Kilnkon Operating Manual

A. Display Detail
B. Key board Detail
C. Input Description
D. Output Description
E. How to program, Parameter List and Description
F. List of Messages and Description
G. Graph Monitoring
H. Temperature Calibration

A. Display Detail:

Screen 1: Home Page information

Manual : Shows operating Mode of machine. In auto cycle Mode Auto is displayed.

Heating Zone : Information inside Red coloured area shows Heating Zone information.

- TC indicates thermocouple number.
- Pressing CLEAR key, % analogue Output is displayed in place of TC numbers (Zone 1 to 4 only).
- Values under Act °C show actual Temperatures of six Thermocouples (R type thermocouple, Nonlinear).
- LEDs under UV title shows ultraviolet sensor input status of respective sequence controller which indicates flame at respective burner is ON or OFF.
- Set: shows the set value of Temperature of the Kiln
- Damper: shows the recuperation damper output status.FWD – Forward – Damper forward Output is ON. BWD – Backward - Damper backward Output is ON. OFF – None of Forward and Backward output is ON.
- Blower: shows Blower output ON/OFF status.
- Heating time: shows total Heating time taken to reach final set temperature. It is in 000:00 hour:min unit.

Cooling Zone : Information inside Blue coloured area shows Cooling Zone information.

- Value under Act °C shows actual Temperature of 7th Thermocouple which is under cooling Zone.
- Damper: shows the recuperation damper output status.FWD – Forward – Damper forward Output is ON. BWD – Backward - Damper backward Output is ON. OFF – None of Forward and Backward output is ON.
- Blower: shows Blower output ON/OFF status.
- Cooling time: shows total Cooling time taken to reach Cooling complete temperature (programmable parameter. PROG mode, Page Title: Cool Set Temperature). It is in 000:00 hour:min unit.

Pop up messages : Red/Blue boxes with messages will be popped indicating to perform tasks

- During Heating or Cooling Cycle, message is popped which reminds task to be performed at this actual temperature.
- Performing this task, press Accept so that system will check for another task.
- Messages of Heating profile will be displayed in Red Dialogue box and messages to be displayed during cooling will be in Blue dialogue box.

Screen 2: Current Status of Temperature profile

Current Set temperature	: Set temperature of heating profile. Set temperature changes according to the set ramp time of that step.
Target Set Temperature	: Set temperature of that step entered in program menu. This set temperature indicates within set ramp time current set temperature will reach this value.
Final Set temperature	: Set temperature of last step of heating profile.
Current Step No. /10 steps	: Current step of heating profile out of entered steps.
Profile No.	: Heating Profile number out of 25 saved temperature profiles (Each profile having no. of steps to run, set temperatures, ramp and hold times).
Heating Cycle time	: Heating Time elapsed till current profile step.
Cooling Cycle time	: Cooling Time taken to reach cooling temperature.
Set Ramp Time	: For the current step of the profile this value shows the set Ramp time in PROG menu.
Current Ramp Time	: For current Ramp how much time is elapsed out of set Ramp time is displayed here.
Set hold Time	: After ramp is over for how much time system will wait to start new ramp is shown here. It is the set Hold time in PROG Mode.
Current Hold Time	: Out of set Hold time for current step how much time is elapsed is displayed.

Note: If unit of Ramp and Hold time is selected minutes then these values will be displayed in Minutes. If unit is set in hours then these values will be displayed in hour:min format.
Unit of Ramp and Hold Time can be selected from PROG Mode - Configuration Page – Ramp and Hold Time unit.

Screen 3: Digital Inputs

Screen shows Digital Input current status. ON: Input Present, OFF: Input Absent

Screen 4: Digital Outputs

Screen shows Digital Input current status. ON: Output is ON, OFF: Output is OFF. Pressing Scroll Down arrow key multiple times, analogue outputs can be viewed.

Screen 5: Temperature calibration page.

- Temp CH : Numbers under this title show Temperature channels i.e. Thermocouple number. 8th channel shows the room temperature.
- Gain : Gain values of every Zone. Range is 0.90 to 1.20
- Offset : temperature offsets of every channel. Each offset count equals 5uV change.
- Act °C : Values under this title display actual temperatures of channels.
- Freq : Frequency input on controller pin (For Engineer's use only).

