

HEMI HEATING 
SURFACE • HEATING • SYSTEMS

**INSTRUCTION MANUAL
FOR DTCOM**

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Thank you for purchasing Hemi Heating AB HTC equipment for controlling your temperature.

Read this instruction manual before using your HTC equipment to ensure proper operation and keep this instruction manual handy as a quick reference..

This equipment is compliant to applicable CE requirements.

1. Purpose of use

The HTC equipment is intended to control temperature at a certain object for professional purpose. The heating elements, sensor and other related components must comply with specification. No other use is allowed. Settings must be compliant to cable manufacturers recommendations.

1.1. Precaution

- 1) This equipment must be operated by trained personnel.
- 2) The HTC equipment must only be operated in the way it is designed for.
- 3) Never modify or disassemble the HTC equipment.
- 4) **Before use** - check equipment for visual and other damages! Never operate the heater jackets or the temperature controller and its cables if they have any visual damages.
- 5) Only connect the HTC equipment to a voltage according to the specified operating voltage stated on the **label of the heated jacket/objekt** and in the documents.
- 6) Incoming voltage must be equipped with a fuse. Recommended maximum fuse rating 16A.
- 7) The controller must be connected via a RCD type A (residual current device). Ensure that the RCD is properly connected to a grounded power outlet.
- 8) Make sure all cables between controller and the heater jackets are installed properly before operating.
- 9) Do not touch the heated part of the jacket when it is in operation.
- 10) When removing the heater jacket/tent after operation, handle carefully and do not touch heated parts.
- 11) Make sure that the power is off while mounting/dismounting the heater jackets.
- 12) The HTC equipment must be stored in dry conditions.
- 13) Make sure you have proper ventilation due to vaporization of hazardous substances.
- 14) Test electrical insulation regularly.
- 15) Do not set temperature that could trip the over temperature switch or thermostat of the heater fan.
- 16) Do not cover and keep all parts ventilated during operation.

If any of these precautions is not fulfilled or unclear please contact Hemi Heating AB.

2. Components

Hemi Heatings HTC5000 HTC5000PRO set equipment contains the following items:
 Controller, Power cord, Temperature sensor, Hirschmann connector, Manual



Fig 1. Overview of the components.

3. Controller rear end



3.1 Connectors input

3.1.1 Power Supply
 3.1.5

3.1.2 Power output

- Pin 1 Phase regulator power output
- Pin 2 Neutral
- Pin 3 Phase continuous power, (optional)
- GND

3.1.3 Type K socket, 3.1.4 HTC5500PRO) Phone RJ12 6/6 Mod bus

(HTC5500PRO)Alarm

How to record a process with Temperature Controllers

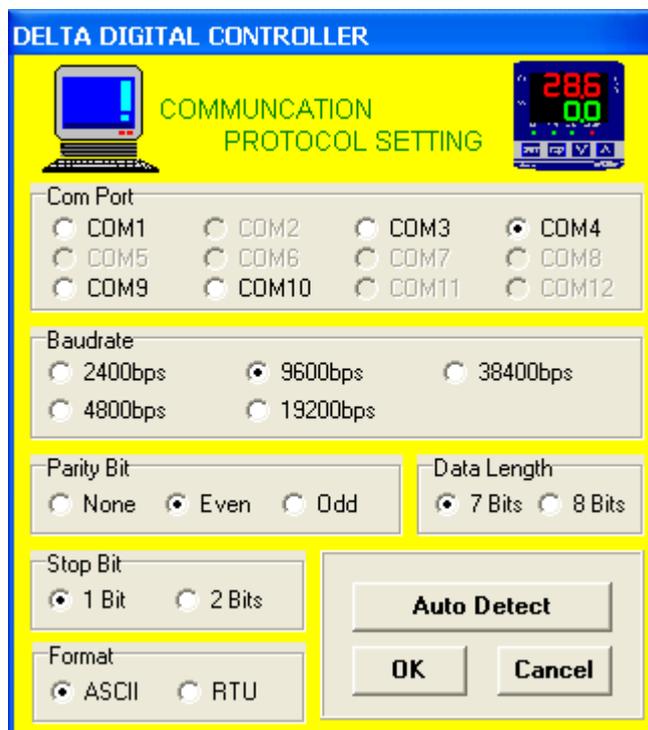
Part used in the example:

