SMART MANAGER SOFTWARE AND PTCC TEC CONTROLLER

USER GUIDE

WHAT IS SMART MANAGER?

Smart Manager is a complementary software application designed to work with the PTCC-01 TEC controller, enabling real-time adjustment and monitoring of its parameters via a PC interface. It replaces the physical button panel on the PTCC-01-ADV, offering a more convenient and flexible interface.

An extended version of Smart Manager is used with VIGO LabM series and other IR detection modules featuring programmable PIP amplifiers, as described in section PIP-BASED DETECTION MODULES.

GETTING STARTED

To begin using Smart Manager, connect the PTCC-01 controller to a USB port on your PC and launch the Smart Manager application. Then, select the desired device from the list.

⚠ Note: If the device list is empty, check the USB connection and reload the list by selecting ***Devices*** → ***Reload Devices List*** or by right-clicking on the yellow background and choosing ***Reload Devices List***.

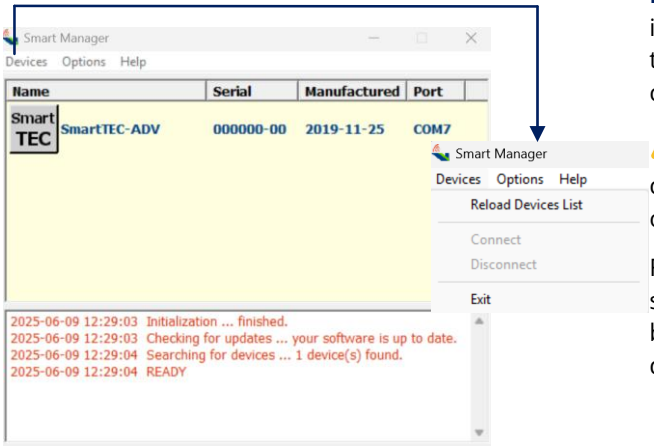


FIGURE 1. Startup window

TABLE OF CONTENTS

OVERVIEW AND FUNCTIONS

CONTROLLER PANEL

The main interface of the Smart Manager application may vary depending on the device it is used with. If a programmable type detection module is connected, additional options will be available in the form of a blue **DETECTION MODULE PANEL** (FIGURE 3), as described in section PIP-BASED DETECTION MODULES. However, the **CONTROLLER PANEL** (FIGURE 2) itself remains consistent across all configurations.

⚠ If non-programmable detection module is connected, the corresponding section on the right side of the interface will be grayed out by default.

Fields with a salmon background are non-editable and serve informational purposes only. Fields with a green background are editable. Available value ranges may differ depending on the module in use.

Configuration File

The Configuration File function allows the user to load or save configuration settings. These files must be in the dedicated `.smartconfig` format. Saving configurations enables the restoration factory defaults or previously saved settings.

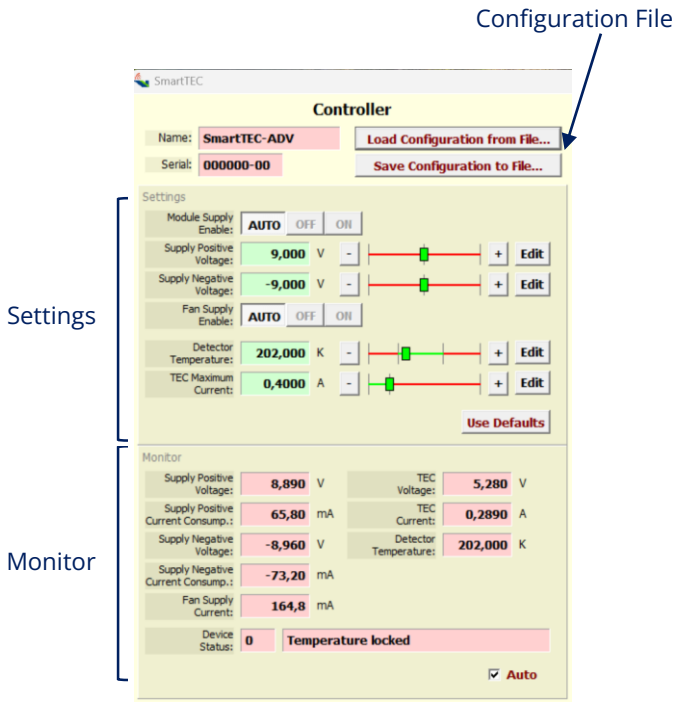


FIGURE 2. Controller Panel view

Settings

Module Supply Enable/Fan Supply Enable

These buttons are grayed out because they are factory-programmed during the default settings configuration.

