easycomposites

MANUAL

OV301 Composite Curing Oven

Version 3.1
26th March 2018

DECLARATION OF CONFORMITY

Easy Composites Ltd. hereby declares that the product listed is in conformity with the requirements and provisions of the following European Union CE directives and their respective standards.

EMC Directive:	**2014/30/EU**
Machinery Directive	**2006/42/EC**
Low Voltage Directive:	**2014/35/EU**
RoHS2 Directive:	**2011/65/EU**

Manufacturer's Name:	**Easy Composites Ltd**
Manufacturer's Address:	Unit 39, Parkhall Business Village Longton, Stoke-on-Trent Staffordshire, ST3 5XA UK
Products:	**OV301 Composite Curing Oven**
Model Numbers:	**OV301-3-2018**
Serial Number:	_____

Declaration of Conformity Issued: June 27th 2018

Signature: _____

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General Information:

Designed, manufactured and quality assured in-house by Easy Composites Ltd in the UK, OV301 is a fully featured professional curing for convenient bench-top installation.

The oven is particularly suited for composites use, including curing or post-curing laminates, prepregs, thermoplastics, castings and moulds. The precision manufactured, sturdy design is engineered for demanding everyday production use whilst the convenient bench-top size and precision control makes the oven equally suited to laboratory or R&D use.

Suggested Uses:

- Curing of vacuum bagged prepreg carbon fibre/glass fibre parts.
- Curing and post-curing of traditional laminated composite parts.
- Post-curing and treatment of high temperature moulds and tooling.
- Curing thermoplastics such as PP and PLA.
- Curing or post-curing thermoset resin castings (PU, epoxy etc.).
- Research and development/material testing.

Features:

- PID precision temperature control; ambient to 200°C.
- Programmable temperature ramp and soak control.
- Two independent ¼ BSP female vacuum ports. (also known as G1/4 or Rp1/4)
- Very high thermal efficiency for low power consumption.
- Powerful 2kW heating power.
- Fan assisted forced convection for internal temperature consistency.
- Removable and Re-positionable internal shelf.
- Multi-tier safety features.
- Sturdy, CNC precision construction for demanding daily use.
- Removable electrical control box for fast and easy repair and maintenance support.
- Easily replaceable core components and full spare part availability.

Integrated Vacuum Ports

OV301 has been designed from the ground-up to offer all the functionality necessary for a fully featured composites curing oven and as such features a bank of two integrated vacuum ports with optional gauge and valve assemblies allowing vacuum bagged laminates, particularly prepregs, to be connected to a vacuum supply whilst they cure. These connections can be further upgraded with optional quick release couplings.

The vacuum ports can be independently isolated using optional ¼ turn vacuum valves on the outside of the oven. Including two separate ports increases the flexibility of the oven meaning that vacuum bags can be exchanged inside the oven with ease or even run at different pressures.

Safety Features Explained:

To ensure the highest possible safety standards, our Composites Curing Oven has been designed with a range of separate safety features which provide total fail-over protection in the unlikely event of any malfunction or misuse. Safety measures include a maximum temperature limit, monitoring and cut-out of the control enclosure temperature and finally a non-resettable thermal fuse.

Thermal Fuse

The oven features an internal thermal fuse as ultimate protection against the internal temperature of the oven exceeding the safe operating limit. The thermal fuse is non-adjustable and will blow when the unit reaches a temperature of 224°C. Once this fuse has blown, the only way to return the oven to a running state is to replace it. Instructions for making this replacement can be found in this manual and the replacement thermal fuse can be ordered from Easy Composites.

Thermostatic Electrical Safety Switch

The removable electrical enclosure contains all the electronics for controlling the oven. These components have a maximum working temperature to ensure their continued safe operation. The thermostatic electrical safety switch is mounted inside the removable electrical enclosure and will cut the power to the oven if the safe operating temperature is exceeded. The thermostatic electrical safety switch is self resetting. Power will be reinstated to the oven automatically as soon as the temperature within the electrical enclosure returns back to within the safe operating temperature range.

Main Electrical Fuse

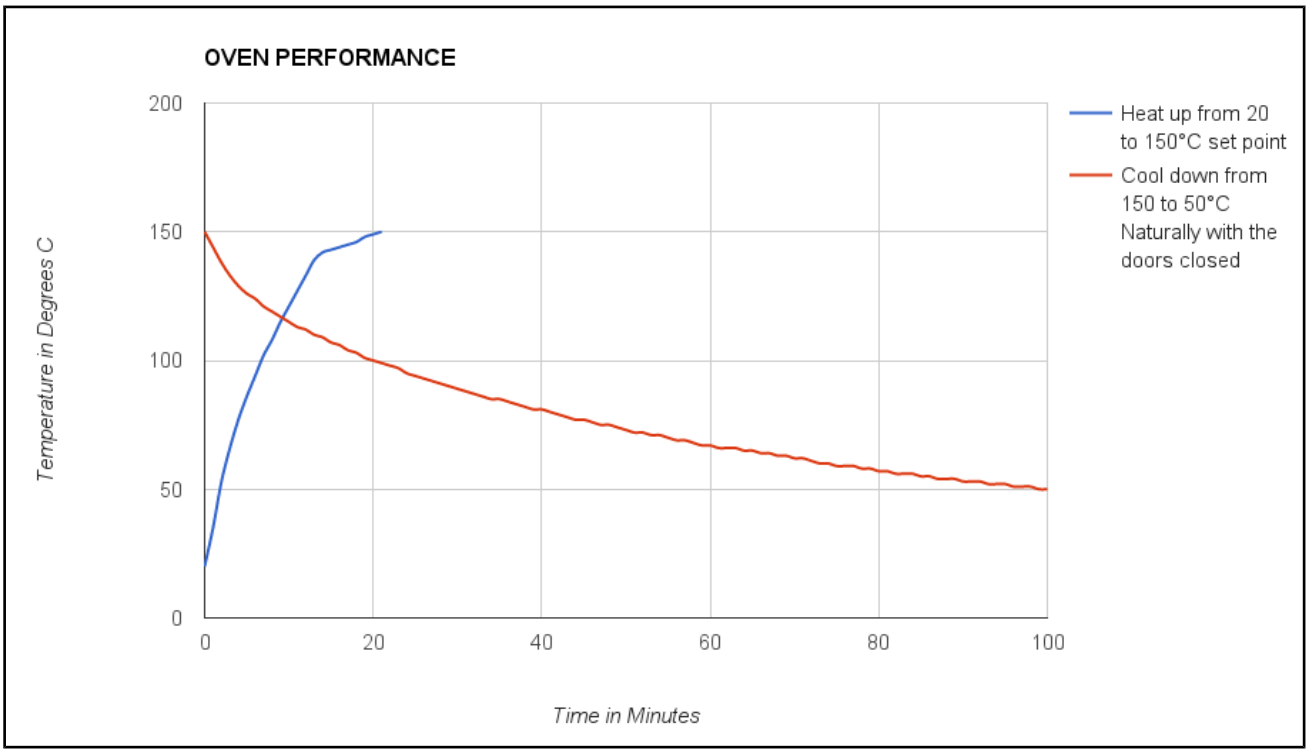
The oven has a main electrical fuse which is designed to both protect the equipment from damage and keep the oven electrically safe in case of an electrical failure or damage. The fuse is non-resettable and requires replacement to return the oven to a working state. Both the current rating and the ‘blow speed’ rating of the fuse are critical in ensuring safe, reliable operation. Instructions for making this replacement can be found in this manual and the replacement fuse can be ordered from Easy Composites.

Earthed Casing

The oven is constructed with a Class II earthing scheme. The oven features a continuous earth between all relevant electrical components, main structural panelling, casings and doors. There is no automated monitoring of the condition of this system. To ensure safe operation the oven should be periodically checked for loose or missing bolts and secure and undamaged earth linkage cables. The oven should always be connected to the mains supply with an Easy Composites supplied IEC power cable. This supply must always be connected to a socket with a functioning earth.

Specification:

Voltage:	**230V AC +/- 10% single phase + neutral and earth**
Frequency:	**50Hz**
Max Temp:	**200°C**
Max Total Wattage:	**2200W**
Max Amperage:	**10A (12.5A Over Current Fuse)**
Internal Dims:	**W.1100mm D.470mm H.500mm**
External Dims:	**W.1300mm D.688mm H.655mm**
Weight:	**90kg**
Max Temperature Ramp Rate (20 to 150'C):	**6°C/min average** *(May be reduced depending on oven loading)*
Natural Cooling Rate (150'C to 50'C):	**1°C/min average** *(May be reduced depending on oven loading)*
Max Ambient Temperature:	**30°C**
Max Shelf Load:	**20kg (evenly distributed)**
Max Internal Temperature Variation:	**2°C**
Set Temperature Accuracy:	**+/- 5°C**
Program Modes:	**Set point, 8 x 8 Segment Ramp/Dwell Pattern**
Communication:	**Modbus® (ASCII or RTU)**
Materials / Appearance:	**Steel; Galvanised (Inner) Powder Coated (Outer)**



Key Safety Warnings:

General Safety

- Never exceed the maximum operating temperature of 204°C. (200°C Set point)
- Ensure that the operating environment is clean and well ventilated.
- Never load with flammable liquids, solvents, or combustible powders.
- Ensure loaded materials will not produce smoke or noxious fumes when heated.
- Never obstruct or blind ventilation slots or grills either internally or externally.
- Never exceed the load weight capacity of the shelves.
- Never modify any aspect of the physical or electrical design.
- Ensure that the equipment is always clean and well maintained.
- Ensure that all operators are trained in the safe operation of the oven.
- Ensure that there is sufficient clear space around the oven.

Use of Thermocouples and Other Probes

Any metal object used to probe into the oven chamber while the oven is connected to the mains power supply must be earthed (grounded). This applies in particular to metal sheathed thermocouples, where the sheaths must be earthed.

Unearthed probes can cause serious electric shock.

