

HEAT TREATMENT EQUIPMENT CATALOGUE

LEADING INNOVATORS IN THERMAL TECHNOLOGY

Industry reference in thermal technology.
Everyday, everywhere since 1958.

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INTRODUCTION

INTRODUCTION TO COOPERHEAT

Cooperheat was established in 1958 to provide an on site heat treatment service to various industries. Today, our product range continues to expand into other market sectors.

The benefits that Cooperheat can offer are unparalleled expertise and product excellence throughout the world, to businesses in heavy fabrication, oil and gas (on and offshore), forging, power generation, foundry, chemical, and any other industry where a heating process is a requirement.

Cooperheat's policy is to design and manufacture equipment, which best meets the requirements and specifications of our customers needs. We have the skill and expertise to supply a range of innovative and versatile equipment, specifically designed with the needs of industry and the operator in mind. As the requirements of heat treatment specification, codes and standards become more demanding, there is a growing need for heat treatment equipment which can provide for consistently reliable results, which conform to both national and international standards, and regulations.

Cooperheat designs, manufactures and supplies quality heat treatment equipment and furnaces, incorporating innovation, versatility and conformance. Heat treatment requirements are now more demanding than ever. This calls for consistently reliable, quality equipment and consumables, which the customer can be confident in using every time.

Cooperheat equipment provides the user with the flexibility to heat treat a range of pipe welds at the same time. From simple butt welds to complex pipe work and vessel fabrications, the range can give you a solution tailored to your specifications. The range includes all necessary power control units, temperature control and recording instruments, cables, heating elements, insulation and accessories.

As a market leader in the field of heat treatment, our range of heat treatment equipment fulfils both the general purpose and specialised needs of our customers. Our reputation for expertise and excellence is renowned throughout the world, our products are recognised globally for their quality, durability, reliability and high standards of safety. Our sales engineers and engineering departments are

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dedicated to providing the very best services to all our customers. Their extensive experience in the field of heat treatment ensures that they are well placed to discuss the customers requirements and to provide an after sales support web.

GLOBAL PRESENCE . . . LOCAL SUPPORT

For sales and more information contact your local Cooperheat Equipment specialist at your nearest regional office. Full contact details can be found at the back of this guide.

INTRODUCTION TO HEAT TREATMENT

1. WELDING PROCESS EFFECTS

The welding process applied to metals joins two components together by fusion. The surfaces to be joined are raised locally to melting point by a source of heat provided by a variety of welding methods based on electric arc, electric resistance or flame. The process energy creates a localised molten pool into which the consumable is fed, fusing with the component surfaces and/or previously deposited weld metal. As the molten pool is moved along the joint axis the components are heated, non-uniformly and subsequently cooled, also nonuniformly. Neighbouring elements of material try to expand and contract by differing amounts in accordance with the sequence of the localised thermal cycle.

Characteristically the cooling weld metal contracts under conditions of severe restraint, leading to the introduction of thermally induced stresses. As constraint tries to take place and the stress system strives to reach its lowest level to achieve stability, distortion will occur as yielding takes place. If the joint is restrained and cannot distort, then high levels of stress will occur and may lead to failure in the form of cracking.

In making a joint, gaps would occur at the plate ends if the weld metal was allowed to expand and contract without restraint. A longitudinal force on the weld is required to close the gap giving a tensile stress whilst corresponding comprehensive stresses in the plate material providing the equilibrium. Residual stresses will act in two principle directions; longitudinal stresses parallel to the joint and transverse stresses normal to the joint.

It should not be forgotten that the value of the tensile stresses can be high often exceeding yield point magnitude. So far the mechanical effects of welding in the form of residual stresses have been considered, the deposition of weld metal in a molten pool and the localised melting of the joint faces of the components, along with subsequent cooling, all have metallurgical implications affecting the microstructure of these regions.

Cooling after welding can be relatively rapid. From the molten pool of weld metal an "as cast" type of structure develops. In the region of parent metal at the fusion face raised to melting point, metallurgical restructuring take place to give the heat affected zone (HAZ). In steel the heat affected zones are generally harder than the parent material with corresponding loss of ductility and resistance to impact.

Since the basic sources of weld failure are a consequence of thermal behaviour, a series of potential solutions arise based on the application of heat. The welding processes have to be controlled so that the residual stresses are minimised to protect the integrity of the overall fabrication and the metallurgical structures of the weld metal and heat affected zones are controlled to give properties which are not inferior to those of the parent material which have been used in the design of the product.

A series of heat treatment operations are associated with the welding processes, arising from the need to control these changes. These form the basis of the subject of Heat Treatment Engineering.

2. PREHEAT & POSTHEAT

Preheating involves raising the temperature of the parent material locally, on both sides of the joint to a value above ambient. The need for preheat is usually determined by the pertinent fabrication code and verified by the weld procedure qualification test. Preheat may be required as an aid to welding for one of four basic reasons.

A. To Control the rate of cooling, especially in the heat affected zone, to reduce hardness. High carbon and low alloy steels harden if they are quenched from high temperatures (above cherry red). Exactly the same process can happen in

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a welded joint at the fusion face with the parent material. By raising the temperature of the base metal to be welded, to reduce the temperature differential between ambient and the resultant heat input, hardening may be controlled as the weld cools. Reducing hardness reduces the risk of cracking.

B. To control the diffusion rate of hydrogen in a welded joint. The intensity of the electric arc breaks down water, present as moisture, into its base elements of hydrogen and oxygen. Both of these gases are easily dissolved into the weld metal at high temperatures and hydrogen can play an important role in weld and heat affected zone cracking with a phenomenon known as hydrogen or cold cracking. Preheat can also help by ensuring that the weld preparation area is dry and remains dry throughout the welding operation. The presence of preheat, and associated benefits on cooling rate, helps to facilitate the diffusion of the hydrogen molecules out of the metallic structure. Moisture is also introduced from the welding consumables being present in electrode coatings and fluxes. To obtain the maximum benefits from preheat controlling hydrogen, it must be accompanied by careful controls over removal of moisture from the welding consumables by following manufacturers baking and storage instructions.

C. To reduce thermal stresses. Thermal strains are set up as the molten weld pool cools. Partially made welds can crack as the parent metal restrains the contraction of the weld metal and the cross sectional area of the joint is insufficient to withstand the resultant stress. Preheat can control the level of strain by reducing temperature differentials and reducing cooling rates.

D. Compensation for heat loss. Thicker section steels with high thermal conductivity benefit from preheating during welding improved fusion. Where preheat is applied, every effort should be made ensure the correct levels of particular application are attained, both uniformly over the length of the joint and for the duration of the welding process. Preheat treatments are often specified by the client who has incorporated the heat treatment procedure / welding procedure specification.

Post Heat. This is the term given to the extension of preheat on completion of the welding at the same or increased temperature. Its purpose is to effect diffusion of hydrogen



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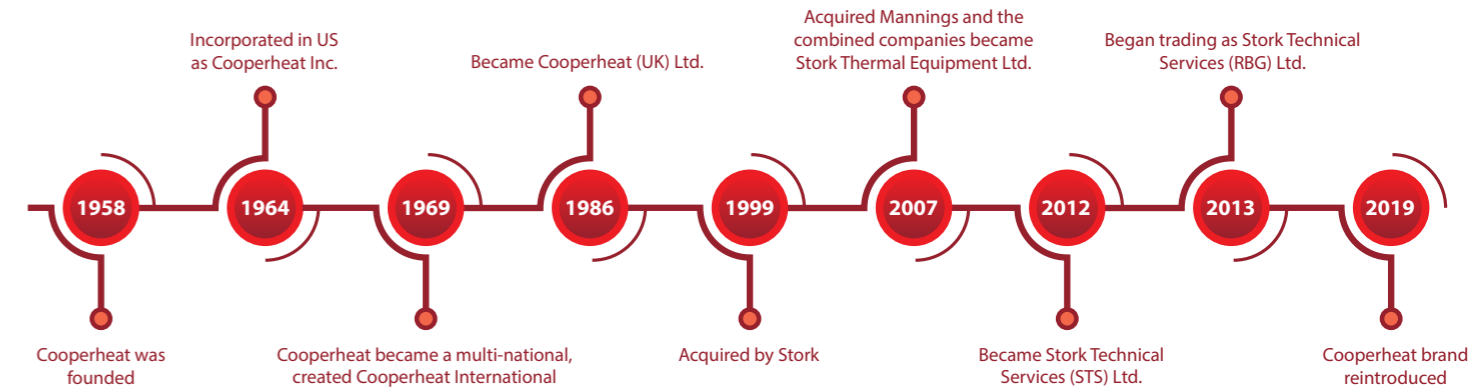
from the joint and reduce susceptibility to the associated form of cracking. It is usually applied to the higher strength carbon manganese steels and the low alloy steels where the risk of hydrogen cracking is higher. Post heat treatments are often specified by the client who has incorporated the heat treatment procedure / welding procedure specification.

3. POST WELD HEAT TREATMENT.

Post weld heat treatment. This is a process commonly referred to as stress relief, so called because it is carried out at temperatures at which yield strength has fallen to a low value. If the structure is heated uniformly, the yield strength of the material around the weld is unable to support the initial deformation. Creep occurs at the elevated temperatures and strain will occur by a diffusion mechanism, relaxing the residual stresses even further. The extent to which residual stresses are relaxed will depend on temperature for any given material and on material for any given temperature. The stress distributions at the higher temperatures become more uniform and their magnitude reduces to a low level. On cooling, provided it is carried out in a controlled manner, the improved stress distribution is retained. In addition to a reduction and re-distribution of residual stresses, post weld treatments at higher permits some tempering or aging effects to take place. These metallurgical changes are very beneficial in that they reduce the high hardness of the as-welded structures, improving ductility and reducing the risks of brittle fracture. Post weld heat treatment has mandatory significance governed by the national standards and codes, as well as being required to offer acceptable component life in onerous environments. As with preheat, the alloying content of the steel is related to the significance of heat treatment temperature.

Features of Post Weld Heat Treatment. There are five aspects to a post weld heat treatment that must be addressed. The hot zone is adequate to raise the weldment to the required temperature and provide a temperature profile therein which is uniform without creating additional undue thermally induced stresses. This aspect has greater significance in the case of localised heat treatments, but nevertheless must also be considered with furnace heat treatments. The heating and cooling rates are at least compliant with the necessary code requirements. These rates will indicate absolute maximum

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values, and are calculated from simple formulae related to component thickness to offer protection against thermally induced stresses. With thicker and more complex structures an experienced heat treatment engineer may wish to consider lower rates than required by the code to ensure acceptable temperature profiles and gradients with a view to keeping these thermally induced stresses to an absolute minimum.

With localised heat treatment, the temperature gradients away from the hot zone must not be unduly severe, again the objective being the minimisation of thermally induced stresses.

The heat treatment system (including insulation), zonal division and number of thermocouples is such that the energy input and level of control is capable of enabling these objectives to be met ensuring that the integrity of the overall structure is not jeopardised.

For local heat treatments, controls have to be implemented to provide assurance that the engineered system is capable of providing appropriate levels of performance.

Benefits of Post Weld Heat Treatment.

1. Reduced residual stresses.
2. Improved metallurgical structure.
3. Improved corrosion resistance.
4. Improved machinability.

INTRODUCTION TO STANDARDS & CODES

Having already established numerous reasons for Preheat, and Post weld heat treatment, the requirements for these heat treatments tend to occur in a number of categories of fabrications:

- Structural Steelwork
- Process / Power Piping
- Pressure Vessels
- Storage Tanks

As the majority of equipment fabricated above, operates in high pressure and temperature environments, it is critical, that it is fabricated to very high standards to guarantee integrity, and performance over many years. In order to ensure such quality, national and international standards have been written that detail the design, fabrication and testing requirements for the manufacture of equipment in all of the above categories.

As an example, ASME VIII Division 1, is the rules for building pressure vessels. It is a well known, and commonly utilised design code in the industry, that provides detailed information, to allow pressure vessel designers/ manufacturers to fabricate vessels that comply with an approved standards. The standard typically

MANNINGS TRANSFORMER POWER UNIT (6 OUTPUT CHANNEL)

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specifies all aspects of the design, including material specification, design calculations to ensure adequate strength, welding methods, and materials, mechanical testing, non-destructive testing of welds, heat treatment, hydro testing, marking.

Generally, by complying with such standards, the end user is assured that the equipment is safe and fit for purpose – which is ultimately required by both the end user, and his insurers.

As is indicated above, included in the standards/ codes of construction, are the requirements for heat treatment. All of the primary codes within the industry which we work, have a section relating to heat treatment requirements; these vary greatly in levels of detail provided.

The important point to note, is that any heat treatment work undertaken, must be in compliance with the code of construction that is being used by the client. It is therefore very important that this information is known right at the start of quotation process.

For most codes, the following information is provided:

- Temperature below which unrestricted heating /cooling is allowed
- Maximum/ Minimum heating and cooling rates
- Soak Temperature
- Soak Time

The above parameters are generally dependent upon the following:

- Soak Temperature - Material
- Heating / cooling rates - Maximum thickness of component being heated
- Soak Time - Weld Thickness

For the major codes, such as ASME VIII mentioned above, the available methods of heat treatment are also identified.

Some common standards that are often referred to:

Unfired Pressure Vessels:

- ASME VIII Div 1 & Div. 2
- PD5500
- AS1210

Process/ Power Piping:

- ASME B31.1
- ASME B31.3
- BS2633
- AS4041

Storage Tanks:

- API 650
- API 620

Structural:

- AWS D1.1

In general, all of the codes are broadly similar in their specifications for heat treatment; however, there are also many subtle differences.

