



TLC-900 Liquid Chiller/Heater Product Manual



tecca

The logo for Teca, featuring the word "teca" in a bold, lowercase, sans-serif font. A vertical line is positioned to the left of the text, and a decorative four-pointed starburst graphic is located at the bottom left corner of the logo area.

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TLC-900

Liquid Chiller/Heater



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What's in the Box ???

TLC-900 Liquid
Chiller/Heater



90 degree elbow
Quick Connects
3/8 Barb

Power Cord



TLC-900 Product Manual and EasyLog Product Manual in print and CD, TECA EasyLog software, DotNet Framework, iTools Engineering Studio, iTools driver, Sample ramp/soak programs, TECA TC-4300 Operations Manual, TLC-900 Literature

Software
and
Manuals

12 feet of 3/8" ID Tubing
and 12 feet of Insulation
and two hose clamps



Remote RTD Connector

Safety Features and Standards

- Automatic recovery to set point after regain of power
- Program resume after regain of power
- No Fluid Flow system shut down with manual reset
- Programmable over-temperature limits
- Hardwired safety overheat limits will shut down everything and trip an alarm. System automatically recovers after cool down.
- Hardwired liquid level indication
- Hard wired liquid flow indication
- System shut down upon sensor break, over and under range
- NRTL evaluated (ETL) to UL (Pending)
- NRTL evaluated (ETL) to CSA (Pending)
- CE (Pending)

Warnings

- Read and understand the manuals included with the product.
- This product should be serviced by a qualified technician.
- Caution: Risk of electrical shock. Always disconnect the power when performing any servicing.
- Use distilled water or a mix of 25% Ethylene Glycol and 75% distilled water to cool below 0C.
- NEVER introduce flammable or explosive materials.
- Read and understand the MSDS for any coolant used
- The unit has an un-vented cap. You may locate the unit above or below your load if the cap is tight.
- Always empty all fluids from the unit prior to shipping.
- Use the external sensor feature with caution. There may be a significant time delay between the fluid temperature and the sensor temperature causing potentially dangerous overheat or freezing conditions.
- Do not fill the unit with de-ionized water, flammable fluids, corrosive fluids, hazardous fluids, explosive fluids or similar fluids.

How do I use it? NOW!

Step 1: Fill the reservoir with distilled water (NOT de-ionized) or just clean tap water. Use a 75% water 25% ethylene glycol if cooling close to freezing.



DO



Step 2: Locate the unit on a flat level surface like the floor or a bench. Make sure you have some room around it for good airflow.

DON'T



Step 3: Attach both fittings to one hose and then to the TLC-900, forming a closed loop.



Step 4: Plug the cord in the back of the unit, the other end in the wall outlet and turn the unit on. The temperature controller will turn on, the fan will start to spin and the pump will energize, prime and begin to move fluid.



It works, on to step 6



Uh oh! A red light!



Step 5: The pump hasn't primed. Press the up and down arrow keys together to restart the pump. Repeat as needed up to 3 times.

Step 6: Now what? Now to attach what you're cooling

Splice your load into the existing tubing.