Screen 6: Heat Set temperature. – PROG (Program) Mode starts

This screen shows Heating cycle parameters.

Screen 7: Cool Set temperature.

This screen shows Cooling cycle parameters.

Screen 8: Set temperature Profile.

This screen shows Heating profile parameters.

Screen 9: Set PID.

Parameters for Temperature control.

Screen 10, 11: Configuration

System level parameters are displayed.

B. Keyboard Detail:

Burner Sequence

- All 6 burners ON/OFF keys.
- After turning any burner ON its Sequence controller power is turned ON and after two seconds trigger to Sequence controller is given.

Blower

- Red coloured keys are for Heating Zone blowers ON/OFF
- Green coloured keys are for Cooling Zone blowers ON/OFF.

Damper

- AUTO : Recuperation Damper auto Forward/Backward sequence is started based on recuperation damper forward and backward time entered (PROG Mode).
- FWD : Recuperation Damper Forward Output ON. If Backward Output is already ON then system will turn it OFF and turn Forward output ON.

- BKWD : Recuperation Damper Backward Output ON. If Forward Output is already ON then system will turn it OFF and turn Backward output ON.
- OFF : Turns whichever Output is ON, Damper FWD or BKWD.

AUTO: Key is used to start Heating profile.

TEST:

- To enter or Exit test Mode.
- In Test Mode digital and analogue Outputs can be tested.

ACCEPT: When any message is popped to perform some task then after completing that task to acknowledge system this key is used.

ABORT:

- After Auto is pressed system checks for cycle start interlocks
- During checking cycle start interlocks if starting heating cycle needs to be aborted then Abort key is pressed.
- Pressing this key operational Mode will be Manual Mode.
- Once heating profile is started then during profile if Abort key is kept pressed for 30 sec then profile cycle can be aborted from that point.

PROG: To enter into or to exit from the program mode.

INC

- To increment character type parameter value.
- In Temperature Calibration Mode : Only increments/decrements numeric value.
- In Test Mode – Analogue Output : To increase analogue output count

DEC

- To decrement character type parameter value.
- In Temperature Calibration Mode : Only increments/decrements numeric value.
- In Test Mode – Analogue Output : To decrease analogue output count

PgUp: To decrement page number.

PgDn: To increment page number.

CLR

- To clear the parameter value.
- ON Main Screen to see % Analogue Output of first four zones.
- At power ON keep pressing this key will open password level 3.

ENT

- Enter is used to save the parameter value.
- In Test Mode : Change the output status to ON or OFF.

F3: During Last Hold time of heating profile if user wants to terminate heating before entered time is reached then pressing F3 key will terminate heating cycle.

Scroll Keys – Arrow keys

- To move the cursor to the parameter upside, downside, right side or to the left side of the current parameter.
- Scroll UP/Down : In Input / Output page to change the page to see more Inputs/Outputs.
- In Test Mode : To shift the curser to the desired output to change its status.

Numeric keys: To enter parameter value

C. Input Description:

INPUT LIST CARD 0		
Sr No	Name of Input	Description
I1	UV IN Burner1	UV input of Zone 1 Burner
I2	UV IN Burner2	UV input of Zone 2 Burner
I3	UV IN Burner3	UV input of Zone 3 Burner
I4	UV IN Burner4	UV input of Zone 4 Burner
I5	UV IN Burner5	UV input of Zone 5 Burner
I6	UV IN Burner6	UV input of Zone 6 Burner
I7	Blower Trip	-
I8	Cycle Start	Cycle start Push Button input.