Soak Temperature — Carbon & Carbon Manganese Steels PWHT temperature is always in the region of 600°C; however, more recent versions of PD5500, quote 550 – 600°C, whereas ASME standards quote $593 \pm 5^\circ\text{C}$ minimum, and AS standards require 580 – 620°C (which was the required in the pre – 2003 PD5500 version).

One of the key differences between the ASME and other standards, is the requirement for temperature gradient control. BS2633, and PD5500, require that the temperature at a distance of $2.5\sqrt{rt}$, from the centre of the weld, reaches a minimum of half of the peak soak temperature during soak. This is to ensure that the temperature gradient is not too severe, such that it causes undesirable levels of thermal stresses.

BS2633, also stipulates that thermocouples are positioned at 1.5t, on each side of the weld - these are required to achieve full soak temperature, in addition to thermocouples at $2.5\sqrt{rt}$ for gradient monitoring.

Choice of 6 channel versions make the units ideally suitable for pre & post weld heat treatment of pipework and vessels. Housed in a Zintec steel wheeled cabinet, the unit is mobile, well balanced and finished in Blue.

These units provide a 65V supply for powering various types of low voltage heating elements. The output channels are controlled by means of energy regulators and temperature controllers, provision is also made for external control from any suitable programmer via a panel mounted control plug. Each channel has its own auto/manual switch so any combination of channels can be operated in either auto or manual mode. The units are protected against over current or over temperature conditions.

Features:

- Outputs for 60V heaters
- Controllers can be set to operate in °C or °F
- Displays set point and work piece temperature
- Neon shows 'power on' for each output channel
- Fitted with temperature controllers and energy regulators as standard
- Core winding thermostats provide automatic protection against transformer coil overheating
- Primary over-current protection provided by a 3-phase circuit breaker
- Multi pin output to connect external programmer
- Selector switches per channel to allow for internal temperature control or external
- Safety plugs fitted as standard to all 65V outputs

6 Way	kVA Rating	65V Output	Max Current Per Output Channel	Energy Regulators	Temperature Controllers
11000	50	•	Each heater rated @ 45Amps (Total 135A per channel)	•	•
11100	70	•	Each heater rated @ 45Amps (Total 180A per channel)	•	•

BASIC SPECIFICATION OF MANNING'S POWER UNITS (6 OUTPUT CHANNEL)

TRANSFORMER CORE

- 3-phase, forced air cooled, Class 'H', 50 or 70kV
- Primary winding connected in Delta
- Secondary winding connected in Star

PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Frequency: 50/60Hz

PROTECTION

- Three phase circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip

SECONDARY OUTPUTS

- Output: 65V
- Temperature controlled output channels
- Auxiliary outputs: Two 110V, centre tapped @ 5A, output sockets

CONTROL

- 110V Energy Regulators
- 110V Temperature Controllers

- Multi-pin Bulgin socket for remote programmer
- Mode Selection: Auto / Manual switches
- Indicators: 110V neon channel indicators

CASE & MOBILITY

- Case: Robust sheet steel case complete with fitted two off fixed and two off swivel/braked 150mm rubber wheels
- Lifting Method: Fork lift under base

MAINS CONNECTION

- The units are complete with 4.5m of four core primary cable

SWITCHING

- Contactorised – 200A, 110V a.c. solenoid contactors



COOPERHEAT TRANSFORMER POWER UNIT (6 & 12 OUTPUT CHANNEL)

Compliance with international heat treatment codes and standards requires equipment that can provide accurate control of the heat treatment specification parameters, including uniformity of temperature throughout the geometry of the work piece. As part of our commitment to continuing innovation, Cooperheat's 50kVA and 70kVA Heat Treatment Modules include our unique Advantage 3 temperature programmer/controllers which ensure the required temperature uniformity within each control zone. The design of our equipment is based on over 50 years experience as a market leader in the field of heat treatment and has been developed to meet the real needs of the heat treatment engineering industry.

Features:

- Outputs per channel for both 30V or 60V heaters (40V and 80V output units also available)
- Advantage 3 operates in °C or °F
- Unique 'Advantage 3' programmer/controller linking



6 Way	12 Way	kVA Rating	32.5V— 0V—32.5V Output	Max Current Per Output Channel	Temperature Controllers
16050		50	•	Each heater rated @ 45Amps (Total 135A per channel)	ADV'3s
16051		70	•	Each heater rated @ 45Amps (Total 180A per channel)	ADV'3s
	16059	70	•	Each heater rated @ 45Amps (Total 90A per channel)	ADV'3s
	16100	100	•	Each heater rated @ 45Amps (Total 135A per channel)	ADV'3s

BASIC SPECIFICATION OF COOPERHEAT TRANSFORMER POWER UNITS (6 & 12 OUTPUT CHANNEL)

<p>TRANSFORMER CORE</p> <ul style="list-style-type: none"> • Three phase, forced air cooled, class H, • Primary winding connected in Delta • Secondary winding connected in Star • Auxiliary winding: 110V a.c. 3.3kVA single phase <p>PRIMARY SUPPLY</p> <ul style="list-style-type: none"> • Primary voltage: 380V, 415V, 440V • Frequency: 50/60Hz <p>PROTECTION</p> <ul style="list-style-type: none"> • Three phase circuit breaker with shunt trip • Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip <p>SECONDARY OUTPUTS</p> <ul style="list-style-type: none"> • Output: 32.5V – 0V – 32.5V (for 30V and 60V heating element operation) • Auxiliary outputs: Two 110V, centre tapped @ 5A, output sockets 	<p>CASE & MOBILITY</p> <ul style="list-style-type: none"> • Case: 304 Stainless steel case complete with two off fixed and two off swivel/braked 150mm rubber wheels • Lifting Method: Fork lift under base <p>TEMPERATURE CONTROL</p> <ul style="list-style-type: none"> • Temperature measurement, display and control • Degrees Fahrenheit or Degrees Centigrade • Start temperature • Temperature ramp up and down in degrees per hour • Hold/soak temperature set point and hold/soak time period setting <p>MAINS CONNECTION</p> <ul style="list-style-type: none"> • The units are complete with 4.5m of four core primary cable <p>SWITCHING</p> <ul style="list-style-type: none"> • Double pole, 180A, contactors with 110V a.c. coil
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CONFIGURABLE HEAT TREATMENT POWER SOURCE

Stock Reference: 18 Series (See Order Code)

The design of our equipment is based on over 60 years' experience as a market leader in the field of heat treatment and has been developed to meet the real needs of the heat treatment engineering industry. As we are aware customers' requirements vary and therefore we have released a configurable range of heat treatment power sources where the customer can specify a unit ranging from a base unit with no control or remote functionality all the way up to a fully programmable unit with built in chart recorder. The best features from all our power sources have been built into this range to give what we feel is the foremost power source available in the market place.

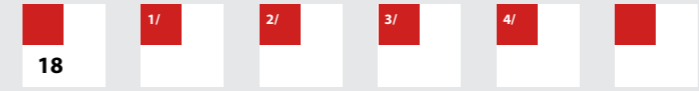
These features include:

- Stainless Steel construction suitable for the worst environments including marine offshore applications. These features include:
 - Stainless Steel construction suitable for the worst environments including marine offshore applications.
 - Extra safe low output voltage of 32.5 – 0 – 32.5V giving 65V for supplying 60V elements yet only giving 32.5V to earth therefore reducing leakage and any potential for shock.

- Earth fault monitoring circuit which will trip the unit out in the event of any earth fault occurring that causes significant earth current to flow.
- Integrated lifting points so that the unit can be easily slung for movement around a site
- Quick removal panels with plug and play harness connections so that units can easily be upgraded.
- Industry proven transformer core with thousands in use around the world.
- Rubber castors instead of Nylon giving much less vibration when moving the units.
- Outputs per channel for both 30V and 60V heaters.
- Controllers and programmers operate in °C or °F and display set point and work piece temperature
- Indicator displays Power On for each output channel.
- Units supplied with a primary supply cable but internal connector block means that this can easily be changed if required.
- Thermal trips embedded in each transformer winding offer protection against overheating.
- Primary over-current protection provided by a three phase circuit breaker.

ORDER CODES

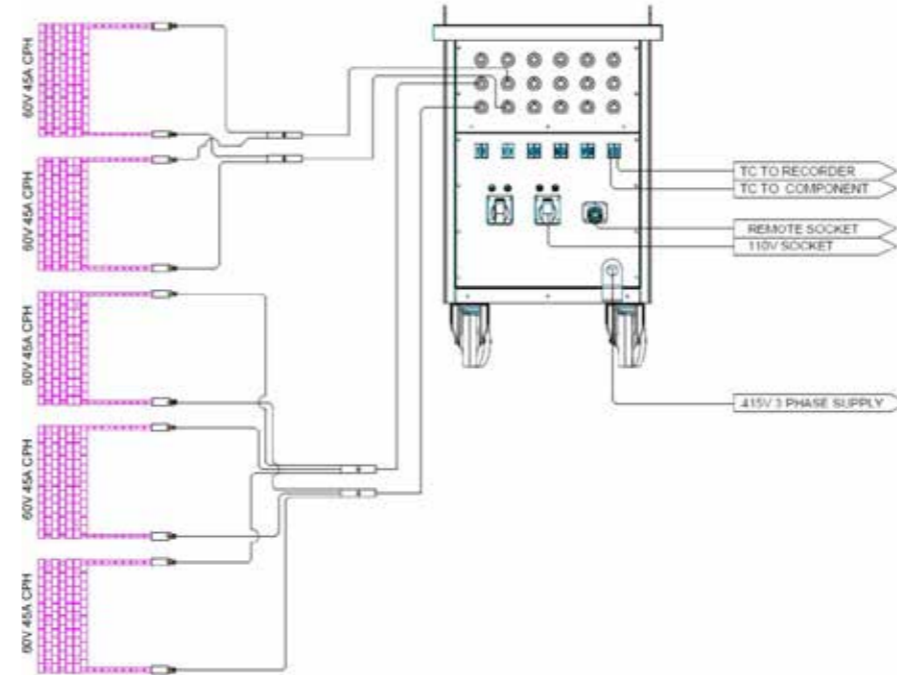
<p>BASIC PRODUCT</p> <p>18 70kVA Stainless Steel Heat Treatment Power Source</p> <p>1/ NUMBER OF CONTROL WAYS</p> <ul style="list-style-type: none"> > 3 3 Output Channels > 6 6 Output Channels > 9 9 Output Channels > 2 12 Output Channels <p>2/ TYPE OF CONTROL</p> <ul style="list-style-type: none"> > 0 None (external controller required) > 1 Energy Regulator > 2 Set Point Temperature Controller & Energy Regulator > 3 Advantage 3 Programmer > 4 Cooper6 Programmer > 5 P256A Programmer > 6 Cooper8 Programmer <p>3/ AUXILIARY 110V SOCKETS & REMOTE CONTROL</p> <ul style="list-style-type: none"> > 2 2 off Auxiliary sockets > 3 3 off Auxiliary sockets 	<ul style="list-style-type: none"> > 7 2 off Auxiliary sockets with remote socket for external controller > 8 3 off Auxiliary sockets with remote socket for external controller <p>4/ CHART RECORDERS</p> <ul style="list-style-type: none"> > 0 No Recorder > 1 Chino 3000 Series - Analogue > 2 Chino 4000 Series - Digital > 3 Fuji PHA Microjet - Digital > 4 Eurotherm 6801A - Digital
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VARIOUS CONFIGURATIONS FOR THE CONFIGURABLE HEAT TREATMENT POWER SOURCE



SCHEMATIC OF A TYPICAL TWO & THREE HEATER CONTROL CIRCUIT



SPECIFICATION FOR CONFIGURABLE HEAT TREATMENT POWER SOURCE

TRANSFORMER CORE

- Three phase, forced air cooled, class H, 70kVA
- Primary winding connected in Delta
- Secondary winding connected in 6 Phase Star
- Auxiliary winding: 110V a.c. 3.3kVA single phase

PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Primary Current: 106A, 97A, 92A
- Frequency: 50/60Hz

PROTECTION

- Three phase 125A circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip
- Earth current monitor trip pre-set to 10A

SECONDARY OUTPUTS

- Output: 32.5V – 0V – 32.5V (for 30V and 60V heating element operation)
- Auxiliary outputs: Two 110V, centre tapped @ 5A, output sockets

- Number of controlled outputs as specified on Order Codes
- Maximum Load per output channel: 3 Way - 360A; 6 Way - 180A; 9 Way - 120A; 12 Way - 90A

CASE & MOBILITY

- Case: 304 Stainless Steel case with galvanised steel base, fitted two off fixed and two off swivel/braked 150mm rubber castors
- Lifting Method: Fork lift under base and lifting points

TEMPERATURE CONTROL

- As specified on Order Codes
- Degrees Fahrenheit or Degrees Centigrade
- Type K Thermocouples

