Software User Manual
MLX90807/MLX90808 PTC-04
Version 1.0

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1 Overview

The PTC-04 solution for MLX90807/MLX90808 has the main goal to provide a very general and user friendly software that can be used as an example for mass production.

1.1 Connection

There are two possibilities for connecting the PTC-04 to the computer – through RS-232 or USB cable. In the first case no extra device driver installation is necessary. In the second case, first time when the PTC-04 is connected with the computer, hardware setup must be performed.

1.2 Related Products

- MLX90807
- MLX90808

1.3 Related Documents

- 90807 90808 Software Description PTC-04
- Pressure Sensors Assembly Guidelines
- Advanced Calibration Options 90807 90808

1.4 Software Installation

It is important that the current user has administrative rights to be able to install the software. When running the installation of the software the following will be installed on the user's computer:

• MPT application (MPTApp.exe) – Melexis Programmable Toolbox application is the main work environment for loading specific user interface modules.

• MLX90807 user interface (UI_090807AAMLX.exe) – MLX90807/90808 PTC-04 specific user interface, which can be executed only by MPT Application.

• MLX90807 PSF (PSF090807AAMLX.exe) – Product Specific Functions library containing several ActiveX objects facilitating the communication with the device.

2 Launching the software

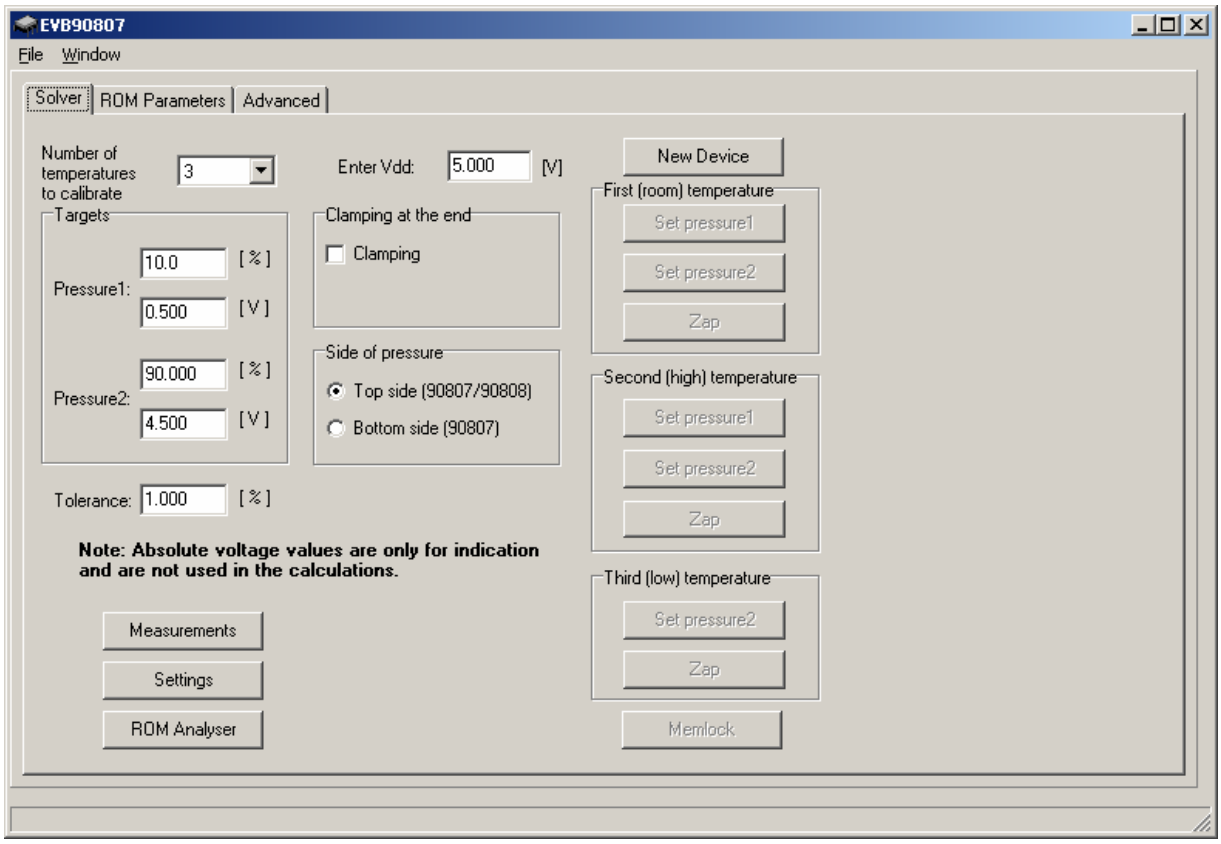
There are two ways to launch the software:

1. Run Melexis Programming Toolbox application (MPT) -> On Workspace panel open UI modules branch -> Double-click on MLX90807 PTC04 to open the user interface. The software is now ready for work.