D. Output Description:

OUTPUT LIST CARD 0			
Sr No	Output No	Name of Output	Description
S1	O1	Hooter	Hooter output
S2	O2	Alarm	Alarm output
S3	O3	Damper FWD	Damper forward output
S4	O4	Damper BKWD	Damper backward output
S5	O5	Spare 1	Spare
S6	O6	Spare 2	Spare
S7	O7	Spare 3	Spare
S8	O8	Spare 4	Spare

OUTPUT LIST CARD 1			
Sr No	Output No	Name of Output	Description
S1	O9	Seq Con1 PWR	Sequence controller 1 power
S2	O10	Seq Con2 PWR	Sequence controller 2 power
S3	O11	Seq Con3 PWR	Sequence controller 3 power
S4	O12	Seq Con4 PWR	Sequence controller 4 power
S5	O13	Seq Con5 PWR	Sequence controller 5 power
S6	O14	Seq Con6 PWR	Sequence controller 6 power
S7	O15	Spare 5	
S8	O16	Spare 6	

OUTPUT LIST CARD 3			
Sr No	Output No	Name of Output	Description
S1	O17	SeqCon1 Trig	Sequence controller 1 trigger
S2	O18	SeqCon2 Trig	Sequence controller 2 trigger
S3	O19	SeqCon3 Trig	Sequence controller 3 trigger
S4	O20	SeqCon4 Trig	Sequence controller 4 trigger
S5	O21	SeqCon5 Trig	Sequence controller 5 trigger
S6	O22	SeqCon6 Trig	Sequence controller 6 trigger
S7	O23	Blower Heat	Heating zone blower
S8	O24	Blower Cool	Cooling Zone blower

Analog Output List			
SrNo	Analog Output No	Name of Analog Output	Description
1	AN1	Z1 Servo Valve	Zone 1 Gas valve
2	AN2	Z2 Servo Valve	Zone 2 Gas valve
3	AN3	Z3 Servo Valve	Zone 3 Gas valve
4	AN4	Z4 Servo Valve	Zone 4 Gas valve

E. How to Program, Parameter List and Description:

How to Program

- Pressing PROG key user can enter into Program Mode
- Using program Mode keys user can go to different screens and set desired values of different parameters (see Keyboard Detail to use program Mode keys).

Program Mode - Parameter List

- Password Levels
  - 0 - No Password required
  - 1 - Password level 1 – operator level
  - 2 - Password level 2 – supervisor level
  - 3 - Password level 3 – supervisor level

Heat Set Temperature				
Sr. No.	Parameter Name	unit	Range	Description
1	Start Data Logging @Z1 Temp	°C	0000 - 1500	Start data logging when Zone 1 actual temperature reaches entered value
2	Start Zone 3 @Z1 Temp	°C	0000 - 1500	Turn Zone 3 burner ON when Zone 1 actual temperature reaches entered value
3	Start Zone 2 and 4 @Z1 Temp	°C	0000 - 1500	Turn Zone 2 and 4 burners ON when Zone 1 actual temperature reaches entered value
4	Main Damper OFF @ Z1 Temp	°C	0000 - 1500	Turn Main Damper OFF when Zone 1 actual temperature reaches entered value
5	Start Zone 5 and 6 @Z1 Temp	°C	0000 - 1500	Turn Zone 5 and 6 burners ON when Zone 1 actual temperature reaches entered value
6	Close recuperation Half	°C	0000 - 1500	Half close Recuperation Damper when Zone 1 actual temperature reaches entered value
7	Auto Recuperation Damper ON/OFF	°C	0000 - 1500	Auto
8	Cone Position ON/OFF	°C	0000 - 1500	Check cone position when Zone 1 actual temperature reaches entered value
9	Colour Variation Monitoring Start	°C	0000 - 1500	Start checking colour variation on rings at fixed interval after Zone 1 actual temperature reaches entered value
10	Recuperation Damper FWD Time	sec	0000 - 9999	Recuperation damper forward output ON time
11	Recuperation Damper BKWD Time	sec	0000 - 9999	Recuperation damper backward output ON time

Cool Set Temperature				
Sr. No.	Parameter Name	unit	Range	Description
1	Start Cooling after time	Hour / min	0000 - 1000	After Heating is completed, system will wait for entered time and then cooling cycle will be started. If unit of time is selected min/hour in configuration Menu then after entered minutes/hours cooling will be started.
2	Open Recuperation Damper @Z7 Temp	°C	0000 - 1500	Open Recuperation Damper when Zone 7 actual temperature reaches entered value
3	Main Damper Open @ Z7 Temp	°C	0000 - 1500	Main Damper Open when Zone 7 actual temperature reaches entered value
4	Open All Pip Holes @ Z7 Temp	°C	0000 - 1500	Open All Pip Holes when Zone 7 actual temperature reaches entered value