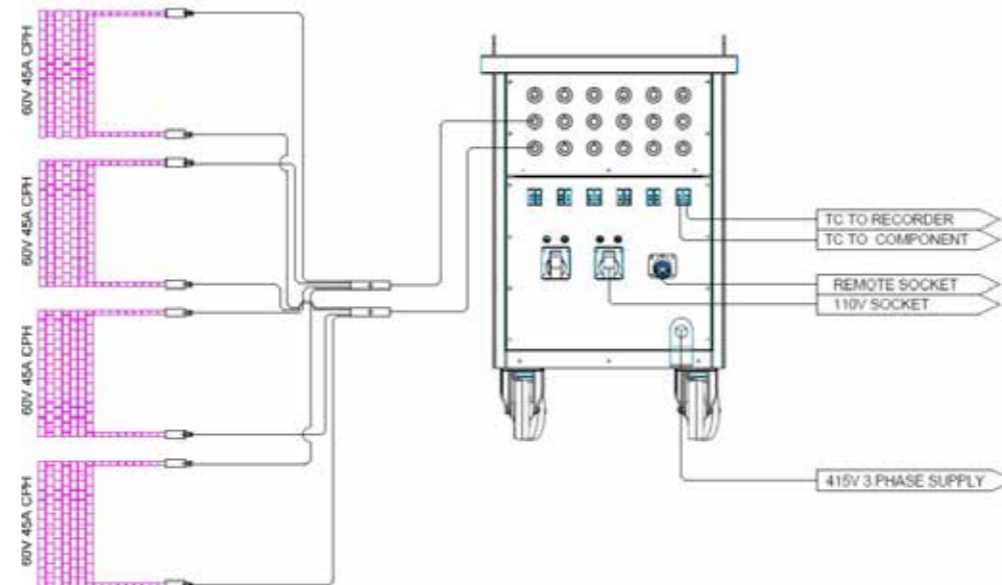
MAINS CONNECTION

- The units are complete with 4.5m of four core primary cable

SWITCHING

- Six off double pole, 180A, contractors with 110V a.c. coil

SCHEMATIC OF A TYPICAL FOUR HEATER CONTROL CIRCUIT



COOPER-K9 – COMPACT 9KVA HEAT TREATMENT UNIT (3 OUTPUT CHANNEL)

Stock Reference: 16200

Cooperheat's CooperK9 has been developed in response to the demand within the heat treatment industry. Traditional heat treatment modules are heavy and require mobilisation using forklifts and large transport vehicles. The newly launched Cooper-K9 is a mobile and portable 9kVA three output channel heat treatment unit that can be loaded and off loaded from a pick up vehicle without the need for heavy lifting equipment such as a powered fork lift truck or crane. The Cooper-K9 splits into two halves. The top half contains the six point recorder and three programmer/controllers and contactors. The lower half contains the power transformer and air circulation fan. The compact module not only avoids the use of heavy lifting equipment, in addition it avoids mobilising valuable 50kVA or 70kVA assets to smaller heat treatment work scopes which may require less than 10kVA of power.

To complement and extend the range of compact heat treatment modules, Cooperheat has also developed the Cooper-K9-3. This module is so lightweight incorporating the power source/contacter unit in three stackable parts. Each part weighs 20kg, which is within the capacity for one person to

load and off load from transportation. As with the standard Cooper-K9, the units are simple to stack and then easily transported by means of a pull out (trolley suitcase type) handle and wide roller wheels suitable for use on all typical industrial surfaces. Furthermore, a unit with no inbuilt recorder is available for operators that wish to use their own portable recorders or where chart recording is not required. A six channel unit, using six 30V heaters is also offered with or without an inbuilt recorder.



BASIC SPECIFICATION OF COOPER-K9 – COMPACT 9KVA HEAT TREATMENT UNIT (3 OUTPUT)

TRANSFORMER CORE

- Single phase natural air cooled, class H, 9KVA
- Auxiliary winding: 110V a.c. 0.5kVA single phase

PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Primary current: 24A
- Frequency: 50/60Hz

PROTECTION

- Double Pole, 32A Miniature Circuit Breaker (MCB) with Shunt Trip
- Core winding over temperature thermostats linked to MCB shunt trip

SECONDARY OUTPUTS

- Output: 32.5V – 0V – 32.5V (for 30V and 60V heating element operation)
- Auxiliary Output: 110V @ 1A, for TAU recharging
- Number of temperature controlled output channels: 3 channels
- Maximum load per output channel: 2.7kW (e.g. one 60V, 2.7kW heating element per output channel)
- Maximum current per output channel: 45A

TEMPERATURE RECORDER

- 6 Channel Dot Matrix Strip Chart Recorder
- LED digital display of channel number, temperature value °C or °F and recording and alarm status

- Chart scale 0-1200°C (0-2200°F)
- Chart width: 100mm
- Chart length: 16m
- Recorder door rated to IP65

ADVANTAGE 3, TEMPERATURE PROGRAMMER/ CONTROL PARAMETERS

- Temperature measurement, display and control: °C or °F
- Start and end temperature
- Temperature ramp up and down in degrees per hour
- Hold/soak temperature set point and hold/soak time period setting

CONSTRUCTION (ALL DIMENSIONS ARE NOMINAL)

- Cases material: Brushed Stainless Steel
- Upper control unit weight: 17kg
- Upper control unit height: 390mm
- Upper control unit width: 335mm
- Upper control unit depth: 410mm
- Lower power unit weight: 52kg
- Lower control unit height: 470mm
- Lower control unit width: 335mm
- Lower control unit depth: 410mm

SWITCHING

- Three single pole, 60A contactors with 110V a.c. coil

COOPER36 (50KVA, 36 OUTPUT CHANNEL)

Stock Reference: 16080

Cooperheat's Cooper36 has been specifically designed to heat treat up to 36 small tubes and pipes simultaneously.

With Cooperheat's extensive industry knowledge, it was recognised that there was a requirement for a unit with a higher number of control channels that would be capable of controlling one heater per output specifically designed for small tubes / pipes (i.e. 1" to 5" diameter welds).

Traditionally, these pipes are heat treated using multiple standard (6 channel) heat treatment units which results in tying up 300kW of machine output power. However, with the development of Cooper36, one machine with 36 control channels can treat up to 36 pipes at one time using 50kW output power for 36 small diameter pipe welds.

Not only does Cooper36 reduce costs and time associated with using multiple units to heat treat large volumes of pipe and tubing but it also provides added safety benefits by working in conjunction with 30V heaters rather than the standard 60V heaters.

Set up time and materials required for the 36 output unit also achieves further cost savings. The feed and return cables are required to supply 45A, allowing lighter, lower cost cable to be



used. In addition, by using only one unit instead of six, reduces environmental impact with less transportation requirements and using only one off load electrical losses instead of six.

BASIC SPECIFICATION OF COOPER36

TRANSFORMER CORE

- Three phase, forced air cooled, class H, 50kVA
- Primary winding connected in Delta
- Secondary winding connected in Star
- Auxiliary winding: 110V a.c. 3.3kVA single phase

PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Primary current: 76A, 70A, 66A
- Frequency: 50/60Hz

PROTECTION

- Three phase 80A circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip

SECONDARY OUTPUTS

- Output: 32.5V for 30V heating element operation
- Auxiliary outputs: Four 110V, centre tapped @ 5A, output sockets
- Number of temperature controlled output channels: 36 channels
- Maximum load per output channel: 1.35kW
- Maximum current per output channel: 45A

CASE & MOBILITY

- Case: 304 Stainless steel case with galvanised complete with fitted two off fixed and two off swivel/braked 150mm rubber wheels
- Weight: 362kg
- Height: 1420mm
- Width: 680mm
- Depth: 665mm
- Lifting Method: Fork lift under base

TEMPERATURE CONTROL

- Temperature measurement, display and control: Fahrenheit or Centigrade
- Temperature ramp up and down in degrees per hour
- Hold/soak temperature set point and hold/soak time period setting

MAINS CONNECTION

- The units are complete with 4.5m of four core primary cable

SWITCHING

- 36 single pole, 80A, contactors with 110V a.c. coil

3-PHASE CONTROL TROLLEY

Stock reference: 14003

The 3-Phase Control Trolley, when used in combination with 4-Bank Channel Elements, is an ideal mobile unit for providing power, switching and temperature control for internal vessel heat treatments and temporary furnaces.

Six circuits of three elements can be controlled (connected in star) to the 3-Phase Control Trolley providing a maximum power output from eighteen 4-bank channel elements of 238kW from a 415V supply and 218kW from a 380V supply.

Each of the six power and control channels are protected by three, 60A, miniature circuit breakers and controlled by an Advantage 3 temperature programmer/controller.

For safe connection the unit is fitted with six, 3-phase, neutral and earth panel mounted sockets rated at 63A per phase. Fully loaded, the 3-Phase Control Trolley requires a 3-phase, neutral and earth supply of 360A per phase. The incoming supply

is protected by a 3-phase and neutral, 400A, isolator. The 3-Phase Control Trolley provides power distribution and control, via six control channel outputs, for up to eighteen 240V, 13.2kW, (or 220V, 12.1kW) 4-bank channel elements.

Designed for supply & control of mains voltage type heaters - 4-bank channel heaters, or ceramic pad heaters.



REQUIRED CABLES		
Stock Reference	Description	Quantity Per Unit
35060	30m 3-Phase Control Trolley Quad cable c/w 63A 5 Pin Plug and connectors	Six
32002	3 Way Splitter	Six
34000	30m compensating cable with thermocouple plug/socket	Six

BASIC SPECIFICATION OF 3-PHASE CONTROL TROLLEY	
<p>PRIMARY SUPPLY</p> <ul style="list-style-type: none"> 380V or 415V, 360A, 3-phase, neutral and earth <p>PROTECTION</p> <ul style="list-style-type: none"> 400A, 4 Pole Mains Isolator <p>OUTPUTS</p> <ul style="list-style-type: none"> Six Control Channels Each channel controlled via triple pole 63A Contactors Each channel phase protected via single pole MCB Control Inputs from separate programmer via 6 x 3 pin cannon sockets (110V). Outputs: Six x 63A 5 Pin Sockets Auxiliary Outlets: 3 x 110V @ 5A 	<p>CONTROL</p> <ul style="list-style-type: none"> Temperature measurement, display and control: Fahrenheit or Centigrade Temperature ramp up and down in degrees per hour Hold/soak temperature set point and hold/soak time period setting <p>CASE & MOBILITY</p> <ul style="list-style-type: none"> Case: 304 Stainless Steel case complete with fitted two off fixed and two off swivel/braked 150mm rubber wheels Weight: 105kg Height: 840mm Width: 970mm Depth: 590mm Lifting Method: Fork lift under base

COOPER8, 6 CHANNEL PROGRAMMER/CONTROLLER/DATA RECORDER

Stock Reference: 12420

Introduction

High quality control equipment at realistic prices contribute to Cooperheats continued success in the thermal industry. The companies latest concept is the introduction of the Cooper8, 6 channel Programmer/Controller/Data Recorder

Cooperheat's innovative Cooper8 is a heat treatment programmer/controller and digital recorder combined unit which is designed to work in conjunction with standard heat treatment equipment. The Cooper8 can be used as a separate modular unit or can be built into a bespoke heat treatment unit. The most versatile heat treatment unit on the market, the Cooper8 can be used as a six channel programmer module which is compatible with any standard heat treatment transformer power source with inputs for contactor control. In addition, it can also be used as a sophisticated programmer with the capacity to download data for analysis and print temperature charts. The controls of the Cooper8 are extremely intuitive and can be operated and monitored by the operator locally or via remote control and remote data monitoring. To meet specific or bespoke heat treatment requirements, the Cooper8 can be customised with your needs in mind.

Features:

- The unit is capable of control via Wi-Fi, 3G/4G or LAN hardwire connection from a smart phone, tablet or computer.
- Controls six thermocouple channels
- Monitors an additional six channels
- Runs one or two independent heat treatment programs

- (controls 3+3 or 2+4 control zones) at the same time
- Selectable holdback to control temperature differentials
- Heat treatment profiles up to ten segments
- Operates and records in °F or °C
- Six output thermocouple sockets (for use with separate recorder if required)
- Range 0-1200°C (0-2200°F)
- Max ramp 1200°C or F° per hour
- Max soak length 99 hours 59 minutes
- Chart can be viewed from the LCD screen in real time
- Chart and job specifications can be printed using any Windows compatible device and Cooper8 software
- Multiple languages available on request
- Colour, 7 inch, LCD screen, with touch screen control



SPECIFICATIONS	
<p>GENERAL</p> <ul style="list-style-type: none"> Case material: Stainless Steel Case dimensions: Width 32.5cm, height 26cm, depth 43cm Display: Colour, 7 inch, LCD screen, with touch screen control Weight total unit: 13kg Environment: Operating temperature 0-50°C Storage: Temperature -20°C to 60°C - Relative Humidity 10%-90% Supply: 110Va.c., 5A, 50/60Hz <p>RECORDING AND CONTROL</p> <ul style="list-style-type: none"> Sensor: Type K Thermocouple to BS EN 60584-1 	<ul style="list-style-type: none"> Accuracy: ± 0.1% of span ± 1°C Control: PID Units: °C or °F Channels: 6 control channels plus 6 monitoring channels <p>PROGRAM</p> <ul style="list-style-type: none"> Ten segment program profiles. Each segment can be temperature level, ramp up, ramp down or hold period In addition to all six zones running to a common program, two independent programs can be run simultaneously controlling 3+3 control zones or 2+4 control zones

COOPER6 PROGRAMMER/CONTROLLER

Stock Reference: 12060

Please note: The FGH P256 Programmer has now been discontinued by the manufacturer and is no longer available from any supplier in the world market.