2. The same can be automatically done by running the specific item on the Start menu: Start->Programs->Melexis->Melexis Programmable Toolbox->MLX90807PTC04 UI.

3 Start up MLX90807/MLX90808 PTC-04

When the MLX90807 software is launched successfully the following window will appear:



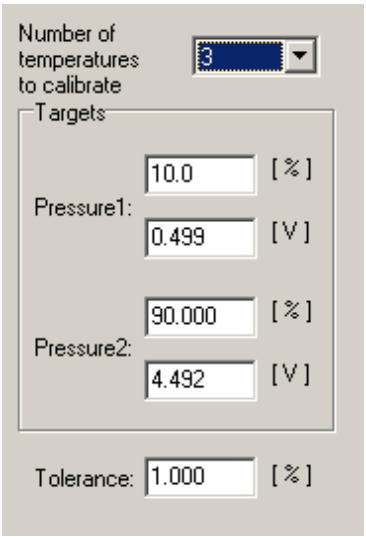
3.1 The solver tab

The main goal of the solver is to allow the software user to quickly evaluate the MLX90807 and MLX90808 without needing an in depth knowledge of the chip. The solver user interface can be divided into 4 parts:

- The software user's inputs.
- The calibration step by step
- The results
- Additional features.

3.2 The software user's inputs

The software calibration inputs are shown in the picture bellow. The calibration steps to follow will depend on the given inputs.

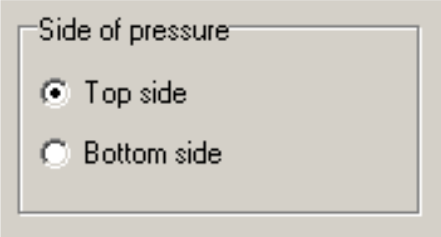


The first calibration input is the number of temperature points. Depending on the required accuracy and on the temperature range of the application, one, two or three temperature points can be chosen. Often the target accuracy can be reached by using two calibration temperatures. The software doesn't need to know the selected temperature values. Melexis advices to select the first temperature at ambient, the second at 85°C and the third at -15°C. It is mandatory that the second temperature is higher then the first one and that the third temperature is lower then the first one.

The second calibration input is the desired output level for the low and high calibration pressures used. These desired output levels are also expressed as a percentage of the supply voltage to take into account the ratiometricity of the chip. Melexis advices to use the pressure corresponding to an output of 10% of Vdd as the low pressure and an output of 90% as a high pressure during calibration.

The third input for the solver is the desired tolerance on the obtained output characteristic curve. When the solver is not able to adjust the curve within the specified tolerance, its stops and gives a warning message. During a first evaluation phase Melexis advices to use a relaxed tolerance of about 5% to collect as much information as possible from the solver and only use this feature in a later phase of the development.

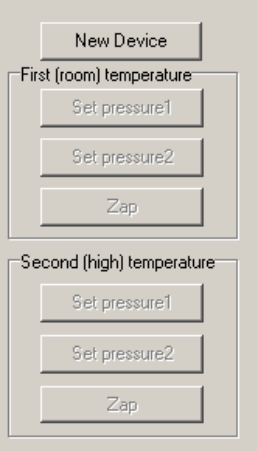
The last input of the solver is on which side of the chip the positive pressure is being applied. The picture bellow shows how to make this selection.



The absolute pressure sensor 90808 will always be used with the pressure applied to the top side of the chip whereas the relative pressure sensor 90807 can be used by applying the pressure either to the top side or to the back side of the chip.

3.3 The calibration step by step

As a function of the software user inputs the software will propose the different steps to follow to calibrate the chip. An example of the different calibration steps can be seen in the picture below.