5	Blower ON @ Z7 Temp	°C	0000 - 1500	Blower ON when Zone 7 actual temperature reaches entered value
6	Blower OFF & Cooling Complete	°C	0000 - 1500	Blower OFF & Cooling Complete when Zone 7 actual temperature reaches entered value

Set Temperature Profile				
Sr. No.	Parameter Name	unit	Range	Description
1	Steps to Run	-	00 – 10	Number of steps to run in the selected profile.
2	Set Temperature – Step 1	°C	0000 – 1500	Set Temp at Profile step 1. Completion of ramp time of step 1 current set temperature will be the entered value.
				The above will be same for set temperatures for step 2 to step 10.
3	Ramp Time – Step 1	Hour/ min	0000 – 9999	The ramp time during which current step temperature will reach set temperature of that step. Unit will be hour or min selected by the user in configuration page. Entering Ramp time 0000, system will start hold time.
				The above will be same for Ramp times for step 2 to step 10.
4	Hold Time	Hour/ min	0000 – 9999	The system will hold for this time after completing a ramp time for entered value. Unit will be hour or min selected by the user in configuration page. Entering hold time 0000, system will start next step.
				The above will be same for Hold times for step 2 to step 10.
5	Zone 5 Set Temp.	°C	0000 – 1500	Alarm condition. When Zone 5 temperature reaches entered value then alarm is invoked. All sequence controllers will be turned OFF by the system. Cycle will not be broken. When Z5 actual temperature reaches this set value then Manually sequence controllers can be turned ON.
6	Zone 6 Set Temp.	°C	0000 – 1500	Alarm condition. When Zone 6 temperature reaches entered value then alarm is invoked. All sequence controllers will be turned OFF by the system. Cycle will not be broken. When Z6 actual temperature reaches this set value then Manually sequence controllers can be turned ON.

Set PID				
Sr. No.	Parameter Name	unit	Range	Description
1	Pb	°C	000 – 999	Set Proportional bands of four temperature zones

2	Ti	sec	000 – 999	Set Integral times of four temperature zones
3	Td	sec	000 – 999	Set Derivative times of four temperature zones
3	Ct	sec	000 – 999	Temperature Output (Servo valve output) update times of four zones
4	MAX OP%	-	000 – 100	Maximum % Analog Output allowed at the servo valves of four zones
5	Alarm Band	°C	000 – 999	Temperature band (set temperature ± alarm band) within which actual temperature falls then it is considered ok. Difference between set and actual temperature goes below set temp. - alarm band or above set temp. + alarm band then alarm is invoked.
6	Manual Mod OP%	-	000 – 100	Manual Mode servo valve output. In Manual Mode if burners are turned ON then servo valve will give fixed analog output entered by operator.

Configuration				
Sr. No.	Parameter Name	unit	Range	Description
1	Profile No.	-	00 -24	25 different heating profiles can be saved and loaded as per requirement. Set Heat parameters, Set cool parameters and set profile parameters are saved for each profile.
2	Calibration Mode	-	OFF/Temp.	If temperatures of 8 channels need to be calibrated then turn calibration mode to temperature mode. By default it will be OFF.
3	Password Level 1	-	0000 – 9999	Password level 1. To change operator level parameters.
4	Password Level 2	-	0000 – 9999	Password level 2. To change operator level parameters.
5	Password Level 3	-	0000 – 9999	Password level 3. To view and change supervisor level parameters.
6	Password Lock delay	min	00 – 99	If password entered is correct then after this delay parameters will be locked again. User will need to re-enter the password to change parameters.
7	Set Date(dd/mm/yy)	-	01-31, 01-12, 00-99	Set date, month and year.
8	Set Time(hh/mm)		00-23, 00 – 59	Set time. Hour, min
9	Ramp and Hold Time unit	-	Hour/ Min	Unit for profile parameters like ramp or hold time. This unit is also applicable to start cooling after time (Set cooling parameters)
10	Dly bet Auto Mode & Cyc start	sec	0000 - 9999	Delay between pressing auto key and giving cycle start input. Within this delay if cycle start input is not given then user needs to press