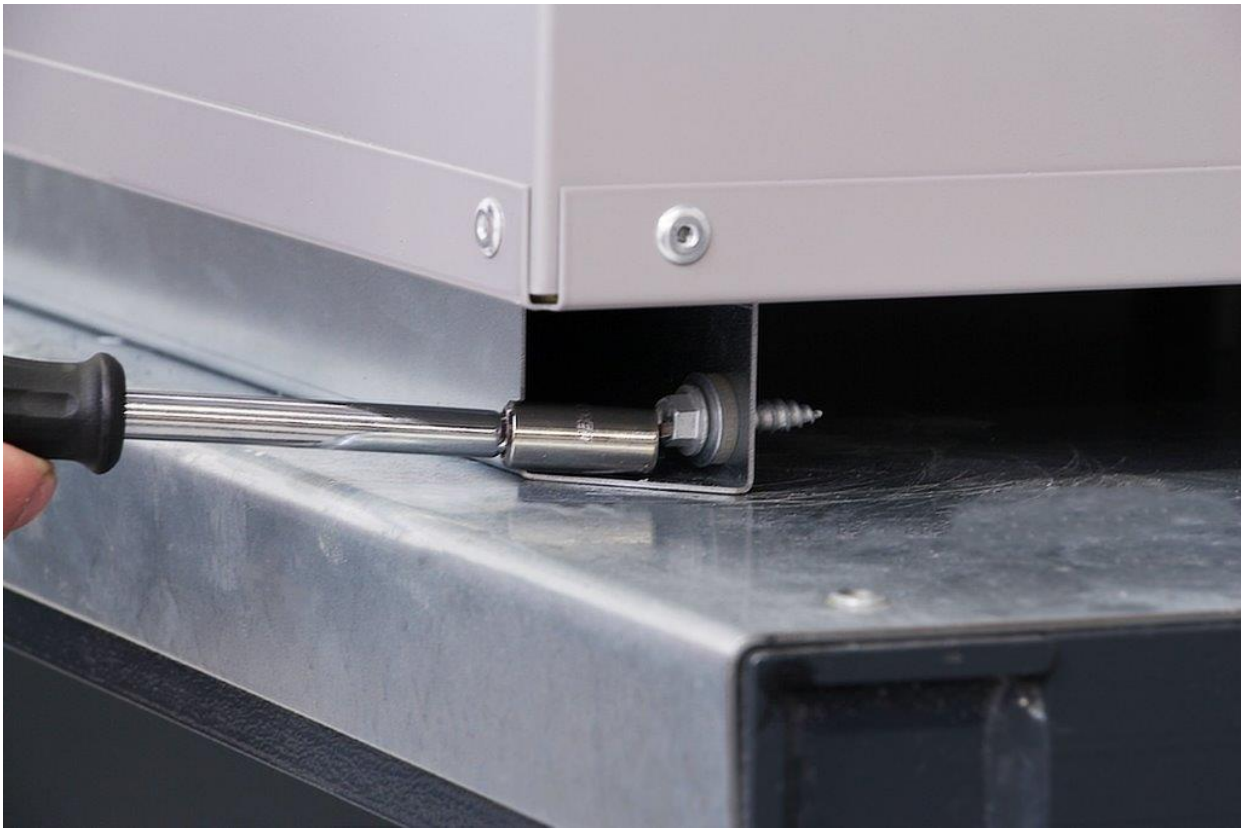
On Receiving your Oven:

Inspection:

The OV301 is typically supplied securely fixed onto a wooden pallet. Upon delivery inspect the outer packaging of the oven and check for any signs of damage, if potential damage is evident please refuse delivery or mark the drivers note as ‘damaged’

Unpacking:

To remove the packaging, locate the pallet on a flat floor with good access and space all around. Carefully remove any strapping, boarding and film covering the oven. Carefully cut any strapping, eye protection and gloves are ESSENTIAL to avoid injury as the tension is released from the straps. The Oven will be screwed onto the wooden pallet for extra security. The 4-screw used for this are located on each of the four corners. See the image below for details.



Open the oven doors and remove the contents to avoid damage during lifting and moving. Ensure the oven doors are closed and latched. Then, using a minimum of 2 people and using appropriate heavy lifting techniques, carefully remove the oven from the pallet and move to its final position.

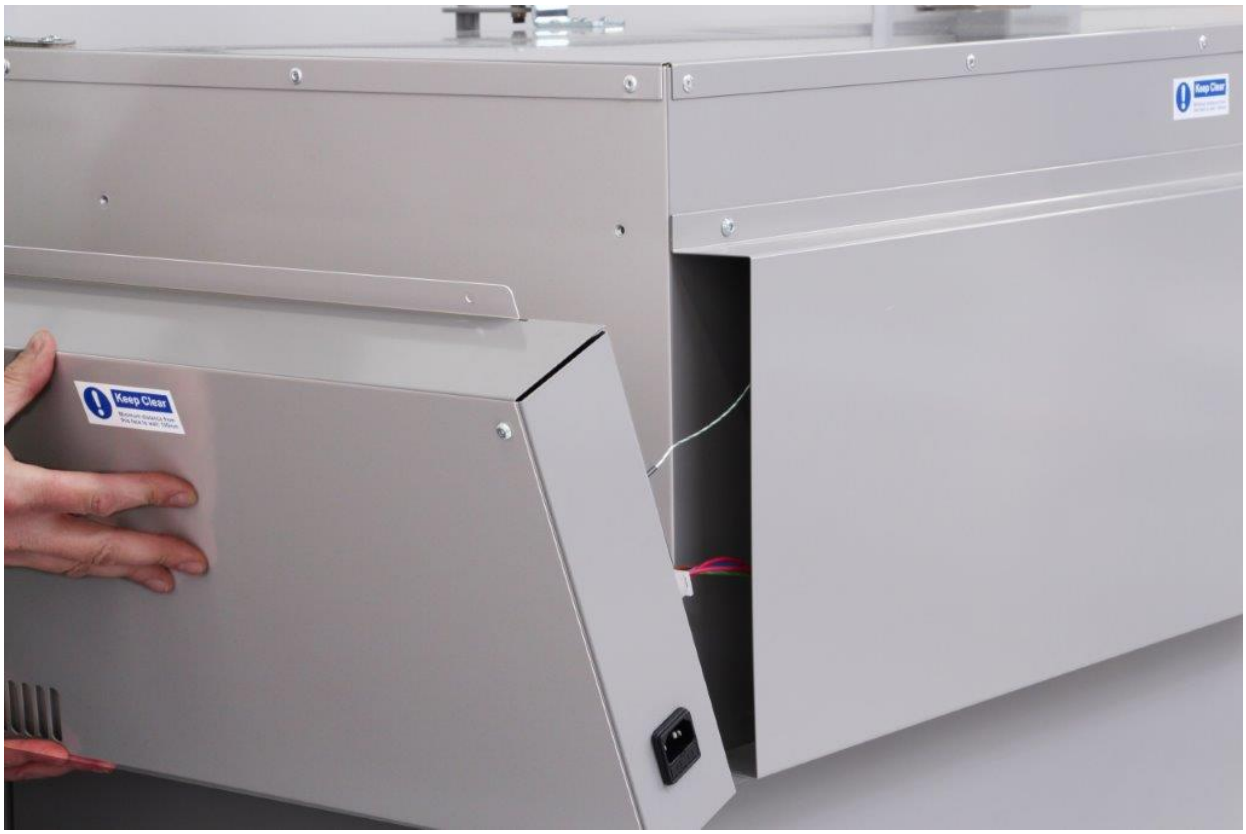
DO NOT LIFT OR MOVE THE OVEN FROM THE DOORS OR CONTROL BOX

Assembly:

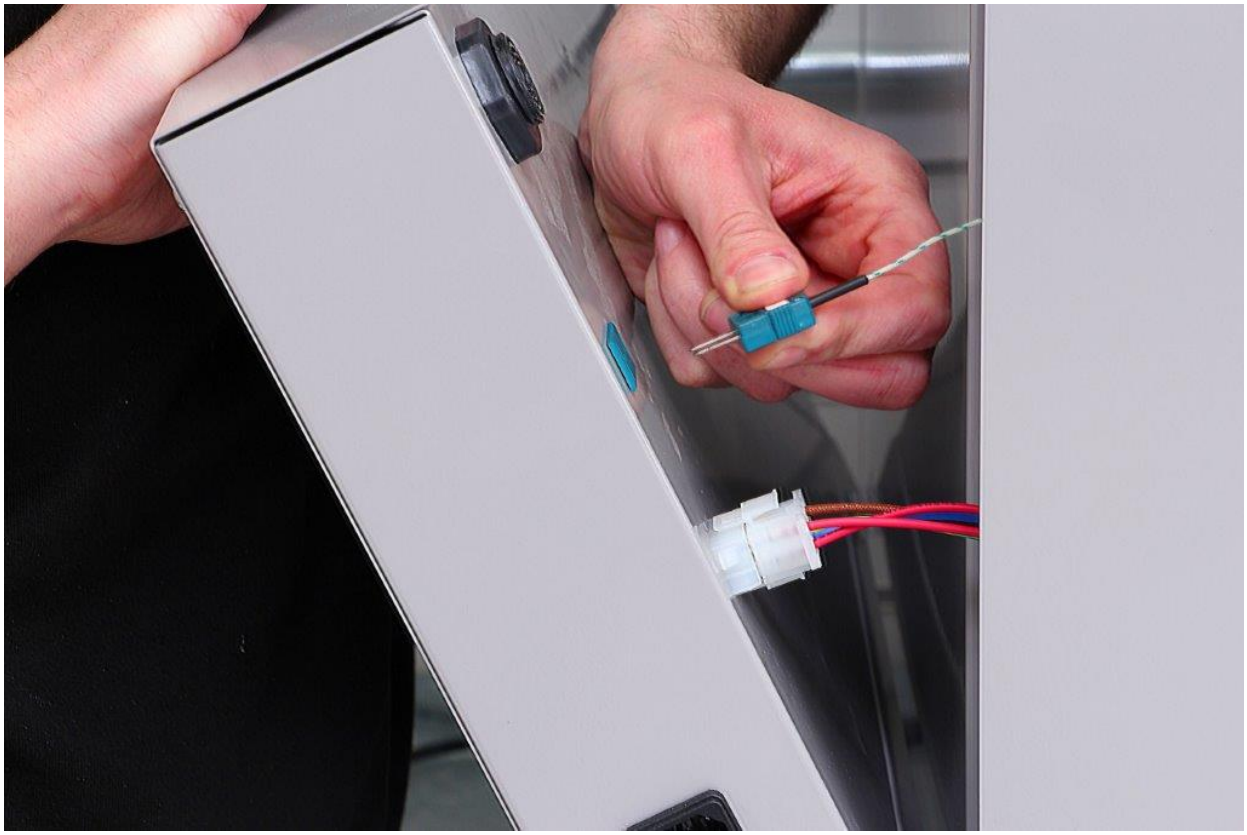
Fitting The Electrical Box:

The oven is supplied without the electrical control box fitted. Fitting is a simple one-man operation.

Lift the control box into position, slotting the tags at the bottom of the control box into the slots on the side of the oven. Tilt the box away from the oven slightly to allow access to the electrical connectors towards the rear of the oven.



Connect both the thermocouple cable (green plug) and the main electrical connector (white plug) to the sockets on the inner face or the electrical control box. Both these connectors can only be fitted one way round. The orientation of the thermocouple socket can be determined by the width of the pins, the wide pin going into the wide slot. The white connector features both round and semicircular pins, orientate the connector so these coincide. It is impossible to connect these the wrong way around and they should engage easily and by hand. See image below.