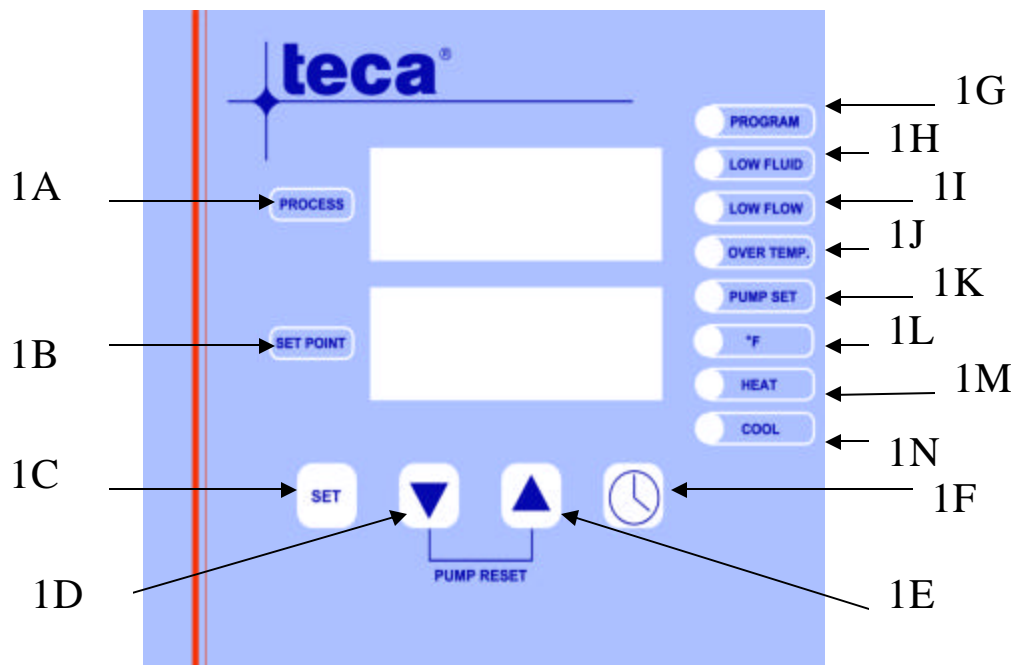


Or attach your load and options your own way.



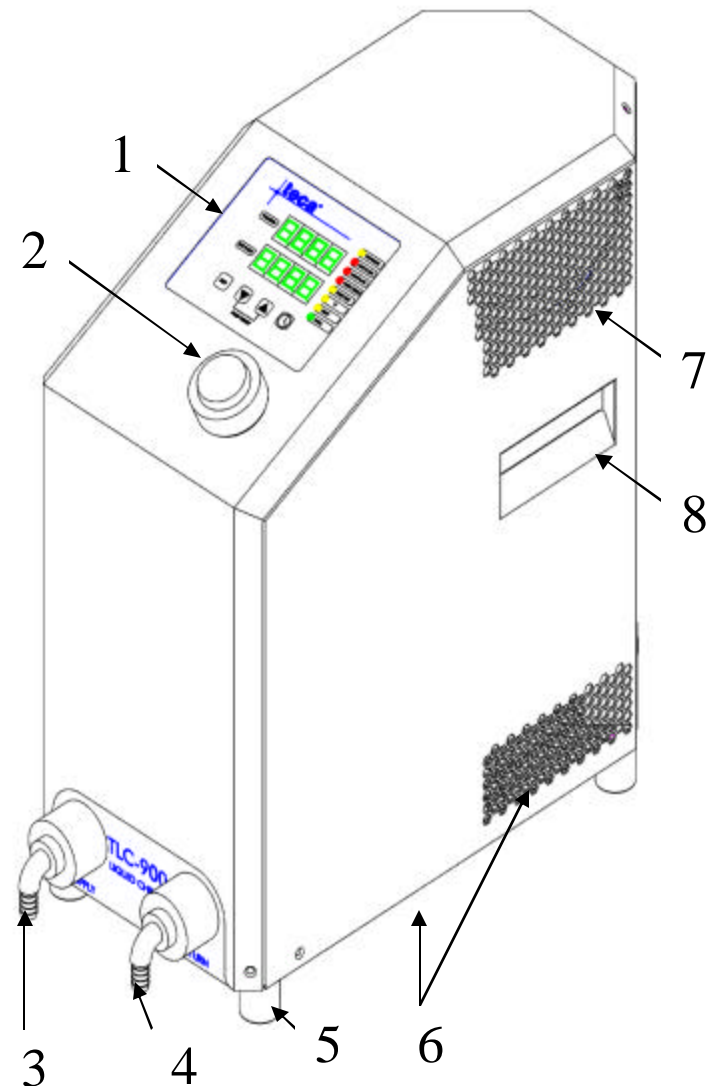
Adjust the set point using the arrow keys.