Supply Positive Voltage/Supply Negative Voltage

Voltage ranges are limited to prevent damage to connected modules. For example, the PIP is powered only with ±9 V, as other voltages may cause amplifier damage or malfunction. Some detection modules are powered with ±12 V or ±15 V.

If a module without internal memory is connected, and thus lacks internal memory, the voltage supply will be adjustable within the range of ±3 V to ±15 V.

Detector Temperature

The temperature is controllable in the range of of 180 K to 300 K.

TEC Maximum Current

The maximum value of the range is determined by the number of cooling stages in the TE cooler.

If a module without internal memory is connected, the maximum current will be adjustable within a different range.

Use Defaults

This button restores the deafoult values, which are original factory-programmed settings.

Monitor

The Monitor section displays real-time values measured by the PTCC, verifying that the-selected settings were correctly applied.

Device Status

Displays the device status and any potential errors.

Auto checkbox

Selecting this checkbox enables real-time monitoring by maintaining continuous communication between Smart Manager and the module. It is recommended to disable it once the parameters have stabilized to minimize potential interference.

PIP-BASED DETECTION MODULES

Connecting a **PIP-based** detection module activates the blue **DETECTION MODULE PANEL** (FIGURE 3) allowing adjustment of the module's settings.

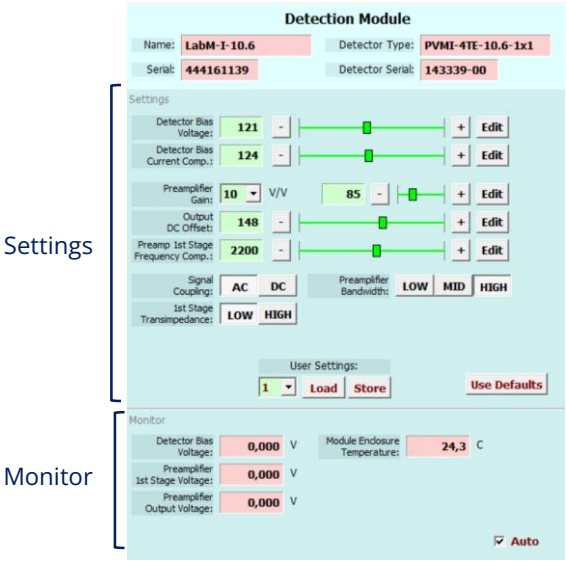


FIGURE 3. Detection Module Panel view

Settings

Detector Bias Voltage

Sets the detector bias voltage. The range is defined on a 0 – 256 scale, while the actual detector bias voltage varies within the 0 – 1 V range. This results in the following approximate conversion factor:

$$V_b = \frac{x}{256} \cdot 1\ V$$

x – bits set

Detector Bias Current Compensation

Sets the detector bias current compensation. The range is defined on a 0 – 256 scale, while the actual detector bias current varies within 0 – 10 mA range. This results in the following approximate conversion factor:

$$I_{comp} = \frac{x}{256} \cdot 10\ mA$$

x – bits set

⚠ Note: The **Detector Bias Voltage** and **Detector Bias Current Compensation** fields interact with each other. When adjusting their values, monitor the **Preamplifier 1st Stage Voltage** field in the Monitor section until the value approaches 0 V.

Preamplifier Gain

Sets the gain of the 2nd stage. The slider on the side allows for precise gain adjustment.

Output DC Offset

This parameter is used to adjust the DC offset at the amplifier's output. It directly affects the **Preamplifier Output Voltage** parameter, which can be observed in the Monitor section and should be close to 0 V.