Once connected, hinge the control box flush with the side of the oven, ensuring the tabs along the front edge next to the main controls engage with the slots. Insert the 4-fasteners and tighten using a suitable Allen key or other hexagon driver tool.

Installation:

Intrinsically an oven is a potential source of risk from heat, fumes, smoke and fire, when selecting a location and environment to install the oven you must assess the potential risks that your particular environment and process may present and install the oven in a safe manner accordingly.

This oven is designed to be located in a clear environment upon a suitable bench or work-surface. The bench used should be designed to carry a load in excess of 150kg and be of suitable construction. The surface should be clean flat and level.

If the oven is to be fitted in proximity to a wall or other equipment or materials, the following clearances should be observed:
Rear – The rear of the oven should be spaced at a minimum distance of 50mm from a wall or other object.
Sides – The sides of the oven should be spaced at a minimum distance of 100mm from a wall or other object.
Top – The top of the oven should be kept clear and spaced at a minimum distance of 1 meter from a ceiling or other object.

The oven feature several exterior cooling vents, care should be taken to ensure these are never obstructed.

If the oven is installed in an environment where it is likely that objects may be placed accidentally within the immediate proximity of the oven, suitable ‘clear zone’ marking and signage should be installed as appropriate.

Electrical Connection and Disconnection:

The OV301 is designed to be connected to a standard 230V 50Hz mains electricity supply; the oven can draw a continuous 10A on warm-up the supply wiring socket should be rated at 13A, although nearly all ‘standard’ sockets will meet this requirement if you are in any doubt check with a qualified electrical installer. The power-lead is connected to the oven using a standard IEC 3-pin plug and socket. Electrical isolation of the oven is achieved by disconnecting this lead.

The oven should always be connected to a socket with a functioning earth and should only be connected using an Easy Composites supplied IEC power lead.

Due to the high current draw of this oven, the use of extension leads should be avoided. If however there use cannot be avoided, they should be fully unwound and should not be used to power any other items simultaneously.

To isolate the oven from the mains electrical supply and therefore make it electrically safe to allow any cleaning or maintenance to take place, simply pull out the IEC lead from the back of the oven.

Initial Set Up for Running:

Operating Conditions:

The oven should be operated in a clean, dry environment where the ambient temperature will be below 30°C. If conditions rise above this temperature the oven is liable to reach it's external cut-out temperature of 50°C. This will cause the oven to power down and become non-operational until the external temperature reduces far enough to reset the thermostat.

The oven requires a clean air environment to operate as it relies upon convective ventilation to cool its primary electrical components such as the relay, fan and controller. It is essential that the environmental air is as clean as possible to reduce the risk of airborne contaminants damaging these vital components. This is of special importance if the oven is to be used for carbon fibre processing. Dust and airborne fibres from carbon fibre are electrically conductive, if they come into contact with any electrical device they can lead to dangerous situations. The oven should not be located in the same area where dry fibres are processed or laminates are trimmed.

Pre-operation Checks:

Before the first and before every subsequent use the oven should be checked to ensure safe and continued operation. Please implement and record the oven condition using the following checklist, include any further checks that you deem necessary for your particular process or application.

- Oven operating area clean and free from obstruction, clear zone checked.
- Oven body and chamber clean and clear of dirt, dust, loose materials etc.
- Mechanical components display no signs of damage or failure.
- Electrical supply is free from strain and/or damage.
- All controls, displays and markings are in functional and legible condition.
- Switch on fan, check for free running and quiet operation.
- Switch on heat, check for normal display on control and normal set-point.
- Inspect the function of the door closures, latching and seal.

Changing the Oven Between °C and °F:

As standard the oven is supplied with the temperature unit set to °C. This can easily be changed using the following procedure:

- Press and hold ☑ for at least 3 seconds. This will change the current display to read CnPt
- Press ☒ once so the current display reads tPUn, the target value should read C If you go past it, keep pressing ☒ to go round the loop again.
- Use ▲ and ▼ to change between C and F.
- Press ☑ to lock in the unit, then press ☑ again to return to the main run display screen.

It should be noted that when changing between temperature units, the controller will automatically convert any program temperatures or alarm temperatures to the equivalent value in the new unit.

The Control Fascia:

Current Oven Temperature: This temperature is fed back from the internal oven thermocouple and displayed in red, in this case the current temperature is 77 degrees Celsius.

Target Oven Temperature:

This is the temperature the oven is set to and is displayed in green, in this case the oven is trying to achieve 78 degrees Celsius. If this value is flickering, the value has not been accepted and the oven will still be trying to achieve the old set point. Press ☑ to accept the value, this should stop the flickering and commit the new set point.

Temperature Unit Indication:

To the right of the current temperature LCD readout (red) there are 2 indicator lights; one for degrees Celsius and one for degrees Fahrenheit. The active unit will be illuminated orange, in this case the degrees Celsius indicator is illuminated.

Indication Lights:

There are 4 indication lights below the target oven temperature display: AT, OUT1, OUT2 and ALM

AT – Auto tune, this lights up when the controller is carrying out a PID autotune. This should not be illuminated during standard operation.

OUT1 – Output 1, this light comes on when the temperature controller is switching on the heater. The indicator will be lit solidly when the set point is a lot higher tan the current temperature, it will then start to pulse as the temperatures become closer to prevent the oven temperature from overshooting. If the current temperature is far higher than the target, this light may be completely off for prolonged periods.

OUT2 – Output2, this is not used by this oven.

ALM – Alarm, this indicates that the alarm is active. Dependent on how the auxiliary alarms are set up the sounder may be sounding.

Attaching to Vacuum Port Connections:

When connecting a fitting to the integrated vacuum ports it is recommended that a seal is achieved by using either PTFE tape or a non-setting sealant liquid or paste. The choice of thread sealant must be suitable for use at temperatures up to 210°C. The use of a setting thread sealant can make it very difficult to remove the fitting in the future.

Oven Port Type and Size

The fittings are all female parallel thread types. The thread is 1/4” BSPF, also known as G1/4 or Rp1/4.

Compatible Connections Type and Size

It is recommended that only male taper thread fittings are screwed into the ports to ensure a good seal is achievable. All fittings that are screwed into the ports should feature a 1/4” BSPT thread, also known as R1/4. It should be noted that 1/4” NPT fittings do NOT fit these connections.

Easy Composites sell a range of compatible fittings including quick release vacuum coupling connectors suitable for use at the high temperatures found inside the oven.

Running the Oven:

Standard Single Temperature Operation Mode:

In standard operation mode the oven controller is set to a set-point temperature the PID control system then initiates the heating of the oven to this set-point as quickly as possible, it then applies heat as required to maintain this set-point temperature as accurately as possible.

The oven is delivered in this mode; please follow this procedure to operate:
Switch on the circulation fan (green switch) followed by the heating switch (red switch) this will illuminate the controller. The controller will display 2 temperatures the top temperature is the current temperature inside the chamber, the bottom temperature is the set-point temperature or 'target temperature' the set-point temperature will be the temperature that the oven was set to on its previous operation.

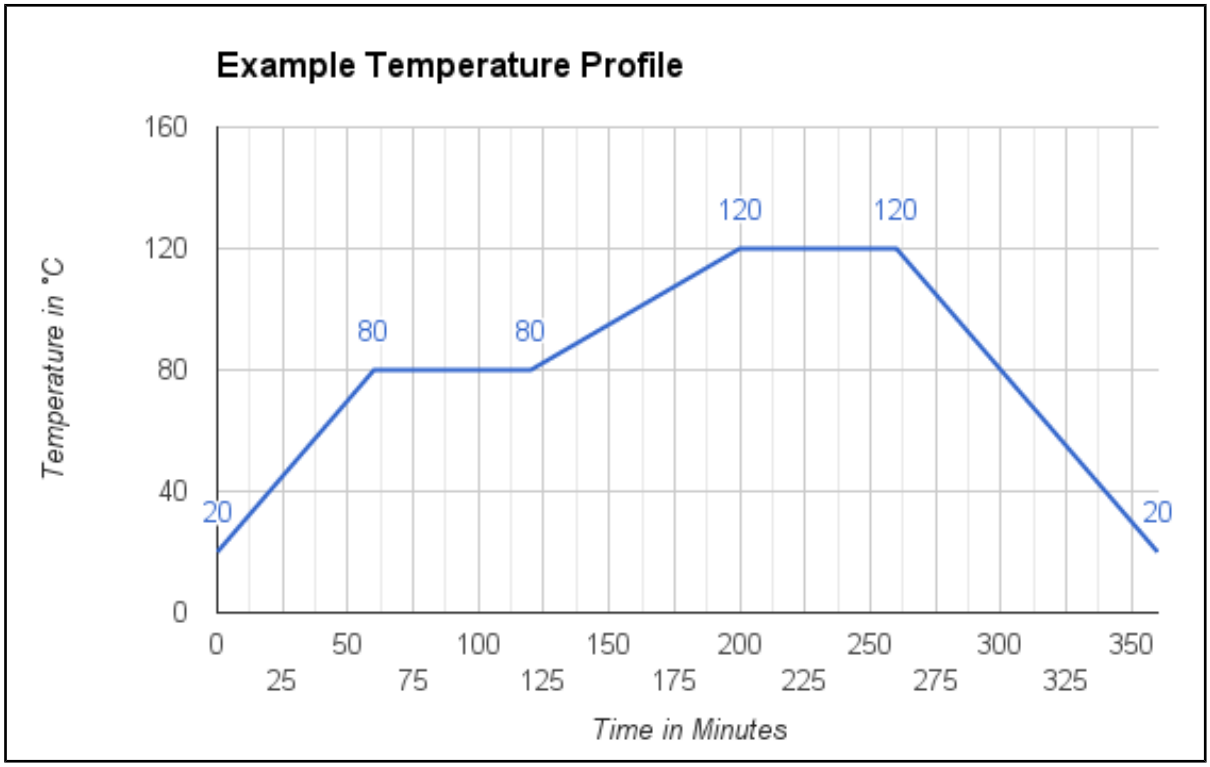
To change the set-point temperature simply use ▲ and ▼ to change the lower display to the desired target temperature. Set and initiate this set-point by pressing ☑ once. The oven will now target that new set-point temperature. If the temperature set-point value is seen to be flickering, the new set-point has not been accepted by the controller. To rectify this simply press ☑ and the set-point will be locked in and the display should go to a steady, illuminated state.

To switch off the oven simply switch off the heating switch (red) followed by the fan switch (green) it is recommended when using the oven above 100°C that the fan is left running for up to an hour after the heating is switched off as this will maintain even temperature distribution throughout the chamber and reduce the risk of the motor over-heating through the heat conduction of the impeller shaft.