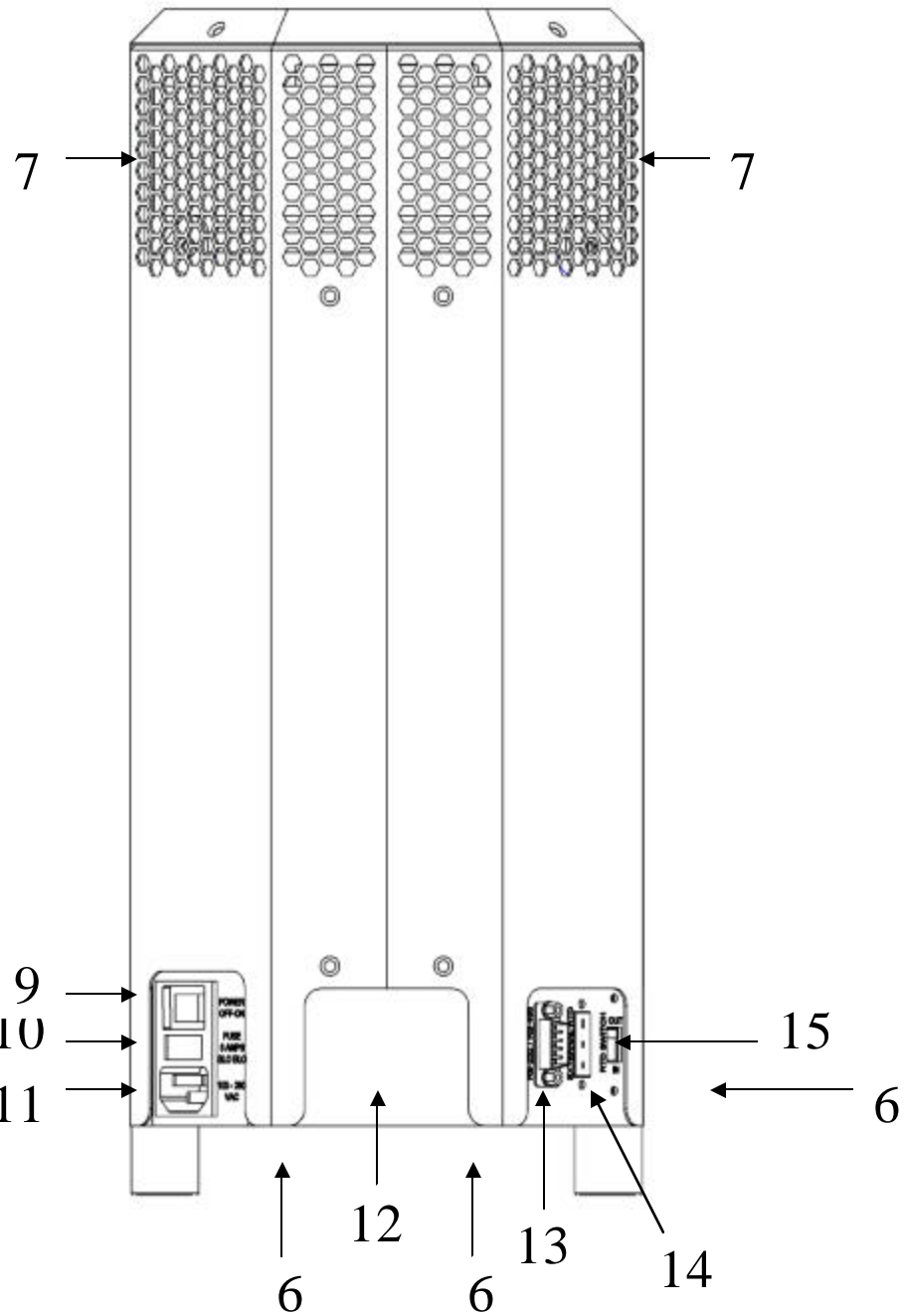




- 1A Process (or fluid) Temperature
- 1B Set Point Temperature
- 1C “Set” - Used in Programming
- 1D “Down Arrow” - Adjust parameter (Temperature) down
- 1E “Up Arrow” - Adjust parameter (Temperature) up
- 1F “Clock Symbol” – Used for programming and initiating program
- 1G This yellow light is ON when running a program
- 1H This red light flashes when there is a low fluid level condition
- 1I This red light flashes when there is a low flow condition
- 1J This red light will be ON during an overheat condition and flash after recovery until manually reset.
- 1K This light is ON when the pump is running. This light is OFF if the no flow condition has not been corrected or the system has not primed indicating a need to reset by pressing both arrow buttons.
- 1L This light is ON when the controller is displaying degrees F.
- 1M This light is ON when heating
- 1N This light is ON when cooling.

