

# Characteristics

## Electrical

### Power supply

Voltage range: 216.2 - 253V  
 Frequency: 50Hz (nom)  
 Phases: 1  
 Power: Programmer: 3VA (max)

Fuse: 1.0A slow-blow HRC  
 20mm x 5mm ceramic

### Control Relay(s)

Contact type: SPST NO  
 Switched Live -  
 nominal 230VAC output  
 @300mA max (signal version)  
 @30A max (power version)

### Thermocouple

R,S,K & N type.

### Connectors - Power

Signal version: 'Rising clamp'  
 terminal block  
 connectors  
 Max. wire size 2.5mm<sup>2</sup>

Power version: 6.35mm Faston blades

### Connectors - Thermocouple

'Rising clamp' terminal block

## Error Handling

Thermocouple failure detection  
 Thermocouple reversal detection  
 Heater failure detection  
 Kiln over-temperature detection  
 Room over-temperature detection  
 Firing run time hours limiter  
 Alarm buzzer

## Other

Keyboard lock facility + indicator  
 Kiln heating indicator  
 Program running indicator

## Temperature

### Temperature setting

Range: 0 to 1320°C (R/S) 0 to 1200°C (K/N)  
 Resolution: 1°C

### Control Accuracy

P.I.D. Control  
 Reading accuracy: ±0.25% FSD ±1 digit

## Time

Start delay range: 00:00 to 99hr 59min  
 Soak time range: 00:00 to 99hr 59min  
 Resolution: 1 min

## Ramps

Ramp rate: 1 to 999°C/hour or full power  
 Ramps can be heating or cooling

## Environmental

Operating temperature range: 0 to +40°C  
 Storage temperature range: -10° to +55°C

## Enclosure

Material: ABS	Size: 120x122x58mm
Sealing: IP65	Fixings: 90x110mm
Colour: Light Grey	(4 off) + (optional) wall
RAL 7035	mounting
	bracket



This instrument  
 complies with Council  
 Directive 89/336/EEC  
 (electromagnetic compatibility) &  
 Council Directive 73/23/EEC (low  
 voltage safety)



# ST310 Series

## Installation Instructions

# ST310 Series (ST312 ST314 ST315 ST316) Temperature Programmers

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# Installation

## Safety Warnings



**ISOLATE  
BEFORE  
REMOVING  
COVER**

### WARNING

**ISOLATE KILN & PROGRAMMER FROM ELECTRICAL  
SUPPLY BEFORE OPENING THIS INSTRUMENT FOR  
INSTALLATION, CONFIGURATION OR REPAIR PURPOSES**

## Installer Information

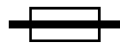
Installation Category: II  
Pollution Class: 2

230V ~ 50HZ 1.0A

Fuse: 1.0A Anti-surge  
20mm ceramic HRC



IP65



**Installation**

## EMC

To meet Electromagnetic Compatibility requirements both the thermocouple lead and the power leads should not exceed 3.0m in length.

This instrument is designed for use mainly in Domestic & Light Industrial environments where electromagnetic interference may cause a loss of accuracy of the displayed temperature reading of up to 3°C. Specified accuracy will be restored when the interference is removed.

*Notes*

**IMPORTANT**

*Error messages are provided to detect kiln faults and so offer some protection to the kiln. For increased protection the use of a heat fuse or other independent over-temperature trip (such as the Stafford Instruments ST101) is recommended. For maximum protection an independent thermocouple, trip & heater contactor circuit should be used.*

*Error messages should normally be left enabled. Error messages should only be disabled as a short term measure—to diagnose kiln problems for example. Power fail recovery may need to be disabled if un-attended firing is not allowed.*

## Mounting

### Mounting Location

Mount the instrument on a suitable vertical surface which will not get hot. Choose a position where the instrument is not exposed to direct heat from the kiln - especially when the kiln door or lid is open.

The cable entry in the instrument base should normally be positioned downwards to guard against moisture ingress.

### Wall Mounting Bracket

This (optional) quick-release metal bracket is in two parts. A flat plate which is screwed to the back of the instrument and a 100mm long short DIN rail which is screwed vertically to a wall or other vertical surface using screws on 90mm centres.

### Direct Wall Mounting

If direct wall mounting is required remove the flat metal plate from the rear of the instrument (if fitted) then screw the instrument's back box to the wall using the 4 holes in the back-box on 90mm x 100mm centres.

*Note: these holes are sealed from the interior of the instrument. It is not good practice to drill further holes in the base of the instrument because this will compromise the IP65 sealing and will compromise the double insulation.*

## Versions

### Signal Relay Base—for kilns with contactors

This version is fitted with signal control relays for operating larger kilns fitted with contactors. Wiring details are shown on pages 4-5.

### Power Relay Base—for small kilns without contactors

This version is fitted with 1 or 2 30A power relays for the direct control of small kilns. The maximum recommended operating current for these relays is 20A i.e. maximum kiln power 5kW. Wiring details are shown on pages 6-7.

