



Installation Instructions

ST515 / ST516

Temperature Programmers

www.staffordinstruments.co.uk



See separate handbook for User Instructions
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Issue: 2.00
Date: 01 Dec 2015

Installation

Safety Warnings



**DISCONNECT BEFORE
REMOVING COVER
(NO USER SERVICEABLE
PARTS INSIDE)**

WARNING

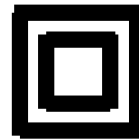
**ISOLATE KILN & PROGRAMMER FROM ELECTRICAL
SUPPLY BEFORE ATTEMPTING INSTALLATION OR
REPAIR WORK**

Installer Information

Installation Category: II
Pollution Class: 2

100-240V ~ 50/60HZ 1.0A

Fuse: 3.15A Anti-surge
20mm ceramic HRC



IP50



EMC

To meet Electromagnetic Compatibility requirements the controller lead should not exceed 3.0m in length.

This instrument is designed for use mainly in Domestic, Commercial & 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.

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.

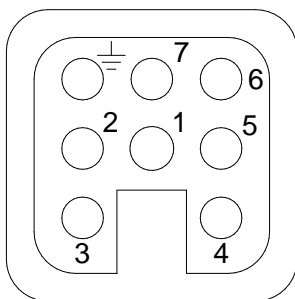
Wall Mounting Bracket

This is a holsterstyle ABS moulded bracket which can be attached with 2 screws. The bracket mounting holes are spaced 70mm. The instrument can be removed from this bracket for in-hand programming if required.

Connecting Lead

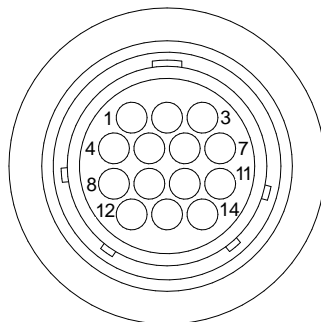
The ST51X range of Temperature Programmers are fitted as standard with a 3m connecting lead and plug. For kilns requiring 2 control outputs the plug type can be either a Harting Han7D or a Tyco CPC14. The wiring of the mating Han7D kiln socket follows an industry standard (as shown below). **The wiring of the mating CPC14 kiln socket varies between kiln manufacturers!** For kilns requiring 3 control outputs (i.e. require the event/damper/fan output) then either the Harting Han12Q or Harting 15DX (see over) connectors are used.

Han7D plug



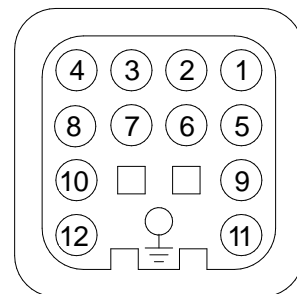
View on pins

CPC14 plug



View on pins

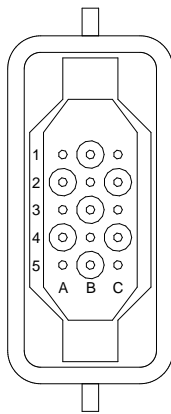
Han12Q plug



View on pins

<u>Wire function</u>	<u>Wire colour</u>	<u>Han7D pin</u>	<u>CPC14 pin</u>	<u>Han12Q pin</u>
Mains (L) supply	Brown	5	8	5
Mains (N) supply	Blue	2	9	6
Mains Earth	Green/Yellow	8/Earth	11	Earth
Heating control output (L)	White/Black	6	14	1
Alarm control output (L)	Yellow	7	12	2
Control output (N)	Black	1	13	-
Damper/Event/Fan output	Black	-	-	3
Thermocouple +ve	Orange	3	1	11
Thermocouple -ve	White	4	2	12

Han15DX plug



View on pins

<u>Wire function</u>	<u>Wire colour</u>	<u>Han15DX pin</u>
Mains (L) supply	Brown	A1
Mains (N) supply	Blue	B1
Mains Earth	Green/Yellow	Clamp
Heating Control Output (L)	White/Black	A2
Alarm Output (L)	Yellow	C1
Event/Damper/Fan O/P (L)	Black	B2
Thermocouple (+)	Orange	B5
Thermocouple (-)	White	C5


Note: the thermocouple connections shown above are for R or S type thermocouples only. For K or N type thermocouples the polarities are reversed and the orange thermocouples wires are replaced with green.