Front Layout





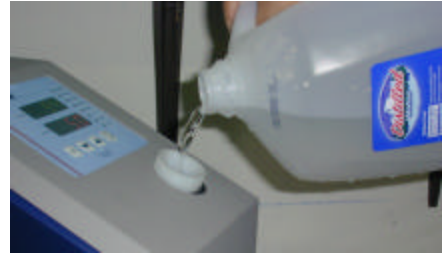
- 1 Temperature Control Front Panel
- 2 Liquid Reservoir Fill Cap
- 3 Fluid Supply (OUT)
- 4 Fluid Return (IN)
- 5 Feet
- 6 Air Intake
- 7 Air Exhaust
- 8 Recessed Handle
- 9 On-Off Switch
- 10 Fuse (5 x 20 mm, slow blow, 5 amp)
- 11 AC Input
- 12 Nameplate
- 13 RS-232 port
- 14 External RTD sensor connector
- 15 Internal/external RTD switch

Filling the reservoir

Fill it with distilled water or tap water (watch out for hard water deposits) or a mix of water (down to 75%) and ethylene glycol (up to 25 %)

Don't fill it with de-ionized water, flammable fluids, corrosive fluids, hazardous fluids, or similar fluids.

How?
Pour it in.



Priming Instructions

Step 1: Usually the system will self prime, establish flow and bleed excess air back into the reservoir without intervention. During this process the low flow light may flash on and off. Long tubes and high pressure drops can inhibit self priming.

Step 2: If there is insufficient (less than .05 GPM or .2 LPM) or no flow for 30 seconds all functions are disabled and only the low flow light and temperature display remain on. The priming sequence can be reinitiated by pressing the up and down arrow keys simultaneously. Repeat this step 3 to 5 times if needed. If the flow can not be established proceed to step 3.

Step 3: If flow can not be established on the entire system, time replace the system tubing with a short loop and repeat step 2 to establish the flow. Then reintroduce the system tubing and load and repeat step 2. If there is still no flow go to step 4.

Step 4: If flow can't be established with a small loop then there is something wrong. Check the reservoir capacity and quick connects. No luck? In the USA Call 773-342-4900. If it works with a small loop but not your system let's look there. Could the needed pump head (capacity) be there? Is there gunk in the lines somewhere? Should there be a filter? Is the filter clogged? Are all the lines connected? Is there a kink somewhere? Did it work for awhile and then stop? Repeat step 3.

Priming Instructions for pump options #3 and #4

For pump options #3 and 4 follow steps one through four above. These pumps have flows so fast the air streams past the bleed block and remains entrained in the flow. Slow the flow down using a valve or by pinching the hose. Observe the bubbles in the flow. This isn't as easy as it sounds so take your time. When the bubbles disappear the pump should be fully primed. As an alternative connect the provided connector and let the liquid return to another vessel while continuing to fill the units reservoir. Un-restrict the flow. Observe the flow for some time. Repeat as needed.

Adjusting the Set Point Temperature

The Set Point is adjusted by pressing the up or down arrow keys.

Initiating the Auto Tune function

The Auto Tune function adjusts specific control parameters to provide good control at the specific set point based upon the reaction of the system to the cooling device. These parameters will be different for different systems and for different circumstances within the same system. These circumstances include changing set point and load.

To set the Auto Tune press the “set” button then use the arrow keys to set the process to “on”. The set point should say “OPt”. Press the “set” button again. Wait for the display to clear, about 5-10 seconds, and the temperatures to return in the display. The “process” display will alternately flash “OPt” and a temperature until the tuning process is complete.