Hemi Heating AB • Tel: +46 8 554 232 50 • Fax: +46 8 554 232 55 • www.hemiheating.se • info@hemiheating.se

- PC with application DTCOM_E (v.1103)
- IFD6500 (converter USB to RS485).
- VFD-CMD04 to connect RS485 from PC to DTC. The Cable from IFD6500 is connected to RJ-contractor which is NOT named OUT1-4.
- Cable who connects VFD-CMD04 with DTC wires on Input-terminal on VFD-CMD04.
- One DTC1000

Recording of process:

- The program is optimized with screenresolution 1024*768. (It will work with other resolutions. But text and layout can be different och not fully visible.
- Start program DTCOM_E.exe (V1.007).
- Connect cable from PC to RS485-multidrop.
- Chose PROTOCOL – SET PC
- Following program box appears.

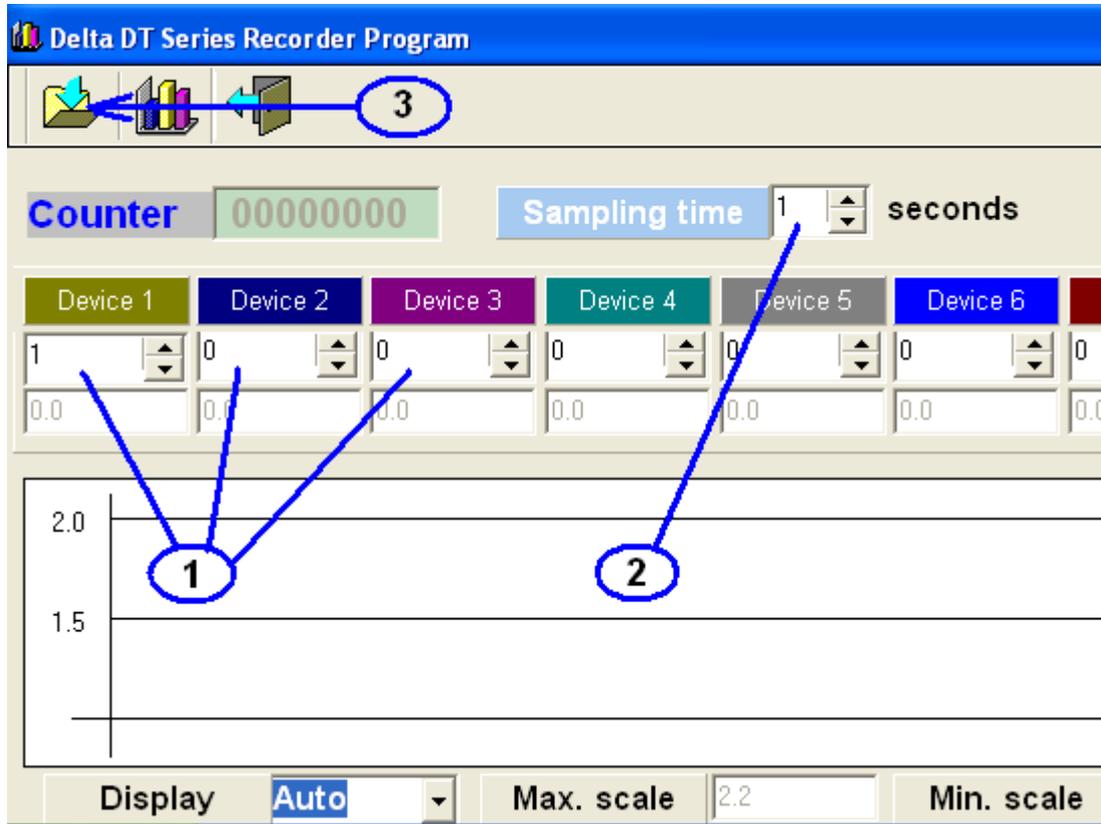


- Chose the correct com-port where your IFD6500 is defined in your PC. The other values is default-values. In this example is IFD6500 defined on COM4. Klick OK.

Klick Program-Recorder.



