

VTC Quick Setup Guide

1. QUICK SETUP

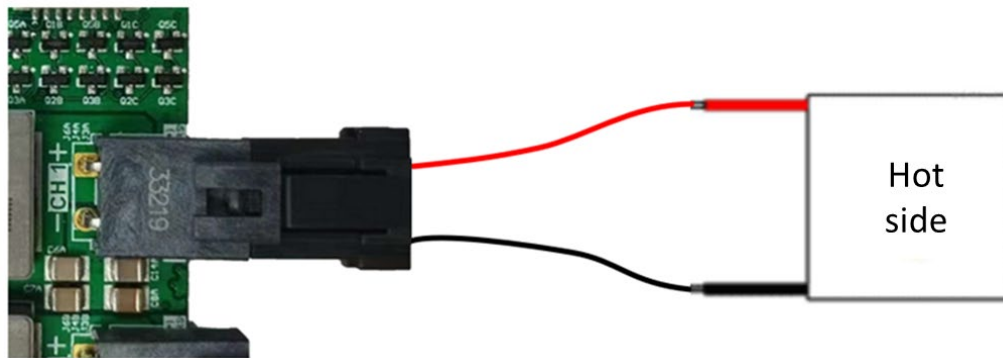
Step 1: Connect all temperature sensors.

Step 2: Configure all temperature sensors to the correct type and ensure all sensors report valid data.

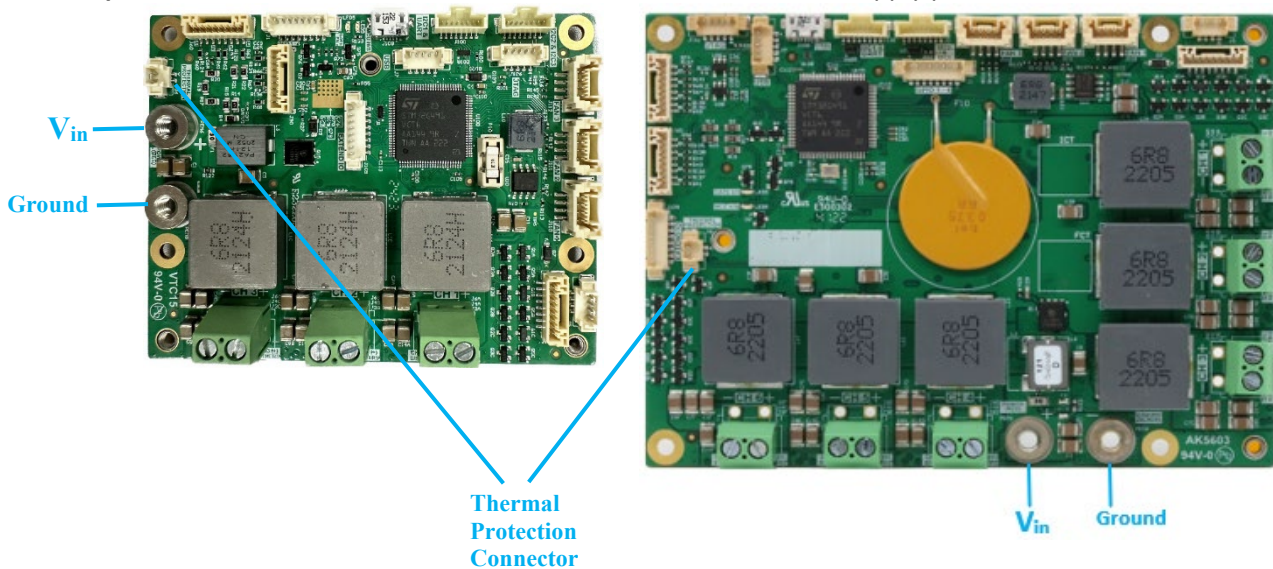
Step 3: Connect all TECs/peltiers. Red wire to "+", black wire to "-".

Step 4: Attach the TEC/peltier "Hot" side to the heat sink. How to detect the "Hot" side:

- Apply +1V to the TEC/peltier for a short period. The side that feels warm is the "Hot" side.
- Alternatively, place the TEC/peltier on a desk like the picture below. The top side is the "Hot" side.