Ramp and Soak Operation Procedure:

The ramp and dwell functionality of the oven allows the oven to automatically follow a temperature profile without the need for any user changes along the way.

Below you can see an example temperature profile such as that used for curing prepreg parts.



When creating a program it is important to understand that there a multiple program levels available to the programmer; patterns and steps. The program is made up of patterns, in-turn patterns are made up of a series of steps. The controller can have up to 8 patterns programmed into it numbered 0-7. Each pattern can have up to 8 steps numbered 0 to 7. A step has 2 components, at time value and a temperature value. If a step had a temperature of 60°C and a time of 20 minutes, the controller would aim to go linearly from its current temperature to 60°C over a period of 20 minutes.

The programmer then has the ability to repeat or cycle any pattern a number of times during a program.

The programmer also has the ability to tell the program which pattern to go to next after completing the previous pattern.

Programming a Simple Single Pattern Program:

Step 1 – Understanding the Program and Determining the Program Set Point.

If we analyse the above example temperature profile graph we can derive our step information. This is always useful to have written out before you begin programming. Looking at the graph, we have a start point of 20°C (This is the current ambient temperature of the oven) The oven holds at 20°C for 1 minute, the temperature then increases at 1°C/min to 80°C, holds for 1 hour. Then it increases from 80°C to 120°C at 2°C/min, holds for an hour before cooling back to ambient (20°C) at 1°C/min.

Using the logic that the controller aims to go linearly from its current temperature to the set point over a set period of time we can write out the following program plan.

Assuming an ambient starting temperature of 20°C.

IMPORTANT:- If an ambient temperature step is not set, the oven will try to reach the first temperature as fast as possible, not following any ramp profile.

	TEMPERATURE SET POINT		TIME SET POINT hh:mm
SP00	20°C	tc00	00:01
SP01	80°C	tc01	01:00
SP02	80°C	tc02	01:00
SP03	120°C	tc03	00:20
SP04	120°C	tc04	01:00
SP05	20°C	tc05	01:40
SP06	*0°C (Leave values at zero for unused steps)*	tc06	*00:00 (Leave values at zero for unused steps)*
SP07	*0°C*	tc07	*00:00*

Step 2 – Changing the Oven Mode from Standard PID to Program Mode.

- hold the ☑ until the display reads CnPt
- Repeatedly press ☒ until the controller reads CoSH
- Use the ▲ and ▼

Now we have the program values we want to enter we can set about entering them into the controller. Firstly we need put the controller into Program Mode. This takes the controller out of standard PID operation mode and therefore will need to be reset if conventional operation is required afterwards.

- Press and hold ☑ for at least 3 seconds. This will change the display to read CnPt

- Press ☒ 4-times until the current display reads CtrL, the target value should read Pid. (If you go past it, keep pressing ☒ to go round the loop again)
- Press the up arrow until the target reads Pro6.
- Press ☑ to lock in the Pro6 (Program Mode)
- Press ☑ again to return to the main run display.

To return to Standard PID mode:-

- Press and hold ☑ for at least 3 seconds. This will change the display to read InPt
- Press ☒ 4-times until the current display reads CtrL, the target value should read Pro6 (If you go past it, keep pressing ☒ to go round the loop again)
- Press ▲ until the target reads Pid.
- Press ☑ to lock in the Pid. (Program Mode)
- Press ☑ again to return to the main run display.

Step 3 – Entering the Program Values.

- Press and hold ☑ for at least 3 seconds. This will change the display to read InPt.
- Press ☒ 5-times until the current display reads PAtn, the target value should read oFF If you go past it, keep pressing ☒ to go round the loop again.
- Use ▲ and ▼ to select the pattern number you wish to use for your program. (0 to 7 are available)
- Once you are on the pattern number you wish to use, press ☑ to select it.
- Next press ☒, this will change the current display to SP00. Edit the value using the ▲ and ▼ to your desired temperature set point. In our case this would be 20. Then press ☑ to lock in the value.
- Press ☒, this will now change the target display to tI00. Edit the value using the u▲ and ▼ to your desired time set point in the format hh:mm. In our case this would be 01:00. (1 hour or 60 minutes.) Then press ☑ to lock in the value.
- Press ☒, you will now be presented with SP01. Repeat the previous 2 steps until all the set points have been entered. Enter values of zero into unneeded steps.

Step 4 – Further Programming Options.

Once the final time set point tC07 has been set, pressing ☒ will change the target display PSt0. This setting allows the user to select a limited number of steps to run from the pattern. For example, if the value was set to 4 then only steps 0 to 4 would be run and steps 5 to 7 would be ignored. This value can be changed with ▲ and ▼ and locked in with ☑.

Touching ☒ will then change the target display to read CyC0. This setting allows the user to select a number of times that the programmed pattern will be repeated in the program. For example if this value was set to 3, the program would repeat the pattern 3 times.

Touching ☒ again will then change the target display to read Lin0. This setting allows the user to select an automatic transition to another pattern on completion of the current pattern. For example if we had just programmed pattern 0 and set this value to C, the oven would run pattern 0 then immediate and automatically run pattern 3 straight after as if the 2 patterns were one program. Set this value to oFF to make the program end at the end of the current pattern.
Touching ☒ again will return to the pattern select screen allowing the user to create or edit a second pattern. Pressing ☑ will return to the main home screen.

Step 5 – Running a Program.

- Press ☒ twice so the display shows Ptrn Please note, this only shows if r-S is set to PStP
- Use the ▲ and ▼ buttons to select the pattern number you wish to run. (0 to 7)
- Press ☑ to accept the pattern.
- Press ☑ to return to the main menu.
- Press ☒ and the target display will change to r-S and the current display will show PStP.
- Use the ▲ and ▼ buttons to select rUn
- Press ☑ until the controller returns to the main run screen. The program is now running.

Display Options During Program Running

During running 3 different display options are available: current temperature set point, time remaining in current step or both the current pattern and the current step in that pattern.

To change the display options, use ▲ and ▼ to select the desired mode whilst on the main run program screen then press ☑ to display it.

r-tC	Residual time in the current step.
SP	Current temperature set point.
P-St	Pattern number – Step Number

Pausing and Stopping a Running Program

During the running of a program, 3 options are available to the user:

StoP The program will stop and the control output will be disabled meaning the oven will slowly cool back to ambient.
PStP Stop the program and maintain the temperature the oven was at before the stop.
PHod Program hold, the program will stop and hold the temperature of the last set point.

To Select one of these options, press ☒ when in the main program running screen. Now use ▲ and ▼ to navigate to the required value and press ☑ to activate. Press ☑ to return to the main program running screen. To resume running, repeat the above steps selecting rUn again.

Controller Security Features:

This series of controller has two built in security lock settings to prevent unauthorized personnel from changing parameter settings. These parameters are set in the Operation Mode

The LoC1 setting affects all parameters in the controller. If LoC1 setting is enabled, the operator will have to unlock the controller to make any changes to the controller's parameters including changing the temperature set point.

The LoC2 setting affects all parameters except the set point. If LoC2 setting is enabled, the only parameter that the operator will be able to change is the set point. In order to change any other parameters, the operator will have to unlock the control before making a change. In order to unlock the control, the operator must depress ☑ and ☒ simultaneously.

Communication Port Use

Connection to a Stand Alone PC for Programming and Monitoring

The oven is fitted with a communication port. The optional programming lead and the associated software is available from Easy Composites Ltd. This lead and software enables the connection of the oven to a Windows PC via USB.

Connection to Plant Wide Data Logging System

If you wish to integrate the oven communication with a plant wide data logging system, the communication details can be found below. Please then refer to the wiring diagram for the connection details to enable the manufacture of a suitable connection lead.

RS-485 Communication Information

1. Supporting transmission speed: 2400, 4800, 9600, 19200, 38400 bps.
2. Non-supported formats: 7, N, 1 or 8, O, 2 or 8, E, 2.
3. Communication protocol: Modus (ASCII or RTU).
4. Function code: 03H to read the contents of register (Max. 8 words). 06H to write 1 (one) word into register. 02H to read the bits data (Max. 16 bits). 05H to write 1 (one) bit into register.
5. Address and Content of Data Register:

Address	Content	Explanation
1000H	Process value (PV)	Measuring unit is 0.1, updated one time in 0.4 second. The following reading value display indicates error occurs: 8002H : Initial process (Temperature value is not got yet) 8003H : Temperature sensor is not connected 8004H : Temperature sensor input error 8006H : Cannot get temperature value, ADC input error 8007H : Memory read/write error
1001H	Set point (SV)	Unit is 0.1, ℃ or ℉
1002H	Upper-limit of temperature range	The data content should not be higher than the temperature range
1003H	Lower-limit of temperature range	The data content should not be lower than the temperature range

1004H	Input temperature sensor type	Please refer to the contents of the “Temperature Sensor Type and Temperature Range” for detail
1005H	Control method	0: PID, 1: ON/OFF, 2: manual tuning, 3: PID program control
1006H	Heating/Cooling control selection	0: Heating, 1: Cooling, 2: Heating/Cooling, 3: Cooling/Heating
1007H	1st group of Heating/Cooling control cycle	0~99, 0:0.5 sec
1008H	2nd group of Heating/Cooling control cycle	0~99, 0:0.5 sec
1009H	PB Proportional band	0.1 ~ 999.9
100AH	Ti Integral time	0~9999
100BH	Td Derivative time	0~9999
100CH	Integration default 0~100%, unit is 0.1%	
100DH	Proportional control offset error value, when Ti = 0	0~100%, unit is 0.1%
100EH	The setting of COEF when Dual Loop output control are used	0.01 ~ 99.99
100FH	The setting of Dead band when Dual Loop output control are used	-999 ~ 9999
1010H	Hysteresis setting value of the 1st output group	0 ~ 9999
1011H	Hysteresis setting value of the 2nd output group	0 ~ 9999
1012H	Output value read and write of Output 1	Unit is 0.1%, write operation is valid under manual tuning mode only.
1013H	Output value read and write of Output 2	Unit is 0.1%, write operation is valid under manual tuning mode only.
1014H	Upper-limit regulation of analogue linear output	1 Unit = 2.8uA(Current Output) = 1.3mV(Linear Voltage Output)
1015H	Lower-limit regulation of analogue linear output	1 Unit = 2.8uA(Current Output) = 1.3mV(Linear Voltage Output)
1016H	Temperature regulation value	-999~+999, unit: 0.1
1017H	Analog decimal setting	0 ~ 3
101CH	PID parameter selection	0~4
101DH	SV value corresponded to PID value	Only valid within available range, unit: 0.1 scale
1020H	Alarm 1 type	Please refer to the contents of the “Alarm Outputs” for detail