The next application window will appear:



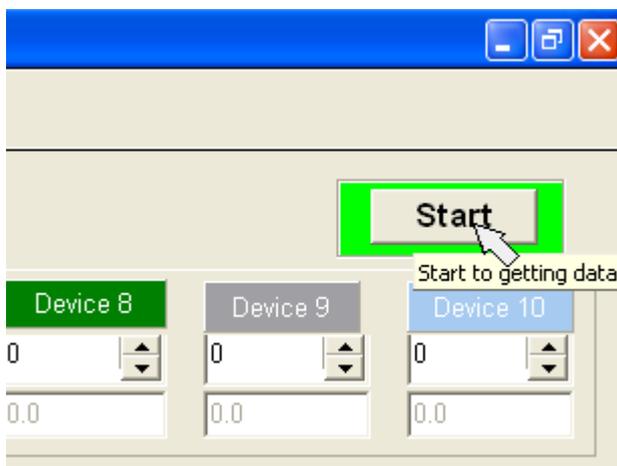
1. Here you pick which units you want to sample (device 1-10). Pick node number on each unit. This example we just use one unit with node number 1 (Device 1).
2. Pick time between samplings.
3. **IMPORTANT!** BEFORE you start process you want to record, you have to klick the box "Save recording data" and chose which file to store data in. If you do not, you cannot save data when completed.

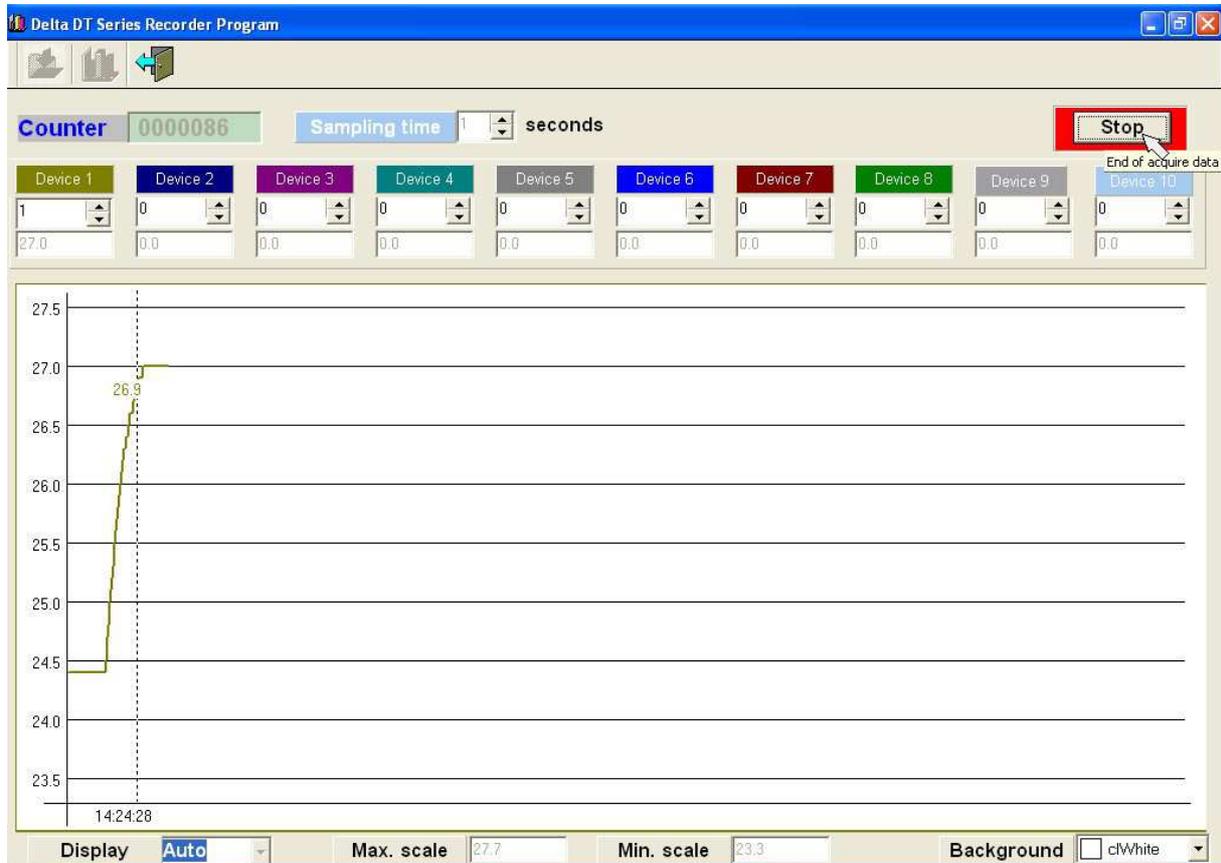
Pick destinationfile an klick “spara”.