Contactors Coil Suppression



The coil of each kiln contactor **should be suppressed** with an RC suppressor. The RC suppressor must be connected directly across the coil terminals on the contactor. Suitable proprietary RC suppressors are often available from contactor manufacturers as add-on blocks.

A suitable RC suppressor with insulated wire leads (fly leads) is the Okaya Electric XEB1201B. This can be supplied by Stafford Instruments Ltd. - part number: %SUPP+.


Configuring

To enter configuration mode power down the ST51X. Press and hold down the  key while powering up the ST51X.







 When the thermocouple type is displayed release the  key.








 The first setup parameter number is now displayed (flashing 00). Refer to the code tables overleaf for a description of the available configurable parameters.



 Change the parameter number with the  &  keys. To display the parameter value press the  key.



 The parameter value can now be altered with the  &  keys. To select another parameter press the  key.

Pressing the  key at any time causes the configuration parameters to be stored. The instrument will then reboot.

Note: in the above sequence if no key presses are detected for 30 seconds the instrument will exit configuration mode without saving any changes.

ERROR MESSAGES

Certain error messages can be disabled by the use of configuration parameters. Error messages should normally be left enabled. Error messages should only be disabled as a short term measure - to diagnose kiln problems for example.

The alarm output contact closes at the start of a firing and opens when the firing is complete. If an error message is generated the firing is terminated, the alarm buzzer sounds and the alarm output contact opens. This output is usually used to drive a secondary (policeman) contactor to isolate power to the kiln elements.

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 is recommended. For maximum protection an independent thermocouple, trip & heater contactor circuit should be used.

Note: Power fail recovery may need to be disabled if un-attended firing is not allowed.

Setup Parameters

No.	Function	Min.	Max.	Default	Notes
0	Thermocouple type	0	3	2	0=K, 1=N, 2=R, 3=S
1	Error 1 enable	0	1	1	0=disabled, 1=enabled
2	Max. user temperature	100	1400	1320	°C
3	Display brightness	0	6	3	0=dim, 6=bright
4	Error 4 enable	0	1	1	0=disabled, 1=enabled
5	Error 5 enable	0	1	1	0=disabled, 1=enabled
6	Error 6 firing hours trip	10	1000	1000	1000=disabled
7	Room temperature trip	30	71	50	°C. 71=disabled
8	Power fail recovery enable	0	1	1	0=disabled, 1=enabled
9	Paused time limit (hours)	1	11	2	11=disabled
10	Set point offset	-99	99	0	°C
11	Proportional band	1	999	55	°C
12	Integral time (seconds)	0	9999	200	0=disabled
13	Differential time (seconds)	0	999	10	0=disabled
14	Kiln element power	0	9999	0	1 unit = 0.1kW
19	Error 9 (not used on ST515/ST516)	0	99	30	Not used
42	Program Linking (ST516 only)	0	1	0	0=disabled, 1=enabled
43	Engineer lockup on error	0	1	0	0=disabled, 1=enabled
44	Control cycle time	5	120	30	Seconds
45	Event / Damper / Fan Relay function (if fitted)	0	3	0	0=disabled, 1=event, 2=damper, 3=fan
46	Remember start delay	0	1	0	0=forget, 1=remember
47	Skip start delay after power failure	0	1	0	0=resume delay, 1=skip delay
48	Reset to factory defaults	0	1	0	1=reset
60	Operating units °C/°F	0	1	0	0=°C, 1=°F