1021H	Alarm 2 type	Please refer to the contents of the “Alarm Outputs” for detail
1022H	Alarm 3 type	Please refer to the contents of the “Alarm Outputs” for detail
1023H	System alarm setting	0 : None (default), 1~3 : Set Alarm 1 to Alarm 3
1024H	Upper-limit alarm 1	Please refer to the contents of the “Alarm Outputs” for detail
1025H	Lower-limit alarm 1	Please refer to the contents of the “Alarm Outputs” for detail
Address	Content	Explanation
1026H	Upper-limit alarm 2	Please refer to the contents of the “Alarm Outputs” for detail
1027H	Lower-limit alarm 2	Please refer to the contents of the “Alarm Outputs” for detail
1028H	Upper-limit alarm 3	Please refer to the contents of the “Alarm Outputs” for detail
1029H	Lower-limit alarm 3	Please refer to the contents of the “Alarm Outputs” for detail
102AH	Read LED status	b0 : Alm3, b1: Alm2, b2: F, b3: _, b4: Alm1, b5: OUT2, b6: OUT1, b7: AT
102BH	Read push button status	b0 : Set, b1 : Select, b2 : Up, b3 : Down. 0 is to push
102CH	Setting lock status	0 : Normal, 1 : All setting lock, 11 : Lock others than SV value
102FH	Software version	V1.00 indicates 0x100
1030H	Start pattern number	0 ~ 7
1040H~ 1047H	Actual step number setting inside the correspond pattern	0 ~ 7 = N, indicate that this pattern is executed from step 0 to step N
1050H~ 1057H	Cycle number for repeating the execution of the correspond pattern	0 ~ 99 indicate that this pattern has been executed for 1 ~ 100 times
1060H~ 1067H	Link pattern number setting of the correspond pattern	0 ~ 8, 8 indicates the program end. 0~7 indicates the next execution pattern number after executing the current pattern
2000H~ 203FH	Pattern 0~7 temperature set point setting Pattern 0 temperature is set to 2000H~2007H	-999 ~ 9999
2080H~ 20BFH	Pattern 0~7 execution time setting Pattern 0 time is set to 2080H~2087H	Time 0 ~ 900 (1 minute per scale)

6. Address and Content of Bit Register: (First bit of reading will put into LSB, Write data = FF00H for bit set, 0000H for bit clear

Address	Content	Explanation
0810H	Communication write-in selection	Communication write in disabled: 0 (default), Communication write in enabled: 1
		°C / linear input (default) : 1 , °F : 0
0811H	Temperature unit display selection	Except for the thermocouple B, S, R type, all the other thermocouple type are valid. (0 or 1)
0812H	Decimal point position selection	OFF: 0 (default), ON : 1
		0 : STOP, 1 : RUN (default)
0813H	AT setting	0: RUN (default), 1: STOP
0814H	Control RUN/STOP setting	0: RUN (default), 1: Temporarily STOP
0815H	STOP setting for PID program control	
0816H	Temporarily STOP for PID program control	

7. Communication Transmission Format: Command Code: 02: read N bits, 05: wrote 1 bits, 03: read N words, 06: write 1 words.

Maintenance:

Although all of the components of this oven are designed to be maintenance-free, the oven should be regularly inspected for cleanliness, damage and faults.

How to Isolate from the Mains Supply:

Before any maintenance work or cleaning is carried out the oven MUST be fully cool and isolated from the mains supply. To isolate the oven, simply pull out the mains cable from the back of the IEC socket as shown.

It is strongly recommended that a lockout procedure is used to prevent someone from reconnecting the power before the work is complete and the oven is made safe. Removing the power lead all together from the work area could aid in preventing accidental reconnection. Clear signage is also recommended advising anyone that the oven is not to be reconnected; this could be affixed over the power socket. Removing the main fuse from the oven will also limit the components that could become live in case of an accidental reconnection of the power.

It is always recommended that the oven is checked for live connections before commencing or recommencing any work.

Cleaning:

To clean the oven, first disconnect the power supply and then wipe down with a damp cloth detergent can be used if necessary. Do not use solvents or abrasive cleaners to clean the oven. Always test any cleaner in a small inconspicuous area first.

Inspect inside the controller cover that there are no heavy deposits of dust, isolate from the power supply and vacuum clean if required.

Troubleshooting:

Issue	Diagnostics	Possible Cause	Remedial Action
Oven will not start or turn on	**The green fan switch does NOT light up when switched on:**	**Electrical fuse in lead blown. (UK Power Lead Only)**	**Check fuse for continuity and replace as required.**
		Electrical fuse in oven blown.	**Check fuse for continuity and replace as required.**
		Supply inlet socket or lead damaged.	**Check and replace as required.**
	The green fan switch lights up when switched on but the fan does NOT run:	**Thermal fuse inside oven chamber blown.**	**Check for continuity and replace as required.**
	The green fan switch lights up when switched on and the fan starts but the red heat switch does NOT light up when switched on:	**External case temperature above 40°C.**	**Allow cooling, oven will restart automatically. If this does not occur, the electrical case temperature protection switch is faulty. Test and replace as required.**
Oven not heating up	**Set the target temperature to a high temperature and accept this new set point by pressing the ☑** **Monitor the small 'out1' light on the temperature controller. The 'out1' light is NOT illuminating (either solid or flashing)**	**If there is no 'output' signal light on the controller the controller set-point may be too low or running mode not initiated.**	**Read controller setup information and ensure setup is correct.**
	Set the target temperature to a high temperature	**Heating element fault or damaged.**	**Replace heating element**
		Relay Faulty or damaged	**Replace Relay**

	and accept this new set point by pressing the ☑ **Monitor the small 'out1' light on the temperature controller. The 'out1' light is illuminating (either solid or flashing)**	**Wiring fault or damaged**	**Inspect wiring from signal wires to relay, and both the live (running through the relay) and the neutral to the element.**
Vibrating or Rattling Noise		**Fan/motor bearing damaged or worn**	**Replace fan/motor**
		Fan impeller loose on shaft	**Tighten impeller nut (Anti-Clockwise to tighten!)**
		Foreign object/material contacting moving parts of the fan/motor assembly	**Clean as required**
		Imbalance of the Impeller through dirt build-up	**Clean impeller as required.**
		Bent impeller or fan guard	**Check clearances and straighten or replace components as needed.**
Oven cutting out intermittently		**External case over-heating triggering safety thermostat.**	**Ensure ambient temperature is with limits. Check function and free running of fan.**
		Wiring damage or fault	**Check power inlet lead and internal wiring for faults.**
Slow at heating up		**Oven over-loaded with material**	**Reduce the amount of material loaded into the oven**
External surfaces / doors excessively hot		**Air-leakage past doors/seals**	**Check doors for proper closing and sealing, adjust/replace components as required**
		Circulation fan failure	**Check for the proper function and free-running of the fan.**
Temperature over-runs set-point by over 5°C		**Oven over-loaded with material**	**Reduce the amount of material loaded into the oven**
		Controller out of 'tune' for loaded material	**Run auto-tune with the amount of material to be processed.**
		Faulty or damaged relay	**Test and replace relay**
Doors will not close		**Foreign object between door and seal**	**Inspect the closure and clear as required**
		Doors or hinges damaged	**Assess repair/replace as required.**
Temperature is not accurate		**Incorrect thermocouple type selected**	**Check controller is set to the correct 'K-type' thermocouple**
		Thermocouple damaged or malfunctioning	**Replace thermocouple**
		Thermocouple fouled, blocked or blinded	**Check that the thermocouple probe is properly fixed and clear of obstruction**
		Controller out of 'tune' for loaded material	**Run auto-tune with the amount of material to be processed.**

Uneven temperature distribution		**Air circulation blocked or blinded**	**Check that there is adequate space inside the chamber for free air movement and that the fan inlet grill is free from obstruction**
		Circulation fan failure	**Check for the proper function and free-running of the fan.**
		Doors not properly sealed	**Check for proper fit closure and seal of the doors**
Controller display is not 'normal'		**Incorrect or unexpected operating mode or setting menu.**	**Attempt powering off the controller and restart to see if normal operation is resumed. If not refer to the controller manual to re-establish desired operating mode and setting**
		Error or Fault code displayed	**Refer to controller manual to establish the cause of the fault code.**
The oven is not completing the set program		**The PS40 value is incorrectly set meaning that the program only runs a limited number of program steps.**	**Change the value to the correct setting. Navigate to PS40. Details of changing this setting can be found in the "Further Programming Options" section of this manual.**

Performing a Full Factory Reset

Removing all Existing Settings from the Controller

Note: Resetting Factory Default Settings erases all of the values entered by the user.

Record any necessary settings such as ramp and dwell programs before proceeding. This process can take up to 1 hour to complete, ensure you have sufficient time available to complete it. On completion the oven should be tested under supervision to ensure its correct operation.

- Repeatedly press ☒ until the controller reads LoC
- Use the ▲ and ▼ buttons to select LoCl then press ☑
- Press and hold the ▲ and ▼ buttons together for one second. When the buttons are released the display will read Shou and oFF
- Press ☒ and the display will read PASS and 4321
- Use the ▲ and ▼ buttons to change 4321 to 1357 then press ☑
- Power down the unit for 10 seconds the switch back on

Entering the Oven Factory Settings

Step 1 – Set the Input type

- Press and hold the ☑ until the display reads InPt
- Use the ▲ and ▼ buttons to select J then press ☑

Step 2 – Set the Enable Communications

- Press and hold the ☑ until the display reads InPt
- Repeatedly press ☒ until the controller reads CoSH
- Use the ▲ and ▼ buttons to select on then press ☑

Step 3 – Set the Temperature Unit

- Press and hold the ☑ until the display reads InPt
- Repeatedly press ☒ until the controller reads tPUn
- Use the ▲ and ▼ buttons to select C then press ☑

Step 4 – Set the Upper Temperature Limit

- Press and hold the ☑ until the display reads InPt
- Repeatedly press ☒ until the controller reads tP-H
- Use the ▲ and ▼ buttons to select 200 then press ☑

Step 5 – Set the Lower Temperature Limit

- Press and hold the ☑ until the display reads CnPt
- Press ☒ until the controller reads tP-L
- Use the ▲ and ▼ buttons to select 10 then press ☑

Step 6 – Set the Display Accuracy

- Press ☒ until the controller reads SP
- Use the ▲ and ▼ buttons to select 0 then press ☑

Step 7 – Set the Alarm 1 Mode

- Press and hold the ☑ until the display reads CnPt
- Press ☒ until the controller reads AL A 1
- Use the ▲ and ▼ buttons to select 11 then press ☑

Step 8 – Set the Alarm 2 Mode

- Press and hold the ☑ until the display reads CnPt
- Repeatedly press ☒ until the controller reads AL A2
- Use the ▲ and ▼ buttons to select 12 then press ☑

Step 9 – Set the System Alarm Mode

- Press and hold the ☑ until the display reads CnPt
- Repeatedly press ☒ until the controller reads SAL A
- Use the ▲ and ▼ buttons to select AL A 1 then press ☑

Performing a PID Autotune

To setup the ovens control we need to tune the controller to the specifics of the individual oven. The controller does this by running an automate program.