				auto key again.
11	Time between MSG and Hooter	sec	0000 - 9999	As message is popped on screen alarm output is turned ON. Within this time if any accept or abort key is not pressed then hooter will be turned ON.
12	UV input settling Time	sec	0000 -9999	After turning burner ON respective UV input should be present within this time. On completion of this time UV input is absent then notifying message will be popped on screen.
13	UV monitor during Profile cyc	-	ON/OFF	UV monitoring during auto cycle. If this parameter is entered OFF then above parameter will have no effect during cycle.
14	Colour Variation Monitoring	-	0000 - 9999	During heating cycle monitor colour of material every this interval. Colour monitoring will start after Zone 1's actual temperature reaches entered value in a parameter (Set heat parameters).
15	Colour Variation on rings Not OK, Time before recup. Damper	min	0000 - 9999	If colour variation is not OK (i.e. abort is pressed when colour variation is asked OK) then after this delay recuperation damper action will be taken.
16	Temperature Linear	-	ON/OFF	To make Temperature Linearity ON & OFF this parameter is used.
17	Reset cycle count (SD Card)	-	ON/OFF	This parameter is used to reset the cycle count (i.e. Cycle data will be stored in the Memory card at the first location of Memory card). Previous record at that location will be overwritten by current cycle data. This parameter will become active after entering Level 3 password.

Temperature Calibration: Calibration Mode in Configuration page has to be "Temp." to edit these parameters.				
Sr. No.	Parameter Name	unit	Range	Description
1	Temp Ch. (Non settable)	-	00 – 08	Number of temperature channels.
2	Gain	-	0.90 – 1.20	Gains of Channel. Applied to input frequency. For 8th channel (Room temp.) gain is not applied.
3	Offset	-	00 – 99	Offset to minimise error in temperature reading. Mid value of offset is 70. Mid value for 8th channel is 50.
4	Act (View Only)	°C	0000 – 1500	Actual temperatures of all 8 zones.
5	Freq (View Only)	Hz	00000 - 100000	Frequency input at controller.

F. List of Messages and Description:

Sr. no.	Message List	Description/Comment
Cycle start Interlocks		
1	Temp Zone open	If any Temperature Zone is Open while starting temperature profile then this message with Zone number is displayed.
2	Connect recuperation Damper Plug	Connect recuperation Damper Plug
3	Close all six combustion air valves	Close all six combustion air valves
4	Close Z2 to Z4 Gas valves	Close Z2 to Z4 Gas valves
5	open regulator valve	open regulator valve
6	turn on blower	turn on blower
7	close main damper bypass valve	close main damper bypass valve
8	Open main gas valve and check pressure 20kg/sq.cm	Open main gas valve and check pressure 20kg/sq.cm
9	Check recuperation Damper Open	Check recuperation Damper Open
10	Turn all sequence controller ON	Turn all sequence controller ON
11	Turn On Z1 Burner	Turn On Z1 Burner by pressing key 1 - ON in BURNER SQUENCE block on the HMI
12	Starting temperature profile	Heating temperature profile is starting now
Heating profile Messages		
13	Abort Profile cycle???	Confirmation about aborting cycle. Pressing Accept will abort the cycle, pressing abort will not abort the cycle and continued it from the current point
14	Turn ON Z3 Burner	Turn On Z3 Burner by pressing key 3 - ON in BURNER SQUENCE block on the HMI
15	Turn ON Z2 & Z4 Burner	Turn On Z2 & Z4 Burners by pressing key 2 & 4 - ON in BURNER SQUENCE block on the HMI
16	Turn ON Z5 & Z6 Burner	Turn On Z5 & Z6 Burners by pressing key 5 & 6 - ON in BURNER SQUENCE block on the HMI
17	Main Damper OFF	Turn the Main Damper Off
18	Half close recup damper	half close recuperation Damper
19	Auto recuperation damper ON	Auto recuperation Damper ON/OFF sequence pressing AUTO key in DAMPER block on the HMI
20	Check cone position	Check Cone position
21	Z1 UV absent	During heating cycle Z1 flame is missing or due to any other reason Z1 UV input is missing
22	Z2 UV absent	During heating cycle Z2 flame is missing or due to any other reason Z2 UV input is missing
23	Z3 UV absent	During heating cycle Z3 flame is missing or due to any other reason Z3 UV input is missing