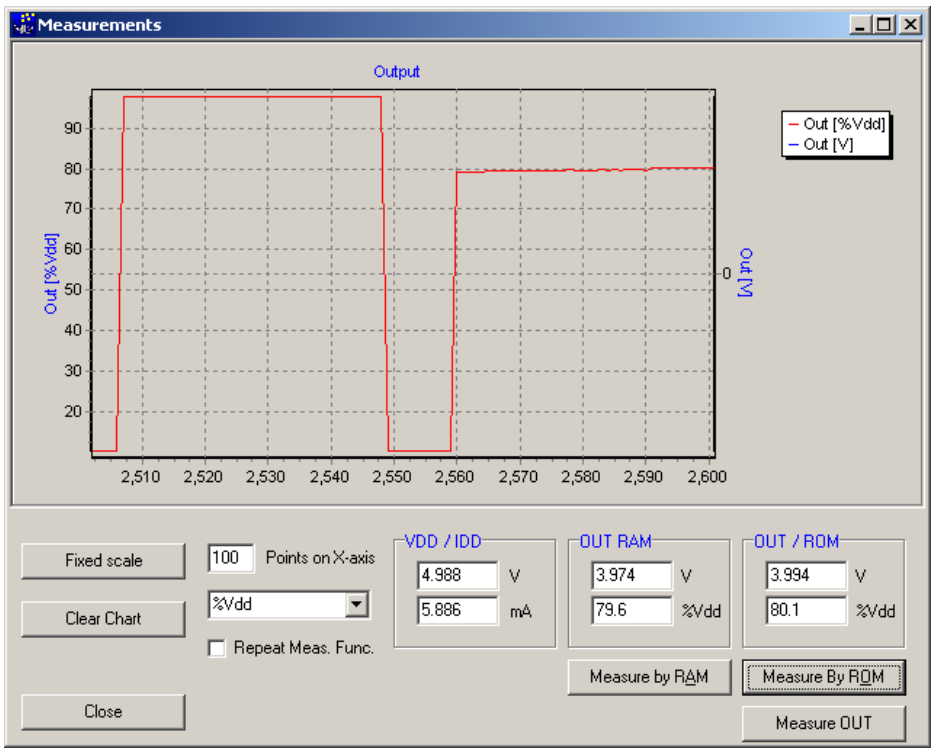
When connecting a new device to the PTC-04, the button “New device” has to be pressed. If a device already calibrated at first temperature is connected to the PTC-04, after pressing the button “New Device”, the calibration of this device can be continued starting with the second calibration temperature.

When the temperature and the pressure are settled the user just needs to press the corresponding button. At the end of this calibration step, another calibration button will appear. The software user just needs to follow the instructions written on the button (i.e. to set the corresponding pressure and temperature) and then press it.

The buttons Zap write the solver settings into the memory of the chip. As the memory of the chip is only one time programmable Melexis strongly recommends making a check of the calibrated curve before performing a Zap (see next section to see how to check the curve).

3.4 The results

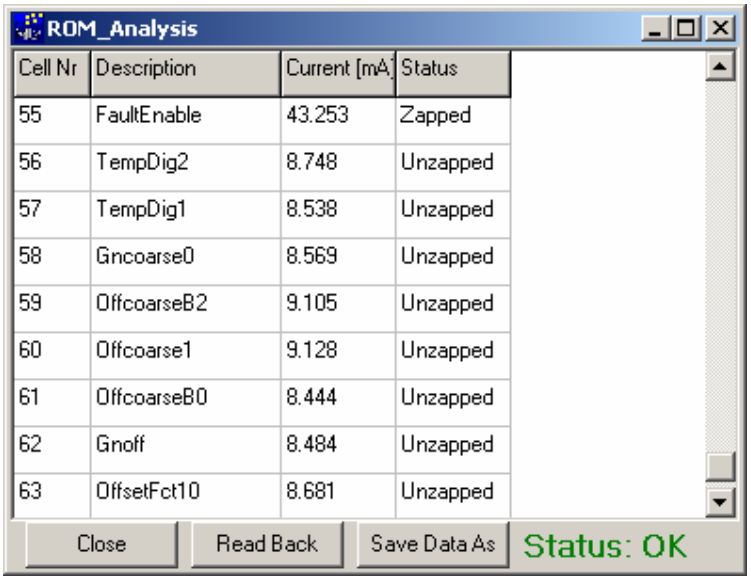
When the calibration has been completed successfully the calibrated curve can be checked with the measurements button. When using the measurements button the following window will be displayed:



By using the **Measure by Ram** button the register of the chip are loaded with the solver settings stored in a memory of the evaluation board so the obtained curve can be checked without needing to write the settings into the on chip one time programmable memory.
After using the Zap buttons, the curve can be checked with the **Measure By Rom** button. In this case first a reset of the chip is done so the register of the chip are loaded with the settings coming from the internal one time programmable memory. With the **Measure Out** button the output of the chip is measured without resetting the device.