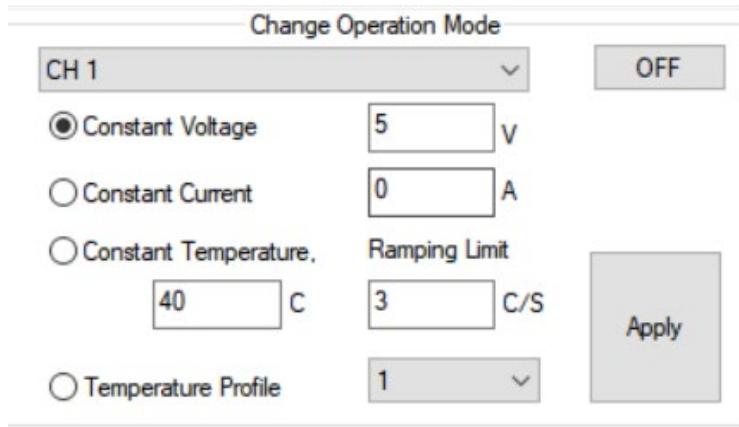


Step 5: Connect thermal fuse or short thermal fuse connector and apply power to the TEC Controller.



Step 6: Quick check on sensor and TEC/peltier pairing

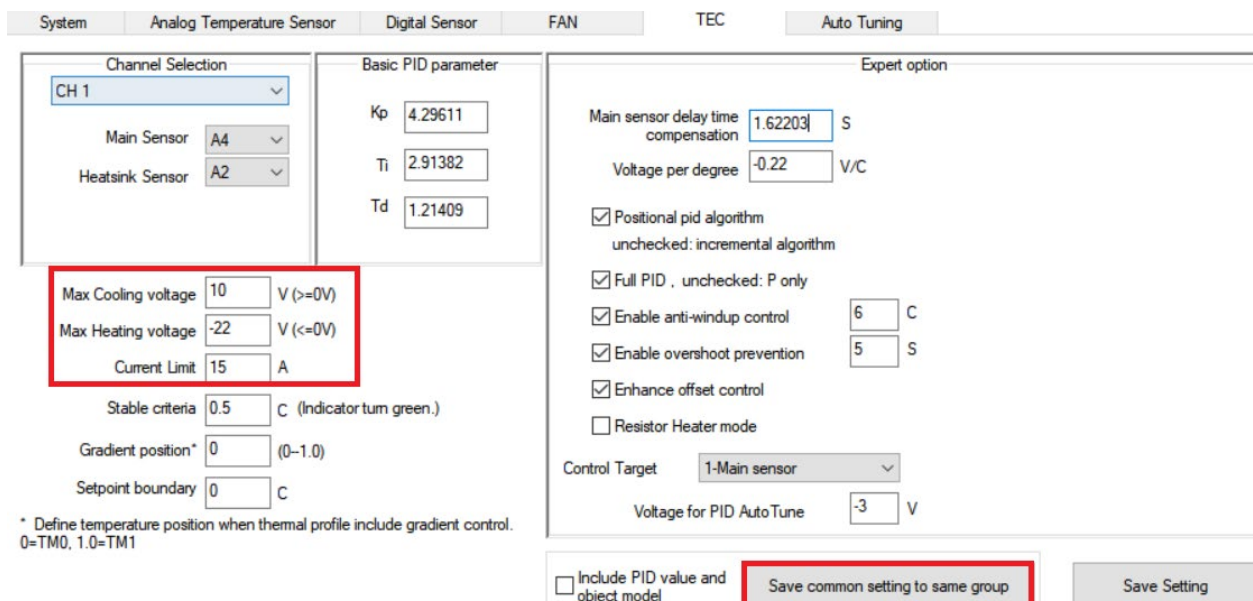
1. Apply +5V to each channel, one at a time. Only have one channel powered with +5V at any given time.