24	Z4 UV absent	During heating cycle Z4 flame is missing or due to any other reason Z4 UV input is missing
25	Z5 UV absent	During heating cycle Z5 flame is missing or due to any other reason Z5 UV input is missing
26	Z6 UV absent	During heating cycle Z6 flame is missing or due to any other reason Z6 UV input is missing
27	Check colour variation on rings	Check colour variation on rings
28	Open recuperation damper, half open main damper	Open recuperation Damper and Half open Main Damper
29	Turn off recuperation damper	Turn off recuperation damper
30	heating complete	Heating is completed. All profile steps are over and actual temperature has reached final set temperature
31	turn off main gas valve	turn off main gas valve
32	turn off automising air valve	turn off automising air valve
33	turn off blower	turn off blower
34	wait cycle start	Waiting cycle start Input after pressing AUTO key
35	temp over alarm (Z5 Z6 alarm)	During heating profile actual temperature of Zone 5 or Zone 6 has reached its set value and so all burners are turned OFF. User has to manually turn them ON after Z5 or Z6 actual temperature reaches below then its set value.
36	Aborting cycle	To abort Heating Profile at any point, keep pressing Abort key for 5 seconds will ask for the confirmation to abort the cycle. Pressing accept will abort the heating cycle
37	cooling begin	Cooling begin
38	Start Previous Profile?	During heating cycle if power goes down then last point of heating cycle is saved. At power up if user wants to start cycle from the last point then this message is displayed.
39	Start new Profile?	If user does not want to start previous running cycle then pressing abort on above message this message will be displayed.
40	Start Previous Cooling?	During cooling if power goes down then cooling can be retrived at power ON. Pressing accept cooling begins where it was stopped.
41	Blower is Tripped	Blower trip input is sensed.
42	Temp. Zone 1 is Open. Burner is Turned OFF.	In Manual or Auto Mode if burner is ON and in any case thermocouple gets open then burner is turned OFF. Before turning burner On if Thermocouple is Open then also this message is displayed.
43	Temp. Zone 2 is Open. Burner is Turned OFF.	As above.
44	Temp. Zone 3 is Open. Burner is Turned OFF.	As above.

45	Temp. Zone 4 is Open. Burner is Turned OFF.	As above.
46	Temp. Zone 5 is Open. Burner is Turned OFF.	As above.
47	Temp. Zone 6 is Open. Burner is Turned OFF.	As above.
48	Cooling Zone 7 is Open	Cooling Zone thermocouple is not connected.
49	Zone 1 Temperature is too Low	If Zone 1 actual temperature goes below set temp. - alarm band then this message is displayed
50	Zone 1 Temperature is too High	If Zone 1 actual temperature goes below set temp.+ alarm band then this message is displayed
51	Zone 2 Temperature is too Low	If Zone 2 actual temperature goes below set temp. - alarm band then this message is displayed
52	Zone 2 Temperature is too High	If Zone 2 actual temperature goes below set temp.+ alarm band then this message is displayed
53	Zone 3 Temperature is too Low	If Zone 3 actual temperature goes below set temp. - alarm band then this message is displayed
54	Zone 3 Temperature is too High	If Zone 3 actual temperature goes below set temp.+ alarm band then this message is displayed
55	Zone 4 Temperature is too Low	If Zone 4 actual temperature goes below set temp. - alarm band then this message is displayed
56	Zone 5 Temperature is too High	If Zone 4 actual temperature goes below set temp.+ alarm band then this message is displayed
Cooling Profile Messages		
38	Open Main damper holes	Open Main damper holes
39	Open recup damper	Open Recuperation damper
40	Open Main damper	Open Main damper
41	Open all pip holes except front/back	Open all pip holes except front/back
42	Blower ON ,open holes front/back	Blower ON ,open holes front/back
43	Automising valve open, turn on main cooling bypass valve	Automising valve open,turn on main cooling bypass valve
44	Blower OFF and cooling complete	Blower OFF and cooling complete