Cooperheat are pleased to advise, that they have an alternative unit available, the Cooper6 which provides the same heat treatment profile programming and temperature control capabilities as the P256. The Cooper6, 6 channel programmer/controller has been developed for use in conjunction with our range of Transformer Units, providing automatic temperature process control for up to six output channels. The Cooper6 unit can control temperatures both manually and automatically, depending on user requirements. In automatic mode, the channel controller will ensure that the control zone temperature closely follows the temperature rise, hold



and fall segment parameters programmed by the operator. Programming and operation of the unit is kept uncomplicated and user friendly through the use of a simple operator interface with easy to read displays showing both the set point and process actual temperatures. The display provides visual indication of the running heat treatment program status and control zone output. In addition, individual neon lights indicate when a control zone contactor is energised. The Thermocouple Fault feature ensures the 6 channel programmer/controller automatically cuts out the heater power when any control zone thermocouple input indicates a temperature below -30°C or open circuit. This negative temperature level could indicate a reversed thermocouple fault condition which would compromise the integrity of the heat treatment process.

Features:

- 6 channel digital temperature controller / programmer
- Each channel can be programmed to operate in Automatic, Manual or OFF modes.
- Operator interface providing visual indication of heat treatment programme status
- Thermocouple fault 'stops control zone contactor and heating power when temperature reaches - 30°C which could indicate hazardous reversed thermocouple condition is open circuit.

CONTROLLER PROFILE

- Start temperature: 0°-1200°C (2000°F) in 1 degree increments
- Heating rate: 1°-1000°C per hour in 1 degree increments
- Soak temperature: 0°-1200°C (2000°F) in 1 degree increments
- Soak time: 0-100 hours in 0.1 increments
- Cooling rate: 0°-1000°C per hour in 1 degree increments
- End temperature: 0°-1200°C (2000°F) in 1 degree increments
- Proportional Band Setting: 5, 10, 20 and 40°C
- Hold-Back Setting: 10, 20, 40 and 60°C

SPECIFICATIONS

GENERAL

- Case Material: Stainless steel
- Case Dimensions: Width 26.5cm, Height 22.5cm, Depth 31 cm
- Display: LED panel
- Weight: 7kg
- Enclosure: Front IP64, Rear IP20

TEMPERATURE CONTROLLER



Spare Temperature Controller

The Set Point temperature controller provides temperature control to a single output channel. The controller raises the temperature of the workpiece to the selected temperature and maintains it at that level. The unit displays both workpiece and set point temperatures.

Stock reference & description:

548-045 THC-400C Temperature controller



Spare Advantage 3 Programmer/Controller

Cooperheat's Advantage 3 temperature programmer controller with its unique linkable control zone feature, is fast becoming the heat treatment industry standard. Providing the user with versatility, flexibility, cost savings and time. The Advantage 3 can be used individually or combined to control temperature differentials in a number of user selectable configurations. This control of temperature differential is an important requirement of international heat treatment codes and standards including ASME, BS, EN, ANSI & DIN. The Advantage 3 is fitted as standard to Cooperheats Heat Treatment Modules. It can also be purchased separately as a spare or to upgrade any make or model heat treatment transformer, module or unit. Specifically designed for localised heat treatment industry, the Advantage 3 reduces the number of standard six channel (single program) programmers normally required to heat treat work pieces requiring different heat treatment cycles and where only one standard 6 channel (single program) programmer is available, eliminates the need for multiple shift working to carry out several separate heat treatment processes for each heat treatment specification.

Stock reference & description:

548-055 Advantage 3 linkable, programmer/controller



Advantage 3 Programmer/Controller Heat Treatment Unit Upgrade Kit

Contains the necessary parts and instructions required for upgrading any 6 channel make or model of heat treatment unit to provide the additional functionality, user benefits and cost savings provided by the Advantage 3 linkable programmer/controller. See Advantage 3 upgrade kit technical specification for full details.

Stock reference & description:

12300 Advantage 3 programmer/controller heat treatment unit upgrade kit (for six control channels)



Spare Advantage 1: Programmer/Controller

Cooperheat's Advantage 1 temperature programmer / controller provides the user with versatility, flexibility, cost savings and time. The Advantage 1 is used individually to control temperature differentials in a number of user selectable configurations. This control of temperature differential is an important requirement of international heat treatment codes and standards including ASME, BS, EN, ANSI & DIN. The Advantage 1 is an alternative to the Advantage 3 which is fitted as standard to Cooperheat six channel Heat Treatment Modules and does not have the linkable feature. It can also be purchased separately as a spare or to upgrade any make or model heat treatment transformer, module or unit. Specifically designed for localised heat treatment industry, the 6 off Advantage 1's in each Heat Treatment Module allows several separate heat treatment processes to occur at the same time therefore eliminating the need for multiple shift working to carry out.

Stock reference & description:

548-050 Advantage 1 Programmer / Controller

CHINO AH4712 & 4724 (12 OR 24 POINT) HYBRID TEMPERATURE CHART RECORDER

The AH Series Chino hybrid temperature recorder is a popular recorder which gives the option of printing to chart and also saving the data to an SD card which can then in turn be downloaded to your PC. The recorder has a bright and clear, easy to read LCD display. Various measuring and recording settings can be easily set by the operator on the control panel. The unit is designed for pre and post weld heat treatment processes utilising type K thermocouples. Contained within a rugged, cost-effective, mild steel case, the recorder is designed and built to withstand normal site conditions.

For process monitoring by the operator in any site light conditions, the level of illumination of the chart and the scale plate can be adjusted by the operator.

The AH Series Chino recorder can also be supplied as a panel mounted version.

Features:

- Standard scale supplied is 0-1000°C
- Type K polarised sockets fitted to the rear of the case
- SD card to export data to PC
- Ethernet port for Web viewer and email alarm notifications
- Chart end notification
- The chart drive speed can be selected to be 12.5, 25, 50, 75, 100 or 150mm per hour
- Chart and scale illuminates for viewing in low light
- Reliable
- Simple to calibrate



GENERAL SPECIFICATIONS

<p>POWER REQUIREMENT</p> <ul style="list-style-type: none"> • Power supply voltage: 100-240V a.c • Power supply frequency: 50Hz/60Hz <p>OPERATING ENVIRONMENT</p> <ul style="list-style-type: none"> • Ambient temperature: 0°C-50°C • Ambient humidity: 30%-90% RH 	<p>PHYSICAL</p> <ul style="list-style-type: none"> • Scale length: 180mm • Accuracy: +/- 0.5% of input scan • Dead band: 0.4% of input span • Balancing time: Approximately 2 seconds • Chart: Fanfold 20 metres long • Channels: 12 or 24 • Stamping interval: 6 seconds • Stamping system: 12 colour • Weight: 17.5kg • Illumination : 3 x L.E.D.'s
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CHINO EH3000 (12 POINT) TEMPERATURE CHART RECORDER

Stock Reference: 40005



The EH Series Chino temperature recorder is a popular, basic, analogue alternative to digital recorders. The Chino temperature chart recorder is designed for pre and post weld heat treatment processes utilising type K thermocouples. Contained within a rugged, cost-effective, mild steel case, the recorder is designed and built to withstand normal site conditions. Each input is individually recorded on the

chart paper using a multi coloured printing system for clear identification of each thermocouple input trace. For process monitoring by the operator in any site light conditions, the level of illumination of the chart and the scale plate can be adjusted by the operator.

The EH Series Chino recorder can also be supplied as a panel mounted version.

Features:

- Standard scale supplied is 0-1200°C
- Type 'K' polarised sockets fitted to the rear of the case
- Alternative scales available upon request
- Easy access to power supply and chart drive switches
- The chart drive speed can be selected to be 12.5, 25, 50, 75, 100 or 150mm per hour
- Manual fast forward chart advance
- Printer refill warning visible on chart
- Ease of operation
- Reliable
- Low maintenance
- Simple to calibrate

SPECIFICATIONS

<p>POWER REQUIREMENT</p> <ul style="list-style-type: none"> • Power supply voltage: 100-240V a.c • Power supply frequency: 50Hz/60Hz <p>OPERATING ENVIRONMENT</p> <ul style="list-style-type: none"> • Ambient temperature: 0°C-50°C • Ambient humidity: 30%-90% RH 	<p>PHYSICAL</p> <ul style="list-style-type: none"> • Scale length: 180mm • Accuracy: +/- 0.5% of input scan • Dead band: 0.4% of input span • Balancing time: Approximately 2 seconds • Chart: Fanfold 20 metres long • Channels: 12 • Stamping interval: 6 seconds • Stamping system: 12 colour • Weight: 17.5kg • Illumination: 3 x L.E.D.'s
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AUTOMATIC THERMOCOUPLE ATTACHMENT UNIT

Stock Reference: 41756 for 100-125V unit / 41757 for 220-240V unit

Cooperheat's Automatic Thermocouple Attachment Unit (TAU) enables direct attachment of thermocouples to a work piece using the capacitive discharge method. This technique was pioneered by Cooperheat and has since become a recognised global standard.

By reducing the risk of expensive rework, due to thermocouples breaking off during the heat treatment process, this innovation provides a high integrity welded connection which provides reliable and accurate temperature control and recording.



The Cooperheat TAU has a unique automatic operation feature overcoming difficulties associated with manual attachment units which require both hands to operate. Cooperheat's TAU requires only one hand to operate which is an important safety feature when working at elevated levels or inaccessible locations.

Features:

- Three power output settings enable attachment of wire diameters 0.5, 1.0 and 2.0 mm: equivalent to 24, 18 and 12 awg
- Non-corrosive, stainless steel casing
- Battery or mains operated
- Capable of over 1000 discharges from a fully charged integral nickel cadmium battery
- Available for use with 110V or 230V battery recharging supplies
- Third party tested to ensure Electro-Magnetic Compatibility (EMC)

Benefits:

- Single handed, one person operation in automatic mode
- Operator friendly
- Light weight and portable
- No welding skills required
- LEDs indicate unit charging and battery status
- Automatic switch off after 3 minutes to save battery power
- Three power settings can be selected

SPECIFICATIONS

POWER REQUIREMENT

- Power Consumption: 5.0VA
- Battery Voltage: 12 Volts
- Battery Capacity: 3.0Ah
- Thermocouple Diameters: 0.5, 1 & 2mm selectable
- Discharge Voltages: 50/70/83Vd.c nominal
- Battery Monitor: Monitoring LED and Automatic Full Discharge Protection

- Number of Discharges: Approximately 1000 on setting 2 at a rate of 200 discharges per day with fully charged battery
- Height: 210mm
- Width: 215mm
- Depth: 90mm
- Weight: 4.25kg

CERAMIC PAD HEATING ELEMENTS (FCP)

We incorporate the highest quality materials available in the construction of our (FCP) heating elements. These materials make the heating elements highly durable, which extends the usable life of Cooperheat heating elements beyond that normally expected.

This extended life, high durability and reliability combine to save you money by:

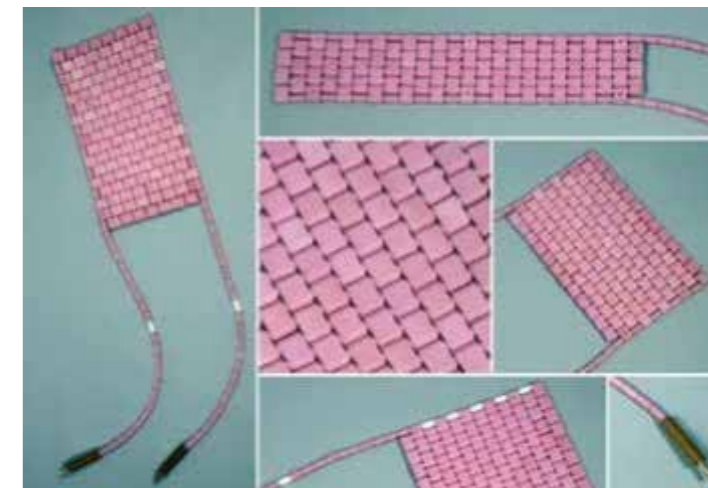
- Reducing reworks and lost time due to heating element failures.
- Reducing your annual costs for replacing or repairing failed or damaged heating elements.

Cooperheat ceramic heating elements are constructed from high grade sintered alumina ceramic beads, nickel chrome core wire and nickel cold tail wire. The construction allows the heating element to be flexible and provides high heat transfer efficiency.

We insist on using high quality, ceramic beads, with a high resistance to thermal and physical shock, in the construction of the FCP.

The important physical properties, which make these beads superior to other beads used in the heat treatment industry, are available on request.

- Alumina content - 95%
- Bulk density fired - 3.7Mg/m³
- Grain size - 6µm
- Vickers hardness - 12.5
- Rockwell hardness - 78 (R45N)
- Compressive strength - 2000MPa
- Flexural strength - 320MPa (ASTM C1161, 3 point)
- Young's modulus - 325Gpa
- Thermal conductivity - 21W/m³



These beads are supplied to us by one of the leading specialist ceramic manufacturers in the ceramic industry. The cold tails of Cooperheat ceramic heating elements are butt welded to the heater core wire which eliminates the cold tail/core wire junction failures often seen with low quality heaters which use steel ferrules.

By selection, from the extensive range of the Cooperheat FCP, any pipe size or pipe configuration can be covered so that the correct amount of heating power can be applied to successfully heat treat the pipe weld or other fabrication. Our FCP's are manufactured with a range of power ratings for use with a selection of standard voltages.

If you require any special heating element configuration, voltage or power rating, we will use our heat treatment engineering expertise to provide you with a heating element custom built to meet your exact needs.

Please note: the width of the heater is the first measurement (ceramic bead width—tail to tail)

CERAMIC PAD HEATING ELEMENTS (FCP)

HEATING ELEMENT SELECTION GUIDE: (FOR HEAT TREATMENT CYCLES UP TO 800°C)

Suggested applications for ceramic pad elements on Straight Pipe Butt Welds in Carbon Steel / Chromium Molybdenum Vanadium steel. To be used as a guide only: Reference should always be made to specific code or specification heated width requirements.