During this process the oven will heat up to 145°C so care should be taken to ensure it is clean and empty.

- Empty the oven and ensure it is clean inside
- Close the oven doors – The doors should NOT be opened during this processed
- This process may take up to 30 minutes and MUST be supervised at all times – Ensure you have set aside enough time to complete the process.
- Use the ▲ and ▼ buttons to select a temperature of 140 then press ☑
- Press the ☑ for one second. The display will read At and oFF
- Use the ▲ and ▼ buttons to select on then press ☑
- The oven will now begin heating, do not leave the oven unsupervised during this process.
- To check the status of the process, monitor the AT indicator light on the display. This is a small light above the ☑ This should be flashing during the autotune process.

When the AT light stops flashing, the process is complete.

Part Replacement Procedures:

All maintenance, repair, and replacement procedures should be carried out by a qualified and competent technician with the oven isolated from the electrical supply and without any residual heat being present. All replacement components should be of original design and specification. If works are carried out improperly the result could be poor performance, damage, injury or death.

Removing and Refitting the Rear Cable Cover.

Certain maintenance procedures require the removal of the rear cable cover. If that is required, please follow these steps.

Ensure the oven is fully cooled and isolated the oven from the main electrical supply. At no point should the power be reconnected until this cover has been refitted.

Support the rear cover at all times. Loosen one turn at a time the 4-retaining bolts using a suitable Allen key or hexagon drive tool.

Once undone lift off the cover. See below image for guidance.

Removing and Refitting the Inner Covers and Fan Shroud.

Certain maintenance procedures require the removal of the inner covers and fan shroud. If that is required, please follow these steps.

Removal.

Ensure the oven is fully cooled and isolated from the main electrical supply.

Remove the thermal fuse cover by removing the 2-retaining bolts and lifting it out. See Image below.

Undo the 8-bolts that attach the inner and outer shroud skins, carefully lowering the inner cover once it becomes detached onto the base of the oven.

Undo the 4-inner cover fixing bolts and carefully remove this plate being careful to ensure that excessive strain is not put on the thermocouple cable. See image below.

Refitting.

Refitting is simply a case of reversing the removal process. Any excess thermocouple cable should be fed back into the oven casing. Also it should be noted the 4-inner cover fixing bolts are of a retained type to conform with the European Machinery Directive 2006/42/EC and the Machinery fixed guarding standard EN ISO 14120. These should not be modified in any way. When refitting the cover is actually held in place by the hexagon nut and not the bolt head as would be more traditional. When tightening these fastenings it should be noted that there will be a gap under the head of the bolt when the fastener is fully tight. Do not over tighten these fittings.

Electrical Fuse.

The electrical fuse is located on the rear of the oven and is integrated into the IEC power inlet socket. To replace the fuse first isolate the oven from the electrical supply by unplugging the supply power lead then grip the plastic fuse carrier and remove. Exchange the damaged fuse with a new replacement from Easy Composites Ltd. Replacement is simple a reversal of the removal process.

Thermocouple

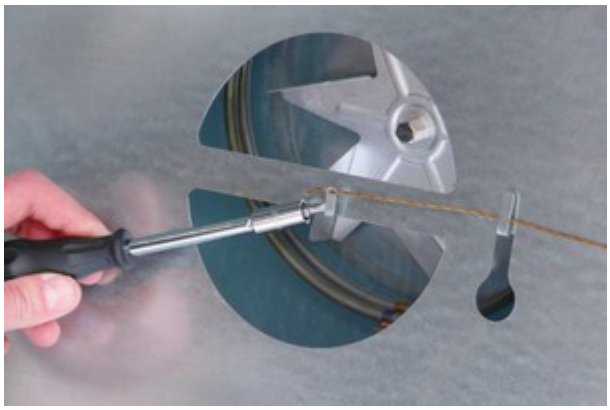
In the rare event of a faulty thermocouple requiring replacement follow these instructions to carry out a replacement.

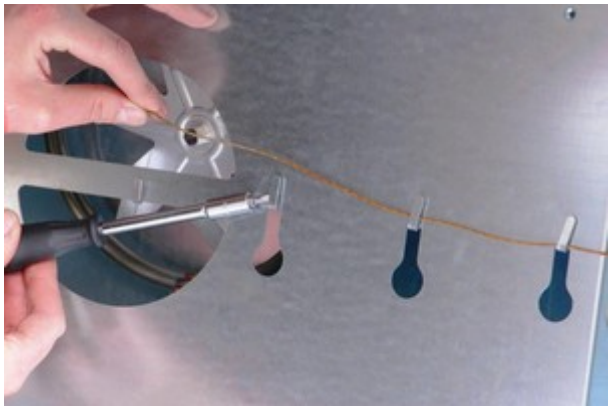
Removal.

First isolate the oven from the electrical supply as detailed earlier in this manual.

Remove the Inner covers and fan shroud as detailed in the “Removing and Refitting the Inner Covers and Fan Shroud” section of this manual.

Unthread the thermocouple cable from its locating tabs, these tabs can be slightly bent out to allow this if required using a screw driver as shown in the below images.





Remove the rear cable cover as detailed in the “Removing and Refitting the Rear Cable Cover” section in this manual.

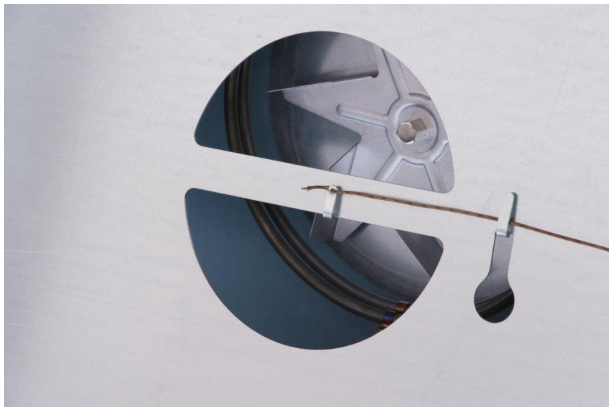
Disconnect the green thermocouple plug from the bulk head socket by simply pulling on it. Pull the thermocouple through the oven skin and discard.

Fitting of New Part.

Ensure the end of the thermocouple is straight then thread the tip of the thermocouple through into the oven from the rear.

Reposition the thermocouple tip by feeding it 10 to 15mm through the eye on the retaining tab on the inside of the oven. Bend the thermocouple cable such that it is not touching any metal parts and secure by pressing the tab back into the cover by hand.

Hook the cable into guidance hooks as shown below. A screw driver may be necessary to open the gap sufficiently to allow this to happen.



Refit all the inner covers as detailed in the “Removing and Refitting the Inner Covers and Fan Shroud” section of this manual.

On the rear of the oven, connect the thermocouple plug to the thermocouple socket. The connector can only be fitted one way round. The orientation of the thermocouple socket can be determined by the width of the pins, the wide pin going into the wide slot.

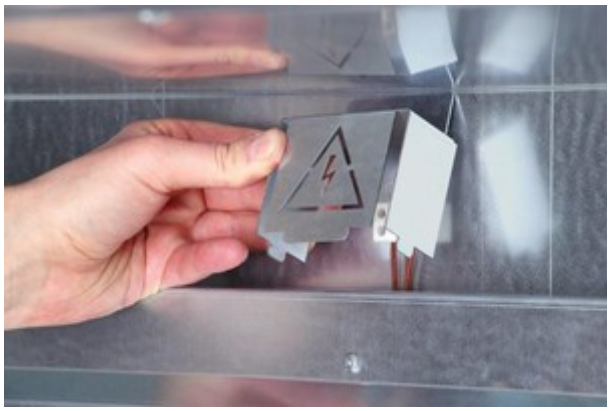
Once the thermocouple has been reconnected, refit the rear cover.

Thermal Fuse

WARNING: Before Replacing the thermal fuse it is essential that the cause of the over temperature situation is established to avoid repeating the condition, some possible causes are incorrect programming of set-points and limits, faulty thermocouple, faulty solid state relay, incorrect thermocouple, incorrect thermocouple calibration or thermal runaway caused by the exothermic reaction of material placed into the oven. Establishing the cause of the thermal fuse breaking is of paramount safety importance and qualified personal should be used to assess this. Only once the cause of the over-limit temperature condition is established and remedied should the work to replace the fuse be embarked upon.

To replace the thermal fuse first isolate the oven from the electrical supply by unplugging the supply power lead. Ensure the oven interior is fully cold before proceeding.

Undo the two cover retaining screws using a hex key type tool and lift off the cover.



Loosen the two screw terminals on the ceramic connection block using a flat head screw driver and remove the thermal fuse.

CAUTION:- THESE TERMINALS HAVE THE POTENTIAL TO BE LIVE IF THE OVEN HAS NOT BEEN ISOLATED FROM THE MAINS SUPPLY. IF YOU ARE IN ANY DOUBT AS TO HOW TO SAFELY CARRY OUT THIS PROCEDURE, PLEASE HAVE THE WORK CARRIED OUT BY A COMPETENT ELECTRICAL PROFESSIONAL.

To fit the new component, bend the legs of the new fuse to approximately match the old fuse. Insert the new fuse into the terminal block and tighten the terminals on the ceramic connector. The polarity of the fuse is unimportant. This connector should NOT be overtightened as this can crack the ceramic block. If any damage to the ceramic block is observed, the oven should not be used until the block has been replaced. Contact Easy Composites should you require a replacement part.

Refit the cover ensuring the tags engage with the slots on top of the main cover. Fit and tighten the 2 cover retaining bolts.

The oven should be tested under constant supervision before returning it to full service. To do this, heat the oven to a low temperature (say 70°C) and soak it for 20 minutes. During this soak watch the main controls, paying special attention to the illumination of the buttons. Any flickering of the lights may indicated a loose electrical connection. If this is observed, the thermal fuse should be checked for a good electrical connection.

NEVER MODIFY, REPAIR OR BYPASS THE THERMAL FUSE THIS IS AN ESSENTIAL, SAFETY CRITICAL COMPONENT OF THE OVEN.

Fan

The fan is a non-serviceable component and although it should offer many thousands of hours of reliable service if a fault occurs such as noise, vibration, or failure to operate, it should be entirely replaced.

To replace the fan first isolate the oven from the electrical supply by unplugging the supply power lead. Ensure the oven interior is fully cold before proceeding.