Preamplifier 1st Stage Frequency Compensation

Defines the capacitance in the first-stage feedback loop and influences both the stability and bandwidth of the amplifier. Increasing the value decreases the capacitance, resulting in weaker frequency compensation. Conversely, a lower value means higer capacitance, which may cause the circuit to be overcompensated.

Signal Coupling

Allows selection of AC (when detector is biased) or DC coupling. Choosing AC results in a low cut-off frequency f_{lo} of 10 Hz.

1st Stage Transimpedance

Buttons set the transimpedance gain. LOW corresponds to 1 kV/A, while HIGH corresponds to 5 kV/A. For example, with a **Preamplifier Gain** of 5 V/V along with HIGH transimpedance, the effective transimpedance of the entire signal path is 25 kV/A.

Preamplifier Bandwidth

The values depend on the module in use.

Preamplifier symbol	Preamplifier bandwidth		
	LOW	MEDIUM	HIGH
PIP-UC-LS	150 kHz	1.5 MHz	20 MHz
PIP-UC-HS	1.5 MHz	15 MHz	200 MHz

User Settings

Allows up to 4 user-defined configurations to be saved for future use.

Use Defaults

This button restores the default values, which are the original factory-programmed settings.

Monitor

The Monitor section allows the user to monitor exact values. As mentioned earlier, the **Preamplifier 1st Stage Voltage** and **Preamplifier Output Voltage** should be close to 0 V.

Auto checkbox

Selecting this checkbox enables real-time monitoring by maintaining continuous communication between Smart Manager and the detection module. It is recommended to disable it once the parameters have stabilized to minimize potential interference.

WHAT IS PTCC-01-ADV?

The PTCC-01-ADV is a programmable, precision, low-noise thermoelectric cooler controller designed to operate with VIGO IR detection modules. It enables parameter adjustment without the need to connect the module to a PC. The controller is compatible with both classic (MIP, SIP-TO8, FIP) and programmable PIP amplifiers integrated with VIGO IR detectors.

PTCC-01-ADV MENU

The menu is organized into a three-level structure. The first level is the Main Menu, followed by Submenus as the second level. The third level is Edit Mode, where parameters can be adjusted.

To navigate through the menu, use the following buttons:

- To move up or down in the menu
- To increase or decrease the value of a parameter

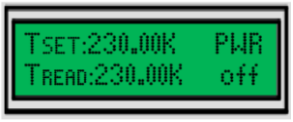
- To navigate between menu levels
- To choose a peremeter to edit
- To cancel or accept a selection

The PTCC menu is essentially identical to the one described above for Smart Manager, as it consists of the same parameters. However, navigation between individual fields is performed using the buttons mentioned above.

As with the **CONTROLLER PANEL** described previously, not all fields and their ranges are editable. Additionally, the menu structure may vary depending on whether a PIP-base module is connected.

EXAMPLE OF BROWSING THE MENU

To clarify menu navigation, the following example shows how to change the detector temperature parameter:



1. The default screen on PTCC display

Press the “down” button repeatedly until the right panel is displayed.

2. **PTCC Settings**

Press “accept” buton.

Press the “down” button repeatedly until the right panel is displayed.

3. **Detector Temperature**

Press “accept” buton.

4. Edit Mode – the last digit in underscores and blinking

Press the ”up” or “down” buttons until the desired value appears

5. Edit Mode – the desired value

Press “accept” button.

Press “cancel” button to exit edit mode.

6. Parameter changed

⚠ Note: If the “accept” button is pressed but Edit Mode is not entered, it indicates that the parameter cannot be modified – as previously described in the case of Smart Manager, for example, with the **Module Supply Enable** buttons or the **Supply Voltage** range.

FAQ

Q: The Smart Manager software is not able to identify the device. It remains in the “searching for devices” state indefinitely.

A: In certain cases, a stable connection to the unit via Smart Manager can only be established if the USB cable is connected before the unit is powered on. After powering the unit with the USB already connected, it is recommended to wait several minutes before launching the Smart Manager software. If the software is opened too soon – or if the USB is connected after the unit has already been powered – the device may not be detected correctly.