Changing temperature indication from C to F

Change the P1 parameter in the configuration level, CnF from 7 to 15

Over Temperature Safety

When an over temperature condition occurs the following will happen:

- The OVER TEMP light will be on.
- System heating and cooling will be disabled
- The pump reset function will be disabled
- If a program is running it will be placed in the “hold” mode

When the condition has cleared normal operation will resume. Heating and cooling will be enabled. It will be possible to reset the pump. The OVER TEMP light will flash until the over temperature condition has been acknowledged using the L.rS parameter in the Basic Mode.

Using the external RTD sensor

Caution!! Use the external sensor feature with caution. There may be a large time delay between the fluid and the sensor temperatures causing overheating (boiling) and under-cooling (freezing) conditions. Fully evaluate the system conditions prior to and during the use of this feature. The RTD is a three wire, 100 ohm, single element, Class A.

Identify where and how you wish to use the external sensor. Take special consideration and thought with respect to system safety. An example of a sensor without insulation is shown to the right.



Connect the sensor to the back of the chiller, change the position of the selector switch to “external sensor”, turn the unit on and verify the function and safety.

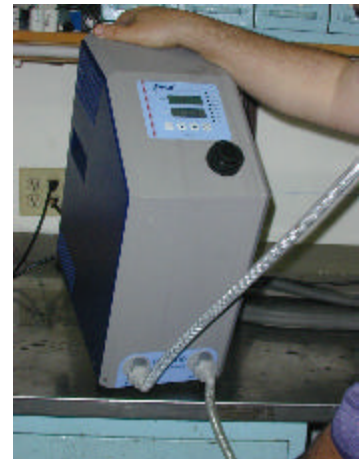
A faulty or disconnected RTD is signaled on the display as % % % %

Adaptive Fan Control

Adaptive Fan Control is a special feature designed to improve overall temperature control and user comfort while maintaining maximum performance when needed. The most evident characteristic is the reduced fan noise as the system approaches set point. The fan speed is directly related to the amount of cooling required. This feature has been factory preset. Changes, while not recommended, can be made within the “Set-Up Operator” mode described later in this manual. Detailed information is found in the TC-4300 Operators Manual.

Draining the system

To drain the system put a quick connect with hose onto the return. Put the end of the hose into a vessel to collect the fluid. Loosen the cap. Tilt the unit forward to about 30 degrees. To completely empty the system put another connector and clean hose in the supply. Apply a slight pressure into the end of the hose to force the remaining fluid out.



Guaranteed Soak and Ramp Tracking Limits

For the Guaranteed Soak Limit function enter the configuration level, CnF and change the P46 parameter to anywhere from 0.1 to 100.0 degrees C or F. Example: SP=70, P46=2.5, the program waits when $PV > 72.5$ or $PV < 67.5$. Setting to OFF disables this function.

Parameters P44 and P45 respectively set the Low and High Tracking limits. Setting to OFF disables these functions.

Controller Modes

Warning: There are many parameters which can be changed in each mode. Those used in normal day to day operation have been described in previous sections. Do not make changes to any parameters unless it is covered in this manual. Other changes may alter the function of the system in an inappropriate and/or unsafe manner.

Mode	Code	Description
Basic Operator	OP.b	From this level an operator can change setpoint, force an auto tuning process, start a predefined program, and reset the pump.
Program Editing	OP.P	In this level individual program segments are defined, as well as the number of program cycles.
Set Up Operator	OP.S	From this level an operator can set PID parameters, set point limits, and other key operational parameters. Use with caution.
Configuration	CnF	This is the level for factory configuration.
Input Calibration	I.CL	This is the level for access calibration parameters.

* To switch controller modes, press the ⌚ and **SET** pushbuttons for more than 3 s. The display will soon show OPr and the current operational mode. Press the ▲ or ▼ pushbutton to select the new level.

*To confirm the selection press the **SET** pushbutton.

*OP.S (1), OP.P(415), and CnF each have their own pass code for level access. If the selection is other than OP.b The display will show display PASS and ---- . Press the ▲ or ▼ pushbutton to set the proper password.