2. Check which sensor's temperature drops. This sensor is the main sensor for that channel.
3. When applying +5V, the heat sink temperature will slowly increase.
4. If one sensor's temperature increases rapidly when applying +5V, it may be due to reversed TEC/peltier "+" and "-" wire connections or the TEC's/peltier's "cool" side being attached to the heat sink. Correct this before continuing the system setup.

Step 7: Configure each channel's protection level

- The maximum cooling voltage, related to the coefficient of performance ($COP = Q_c/P_{in}$), is recommended to be set at 40% of V_{max} .
- Maximum heating voltage and current limit are only related to the TEC/peltier specifications and total system power budget. Setting these to 90% of I_{max} and V_{max} is recommended. (Negative voltage is used for heating).



If 6 channels are organized into a group, using "Save Common Setting to Same Group" can save time configuring each channel individually.

SPECIFICATIONS*

Hot Side Temperature	27.0 °C	50.0 °C	80.0 °C
Qcmax ($\Delta T = 0$)	215.2 Watts	231.6 Watts	248.3 Watts
ΔT_{max} ($Q_c = 0$)	73.6 °C	82.6 °C	93.1 °C
I _{max} (I @ ΔT_{max})	16.0 Amps	15.6 Amps	15.1 Amps
V _{max} (V @ ΔT_{max})	23.3 Volts	25.9 Volts	29.2 Volts
Module Resistance	1.37 Ohms	1.54 Ohms	1.77 Ohms
Max Operating Temperature	120 °C		
Weight	36.0 gram(s)		

* Specifications reflect thermoelectric coefficients updated March 2020

System
Analog Temperature Sensor
Digital Sensor

Power supply current limit A

Ambient sensor

Input current limit should be set based on the PSU's capacity and real usage demand, leaving enough power for other system components.

Step 8: Auto tune all 6 channels simultaneously.

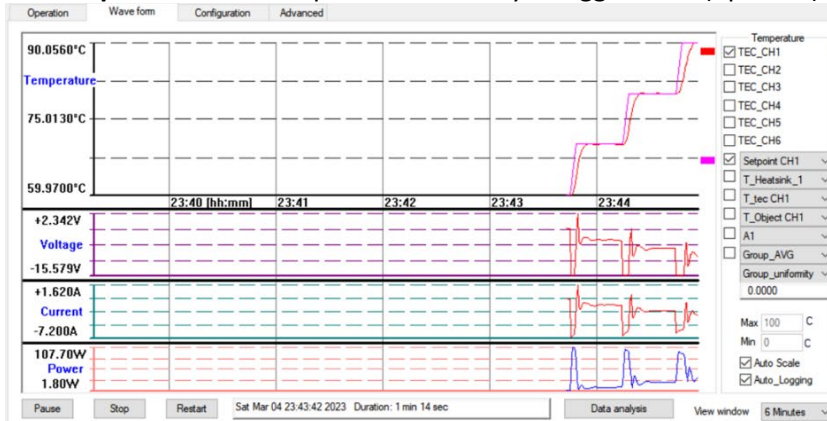
High precision (Fast)

	Status	Ku	Tu	V _{dt}	Sensor delay Compensation	Kp	Ti	Td
☒ CH 1		4.77346	9.71273	-0.22	1.62203	4.29611	2.91382	1.21409
☒ CH 2		2.56211	6.58553	-0.17795	1.6	1.07901	3.29276	0.823191
☒ CH 3		0	0	-0.17204	0.9	1.54009	2.89479	0.964929
☒ CH 4		0	0	-0.17204	0.9	1.5	2.5	0.7
☒ CH 5		0	0	-0.17204	0.9	1.5	2.5	0.7
☒ CH 6		0	0	-0.17204	0.9	1.5	2.5	0.7

Start Auto Tune

Cancel

Step 9: Run thermal profiles and analyze logged data (optional)



When "Auto Logging" is enabled, all listed items, including the voltage & current data of the 6 channels, will be automatically saved to two files.

Summary_Waveform_04D 23H 43M 42S.CSV
Waveform_04D 23H 43M 42S.CSV

- Summary_waveform_xxx: Records two data points (max and min) for the last minute
- Waveform_xxx: Records one real-time data point every 0.5 seconds.