The box becomes sunken (upper left corner).

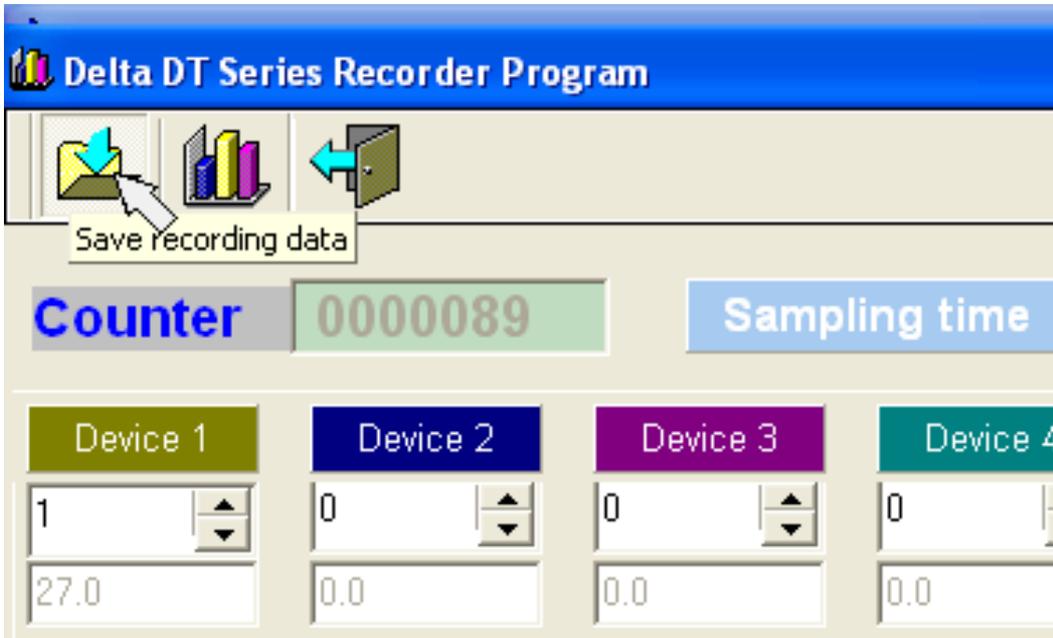
In the upper right corner you can start recording. When recording is in progress the color around the button changes to red and text in the button changes to Stop.



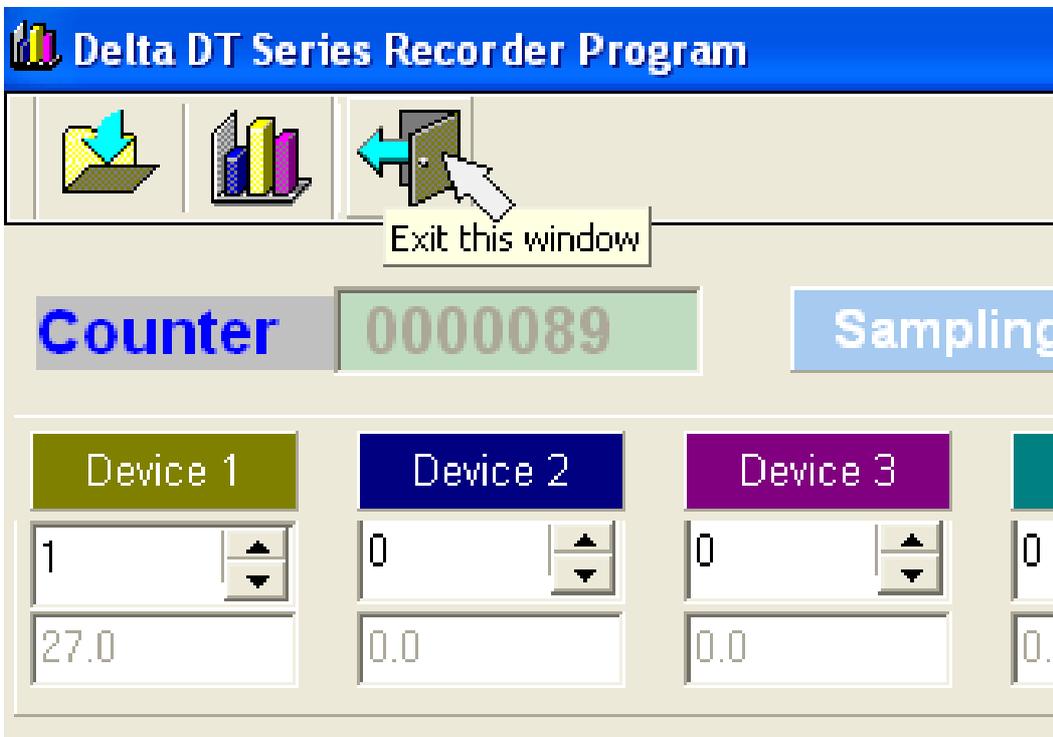


During recording curve/curves are plotted. When the process is finished you click on stop button.