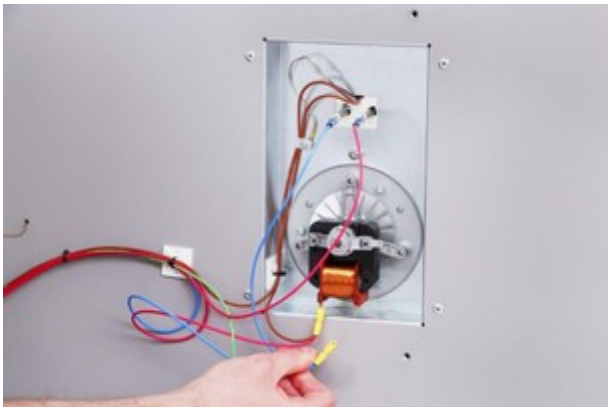
Remove the inner cover and fan shroud as detailed in the “Removing and Refitting the Inner Covers and Fan Shroud” section of this manual.

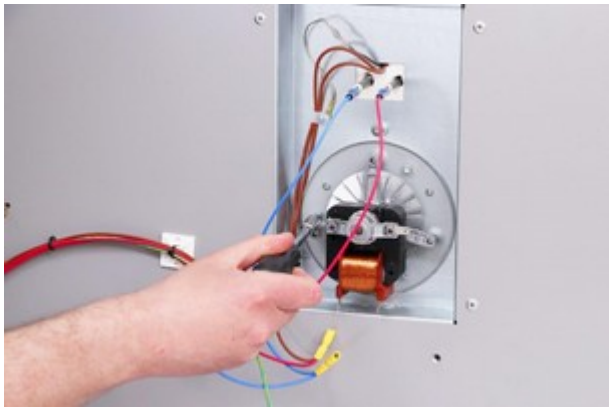
Remove the fan blades by undoing the central nut. Hold the fan blades with one hand and undo the nut; **THE NUT HAS A LEFT HAND THREAD! IT SHOULD BE UNDONE BY TURNING IT CLOCKWISE AND TIGHTENED BY TURING IT (COUNTER) ANTI-CLOCKWISE.**

Please see below images for details.

Remove the inner cover and fan shroud as detailed in the “Removing and Refitting the Rear Cable Cover” section of this manual.

Disconnect the electrical connection terminals from the fan motor. Then undo the fan retaining screws and remove the fan. See below images for details.





Refitting is simple a reversal of the removal process. Please remember that the fan blade retaining nut has a reverse thread.

Please note that for continued accurate and safe operation of the oven the proper specification and type of heating element must be used. Contact Easy Composites Ltd for the correct replacement part.

Heating Element

The heating element is a non-serviceable component and although it should offer many thousands of hours of reliable service if a fault occurs such as low performance or failure it should be entirely replaced.

To replace the heating element first isolate the oven from the electrical supply by unplugging the supply power lead. Ensure the oven interior is fully cold before proceeding.

Remove the inner cover and fan shroud as detailed in the “Removing and Refitting the Inner Covers and Fan Shroud” section of this manual.

Undo the element retaining screws and carefully pull forward to expose the electrical connections.

Disconnect the electrical connections remove the old element.

See below images for details.

Refitting is simple a reversal of the removal process. Please remember that the fan blade retaining nut has a reverse thread.

Please note that for continued accurate and safe operation of the oven the proper specification and type of heating element must be used. Contact Easy Composites Ltd for the correct replacement part.

Wiring Diagram:

Please refer to the wiring diagram in the back of this manual.

Warranty

Limited Warranty in Europe and Africa (E&A)

The terms of this Easy Composites Ltd. warranty shall apply to Easy Composites OV301 Composite Curing Oven purchased directly from Easy Composites Ltd.

What is the Warranty Period?

Easy Composites Ltd. offers a one (1) year limited warranty on the OV301 Composite Curing Oven. The warranty period starts on the date of purchase of a brand new, unused product by the initial first end user. Easy Composites Ltd. will require copy of the original proof of purchase of the initial first end user as a condition of receiving warranty service. Please note that the duration of the warranty depends on the laws of your country. We strongly advise you to keep your receipt of purchase in order to prove the date of purchase of this product.

Easy Composites Ltd. warrants that the products are free from defects in materials and workmanship, with its obligations under this warranty being limited (save in the case of sole gross negligence causing death or personal injury) to repair or replacement at its own expense provided a claim is made within the warranty period applicable to the product.

What Easy Composites Ltd. Will Do to Correct Problems?

Pursuant to this limited warranty, Easy Composites Ltd. will, at its option, repair or replace products (a) with new or previously used products, parts, or components equivalent to new in performance and reliability, or (b) with re-manufactured products using new components or new and used or reconditioned components equivalent to new in performance and reliability, or (c) with a product equivalent to an original product that has been discontinued.

Refund of the price paid is applicable only in cases provided in the applicable law and provided that the product is returned to Easy Composites Ltd. may direct with a copy of the sales receipt. Shipping and handling charges may apply except where prohibited by applicable law. When a product or part is replaced, the replacement item becomes your property and the returned product or part becomes the property of Easy Composites Ltd. All products received by Easy Composites Ltd. for replacement will become the property of Easy Composites Ltd.

In the unlikely event that your product has recurring failures or Easy Composites Ltd. is unable to repair or replace the product, Easy Composites Ltd. will provide you with a replacement product selected by Easy Composites Ltd. that is the same or equivalent to your product in performance. This is your exclusive remedy for a defective product.

Post-replacement

Any replaced/repaired product will be warranted for the remainder of the original warranty period or six (6) months, whichever is longer or for any additional period of time that may be applicable in your jurisdiction.

What Does This Warranty Not Cover?

1) defects caused by (a) an act of God (such as a flood), accident, fire, misuse, neglect, unusual physical or electrical stress, or modification; (b) improper or unauthorized installation, wiring, repair, testing or (c) any other cause beyond normal usage;
2) instances in which someone other than Easy Composites Ltd. (or its authorized service centres) tests, alters, repairs, modifies or services the products in any way;
3) products that have: (a) serial numbers or date tags that have been removed, altered or obliterated; (b) component serial numbers that do not match each other, or component serial numbers that do not match the housing; or (c) nonconforming or non-Easy Composites Ltd parts;
4) consumable spares, accessories and safety protection devices (unless they are found to be non-functional or broken upon purchase of product), such as:

- Thermal Fuse
- Electrical Protection Fuse
- Thermocouples
- Heating Elements

IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT SHALL (A) HAVE NO DURATION GREATER THAN 1 YEAR FROM THE DATE OF PURCHASE DEPENDING ON THE PARTICULAR PRODUCT, (B) TERMINATE AUTOMATICALLY AT THE END OF THAT PERIOD, AND (C) TO THE EXTENT PERMITTED BY LAW, BE EXCLUDED. CONSEQUENTIAL AND INCIDENTAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOSS OF PROPERTY AND THOSE ARISING FROM BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, ARE NOT THE RESPONSIBILITY OF EASY COMPOSITES LTD, AND TO THE EXTENT PERMITTED BY LAW, are excluded.

No warranty is made that any software provided or suggested by Easy Composites Ltd. will meet your requirements or will work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected.

No Other Warranties

Except as set forth above, and in the printed warranty which accompanies the OV301 Composites Curing Oven, Easy Composites Ltd. grants no other warranties, express or implied, by statute or otherwise, regarding the products, their fitness for any purpose, their quality, their marketability or otherwise.

Limitation of Liability

Easy Composites Ltd's liability under the terms of the above warranty is limited to replacement of product units found to be defective in materials or workmanship. Easy Composites Ltd. shall have no liability other than as provided under warranty to distributor, whose sole remedy shall be as provided by Easy Composites Ltd. under this section. In no event shall Easy Composites Ltd. be liable for the cost of

procurement of substitute goods by distributor or for any special, consequential, reliance or incidental damages, however caused, or under any theory of liability, even if Easy Composites Ltd. has been advised of the possibility of such damages. These limitations will apply notwithstanding the failure of essential purpose of any limited remedy.

What Law Governs This Warranty

This limited warranty is governed by and construed under the laws of the country in which the product was originally purchased. For consumer transactions, the limited warranty terms contained in this statement, except to the extent lawfully permitted, do not exclude, restrict, or modify but are in addition to the mandatory statutory rights applicable to the sale of this product to you.

How to Obtain Warranty Support

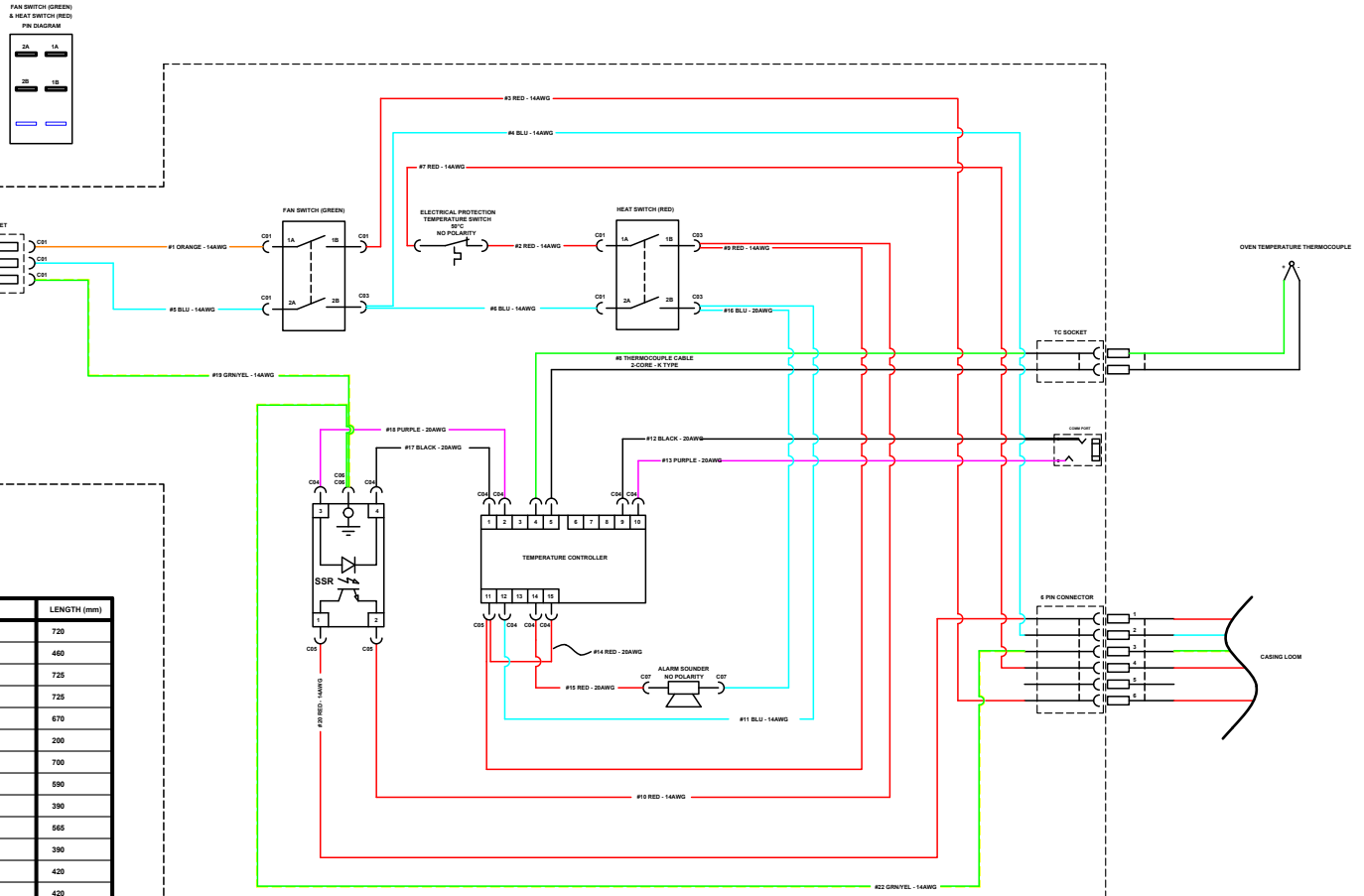
Before submitting a warranty claim, we recommend that you contact the Easy Composites Technical Support Line on +44 (0)1782 454499 or email sales@easycomposites.co.uk for technical assistance. The phone lines are monitored Monday to Friday 9am until 5pm (UK Time) and Saturday 9am until 11am (UK Time) excluding national holidays. Valid warranty claims are generally processed through the point of purchase during the first thirty (30) days after purchase; however, this period of time may vary depending on where you purchased your product. Please check with Easy Composites Ltd. or the retailer where you purchased your product for details.