Time	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	Setpoint C	T_Heatsink	T_tec	CH1 T	Object (A1	Group_AV	Group_uni	Ambient	V(1)	V(2)	V(3)	V(4)	V(5)	V(6)	I(1)	I(2)
23:43:42	59.9707	59.9707	61.5569	61.5569	25.0005	25.0018	60	53.6473	59.9787	58.7294	43.4539	59.9794	0	43.4553	-1.9888	12.01	0	0	0	0	-0.6568	0.0295
23:43:43	59.9754	59.9754	61.5661	61.5661	25.0005	25.0018	60	53.5677	59.9807	58.7317	43.4512	59.9808	0	43.4512	-2.0367	12.0101	0	0	0	0	-0.6515	0.0295
23:43:43	59.9777	59.9777	61.565	61.565	25.0006	25.0019	60	53.4873	59.9785	58.7336	43.4543	59.9777	0	43.4531	-2.0669	12.0106	0	0	0	0	-0.7556	0.0322
23:43:44	59.9771	59.9771	61.564	61.564	25.0006	25.0019	60	53.4059	59.9746	58.7349	43.4629	59.9742	0	43.4604	-2.1273	12.0096	0	0	0	0	-0.7421	0.0351

Step 10: Other data logging methods (optional)

System temperature for all of 6 channels
System power for all channel voltage and current

Temperature and voltage will return fix format channel data
AUTOPUSHDATA(85.1209,85.1209,77.5000,77.5000,25.0000,25.0015,
-100058,12.0103,0.0000,0.0000,0.0000,-0.0000,50.4792)

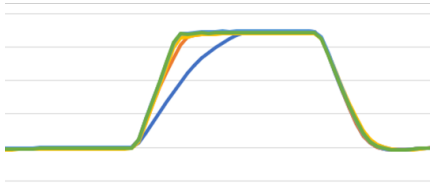
Log interval should be between 0.1 second to 1000 second.

Auto push message can be set as power on default. To disable it, just set Log Control to 0.

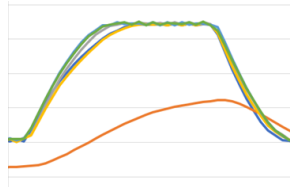
Step 11: Failure analysis (optional)

If one channel ramps up (heats) slower than another channel:

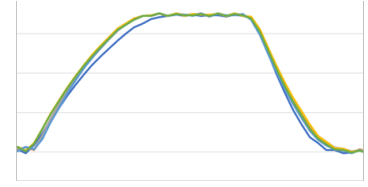
1. Check if the maximum heating voltage level is set the same for both channels.
2. Check the voltage and current values. If the voltage is the same, but the current is lower than the other channel, then check the cable connection and TEC/peltier resistance.
3. If both voltage and current values look correct, then check the quality of the thermal pad assembly for this channel.



Check heating voltage setting on problem channel.

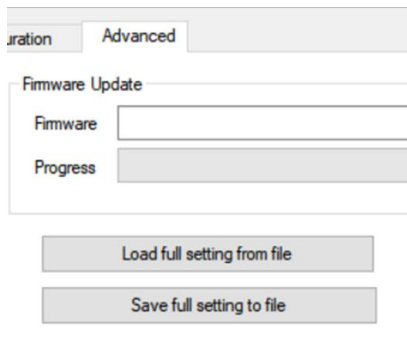


If current close to 0 on one channel, check TEC/peltier connection.



If all channels are ramping up slower than expected, check voltage limit setting on all channels.

Step 12: Copy settings to another unit (optional)



When one unit is configured and running properly, save its settings as a file.

On another unit, you can directly load this setting file to save setup time.

All settings are stored in VTC NVRAM.

Step 13: Check and upgrade firmware (optional)

- Check firmware version: Refer to Section 4.11 on Software User Guide.
- Upgrade firmware: Refer to Section 2.5.3 on Software User Guide.

2. REVISION HISTORY

Version	Date Released	Description of Change
0.0.1	12 Jul 2024	Initial Release
0.0.2	07 Jan 2025	Added Step 5 (short thermal fuse connector) and Step 13 (check/upgrade firmware)

3. LEGAL NOTICES

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