Passwords: OP.S – 1 OP.P – 2 A.CL, CnF, I.CL – 415

Press **SET** to confirm.


*To inspect or modify parameters press **SET** key. To modify a selection use the ▲ or ▼ buttons. Press **SET** again to store the new value and to advance to the next parameter.

*Push ⌚ to scroll backwards through parameters without storing them.

*If no button is pushed for 10 seconds the normal display will appear without modifying the last parameter

Basic Operator Mode (Normal, day to day operation)



To change the setpoint:

- Press ▼ or ▲ pushbutton for more than 1.5 s to begin modifying the setpoint.
- Continue until the desired setpoint has been reached.
- The new setpoint will be loaded automatically after a 2 second delay.
- By pressing  or **SET** it is possible to abort the modification..

To begin control optimization:

- Change the setpoint to the desired temperature
- Press **SET** to view and scroll thru the parameters in the lower display until you find Opt.
- Press ▼ or ▲ to change the Off in the top screen to On
- Press **SET** again to store the new value.
- The display will return to normal in 5 to 10 seconds.
- During the optimization process the upper display will alternate between the actual process temperature and Opt.
- The display will return to normal when the control optimization process is complete.

To begin the Ramp/Soak Program:

- Press **SET** to view and scroll thru the parameters in the lower display until you find nPRg. Select the program you wish to run and press **SET**
- Press the  button on the front panel for 2 – 3 seconds to start the ramp soak program
- Press the  button on the front panel for 2 – 3 seconds to stop the ramp soak program

Programming Mode

The Basics:

- There are 32 segments available in 4 programs of 8 segments, 2 programs of 16 segments, 1 program of 32 segments
- Set Points - What temperature do you want to get to? Initial set points are required for every program. Target set points are required for every segment.
- Actions are required for each segment
- Ramp Rates - How fast would you like to get there?
- Dwell Times – How long do you want to stay there?
- Programming can be done from the front panel or software

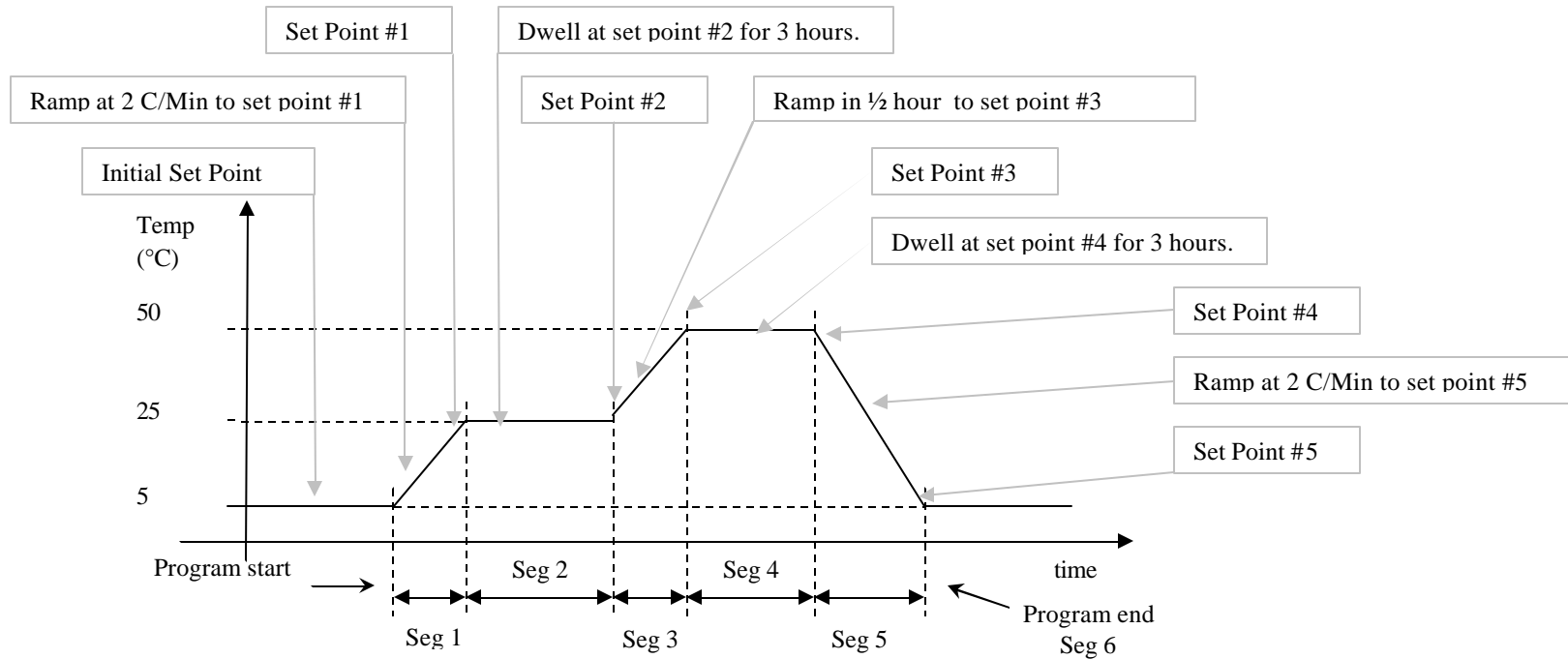
The Software:

- TECA EasyLog is a software package which helps you to build ramp soak programs, set temperatures, tune to set point, view & record data.
- iTools Engineering Studio from Eurotherm is a much more complex software for making many more changes to the temperature controller than just the ramp/soak programs. Only the experienced should work with this. Usually there is no need to do so. Changing the wrong parameter can cause system failure which is not covered under the warranty. Use with caution.
- Eurotherm iTools OPC Server optional, not included (for connection to Labview, etc)

The Manual Method:

- The specific definitions for each segment parameter are shown in the following pages.
- Each segment is identified by a number.
- To select a program to edit, modify the nPrg parameter in the basic mode.
- Then access the “Program edit operative mode” to address each parameter of each segment in order.

Example Profile



Segment			Target Set Point		Temperature	Action				Elapsed
Symbol	Description	Value	Symbol	Description	('C)	Symbol	Description	Value	Units	Time
			itSp	Initial Set Point	5		dwell			
Seg	Segment #	1	Sp. 1	Set Point 1	25	rr. 1	Ramp at a defined rate	2	C/min	0.5
Seg	Segment #	2	Sp. 2	Set Point 2	25	rH. 2	Dwell for defined time	3	Hours: minutes	3
Seg	Segment #	3	Sp. 3	Set Point 3	50	TH. 3	Ramp in defined time	0.5	hours	0.5
Seg	Segment #	4	Sp. 4	Set Point 4	50	TH. 4	Dwell for defined time	3	Hours: minutes	3
Seg	Segment #	5	Sp. 5	Set Point 5	5	rr. 5	Ramp at a defined rate	2	C/min	1.4
Seg	Segment #	6	Sp. 6	Set Point 6	END					