Any claim under this limited warranty is subject to you notifying Easy Composites Ltd. of the alleged defect within a reasonable time of it having come to your attention and in any event no later than the expiry of the warranty period.

Out-of-warranty service

If your product is out of the warranty period, Easy Composites are there to help you to continue your business without disruption. In addition to our standard one year warranty, customers can access our technical support telephone, email and forum support for fast repair advice and replacement parts and equipment.

easycomposites™

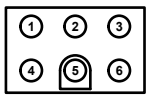


CODE	CONNECTOR DESCRIPTION
C01	6.3mm INSULATED FEMALE SPADE - BLUE
C02	4mm INSULATED FEMALE SPADE - BLUE
C03	6.3mm INSULATED FEMALE SPADE - YELLOW
C04	3mm INSULATED FORK TERMINAL - RED
C05	4mm INSULATED FORK TERMINAL - BLUE
C06	M5 INSULATED RING CRIMP - BLUE
C07	6.3mm INSULATED FEMALE SPADE - RED
C08	-

CODE	CABLE DESCRIPTION	LENGTH (mm)
#1	IEC SOCKET (L) FAN SWITCH GREEN	720
#2	ELECTRICAL PROTECTION SWITCH TO HEAT SWITCH RED	460
#3	FAN SWITCH (GREEN) TO 6 PIN CONNECTOR PIN 6	725
#4	FAN SWITCH (GREEN) TO 6 PIN CONNECTOR PIN 2	725
#5	IEC SOCKET (N) TO FAN SWITCH (GREEN)	670
#6	FAN SWITCH (GREEN) TO HEAT SWITCH (RED)	200
#7	ELECTRICAL PROTECTION SWITCH TO 6 PIN CONNECTOR PIN 4	700
#8	2-CORE TC CABLE - CONTROLLER TO TC SOCKET	590
#9	HEAT SWITCH RED TO TEMP CONT.PIN 11	390
#10	HEAT SWITCH RED TO SSR PIN 2	565
#11	HEAT SWITCH RED TO TEMP CONT. PIN 12	390
#12	TEMP CONT. PIN 9 TO COMM PORT	420
#13	TEMP CONT. PIN 10 TO COMM PORT	420
#14	TEMP CONT. PIN 11 TO TEMP CONT. PIN 15	115
#15	TEMP CONT. PIN 14 TO ALARM	640
#16	HEAT SWITCH (RED) TO ALARM	785
#17	TEMP CONT. PIN 1 TO SSR PIN 4	340
#18	TEMP CONT. 2 TO SSR PIN 3	340
#19	IEC SOCKET TO CHASSIS EARTH	355
#20	SSR PIN 1 TO 6 PIN CONNECTOR PIN 1	440
#21	-	
#22	SSR EARTH PLATE/MOUNTING BOLT TO 6 PIN CONNECTOR PIN 3	420
#23	-	
#24	-	

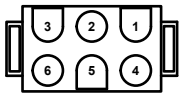
6-PIN SOCKET VIEWED FROM WIRE INSERTION SIDE - USE MAIN CONNECTION SIDE SHAPED HOLE FOR ORIENTATION REFERENCE

USE SOCKET TYPE TERMINALS



6-PIN PLUG VIEWED FROM WIRE INSERTION SIDE - USE MAIN CONNECTION SIDE SHAPED HOLE FOR ORIENTATION REFERENCE

USE PIN TYPE TERMINALS

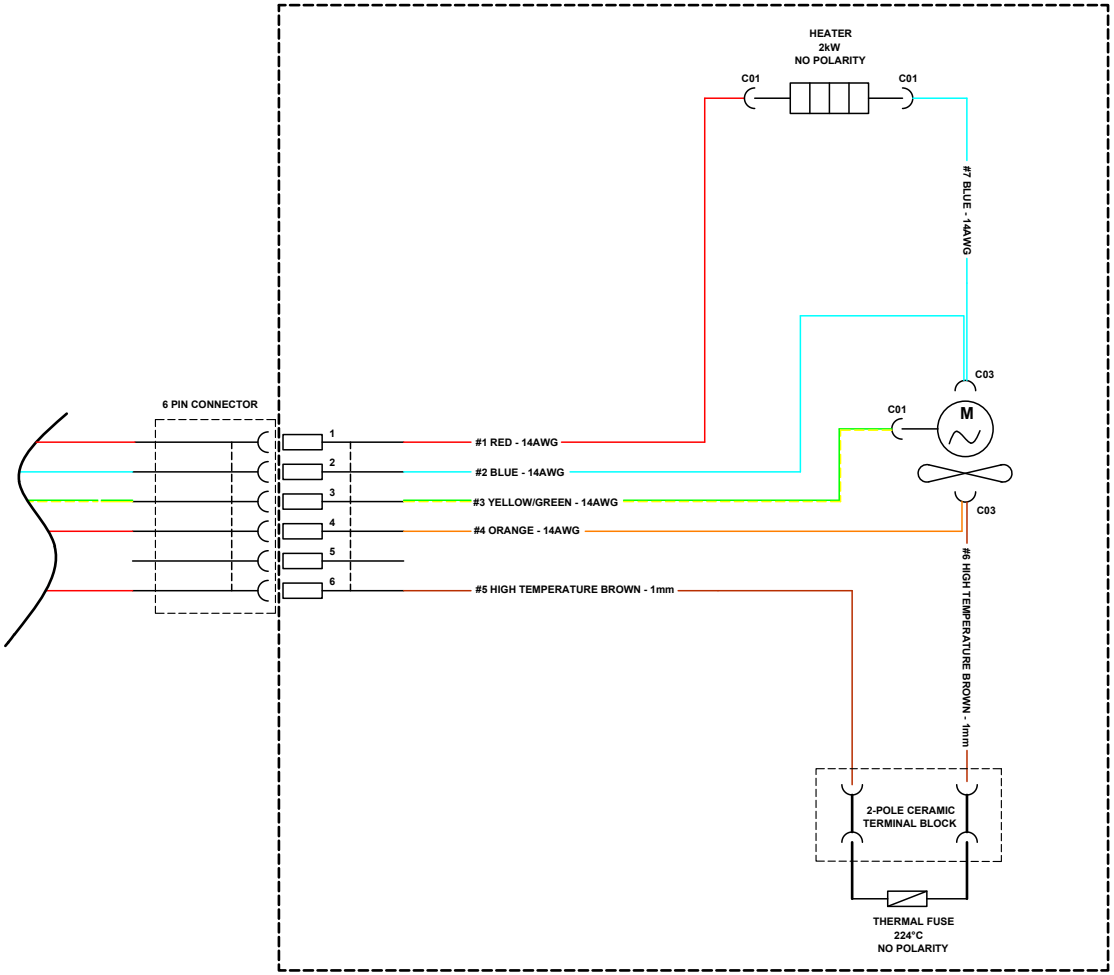


	EASY COMPOSITES LTD
DWG NO:-	ECE00128-01-05 (Sheet 1)
TITLE:-	OV 301 OVEN WIRING DIAGRAM
DRAWN BY	S Johnson
CHECK BY	_
PAPER	A3

easycomposites™

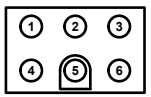
CODE	CONNECTOR DESCRIPTION
C01	6.3mm INSULATED FEMALE SPADE - BLUE
C02	4mm INSULATED FEMALE SPADE - BLUE
C03	6.3mm INSULATED FEMALE SPADE - YELLOW
C04	3mm INSULATED FORK TERMINAL - RED
C05	4mm INSULATED FORK TERMINAL - BLUE
C06	M5 INSULATED RING CRIMP - BLUE
C07	6.3mm INSULATED FEMALE SPADE - RED
C08	-

CODE	CABLE DESCRIPTION	LENGTH (mm)
#1	6 PIN CONNECTOR PIN 1 TO HEATER	1000
#2	6 PIN CONNECTOR PIN 2 TO FAN	1000
#3	6 PIN CONNECTOR PIN 3 TO FAN	1000
#4	6 PIN CONNECTOR PIN 4 TO FAN	1000
#5	6 PIN CONNECTOR PIN 6 TO 2-POLE CERAMIC TERMINAL BLOCK	1200
#6	FAN TO 2-POLE CERAMIC TERMINAL BLOCK	420
#7	HEATER TO FAN	320



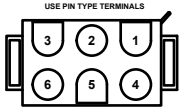
6-PIN SOCKET VIEWED FROM WIRE INSERTION SIDE - USE MAIN CONNECTION SIDE SHAPED HOLE FOR ORIENTATION REFERENCE

USE SOCKET TYPE TERMINALS



6-PIN PLUG VIEWED FROM WIRE INSERTION SIDE - USE MAIN CONNECTION SIDE SHAPED HOLE FOR ORIENTATION REFERENCE

USE PIN TYPE TERMINALS



EASY COMPOSITES LTD	
DWG NO:-	ECE00128-01-05 (Sheet 2)
TITLE:-	OV 301 OVEN WIRING DIAGRAM
DRAWN BY: S Johnson	CHECK BY: _ / PAPER: A3