Nominal Bore Inches — (mm)	0 — 0.8 Inch (0-20mm)	0.8 — 0.9 Inch (20-23mm)	0.9 — 1.1 Inch (23-28mm)	1.1 — 1.4 Inch (28-36mm)	1.4 — 1.8 Inch (36-46mm)	1.8 — 2.4 Inch (46-61mm)
1.0 Inch (25.4mm)	1 x CP48	N/A	N/A	N/A	N/A	N/A
2.0 Inch (50.8mm)	1 x CP48	N/A	N/A	N/A	N/A	N/A
3.0 Inch (76.2mm)	1 x CP12	N/A	N/A	N/A	N/A	N/A
4.0 Inch (101.6mm)	1 x CP15	N/A	N/A	N/A	N/A	N/A
6.0 Inch (152.4mm)	2 x CP12	2 x CP12	N/A	N/A	N/A	N/A
8.0 Inch (205.2mm)	2 x CP15	3 x CP10	3 x CP10	N/A	N/A	N/A
10.0 Inch (254.0mm)	3 x CP12	4 CP8	4 x CP8	Two Rows 3 x CP12	N/A	N/A
12.0 Inch (304.8mm)	4 x CP10	4 x CP10	4 x CP10	Two Rows 4 x CP10	N/A	N/A
14.0 Inch (355.6mm)	3 x CP15	4 x CP12	6 x CP8	6 x CP8	Two Rows 4 x CP12	N/A
16.0 Inch (406.4mm)	Two Rows 4 x CP12	Two Rows 4 x CP12	Two Rows 4 x CP12	Two Rows 5 x CP10	Two Rows 5 x CP10	N/A
18.0 Inch (457.2mm)	Two Rows 4 x CP15	Two Rows 4 x CP15	Two Rows 4 x CP15	Two Rows 5 x CP12	Two Rows 5 x CP12	N/A
20.0 Inch (508.0mm)	Two Rows 5 x CP12	Two Rows 5 x CP12	Two Rows 5 x CP12	Two Rows 5 x CP12	Two Rows 6 x CP10	Two Rows 6 x CP10
22.0 Inch (558.8mm)	7 x CP10	7 x CP10	8 x CP6	N/A	N/A	N/A
24.0 Inch (609.6mm)	Two Rows 5 x CP15	Two Rows 5 x CP15	Two Rows 6 x CP12	Two Rows 6 x CP12	Two Rows 6 x CP12	Two Rows 7 x CP10
47.0 Inch (1,193.8mm)	Two Rows 12 x CP12	Two Rows 12 x CP12	Two Rows 12 x CP12	Three Rows 2 x CP12	Three Rows 12 x CP12	Three Rows 12 x CP12
63.0 Inch (1,600.2mm)	Two Rows 15 x CP12	Two Rows 15 x CP12	Two Rows 15 x CP12	Three Rows 15 x CP12	Three Rows 15 x CP12	Three Rows 15 x CP12

CERAMIC PAD HEATING ELEMENTS (FCP)

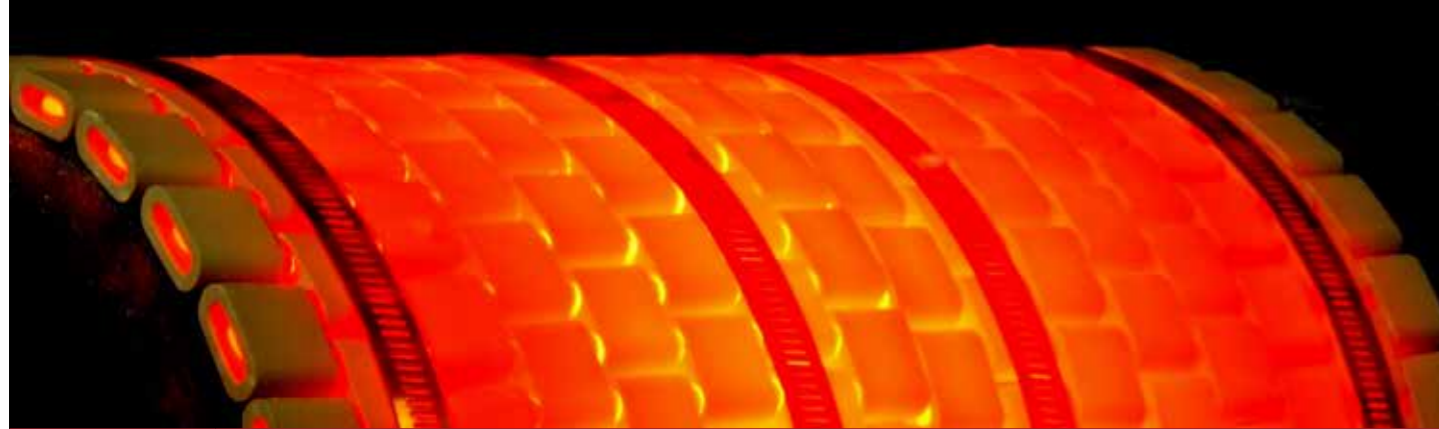
Ceramic Pad Heating Elements 30V—1.35KW—45A (80/20 Ni-Cr Core Wire) (All dimensions are nominal)

Stock Reference	Type Ref	Ceramic Beads Width	Ceramic Bead Height (Length of heater body)	Dimensions Width (mm)	Dimensions Height (mm)
20040	CP10	10	4	250mm	85mm
20042	CP20	20	2	510mm	45mm
20047	CP12	12	4	305mm	85mm
20048	CP7	7	7	178mm	147mm
20049	CP3	3	14	75mm	295mm
20052	CP4	4	11	100mm	230mm

Ceramic Pad Heating Elements 60V—2,7KW—45A (80/20 Ni-Cr Core Wire) (All dimensions are nominal)

Stock Reference	Type Ref	Ceramic Beads Width	Ceramic Bead Height (Length of heater body)	Dimensions Width (mm)	Dimensions Height (mm)
20030	CP3	3	32	75mm	670mm
20031	CP4	4	24	100mm	505mm
20032	CP6	6	16	150mm	335mm
20033	CP8	8	12	205mm	250mm
20034	CP10	10	10	255mm	210mm
20035	CP15	12	8	305mm	165mm
20036	CP15	15	7	380mm	150mm
20037	CP16	16	6	405mm	125mm
20038	CP21	21	5	535mm	100mm
20039	CP24	24	4	610mm	85mm
20041	CP48	48	2	1,220mm	40mm

CERAMIC PAD HEATING ELEMENTS (FCP)



Ceramic Pad Heating Elements 80V—3.6KW—45A (80/20 Ni-Cr Core Wire)
(All dimensions are nominal)

Stock Reference	Type Ref	Ceramic Beads Width	Ceramic Bead Height (Length of heater body)	Dimensions Width (mm)	Dimensions Height (mm)
21630	CP3	3	47	75mm	985mm
21631	CP4	4	35	100mm	735mm
21632	CP6	6	24	150mm	500mm
21633	CP8	8	18	205mm	380mm
21634	CP10	10	15	255mm	315mm
21635	CP12	12	12	305mm	250mm
21636	CP15	15	10	380mm	210mm
21637	CP18	18	8	460mm	170mm
21638	CP21	21	7	535mm	145mm
21639	CP24	24	6	610mm	125mm
21640	CP29	29	5	735mm	105mm
21641	CP36	36	4	915mm	85mm

FLEXIBLE INSULATED PREHEATERS (FIP'S)



Specification

The FIP is designed to provide preheating up to a temperature of 250°C. The element is identical to that used in the FCP heater, but has a high grade thermal insulating mat protected by a stainless steel backing. A feature of this heater are that limpet magnets can be used for fast adhesion to the workpiece. These can be supplied either as a separate item (29269-Assembled pair of high strength limpet magnets with Cross bar) OR built into the preheater (22062).

User Benefits

As with all Cooperheat products, the FIP heater is competitively priced and in addition: has magnetic attachment for fast, low cost installation. It has protection from weld splatter, operates on low voltage for operator safety and is strongly constructed for on site reliability.

Application

Flexible Insulated Preheaters (FIP's) can be used either flat or laid over curved surfaces, they are equally suitable for preheating pipework, fabrications and vessels either longitudinally or circumferentially.

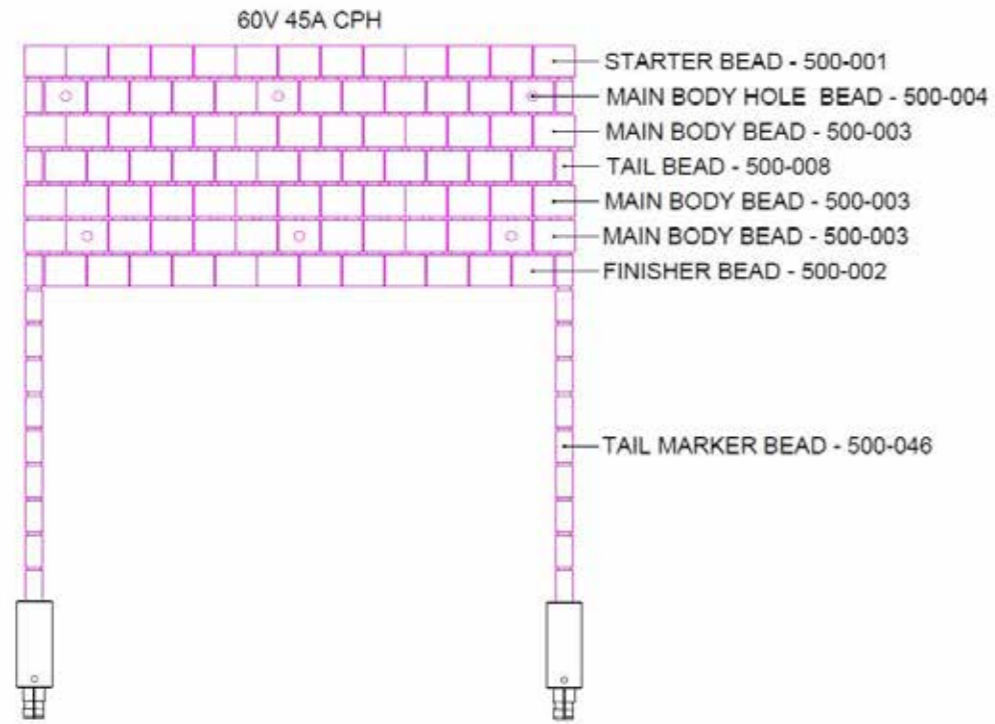
Flexible Insulated Preheaters (FIP's) 60V—2,7KW—45A (80/20 Ni-Cr Core Wire)
(All dimensions are nominal)

Stock Reference	Type Ref	Width (Tail to Tail)	Length (of Heater Body)
22062	Complete with three built in limpet magnets	125mm	810mm
22070	FIP 295	100mm	750mm
22071	FIP 235	125mm	585mm

Flexible Insulated Preheaters (FIP's) 80V—3.6KW—45A (80/20 Ni-Cr Core Wire)
(All dimensions are nominal)

Stock Reference	Type Ref	Width (Tail to Tail)	Length (of Heater Body)
22063	Complete with three built in limpet magnets	125mm	940mm
22072	FIP 395	100mm	1000mm
22073	FIP 305	125mm	775mm

SPARE REPLACEMENT BEADS / WIRE FOR FLEXIBLE CERAMIC PAD HEATING ELEMENTS



Ceramic Pad Heater Beads

Ceramic, sintered alumina beads for repair and manufacture of ceramic pad heating elements.

Stock reference & description:

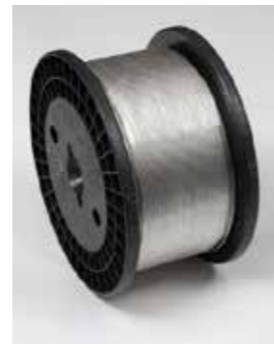
- 500-001 Starter Bead
- 500-002 Finisher Bead
- 500-003 Main Body Bead
- 500-004 Main Body Hole Bead
- 500-008 Tail Bead
- 500-046 Tail Marker Bead (White)

Heating Element Wire

Heating element core wire and cold tail wire for repair and manufacture of ceramic pad heating elements.

Stock reference & description:

- 502-001 19 strand 60/16 nickel chrome core wire
- 502-003 19 strand nickel 212 cold tail wire
- 502-050 19 strand 80/20 nickel chrome core wire



ROPE HEATERS 30V, 40V, 60V & 80V (80/20 Ni-Cr CORE WIRE)

Application

Cooperheat rope heaters can be wound onto pipe diameters between 152mm and 508mm. They provide an excellent and reliable means of preheating when positioned each side of the weld joint to be welded.

Specification

The core of the element is stranded nickel chromium wire insulated with porcelain beads and protected with a closely braided nickel chrome wire outer covering, which has an even heat distribution along its surface eliminating any hot spots. Uniform maximum temperatures of up to 250°C can be achieved. Cold tails are welded for durability and terminated with 60A connectors.