Finish by press box "Save recording data"-box



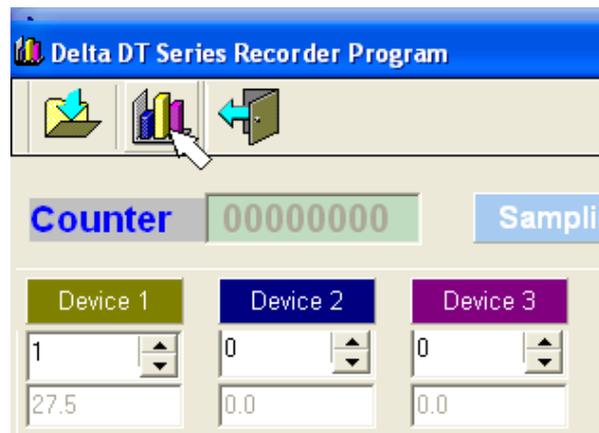
and then you finish Delta Recorder program by clicking Exit.



Show a recorded process:
To show the stored process:
Start DTCOM_E.exe



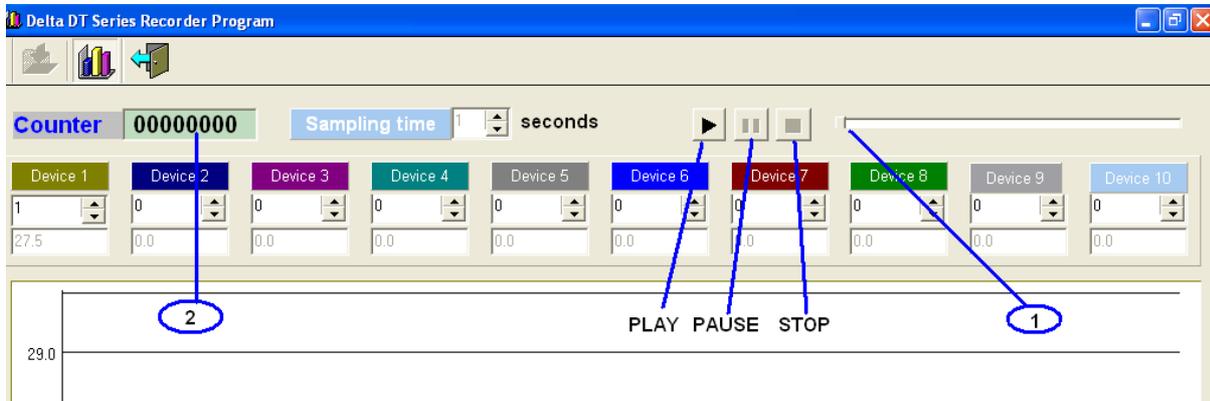
Klick on box Recorder program OR chose meny PROGRAM-RECORDER.



Klick on box with bars to open a recording-file.



Chose which file you want to study and klick "öppna". The box with the bars will now be sunken.



Here you can start viewing process by pressing buttons PLAY, PAUSE and STOP. If you pause, you can pull in list forward and backwards in process (1) or write a sample number (2) to check out different time's points.