G. Graph Monitoring

- In graph mode, the Graph of **Temperature** versus **Time** is displayed.
- X- axis of graph indicates the Time while Y- axis indicates the Temperature of six zones along with the Set temperature.
- Maximum 100 hours of temperature graph can be displayed.
- The Temperature ranges from 0 – 1300 °C.
- User can change the scale of graph from 1300°C to 500°C
- By default the scale of Temperature axis will be 1300°C. That means Y-axis of graph shows 0-1300°C temperature range at a time.
- When the scale of Y-axis is 500°C at that time the Y-axis has a total span of 500°C at a time.
- Tick mark & Label on Y-axis is shown at every 100 °C regardless of the scale.
- The user can select the scale of X-axis of graph from the available scales: 5, 10, 20, 30, 40, 50, 60, 70, 80, 90 & 100.
- The value of scale indicates the span of X-axis of graph in hours displayed at a time.
- By default the scale of X-axis will be 5.
- Tick mark & Label on X-axis is shown at every 1/6 of the total span of graph at a time regardless of the scale of X-axis.
- Label on X-axis indicates the real time clock.
- Auto scrolling option is also available. By default auto scrolling option is 'ON'. In Auto Scrolling the graph automatically shifts left by 1 hour when the value of temperature is plotted at the rightmost location on the screen.
- Following Keys are used to perform different operations in Graph mode:

F4: This key is used to start monitoring the graph. The same key is used again to stop monitoring the graph.

F5: This key is used to change the scale of temperature axis from 1300°C to 500°C & same key is used again to change the scale from 500°C to 1300°C.

Pg UP: This key is used to increment the page number of graph.

Pg Dn: This key is used to decrement the page number of graph.

INC: This key becomes active when the scale of Y-axis is 500°C. This key is used to navigate the 500°C temperature window throughout the 0-1300°C temperature range. On pressing this key the graph is shifted downward by 100°C.

DEC: This key becomes active when the scale of Y-axis is 500°C. This key is used to navigate the 500°C temperature window throughout the 0-1300°C temperature range. On pressing this key the graph is shifted upward by 100°C.

ENT: This key is used to start (ON) auto scrolling of graph. By default the auto scrolling of graph is 'ON'.

CLR: This key is used to stop (OFF) auto scrolling of graph.

Left Cursor: This key is used to manually scroll graph by 1 hour towards left.

Right Cursor: This key is used to manually scroll graph by 1 hour towards right.

Up Cursor: This key is used to increase the scale of X-axis. By default the scale of X-axis is 5.

Dn Cursor: This key is used to decrease the scale of X-axis.

H. Temperature Calibration

- In Program Mode configuration Page set calibration Mode 'Temp.'
- Exit Program Mode and go to temperature calibration page.
- Now cursor will be displayed on temperature calibration page.

Room Temperature Calibration

- For Channel 8 gain is not used.
- Incrementing or decrementing offset get actual value of room temperature.

Other Channels Calibration

- Use temperature calibrator for milli volt input. Give calibrator output to any of the temperature channel for the frequency input.
- On calibrator display set 1300 °C. According input frequency for respective channel can be seen on calibration page.
- Set gain value by which actual temperature reading reachs near to 1300 °C + room temperature (Channel 8). Do not set Offset at higher limit (1200 °C)
- Now on calibrator set temperature 50 °C.
- Set offset such that actual temperature reading show 50 °C + room temp (Ch 8 reading).
- Do not change gain at lower limit (50 °C).
- Now again set calibrator reading to 1300 °C and adjust gain so that actual temperature reading reaches nearer value. Then set 50 °C on calibrator and set offset to get exact temperature value.
- Follow this procedure and until gain or offset at 1300 °C or 50 °C does not need to change.
- Check whole temperature range (50 °C to 1300 °C). Calibration page actual temperature reading should be calibrator reading + room temp reading.
- Follow this procedure for all channels except channel 8 (Room temperature)