Stock Reference	Type Reference	Volts	Length (mm)	Diameter (mm)	kW	Pipe Size (NB Inch)
26001	RH84	30	2,135	16.5	1.35	3 to 6 Inch
26010	RH84LD	30	2,135	9.5	0.67	¾ to 3 Inch
26003	RH117	40	2,970	16.5	1.8	3 to 6 Inch
26011	RH117LD	40	2,970	9.5	0.90	¾ to 3 Inch
26000	RH168	60	4,270	16.5	2.7	6 to 10 Inch
26012	RH168LD	60	4,270	9.5	1.35	¾ to 3 Inch
26020	RH168HD	60	4,270	16.5	5.4	10 Inch and up
26002	RH234	80	5,940	16.5	3.6	6 to 10 Inch
26013	RH234LD	80	5,940	9.5	1.8	¾ to 3 Inch
26021	RH234HD	80	5,940	16.5	7.2	10 Inch and up

SINGLE, DOUBLE & 4-BANK CHANNEL ELEMENTS

The channel element can be used to preheat and post heat large welded fabrications including steam drums and pressure vessels, they can also be used as a heat source in temporary furnace installations where multiple heat treatments need to be carried out

A coiled element manufactured from solid drawn 9 SWG ICA135 or Ni-Cr core wire and insulated with 95% sintered alumina beads, is supported in a stainless steel tray.

The supply voltages for single channels are 30V, 60V or 80V and a range of multi-bank elements can be made up from single elements connected either in series or parallel. These elements are powered directly from the incoming 380V or 415V 3-Phase supply, via a 6-Way, 3-Phase Control trolley (stock reference 14003)

Channel elements can also be supplied utilising 60V or 80V supplies which can be powered and controlled via standard 60V and 80V output, 50kVA or 70kVA heat treatment machines.

Working temperatures of up to 750°C can be achieved, the heaters are capable of higher temperatures using Kanthal core wire. Cold tails are welded not crimped for durability and safe working. Strongly constructed of high grade materials the channel element is designed to withstand a long on site working life and in addition has the following features; portable, designed for extended periods of operation, suitable for a wide range of heat treatment applications, selection of sizes, can be used for temporary furnace applications for large fabrications.

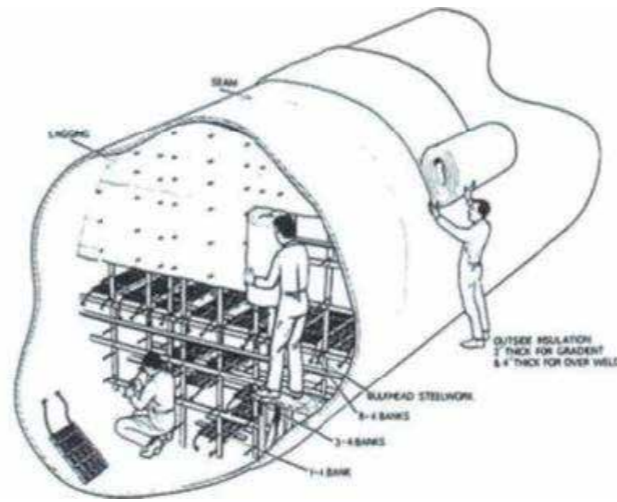
For Post Weld Heat Treatment (PWHT) of large, welded constructions, including steam drums and vessels or for use in furnaces, channel heaters are often more practical than applying large numbers of 60V ceramic heating pad elements. The most common channel element is known as the 4-bank.

Their rugged construction comprises of a stainless steel channel which contains the 9 SWG ICA135 element coil. Dependent upon customer preference we can also produce, upon request, channel elements with cores formed using Ni-Cr 60/16 or 80/20 as the core material.

Application – Internal bulk head heat treatment of vessel seams. (see illustration below)

In specific cases ,in the post weld heat treatment of welded seams of large vessels it is sometimes more practical to make a thermally insulated compartment inside the vessel and then heat the compartment by means of channel elements such as 4-banks.

These elements are used to heat the insulated compartment by resting on transversely placed mild steel channels. The compartment is produced by insulating the outside area of the vessel to be heat treated and then enclosed internally by means of two mild steel insulated bulkhead fitted inside the vessel.

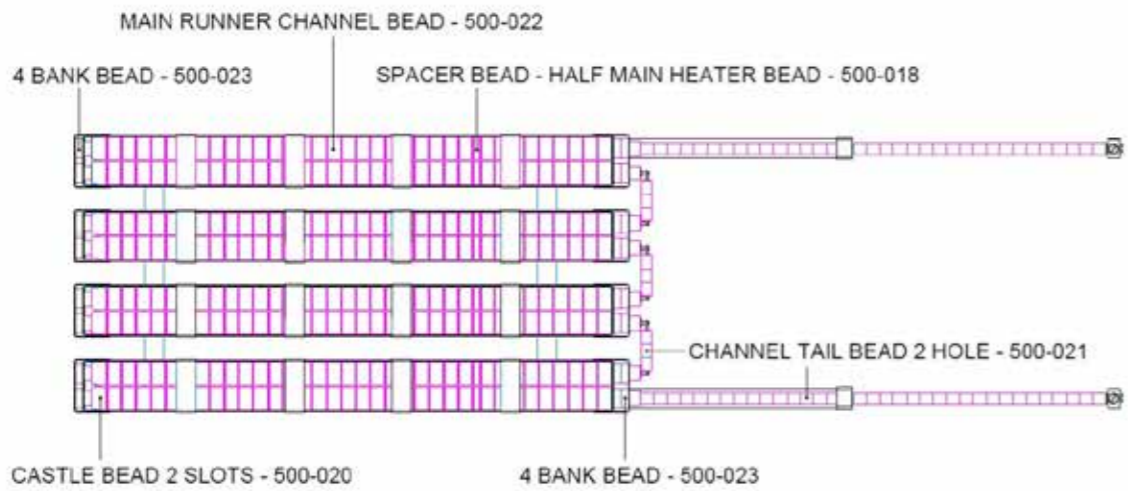


CHANNEL ELEMENTS

Stock Reference	Item Description	Voltage	Current	Power	Dimensions mm
27750	4-Bank Channel Element - 60/16 Ni-Cr	240V	55A	13.2kW	1,335mm (L) x 360mm (W)
27850	4-Bank Channel Element - ICA 135	240V	55A	13.2kW	1,335mm (L) x 360mm (W)
27851	4-Bank Channel Element - ICA 135	220V	55A	12.1kW	1,335mm (L) x 360mm (W)
27901	Single Channel Element - 60/16 Ni-Cr	30V	55A	1.65kW	332mm (L) x 66mm (W)
27902	Single Channel Element - 60/16 Ni-Cr	60V	55A	3.3kW	960mm (L) x 700mm (W)
27932	Single Channel Element - ICA 135	60V	55A	3.3kW	960mm (L) x 700mm (W)
27911	Single Channel Element - 60/16 Ni-Cr	80V	55A	4.4kW	1,190mm (L) x 700mm (W)
27933	Single Channel Element - ICA 135	80V	55A	4.4kW	1,190mm (L) x 700mm (W)
27975	Hot Leads for use with Channel Elements (Per Metre)	-	-	-	Please advise length required



REPLACEMENT BEADS/WIRE FOR CHANNEL ELEMENTS



536-022/1

Channel Element Beads

Ceramic, sintered alumina beads for repair of channel elements.

Stock reference & description:

- 500-018 Spacer Bead - Half Main Heater Bead
- 500-020 Castle Bead 2 Slots
- 500-021 Channel Tail Bead 2 Hole
- 500-022 Main Runner Channel Bead
- 500-023 4-Bank Bead
- 500-025 Tube Bead



500-018



500-021



500-022



500-023

Channel Element Wire & Mild Steel Connectors

Channel element core wire and cold tail wire for repair and manufacture of channel element heating elements.

Stock reference & description:

- 502-011 60/16 Nickel Chrome 9 SWG (1kg=11.56m) Core Wire
- 502-012 60/16 Nickel Chrome 10 SWG (1kg=14m) Tail Wire
- 502-013 80/20 Nickel Chrome 9 SWG (1kg=11.56m) Core Wire
- 502-014 80/20 Nickel Chrome 10 SWG (1kg=14m) Tail Wire

- 27921 60/16 Nickel Chrome Spare Coil for Channel Element
- 536-022/1 2 Hole Mild Steel Connector



Replacement Coil for Channel Elements

THERMAL INSULATION



Superwool Insulation

Superwool is a high temperature insulating fibre blanket manufactured from Calcium Magnesium Silicate. This material has a thermal performance equivalent to refractory ceramic fibre up to 1200°C. However, unlike ceramic fibre, Superwool is body soluble and has a larger needle particle size.

These qualities mean that Superwool represents a lower respiratory hazard than ceramic fibre, although, as with all high temperature insulating fibre, normal respiratory protection in the form of an appropriate dust mask should be worn during handling. Superwool is available in a range of mat sizes, protected by a stainless steel mesh to extend the working life of the insulation. Alternatively, Superwool is also supplied in unmeshed rolls.

Superwool Insulation in Stainless Steel Mesh

Stock Reference	Density 96kg/m ²	Density 128kg/m ²	Thickness (25mm)	Width (mm)	Length (mm)
29797	•		25	100	400
29798	•		25	125	600
29799	•		25	100	750
29800	•		25	300	750
29801	•		25	300	600
29802	•		25	300	900
29803	•		25	600	600
29804	•		25	600	900
29805	•		25	600	1,200
29806	•		25	600	1,800
29808		•	25	600	3,600
29900		•	25	300	750
29901		•	25	300	600
29902		•	25	300	900
29903		•	25	600	600
29904		•	25	600	900
29905		•	25	600	1,200
29906		•	25	600	1,800
29908		•	25	600	3,600

Unmeshed Superwool Insulation Rolls

Stock Reference	Density 96kg/m ²	Density 128kg/m ²	Thickness (25mm)	Width (mm)	Length (mm)
29601	•		25	600	7,300
29611		•	25	600	7,300

THERMAL INSULATION



Ceramic Fibre Insulation

Ceramic fibre is a high temperature insulating fibre blanket. This material has a thermal performance equivalent to refractory ceramic fibre up to 1200°C.

Ceramic fibre is available in a range of mat sizes, protected by a stainless steel mesh to extend the working life of the insulation. Alternatively, ceramic fibre is also supplied in unmeshed rolls.

Ceramic Fibre Insulation in Stainless Steel Mesh					
Stock Reference	Density 96kg/m ²	Density 128kg/m ²	Thickness (25mm)	Width (mm)	Length (mm)
29519	•		25mm	300mm	300mm
29513	•		25mm	300mm	600mm
29511	•		25mm	300mm	900mm
29512	•		25mm	600mm	600mm
29508	•		25mm	600mm	900mm
29509	•		25mm	600mm	1,200mm
29510	•		25mm	600mm	1,800mm
29514	•		25mm	600mm	2,200mm
29515	•		25mm	600mm	3,600mm
29517	•		25mm	600mm	7,300mm
29500		•	25mm	300mm	300mm
29501		•	25mm	300mm	600mm
29502		•	25mm	300mm	900mm
29507		•	25mm	300mm	1,800mm
29503		•	25mm	600mm	600mm
29504		•	25mm	600mm	900mm
29505		•	25mm	600mm	1,200mm
29506		•	25mm	600mm	1,800mm
29518		•	25mm	600mm	7,300mm

Unmeshed Ceramic Fibre Insulation Rolls					
Stock Reference	Density 96kg/m ²	Density 128kg/m ²	Thickness (25mm)	Width (mm)	Length (mm)
29601	•		25mm	600mm	7,300mm
29601/128		•	25mm	600mm	7,300mm

THERMAL INSULATION



Cooperknit Insulation

Cooperknit insulation is a cost effective knitted, silica fibre with many user benefits including reusability, long life and low risk to user health and safety and minimal skin irritation compared with most other high temperature insulating fibres. Independent tests on Cooperknit have shown that no respirable fibres were found in any samples after exposure to 1000°C for 24 hours.

Cooperknit can be used repeatedly at continuous operating temperatures up to 950°C without loss of thermal or mechanical properties. Cooperknit is available in a range of standard mat sizes detailed below, we are also able to supply special mat sizes or configurations to meet your exact requirements. Alternatively, Cooperknit is also supplied in 7.5m long rolls.

Cooperknit Insulation			
Stock Reference	Thickness (mm)	Width (mm)	Length (mm)
29700	10mm	300mm	600mm
29701	10mm	600mm	600mm
29702	10mm	600mm	900mm
29703	10mm	600mm	1,200mm
29704	10mm	600mm	1,800mm
29699	10mm	600mm	7,500mm

INFRARED HEATERS

Cooperheat's electrical infrared heater is an economical and highly efficient infrared, radiant heater that provides a radiant heat source for pre-heating metal fabrications. The heater is ideal for preheat of large welded constructions including steam drums, vessels and rotating equipment and are an alternative to our range of infrared Gas Surface Combustion Units (SCUs).

Specifically designed to replace the costly and heavy induction equipment including SCU's required to deliver preheats on vessels and large constructions, the infrared heater has an exceptionally fast heat up time and is lightweight in comparison to induction alternatives.

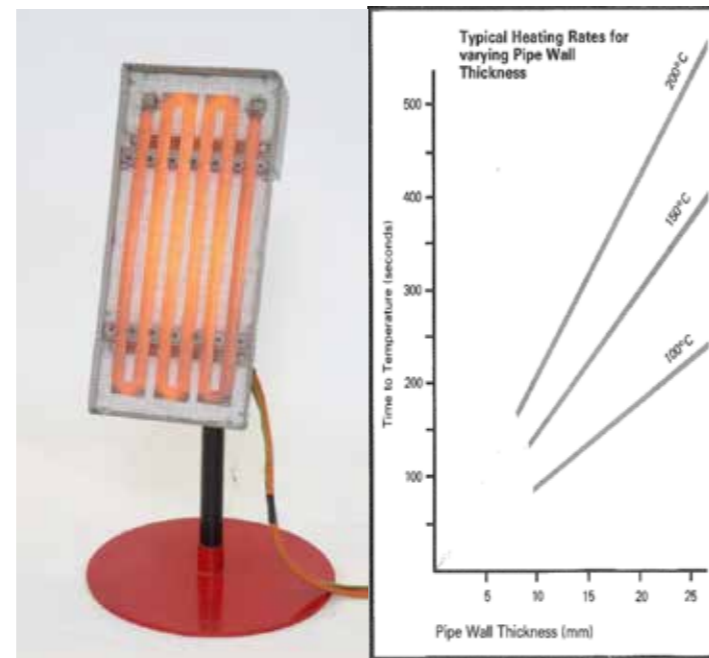
Infra-red panels can be mounted on internal or external support rigs or on separate stands as single units.