Q: When debugging parameters using Smart Manager, it was observed that setting the detector temperature to around 250 K causes the module to stop working if the ambient temperature drops below 250 K. does this indicate that the TEC operates only in cooling mode and not in heating mode?

A: That is correct – the detectors are designed to operate in cooling mode only. Heating functionality is not supported.

Q: With reference to the data presented in the Final Test Report, does the transimpedance value provided in the table refer to the high or low setting? Additionally, which configuration was used to calculate the responsivity – specifically, which transimpedance setting (high or low) and which value of the second-stage (preamplifier) gain were applied during the measurement?

A: All parameters used for the measurements presented in the Final Test Report, including the transimpedance and second-stage (preamplifier) gain, correspond to the values defined in the **Use Defaults** configuration.

Q: The preamplifier’s second-stage gain settings of 150 kV/A and 250 kV/A no longer appear to function correctly. when the preamplifier gain is set to 30, no signal is detected on the lock-in amplifier, despite a signal being present under identical conditions when the gain is set to 20.

A: The issue is caused by amplifier saturation. The **Preamplifier Output Voltage** (shown in the Monitor section at the bottom of the blue window) is at -3.8 V, which indicates saturation – this value should be close to zero. To correct this, follow these steps:

1. In the Settings section of the blue window, adjust the **Detector Bias Voltage** using the "**+**" and "**-**" buttons until the **Preamplifier 1st Stage Voltage** (in the Monitor section) is as close to zero as possible.

If this does not help, try adjusting the **Detector Bias Current Compensation** using its "**+**" and "**-**" buttons.

2. In the Settings section, use the **Output DC Offset** slider to adjust the **Preamplifier Output Voltage**. Observe how the voltage changes in the Monitor section – the goal is to bring this value close to zero.

3. Once optimal values are found, save the configuration in the **User Settings** section.

If difficulties persist, it is recommended to start from the default setup by clicking **Use Defaults** in the blue section. Then, increase the gain gradually, step by step, while making small adjustments to the **Output DC Offset**, keeping the output voltage near 0 V. This approach should help stabilize the signal even when using the 30 V/V second-stage gain.

Q: (Using MIP) the controller side of the software GUI is active and indicates that the detector has successfully cooled to 200 K. however, the detection module side of the GUI remains grayed out, with the exception of displaying the module and detector part numbers and serial numbers. no further interaction with the detection module section is possible.

A: The observation regarding the Smart Manager GUI is correct. The **DETECTION MODULE PANEL** is activated only when a programmable preamplifier is detected. In systems where a non-programmable amplifier is used, this section is automatically grayed out, indicating that parameter modification is not supported.

Q: Can the source of the noise observed by the customer be identified?

A: The noise is caused by communication between PTCC-01 and the PC via USB. To eliminate this noise during measurements, one of the following actions can be performed:

1. Disconnect the USB cable.

2. In the main Smart Manager window, right-click the record with the serial number and select ***Disconnect***.

3. In the Smart Manager window, uncheck the AUTO option at the bottom.

APPENDIX

TABLE 1. Status messages provided by the device

Device status	Description
Temperature locked	STATUS: The detector temperature is equal to the user-defined value (±1 K tolerance).
Cooling	STATUS: Cooling in progress.
Not cooling	STATUS: Cooling has been deactivated by the user. Check PTTC settings.
Detector overheat	ERROR: The set temperature could not be reached within 120 seconds.
Over current	ERROR: The measured current value is higher than the maximum allowed current. Power has been turned off.
TEC open	ERROR: TEC circuit open connection detected.
TEC short	ERROR: TEC circuit short connection detected.
Thermistor open	ERROR: Thermistor circuit open connection detected
Thermistor short	ERROR: Thermistor circuit short connection detected.
PTCC overheat	ERROR: Internal PTCC temperature exceeds the safe limit.
No module	ERROR: The connected detection module without memory is not compatible, or no module is connected.
PIP data error	ERROR: PIP memory detected, but a communication problem occurred.
1-wire error	ERROR: 1-wire memory detected but a communication problem occurred.
PTCC EEPR error	ERROR: Invalid parameter values found in configuration memory.