3.5 Additional features

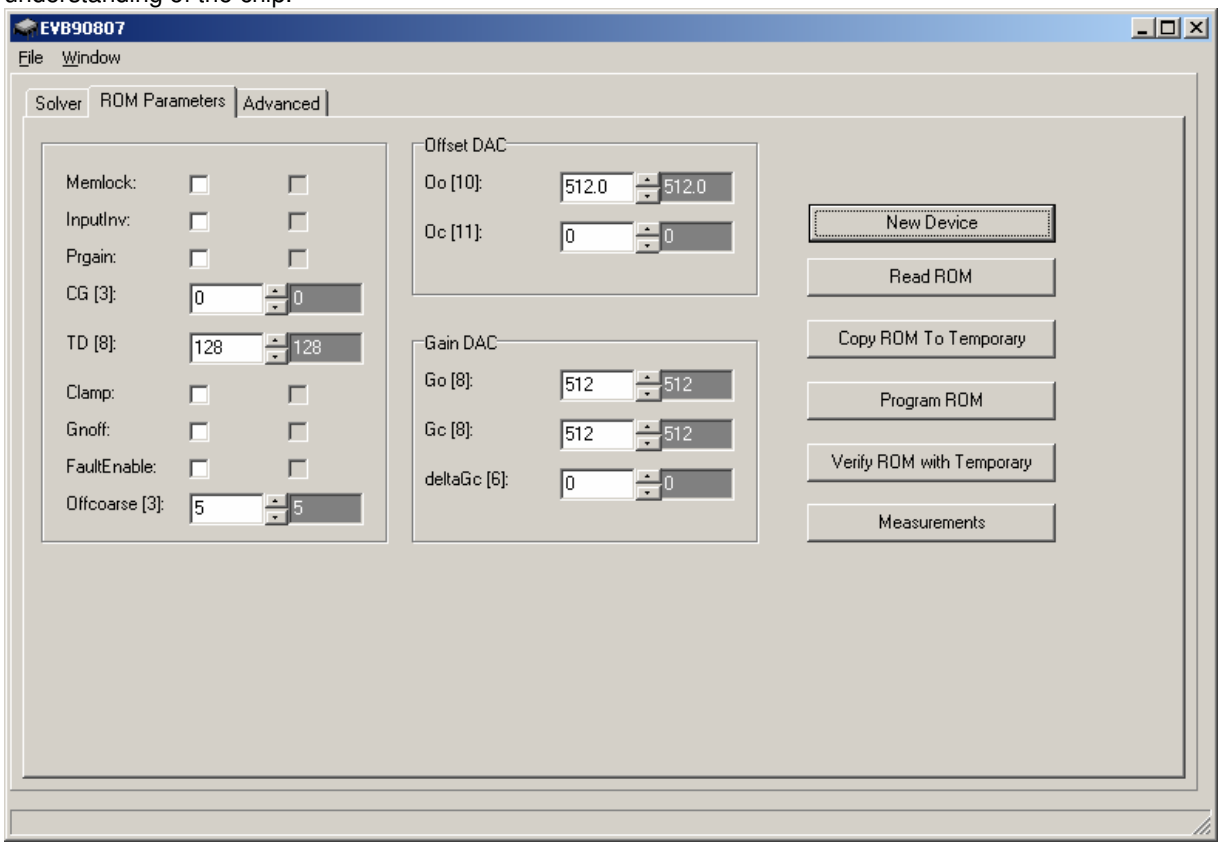
The software gives also the possibility to set automatically the clamping levels at the end of the last calibration step. By selecting low clamping level the output characteristic curve will clamp at about 0,4V and 4,5V. By selecting both low and high clamping level the output curve will clamp at about 0,4V and 4,7V. With the button Rom Analyzer the user can check the content of each memory cell individually. The memory cell content is read by a current. A current lower then 10mA means a logical 0 whereas a current higher then 30mA means a logical 1.The Rom analyzer can be also used as a communication check. At probing, the cell 55 of the 90807 and 90808 is written to a logical 1. So when using a virgin part, a good communication with the device should lead to the following Rom Analyzer window:



By pressing the Settings button the software user has access to the communication settings. Melexis advices to keep the default communication settings.