Symbols and Definitions				
Parameter	Meaning	Range	Available	Alterable
nPrg	number of the selected program	from 1 to 4	always available	only when the programmer state is idle
Seg	number of the segment in execution	from 1 to 8	only when the programmer state is run or hold	never
rt.	remaining time to the end of the program This value refers to the time remaining to the end of the current execution, regardless the programmed number of executions	- from 1 second to 99 min 59 sec the upper display shows 12.30 (12 min 30 sec) the lower display shows rt.S - from 1 h 40 min to 99 h 59 min the upper display shows 18.45 (18 h 45 min) the lower display shows rt.H - from 100 to 9999 hours the upper display shows 125 (125 h) the lower display shows rt.H - over 9999 hours the upper display shows %%%% the lower display shows rt.H	only when the programmer state is run or hold	never
r.rpt	remaining repetitions before the end of the program	- from 0 to 9999 and then inF The figure shows the remaining repetitions after the current execution. For example 0 means that the program stops at the end of the current execution, while inF means that the device is set for endless repetitions.	only when the programmer state is run or hold and the "Program execution repetitions" parameter is different from 0	Never
rpt	time remaining to the end of the program, considering also the remaining repetitions	- from 1 second to 99 min 59 sec: the upper display shows 12.30 (12 min 30 sec) the lower display shows rpt.S - from 1 h 40 min to 99 h 59 min the upper display shows 18.45 (18 h 45 min) the lower display shows rpt.H - from 100 to 9999 hours the upper display shows 125 (125 h) the lower display shows rpt.H - over 9999 hours the upper display shows %%%% the lower display shows rpt.H	only when the programmer state is run or hold and the "Program execution repetitions" parameter is different from 0	Never
itSp	setpoint is the setpoint used by the programmer during the "idle" state.	OFF, and then from rL (setpoint low limit) to rH (setpoint high limit) If set to OFF control outputs will be disabled during the "idle" state. At a program start, the setpoint will be aligned to measure value and then ramp to SP. 1.	always	only when the programmer state is idle
Sp.1	target setpoint of the first segment. This parameter is used also to select the segment type: - setting it equal to the previous setpoint creates a dwell segment	from rL (setpoint low limit) to rH (setpoint high limit)	always	only when the programmer state is idle
t. 1 or rr. 1	duration or ramp rate of the first segment	from 1 sec to 99 min 59 sec (the lower display shows t.s. 1) from 1 min to 99 h 59 min (the lower display shows t.H 1) from 0.1 to 3000 engineering units (°C or °F) per minute (the lower display shows rr. 1) Use the up or down arrow button to select the desired value within the current range. To change the range, travel to the high or low limit, release and press again the up or down key. The lower display will change to point out the next or previous available range.	always	only when the programmer state is idle
Sp.2	target set point of the second segment. This parameter is also used to select the segment type: - setting it equal to the previous setpoint creates a dwell segment - setting it different from the previous setpoint creates a ramp segment	End, and then from rL (set point low limit) to rH (set point high limit) The End value, selectable from the second to the seventh set point, is used to end the program before the last segment.	always	only when the programmer state is idle
rpt	number of program repetitions of the selected program	- from 0 to 9999 and then inF The figure expresses the repetitions after the first execution. Example: If 2 is selected, the program will be executed 3 times, while inF means that the device is set for endless reps.	always	only when the programmer state is idle

Then t. 2 (or rr. 2), Sp. 3, t. 3 (or rr. 3), ... , Sp. 8, t. 8 (or rr. 8) as above.

TLC-900 Pump Options

Option #1

- Can Pump
- Standard Magnetic Drive
- 0 to 50 °C process temperature
- 25,000 Hours Life Expectancy

Option #2

- Impeller Pump
- Low Temperature Magnetic Drive
- -20 to 90 °C process temperature
- 20,000 Hours Life Expectancy

Option #3

- Gear pump
- 3.75 Liter/Min
- -20 to 90 °C process temperature
- XXXXXX Construction
- 50 Micron filtration needed
- 20,000 Hours Life Expectancy

Option #4

- Can Pump
- High Flow Magnetic Drive
- 0 to 50 °C process temperature
- 35,000 Hours Life Expectancy

TLC-900 Accessories

Filter:

- X, Part # TBD
- X, Part # TBD
- X, Part # TBD

Heat Exchanger, Water to Air:

- X, Part # TBD
- X, Part # TBD

Heat Exchanger, Water to Plate:

- 6" Cold Plate, Aluminum, Part # TBD
- 12" Cold Plate, Aluminum, Part # TBD

Input Quick Connects:

- Colder Products PLCD Series (female) , Part # TBD

Input Adapters – NPT:

- 1/4 FNPT, Part # TBD
- 3/8 FNPT, Part # TBD
- 3/8 MNPT, Part # TBD
- 1/2 MNPT, Part # TBD

Input Adapters – Barb Fitting:

- 3/16 Dia. Barb, Part # TBD
- 1/4 Dia. Barb, Part # TBD
- 3/8 Dia. Barb. Part # TBD