To close application you have to first shut down Delta DT Series Recorder Program-window and then Delta controller communication program (DTCOM_E)

4. Control box

4.1. Display, LEDs & pushbuttons

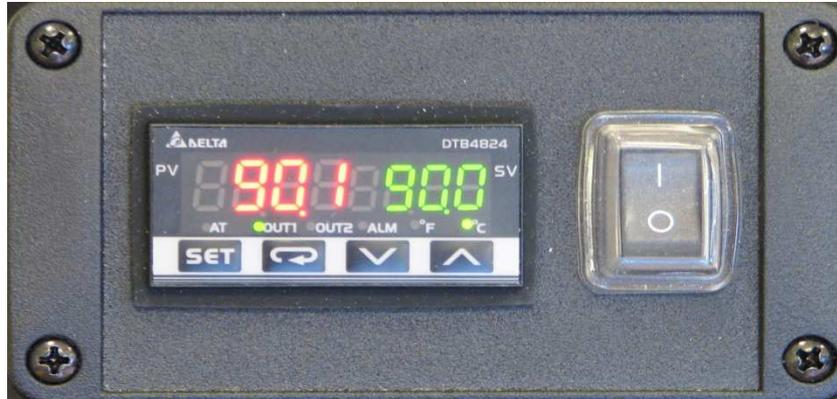


Fig 4. Temperature controller display.

Temperature controller has following display, LEDs and pushbuttons (as shown in the **Fig. 4**):

	PV Display	To display the present temperature value or parameter type.
	SV Display	To display the setpoint temperature, parameter operation read value, manipulated variable or set value of the parameter.
	AT	Auto-tuning LED, flashes when the Auto-tuning operation is ON.
	OUT1/OUT2	Output LED, lights when the output is ON.
	ALM	Alarm output LED, lights when installed alarm value is ON.
	°F, °C	Temperature unit LED. °F: Fahrenheit °C: Celsius.
	Function key	To select the desired function mode and confirm a setting value.
	Mode key	To set parameters within function mode.
	Down key	To decrease values displayed on the SV display. When holded down the decrements will speed up.
	Up key	To increase values displayed on the SV display. When holded down the incremental action will speed up.

4.2. Modes & default settings

There are three modes of operation: operation, regulation and initial setting. When power is applied, controller gets into the operation mode. If wanted press the **Function key** to switch to regulation mode. If the **Function key** is pressed for more than 3 seconds, controller will switch to the initial setting mode. Pressing the **Function key** while in the regulation mode or initial setting mode, forces the controller to return to the operation mode.

PV/SV (Changing the set point value): Sets the temperature set point and displays the temperature process value. Use **Up and Down keys** to choose the temperature set point. When wanted SV value is chosen (SV value blinking) confirm this by pressing the **Function key**.

Setting method: While in any function mode, press the **Mode key** to select the desired function and use the **Up and Down keys** to change settings. Press **Function key** to save the changes.



Fig 5. Menu structure of the controller.

The next charts show more information about default settings and internal functions with different modes (Noticeable is that controller includes four different control modes: ON/OFF, MANUAL, PID and PID PROG and menu structure varies depending which control mode is used):

4.2.1. Operation mode

DISPLAY		EXPLANATIONS
PV	SV	Status of the temperature controller
1234	0.0	Example of displayed temperature values. Use Up and Down keys to set the wanted temperature setpoint.
OR		
no	Cont	Message displayed when controller has not yet been connected to a sensor.
↻		Press the Mode key in main screen to enter the "operation mode".
r-5	run	RUN/STOP. This will inform if the heating is running or stopped. Value needs to be RUN in order to heat.
↻		
Pttrn		Start pattern setting (Only available if PID program control mode used = PID PROG). Please see B series Temperature Controller Instruction Sheet for more information about pattern and step editing.
↻		
SP	1	Set up the position of decimal point. 1 = value with decimal point; 2 = value without decimal point.
↻		

		Upper-limit alarm 1 (This parameter is shown only when ALA1 function is enabled).
		
		Lower-limit alarm 1 (This parameter is shown only when ALA1 function is enabled).
		
		lock function for settings
		
		Display and adjust output value of 1st output group (Display in PID control mode and manual RUN mode).
		
		Display and adjust output value of 2nd output group (Displays in dual loop PID control mode and manual RUN mode).
		
		In case of using an external CT (Current Transformer), the controller displays the current value being measured by CT, if the control output is ON.
		
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4.2.2. Regulation mode

DISPLAY		EXPLANATIONS
PV	SV	Status of the temperature controller
		Example of displayed temperature values. Use Up and Down keys to set the wanted temperature setpoint.
OR		
		Message displayed when controller has not yet been connected to a sensor.
		Press the Function key to enter regulation mode
		ON/OFF of auto-tuning (Set in PID control and RUN mode)

		
		The 0th PID parameter. There are 4 groups of PID parameters built in DTB. When the parameter is set as PID4, the system will automatically adopt the PID value of the current temperature closest to PID0 ~ 3. Please see B series Temperature Controller Instruction Sheet for more information about PID control parameters.
		