Configuration Notes

<u>Parameter</u>	<u>Note</u>
10	Setpoint offset: This is added to the setpoint defined by the user program. This will normally be left at 0.
42	Linking: Enables program linking on the ST516 only. Ignored by the ST515. With linking enabled program n can be optionally linked to program n+1 etc.
43	Engineer lock-up on error: If this feature is enabled then errors cannot be cleared by cycling the power to the controller i.e: cannot be cleared by the user. This forces an engineer call out to determine the cause of the error and a repair to be implemented.
45	K5 Output function: K5 is a programmable output. If set to event mode then K5 is controlled by the user program to open or close at the start of each ramp and to open or close at the start of each soak. If set to damper or fan mode then the user is able to enter damper open & close temperatures or fan on and off temperatures.
46	Remember start delay: By default this feature is disabled and the controller sets the initial value for start delay to 00:00. If enabled the controller remembers the user entered start delay from the previous firing (useful for repetitive overnight firings). In either case the actual start delay can be edited by the user.
47	Skip start delay after power failure: By default this feature is disabled and in the event of a power failure while executing the start delay the controller times off the remainder of the start delay when power is restored. If enabled the controller immediately starts firing when the power is restored. Note: the controller does not contain a real time clock and so does not know how long the power has been off.
60	Operating Units °C/°F: When units are changed the controller will reload its default set of programs (in either °C or °F units as required). <i>Warning! - this will over-write any existing programs!</i>

Characteristics

Electrical

Power supply

Voltage range: 90 - 264VAC

Frequency: 50/60Hz

Power: Controller 4VA (max)

Switched outputs 125VA

Fuse: 3.15A slow-blow HRC

20mm x 5mm ceramic

Control Relays (3)

Contact type: SPST NO

Switched Line voltage O/P @500mA max

(for contactor driving)

Thermocouple

R,S,K & N type.

Lead & Connector

3m flexible grey polyurethane lead

Fitted with Han7D, CPC14 or Han15DX

connector

Environmental

Operating temperature range: -10°C to +55°C

Storage temperature range: -10°C to +55°C

Error Handling

Thermocouple failure detection

Thermocouple reversal detection

Heater failure detection

Kiln over-temperature detection

Room over-temperature detection

Lock-up on error facility

Firing run time hours limiter

User program check

Alarm buzzer (buzzer)

Other

Keyboard lock facility & indication

Kiln heating indicator

Program running indicator

Energy used display

Wall Bracket

Material: ABS flame retardant UL 94V-0

Colour: Dark Grey RAL7012

Fixing slot centres (vertical): 100mm

Fixing slot size: 8mm x 4mm

Temperature

Temperature setting

Range: 0 to 1400°C (R/S) 0 to 1200°C (K/N)

Resolution: 1°C

Control Accuracy

P.I.D. Control or on/off control (selectable)

Reading accuracy: $\pm 0.25\%$ 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: 0.1 to 9.9°/hour then

10 to 999°/hour or full power

Ramps can be heating or cooling

Enclosure

Material: ABS flame retardant UL 94V-0

Sealing: IP51

Size: 80/68mm(W), 165mm(L), 28mm(D)

Colour: Black/Dark Grey

(RAL9011/RAL7012)

Weight

Instrument + wall bracket + cable: 0.841kg (max)

Packaging

Packaged size: 320 x 230 x 75mm

Packaged weight: 1.025kg (max)



This instrument complies with Council Directive 89/336/EC (EMC) & Council Directive 2006/95/EC (safety)

Council Directives 2002/96/EC & 2003/108/EC
The crossed out bin symbol, placed on this product, reminds you of the need to dispose of the product properly at the end of its life. Electrical & Electronic Equipment should never be disposed of with general waste but must be separately collected for proper treatment. In this way you will assist in the recovery, recycling & reuse of many of the materials used in this product.