As single units the heater can be strategically positioned during the rotating operation necessary for welding circumferential seams of large heavy walled pressure vessels.

The infrared heater is rugged, lightweight and comprises of a stainless steel container tray, a layer of silica fibre insulation and a shallow concave strip element manufactured in high temperature Kanthal.

Technical Information:

- The heater can achieve preheating temperatures of up to 350°C
- Rated at 60V, 180A, 10.8kW
- The panels can be used in vertical or horizontal positions
- Our 70kVA Heat Treatment Modules can supply and control up to six infrared heaters (one heater per output channel)



Stock Reference	Item Description	Voltage	Current	Power	Dimensions (mm)
27981	Infrared Preheater	30V	180A	5.4kW	530mm x 240mm
27980	Infrared Preheater	60V	180A	10.8kW	630mm x 370mm
27984	Infrared Preheater	60V	180A	10.8kW	995mm x 235mm
6261/1	Adjustable Pedestal Stand for SCU & IR Heaters	-	-	-	460 > 760mm Tall
6261/2	Adjustable Pedestal Stand for SCU & IR Heaters	-	-	-	760 > 1,370mm Tall

SURFACE COMBUSTION UNIT (SCU)

The Cooperheat Surface Combustion Unit (SCU) is an economical and highly efficient infra-red gas radiant heater that provides a radiant heat source for pre-heating metal fabrications. The SCU is available in a range of sizes.

Applications

- Pre heat of rotating circumferential seams on fabrications, vessels and storage tanks etc, using floor mounted stands.
- Preheat of longitudinal welded seams.
- Preheat of sections of fabrications, vessels and storage tanks etc, requiring repair.
- Preheat of castings.
- Expansion of rotor rings for removal.

Infrared energy is radiated by the hot face of the SCU. Liquefied Petroleum Gas (LPG) or high pressure natural gas enters the rear of the unit drawing in air, mixing inside the plenum chamber and then burns efficiently on the front face of the perforated ceramic tiles. Complete combustion is achieved without flaming. Compared with open flame gas burners, the SCU can save one-third or more of the gas input as there is the absence of flame management. The simplest setup involves one burner connected to a bottle of propane and positioned near the work piece at a distance of 50mm. An optional piezoelectric device can be used to ignite the gas-air mixture on the burner. Other burners may be added to the circuit by means of rapid connect/disconnect couplings. Revolving seams may be temperature controlled using an optical pyrometer and a control unit.

Overview

Open flame burners are still used in some workshops for pre-heating heavy components. Therefore, environmental protection and energy conservation becomes increasingly relevant.

Bottled or piped propane or natural gas enters the rear of the burner by means of a self-sealing, quick release coupling. Combustion air is entrained by gas as it passes through the injector. A deflector in the burner case spreads out the mixture over the full hot face which is made up of rectangular ceramic plaques, each containing hundreds of tiny holes. As the gas/air mixture emerges on the front plate of the plaques, it is ignited

with an electric spark and continues to burn on the plaque surface. The plaques become intensely hot therefore being made from a modern ceramic material will withstand 1000°C (1800°F) on the hot face and yet run cold on the back face where the gas/air mixture enters.

A domed, expanded Inconel mesh grill which protects the plaques from mechanical damage also helps to retain combustion loss to the hot face. When positioned 50-75mm (2-3") away from the work piece to be heated, 15kW (50 thousand BTU/hr) of energy will be directed at it's surface by a 600mm x 150mm SCU. Heat transfer is mainly by radiation therefore the 1000°C (1800°F) radiating surface of the burner permits rapid heating to be achieved. A range of Cooperheat stands and accessories can be supplied as optional extras.



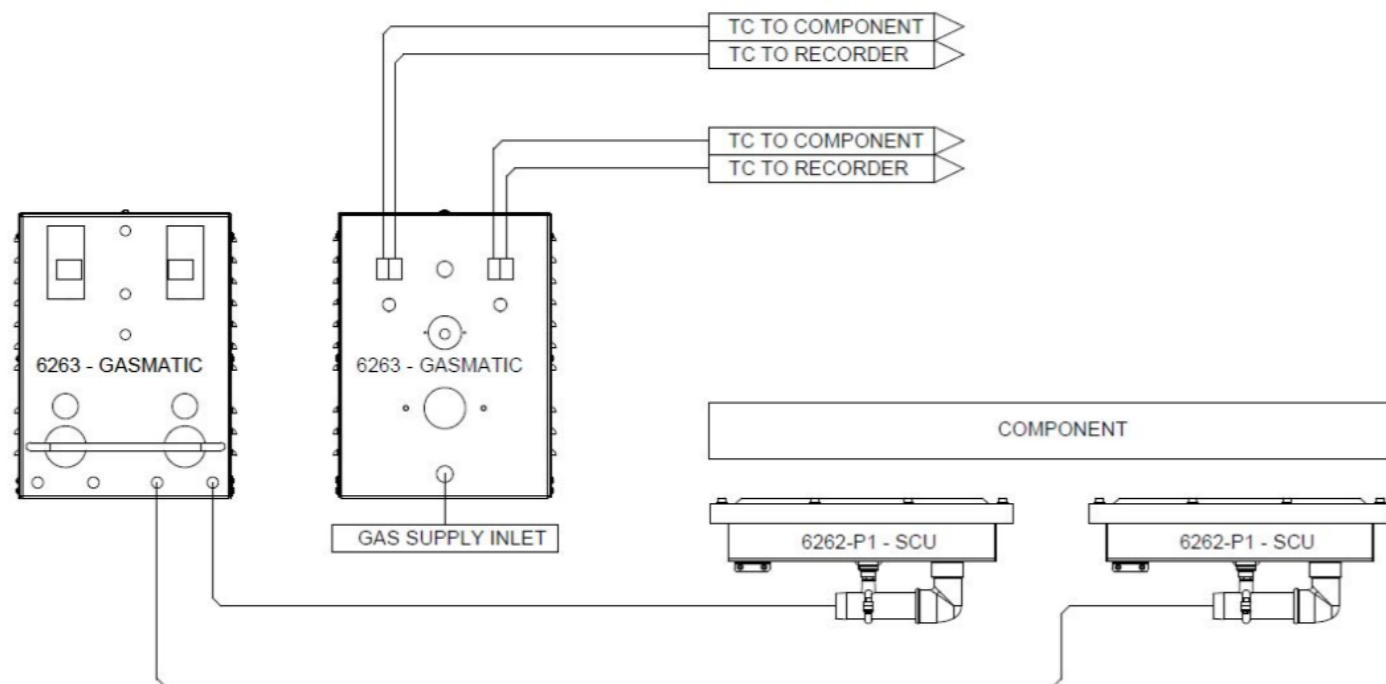
SURFACE COMBUSTION UNIT (SCU)

HIGH VELOCITY GAS COMBUSTION BURNER SET

Components for Surface Combustion Unit (SCU)

Description	Stock Reference
SCU Burner 300 x 150mm (12" x 6") Hot face	6262/P/1
SCU Burner 300 x 300mm (12" x 12") Hot face	6262/P/2
SCU Burner 600 x 150mm (24" x 6") Hot face	6262/P/3
SCU Burner 900 x 150mm (36" x 6") Hot face	6262/P/4
Series Link Fitting	6262/19
Thermal-Magnetic Flame Failure	6262/20
Piezo Spark Ignition Kit	6262/25
Replacement set of six SCU plaques & gaskets	6262/P/15
Twin Outlet Manifold & Pressure Regulator	6263/2
4 Outlet Manifold & Pressure Regulator	6263/4
1.5m link hose with fitted couplings	6264/L/1/C
6m link hose with fitted couplings	6264/L/6/C
10m supply hose with fitted couplings	6264/S/1/C

Schematic of Typical Two Burner Surface Combustion Unit (SCU) Gas Preheat System



High Velocity Gas Burners

Cooperheat have led the way in developing high velocity gas equipment for:

- Heat treatment of vessels and spheres, by internal firing
- Drying out of refractory linings,
- Use as the thermal power source in temporary heat treatment furnaces.

When used in internal firings or in temporary furnaces, even heat distribution of the load is achieved by the process of the hot gases swirling around the inside of the vessel or furnace which actively scrub the load being heat treated. The burner has an exceptional turndown characteristic that can provide, high volume low temperature conditions which are essential at the beginning of the heat treatment cycle. Constructed from high grade stainless steel the burner, combined with the Cooperheat gas train, enables sensitive temperature control.



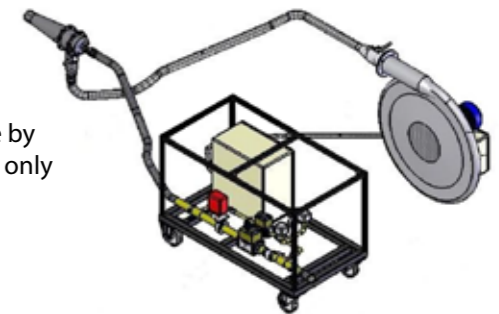
Cooperheat burners have a high turn down ratio of (up to) 50 to 1 (50:1) which provides for sensitive temperature control.

We can supply burner systems from 587 kW (two million BTU/Hr) up to 2,344 kW (eight million BTU/Hr).

Safety

The gas control train, incorporates the following safety systems to comply with BS EN 746-2.

- Flame failure
- High/Low Gas Pressure Cut Off
- Low air pressure cut off
- Air proving prior to ignition
- Valve leak testing
- Double block valves
- Auto ignition of pilot flame only
- Designed for use by skilled operators only



Item	Stock No.
Complete Set (one each of the below)	6500
Gas Burner	6510
Fan	6530
Gas train	6520



1. Compensating cable link cables
To link controller/programmer thermocouple input to the recorder input.

Stork reference & description:
34013 - 3m 'jumper' compensating lead fitted with two type K thermocouple plugs



2. Compensating cable control leads
To connect separate, external controller/programmer units output to power source control input.

Stork reference & description:
33009 - 3m 3-core, programmer/contractor control lead



3. Thermocouple compensating cable
Suitable for use with type K thermocouples where monitoring thermocouples, in addition to the control thermocouples, are required for temperature monitoring purposes. Available in 30m lengths complete with type K thermocouple plug and socket or in 100m rolls without plug and socket (plugs and sockets can be supplied separately as required).

Stork reference & description:
34000 - 30m compensating cable c/w type K thermocouple plug and socket
504-062 - 100m roll of compensating cable without thermocouple plug or socket



4. Splitter cables
For use with triple cable sets. Splitters are used where the operator needs to connect multiple heating elements, in parallel, to triple cable sets to enable the control of multiple heating elements. This enables the heating elements to be grouped to a single control output from a heat treatment unit to allow accurate zonal temperature control.

Stork reference & description:
32001 2 Way splitter
32002 3 Way splitter
32003 4 Way splitter
32004 5 Way splitter



5. Triple cable sets
For use with treatment units controlling 30V, 40V, 60V and 80V heating elements. Includes two double insulated cables for power feed and return, fitted with 300A plug and socket connectors and one compensating cable fitted with type K thermocouple plug and socket.

Stock Reference	Item Description	Cable (mm ²)	Length (M)	Rating (Amps)
35010/10	Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets	6	10	50
35010/20	Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets	6	20	50
35010/25	Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets	6	25	50
35010	Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets	6	30	50
35020	Triple cable set (2x 135A cables + 1x compensating cable) with plugs and sockets	16	15	135
35024	Triple cable set (2x 135A cables + 1x compensating cable) with plugs and sockets	16	30	135
35048	Triple cable set (2x 180A cables + 1x compensating cable) with plugs and sockets	25	15	180
35032	Triple cable set (2x 180A cables + 1x compensating cable) with plugs and sockets	25	30	180
35033/15	Triple cable set (2x 280A cables + 1x compensating cable) with plugs and sockets	50	15	280
35033	Triple cable set (2x 280A cables + 1x compensating cable) with plugs and sockets	50	30	280

Quad cable sets
For use with the 3-Phase control trolley, to connect ceramic heating elements or channel elements.

Stock Reference	Item Description	Cable (mm ²)	Length (M)
35060	Quad cable (3x60A socket connectors, 1 x 300A plug connector, 5 Pin 415V plug)	16	30

ACCESSORIES



1. Elastic Straps

Used to temporarily hold ceramic pad heating elements in place whilst they are correctly positioned and spaced prior to fixing in place with tie wire or banding.

Stock reference & description:

29253 Elastic, 850mm strap with hooks



2. Banding Tape

For bands of more than 4 heating elements, Cooperheat recommends that steel banding and banding clips are used to ensure the heaters remain in full contact with the pipe. For temperatures in excess of 650°C we recommend using stainless steel banding and clips. Please note that mild steel banding should not be used on Chrome Molybdenum post weld heat treatments.