		The 0th SV
		
		The 0th default value for proportional control
		
		The 0th default value for integral control
		
		The 0th default value for derivative control
		
		The 0th default integral value
		
		Heating hysteresis setting (Set in ON/OFF control mode).
		
		Cooling hysteresis setting (Set in ON/OFF control mode).

		
		Heating/cooling control cycle setting.
		
		Control cycle setting of 2nd output group (Set in PID control and Dual Loop output control mode).
		
		P value of the 1st & 2nd output group during dual loop output control.
		
		Dead Band (Set in Dual Loop output control mode)
		
		Temperature inaccuracy adjustment value. Used for the calibration. Please see the part 8.1 Calibration from the Appendix.
		
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4.2.3. Initial setting mode

DISPLAY		EXPLANATIONS
PV	SV	Status of the temperature controller
		Example of displayed temperature values. Use Up and Down keys to set the wanted temperature setpoint.
OR		
		Message displayed when controller has not yet been connected to a sensor.
		Press the Function key for more than 3 seconds to enter initial setting mode
		Select the sensor connected. Default = PT = Pt100
		

TEMP	C	Temperature unit. Default = °C
↻		
TEMP-H	6000	Upper limit of temperature range.
↻		
TEMP-L	-999	Lower limit of temperature range.
↻		
CTRL	PID	The control modes include: ON/OFF, MANUAL, PID and PID PROG. Default = PID.
↻		
S-HC	HEAT	Select heating/cooling/heating 1 cooling 2/heating 2 cooling 1. Default = heating
↻		
ALM1	0	Set up Alarm mode 1. Default = alarm output disabled. Please see B series Temperature Controller Instruction Sheet for more information about alarm output editing.
↻		
SALA	OFF	Set up system alarm
↻		
CO5H	OFF	ON/OFF of communication write-in. Default = OFF
↻		
C-SL	ASCII	Select communication format
↻		
C-NO	1	Communication address

		
		Communication speed
		
		Data length (in bits)
		
		Parity bit
		
		Stop bit
		
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How to Return to Default Settings in DTB



Display		Explanations
PV	SV	Status of the temperature controller
		Temporary display when DTB is switched on: = firmware V1.50; = relay output for OUT1/OUT2
		Example displayed value
		Press for 3 times
		Key-locked function
		Select Lock 1
+		Press "up" and "down" key together for 1 second.

Display		Explanations
P	SV	Status of the temperature controller
		Press "down" key continuously until the value reaches 1357 (<u>please DO NOT modify this value; otherwise system confusion may occur</u>).
+		Press the two keys together once to return to main screen.
		Main screen
Switch off DTB and re-		
		Return to default value. The default sensor is PT100, which will be displayed when DTB is not connected to a sensor or thermocouple.

5. Program examples

Autotuning PID parameters

The CSR control box has factory calibration which will in most cases be a slow adapting temperature curve. A way to get better performance you have to run an AUTOTUNING at the object you intend to heat. Set temperature 60 to 70°C and press the button SET at the front of the controller. Press arrow up then press set to start AT. A green diode flashes continuously during the process.

Ramp – Soak, How to make a pattern

Start HTC Controller

Push SET in 3 sec.

Press 4 times at Set **Ctrl** till Pro6, press SET

Press 1 time at Set **PRt n** to 0, press SET (If you make a program with 1 set point)

Press 1 time at Set the temperature to the chosen value at **SP00**, press SET

Press 1 time at Set the duration time at **t000**, press SET

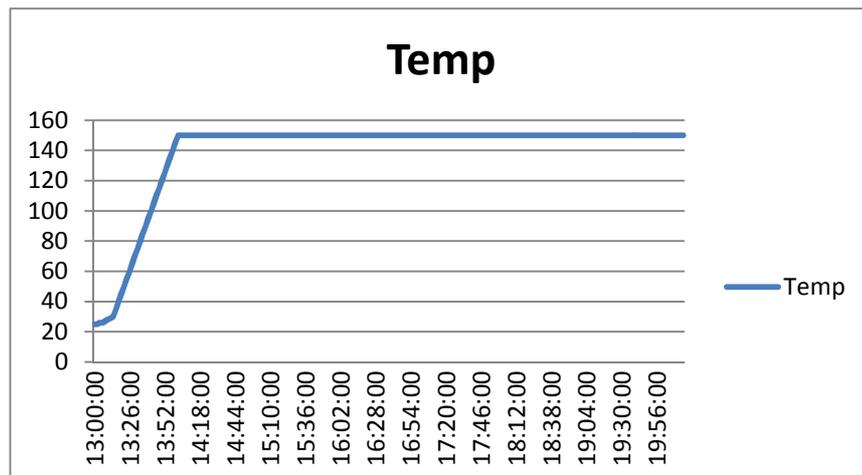
The maximum duration time is 15h 59 min if you need more you have to use another step.

