factory (or as otherwise directed) are to be shipped freight paid. Heating cables and connections, heating elements and other accessories forming part of our supply are subject to three months warranty only.

All parts shipped, whether to replace parts which failed within the warranty period or not, will be invoiced at full F.O.B. factory prices. The parts replaced should then be returned to our factory, transportation prepaid, for our Examination. Credit will be issued if our inspection indicates failure was due to defect of material or workmanship and if failure occurred during the warranty period. No warranty consideration will be given on parts showing evidence of tampering or disassembly.