### Base Type Identification

Option codes written on the yellow warning label attached to the top surface of the base box show the type of base. Option codes are:-

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No alarm relay Signal relay version	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Alarm relay fitted Signal relay version
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No alarm relay Power relay version	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Alarm relay fitted Power relay version

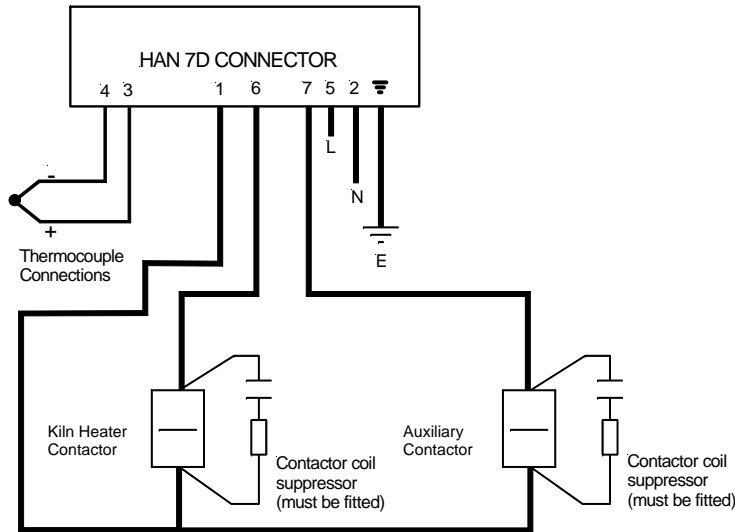
## Wiring

### Connector

If the instrument has been pre-wired with a cable & plug ensure that the plug is compatible with the connector fitted to the kiln. The standard connector is Harting type HAN 7D or similar.

### Kiln Connections

Compatible kiln connector wiring is shown below:-



### Connector Pin List

1	Neutral to contactors	5	Mains Live supply
2	Mains Neutral supply	6	Kiln Power contactor Live
3	Thermocouple +	7	Auxiliary contactor Live
4	Thermocouple -	Earth	Earth

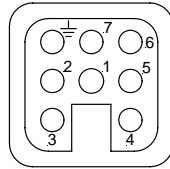
### Contact Suppression

The coil of each contactor **must be suppressed** with an RC filter network. The RC network must be connected directly across the coil terminals on the contactor. Suitable proprietary RC filter networks fitted with insulated wire leads are:-

RS Components	Part No. 210-364
RS Components (tab fixing)	Part No. 210-370
Farnell Electronic Components	Part No. 218-893

*These are also available from Stafford Instruments Ltd.*

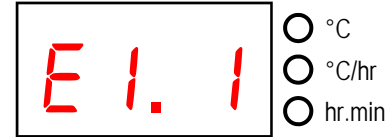
### HAN 7D Pinout



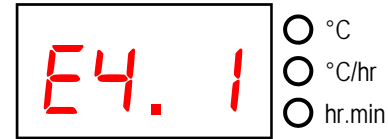
View on pins



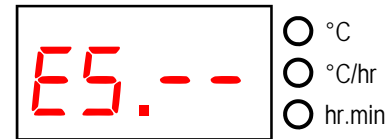
The ambient temperature trip level is now displayed. This can be altered with the  $\uparrow$  &  $\downarrow$  keys in the range 30°C to 70°C or disabled (At.--). If this temperature is exceeded the controller will show Err 7. Press the START/STOP key.



Error 1 (heating failure) message status is now displayed. This can be altered with the  $\uparrow$  &  $\downarrow$  keys. E1.1 indicates that error 1 is enabled. E1.0 indicates that error 1 is disabled. Press the START/STOP key.



Error 4 (contactor welded) message status is now displayed. This can be altered with the  $\uparrow$  &  $\downarrow$  keys. E4.1 indicates that error 4 is enabled. E4.0 indicates that error 4 is disabled. Press the START/STOP key.



Error 5 (overshoot limit exceeded) message status is now displayed. This can be altered with the  $\uparrow$  &  $\downarrow$  keys to E5.0 (10°C), E5.20 (20°C), or E5.-- (disabled). Press the START/STOP key.



Power failure handling status is now displayed. This can be altered with the  $\uparrow$  &  $\downarrow$  keys. PF.1 indicates that power failure recovery is enabled. PF.0 indicates that power failure recovery is disabled. Press the START/STOP key.

The lock-up on error facility described below is used to prevent the clearing of errors by cycling the power to the instrument—to force an engineer call-out. Errors are cleared by entering this configuration mode.



Lock-up on error status is now displayed. This can be altered with the  $\uparrow$  &  $\downarrow$  keys. LE.1 indicates that lock-up on error is enabled. LE.0 indicates that lock-up on error is disabled. Press the START/STOP key.

The instrument will now store the configuration data and then leave configuration mode by resetting itself.