Press button to **PSY0** Sets where the pattern will stop

Press 1 time at Set **CYC0** set to 0, press Set (Set the amounts of cycles the program will execute)
Set **Lt n0** to OFF

Exemple; Pattern will heat to 150°C in 7 h. Starts up with a set value at 30°C 15 min, then keeps the temperature at 150°C duration 7h.

Ctrl Pro6
PRt n 2
SP00 30
t000 00.15
SP01 150
t001 07.00
PSY0 2
CYC0 0
Lt n0 OFF



6. Maintenance

- Test electrical parameters regularly in compliance with local regulations.
- **Before use** - check equipment for visual and other damages! Never operate temperature controller and its cables if they have any visual damages.
- The HTC panel must not be exposed to any sharp edges.
- Please use a soft, damp cloth to clean the HTC equipment.
- The HTC must be kept dry and away from dripping water.
- If equipment is faulty or damaged send the whole set to Hemi Heating AB for examination.
- Do not open or try to repair.

7. Technical data

Operating voltage of: 100-240 VAC, 50/60Hz.

Max power output: 8 A continuously at max 40°C ambient temperature. Max peak duration 10minutes +30%.

Maximum setpoint: example -200-1300°C for type K element or comply with sensor specification

IP rating: IP20

Sensor type: Thermocouple type K

Ambient temperature: -20°C ~ +40°C

Control mode: PID, ON/OFF, Manual or PID program control (Ramp/Soak control)

Altitude: 2000 meters above sea level or less.

Size of casing: H=51mm x W=125mm x D=160mm

Max power output: 8 Amp continuously. (10Amp if on-time is 80% of total cycletime) at max 25°C ambient temperature

Display resolution: 0 or 1 digit to the right of the decimal point

Display: Dual 7-segment digital LED (4 digit)

Probe input: thermocouple type K

Alarms: 3 groups alarms output

Control modes: On-Off, PID, Manual, PID programmable (ramp/soak control)

8. Available HTC items

Hemi Heating has the HTC items for the following purposes:

ITEM	Part.nr	Art.nr	Description
1		RCD-16A	Residual Current Device, 30mA, mounted on power feeder cable, L= 1,5m
2		EAC-M8	External Alarm Cable incl. connector, M8, 1m cable.
3		IFD-6500	USB/RS485 Communication interface, including 3m comm. Cable RJ12
4		MKE-HUB	Splitter box 1:2, needed for connecting the HTC in a network.
5		DTCOM	Log software
6		SPC-30	Splitter cable 30cm to MKE-HUB, to be used to connect several MKE-HUB together in a network. Daisy chain cable feeder
7		DCCF-1	Cable set with one extension connector
8		DCCF-2	Cable set with two extension connectors
9		DCCF-3	Cable set with three extension connectors
10		DCCF-4	Cable set with four extension connectors

9. Calibration a

In this part is described how to check the temperature controller and the type K sensor calibration easily and conveniently on the field.

Type K sensor calibration. First make sure that there is no heating power to the jacket. Therefore jacket is not subjected to heating and only an ambient temperature is measured. The type K sensor is mounted inside the heating jacket. The location is marked with the rectangular symbol on the inner and outer fabric. Double-fold the heater jacket and place a reference sensor/thermometer at this marked area. In this way both measuring points will be situated close to each other and are also thermally insulated. In this mode is possible to compare their values provided that the ambient temperature is constant without any air flow and enough time is given to the measured temperature to stabilize.

Calibration: Actual set point SV can be changed using **Temperature inaccuracy adjustment value** EPoF situated under Regulation mode (see the page 11 for more information). Example if the controller shows 1°C too high from the set point value can be temperature inaccuracy adjustment value be changed to -1.0.

10. Revision history

Revision	Date	Information
1.0	2015-03-19	The new instruction manual for the HTC5000 HTC5000PRO equipment is released.