Stock reference & description:

29257 Mild steel banding (30m roll)
29259 Stainless steel banding (30m roll)



3. Banding Clips

Mild and stainless steel clips for fastening mild and stainless steel banding.

Stock reference & description:

29258 Mild steel banding clips (box of 100)
29260 Stainless steel banding clips (box of 100)



4. Banding Tools For Metal Banding Tape

For tightening, cutting off and clipping mild and stainless steel banding.

Stock reference & description:

29256 Winder banding machine
29255 Ratchet banding machine



5. Recorder Spares

Stock reference & description for EH Series Chino:

542-230 0-1200°C 180mm Fan fold chart ET-201
542-230/1 0-1200°C 180mm Fan fold chart EH-05035
542-234 Ink pad case complete with ink pads
542-231 Ink (12 Colours)

Stock reference & description for Fuji:

542-266 0-1200°C 180mm Fan fold chart
542-277 Print head cartridge

ACCESSORIES



1. Single Pole Contactors

Replacement single pole contactors and contacts for 0-65V and 0-85V output heat treatment modules and units. **Stock reference & description:**

526-054/SA Single pole contactor SU280 - 250A (Assembled)
526-056 Fixed contact for 526-054/SA single pole contactor
526-057 Moving contact for 526-054/SA single pole contactor
526-073/SA Single pole contactor SW200N - 250A (Assembled)
526-073/1 Fixed contact for 526-073/SA single pole contactor
526-073/2 Moving contact for 526-073/SA single pole contactor
526-052/SA Single pole contactor SW60 - 80A (Assembled)



2. Double Pole Contactors

Replacement single pole contactors and contacts for 32.5-0-32.5V and 42.5-0-42.5V output, heat treatment modules and units.

Stock reference & description:

526-074/SA Double pole SW190 - 200A contactor (Assembled)
526-059/1 Fixed contact for 526-074/SA double pole contactor
526-059/2 Moving contact for 526-074/SA double pole contactor



3. Circuit Breakers

Replacement mains circuit breaker for heat treatment modules and units.

Stock reference & description:

522-050 125A circuit breaker for 50kVA heat treatment modules and units
522-051 160A circuit breaker for 70kVA heat treatment modules and units



4. Thermocouple Attachment Unit Spares

Replacement parts for Thermocouple Attachment Units (TAUs).

Stock reference & description:

558-027 TAU rechargeable battery, 3 Amp hour, 12V d.c.
536-128 Pliers and magnet set for TAU
536-058 Replacement TAU shoulder strap and clip
ZY-41756 Replacement, populated printed circuit board for 110V thermocouple attachment unit (41756)
ZY-41757 Replacement, populated printed circuit board for 230V thermocouple attachment unit (41757)



5. Thermocouple Wire

Type K nickel chrome/nickel aluminium thermocouple wire, insulated with high temperature glass braid. Recommended maximum temperature 800°C. A consumable item, which is used to convert the thermal energy at the hot junction of the thermocouple to an electrical mV signal which can then be used by temperature control and recording instruments to accurately control and record the temperature of the item being heat treated.

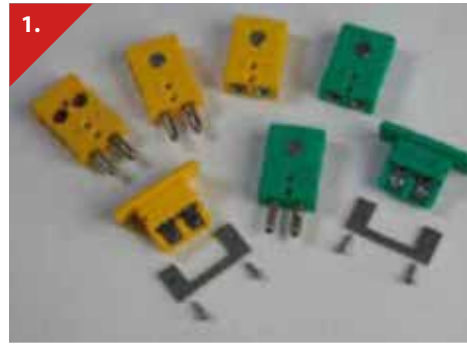
Conforms to: BS EN 60584-1 : 1996 Part 4

BS EN 60584-2 : 1993 Class 1 & ANSI-MC96

The thermocouple wire is attached directly to the work piece using the 'thermocouple attachment unit' stock reference: 41756 (115V unit) or 41757 (230V unit).

Stock reference & description:

43000 100m roll of type K thermocouple wire (Yellow/Red)
43000/G 100m roll of type K thermocouple wire (Green/White)



1. Thermocouple Connectors

Type K plug and socket thermocouple connectors. We offer two types of thermocouple plugs, 516-111 being the standard type normally used with compensating cable. Whereas 516-115 quick connection plugs are ideally suited for use with thermocouple wire where regular connections are required.

Stock reference & description:

516-111/Y	Type K inline plug (standard connection) (Yellow)
516-112/Y	Type K inline socket (Yellow)
516-115	Type K inline plug (quick connection)
516-125	Type K panel mounted socket



2. Tubular, Stainless Steel Sheathed Thermocouples

Commonly used for temperature measurement in furnaces and ovens.

Stock reference & description:

42000	8.0m stainless steel sheathed type K thermocouple with fitted thermocouple plug
42001	0.6m stainless steel sheathed type K thermocouple with fitted thermocouple plug
42002	1.8m stainless steel sheathed type K thermocouple with fitted thermocouple plug



3. High Temperature Putty

A small portion of the soft putty is fixed over the hot junction of the thermocouple, which is attached to the item being heat treated. Once the putty dries, after 20 minutes, it hardens to protect the hot junction and helps avoid possible short circuit of the thermocouple wires which would result in temperature control and recording errors.

Stock reference & description:

43007	Jar of high temperature putty
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4. Digital Thermocouple Calibration Unit

The hand held thermocouple calibration unit is an accurate measurement and millivolt source instrument, which is used to calibrate thermocouple instrumentation. It can measure or simulate 8 different thermocouple types and be used as a millivolt source. The instrument comes complete with the carrying bag, user's manual and a calibration certificate.

Stock reference & description:

41511	VA710 thermocouple calibration unit
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5. True RMS Digital Clamp Meter

The digital clamp meter is an AC/DC multifunction clamp meter capable of measuring a.c or d.c voltage to 600V, a.c current up to 400A, input impedance for DCV: 10MΩ and temperature up to 1000°C using a type K thermocouple. Jaw capacity 30mm. LCD Backlight, auto and manual ranging, diode test and continuity buzzer, data hold, flashlight, auto power off, low battery indication: ≤ 3.6V, input protection. Standard accessories are test leads, point contact temperature probe, carrying bag and user manual.

Stock reference & description:

44007	True RMS Digital Clamp Meter
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1. 60A In-Line Connectors

Spare connectors for repair of splitters and heating elements.

Stock reference & description:

508-009	60A brass male connector
508-010	60A brass female connector
508-019	60A fibre male sleeve for use with 508-009
508-020	60A fibre female sleeve for use with 508-010
508-022	60A fibre pin for use with 508-019 and 508-020
508-040	12.7mm wide copper shim for use with 508-009 and 508-010



2. 300A In-Line Connectors

Spare connectors for repair of triple cable sets and splitters.

Stock reference & description:

508-006	300A brass male connector
508-007	300A brass female connector
508-015	300A fibre male sleeve for use with 508-006
508-016	300A fibre female sleeve for use with 508-007
508-021	300A fibre pin for use with 508-015 and 508-016
508-041	19mm wide copper shim for use with 508-006 and 508-007



3. 300A Panel Mounted Connectors

Spare panel mounted connector sockets for repair of heat treatment modules and units. Supplied complete with fibre washer and lock nut.

Stock reference & description:

508-001	300A panel mounted sockets
508-002	300A panel mounted plugs
508-003	300A panel mounted connector plug with neoprene sleeve



4. Energy Regulator & Aluminium Knob

Energy regulator for 110V use c/w aluminium knob and replacement dial.

Stock reference & description:

552-012	Energy regulator
552-014	Aluminium knob
552-015	Replacement dial



5. 110V 6 Way Control Plug & Socket

Spare in line plug and panel mounted socket, for repair of 110V control cables and control inputs and outputs.

Stock reference & description:

516-300	7 pin panel mounted male plug
516-301	7 pin in line female socket



6. 110V Control Plugs & Sockets

Spare in-line XLR plugs and panel-mounted sockets for repair of 110V control cables and control inputs and outputs.

Stock reference & description:

516-100	3 pin XLR type panel mounting plug for 110V contactor control
516-101	3 pin XLR type panel mounting socket for 110V contactor control
516-102	3 pin XLR type in-line socket for 110V contactor control
516-103	3 pin XLR type in-line plug for 110V contactor control



1. Electrical Fittings - Various

All wiring and cable accessories as used in our equipment are available for purchase. The more common parts detailed below.

Stock reference & description:

558-001	Large cable ties
558-002	Small cable ties
558-003	Large stick on bases
558-004	Small stick on bases
520-018	35 x 8mm copper cable lugs
520-019	35 x 10mm copper cable lugs
520-013	25 x 8mm copper cable lugs
520-030	70 x 10mm copper cable lugs
520-069	6.3mm insulated red receptacles
520-070/1	6.3mm insulated blue receptacles



2. Fuses - Various

Various fuses and holders available as spares for our equipment. Common parts detailed below.

Stock reference & description:

530-001	Panel mounting fuse holder 1.25"
530-023	200A SIBA flat fuse
530-032	200A semiconductor fuse T350
530-053	5A glass fuse 1.25"
530-054	10A glass fuse 1.25"
530-080	DIN rail mounting fuse holder



3. 110Vac Plugs and Sockets

Spare in-line plugs and panel mounted sockets for repair of 110V supply cables and supply outputs.

Stock reference & description:

516-040	Large yellow, 110V, 16A, 3 round pin, Industrial (BS4343) panel mounting socket
516-040/1	Yellow, 110V, 16A, 3 round pin, Industrial (BS4343) panel mounting socket
516-041	Yellow, 110V, 16A, 3 round pin, industrial (BS4343) in-line plug



4. Flexible Insulated Preheat Magnets

Pair of powerful limpet magnets with cross bar used to quickly clamp Flexible Insulated Preheaters (FIPs) to the workpiece being preheated.

Stock reference & description:

29269	Assembled pair of limpet magnets with cross bar
536-001	Replacement, single, limpet magnet



5. Surface Combustion Unit Spare Plaque & Gasket Set

Replacement parts for repair of Surface Combustion Units (SCU).

Stock reference & description:

6262/P/15	Replacement set of 6 SCU plaques & gaskets
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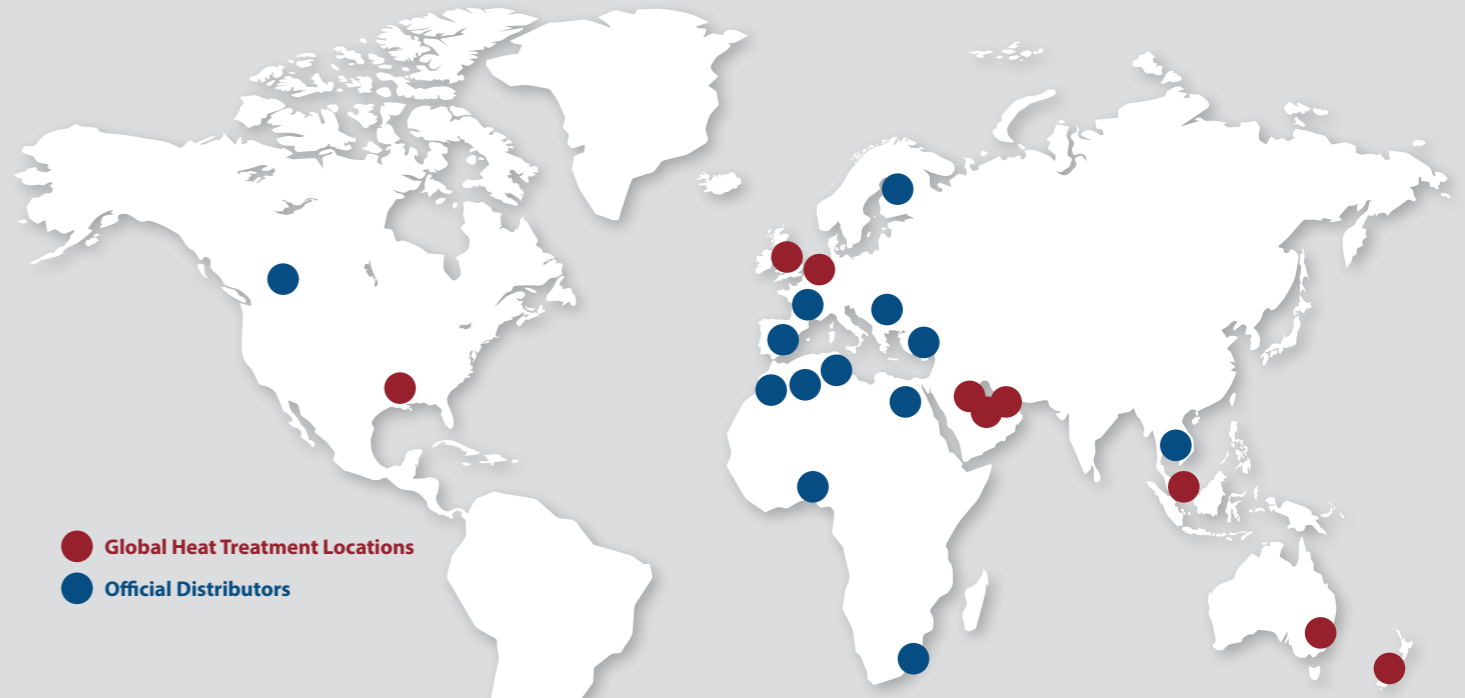
6. Soft Iron Tie Wire

For heating element bands of less than 4 heating elements, soft iron wire is adequate to fix the heating elements and insulation around the workpiece.

Stock reference & description:

29266	Soft iron wire (25kg roll)
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