3.6 The Rom parameters Tab

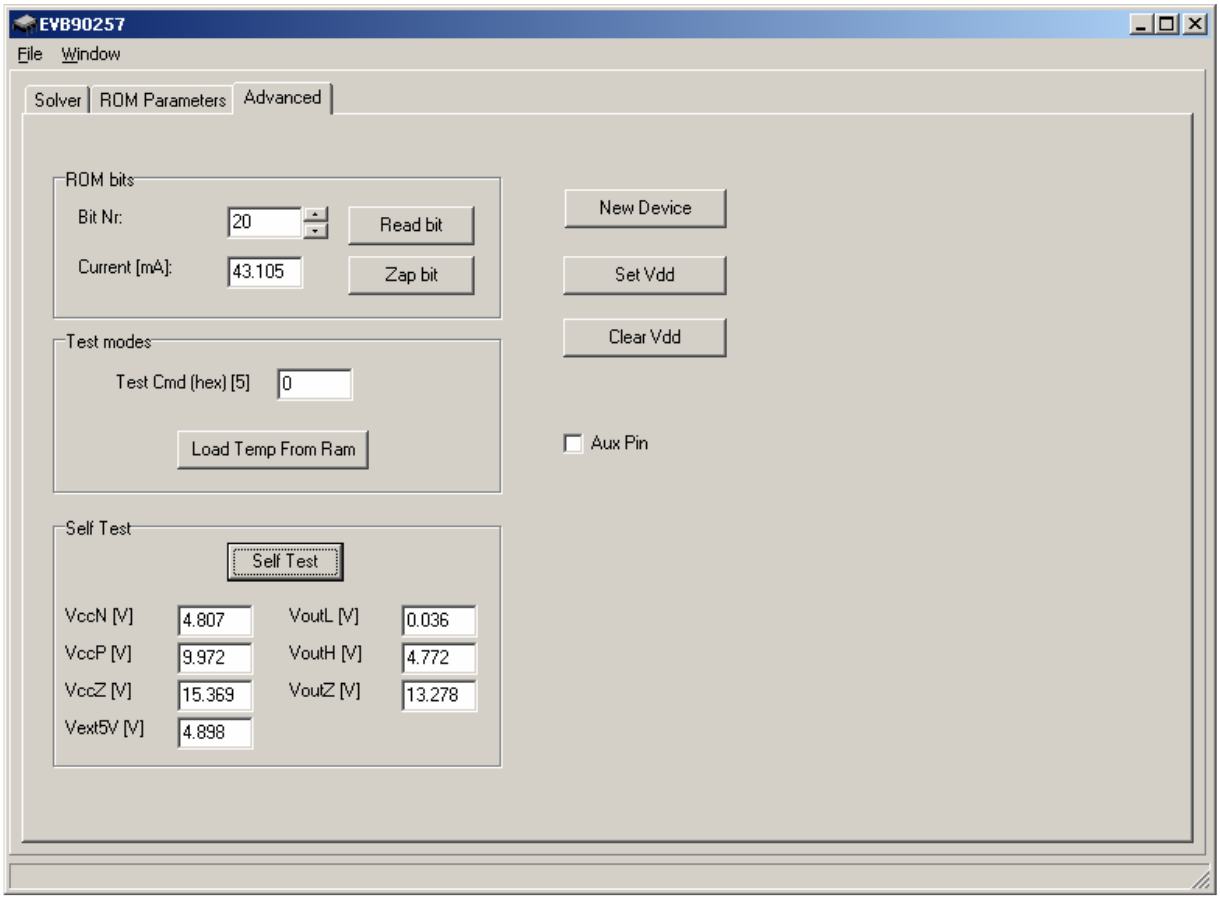
After a quick evaluation of the chip performances with the Solver Tab the software user has the possibility of trying some manual calibration with the ROM parameters Tab. This tool can be used to have a deeper understanding of the chip.



All the memory cells contents can be read by using the button ReadROM. Their contents will be displayed in the dark grey cells. By pressing the button “Copy ROM to Temporary” the memory cells contents are copied from the grey cells to the white cells. The values in the white cells can be individually settled. It is very easy to learn the influence of each calibration parameter on the output curve by spinning the parameters of the white cells and checking simultaneously how the output curve changes with the Measure by Ram button of the measurements button. Eventually the ROM parameters Tab allows the software user to write the values of the white cells into the Memory Cells with the program ROM button. As the memory is only one time programmable this step has to be done carefully.

3.7 The Advanced Tab

With the Advanced Tab the software user has access to the special functions of the MLX90807/90808.



In the Advanced Tab each individual memory cell can be read or written. The supply and programming voltages can be read. The supply of the chip can be reset or set (“Clear Vdd” and “Set Vdd” buttons). Some of the on chip test modes can be used (should only be used for debugging). The selection between the different designs can also be done.

3.8 Multi Solver

Click the “Multi Solver” button, figure 2 will appear:

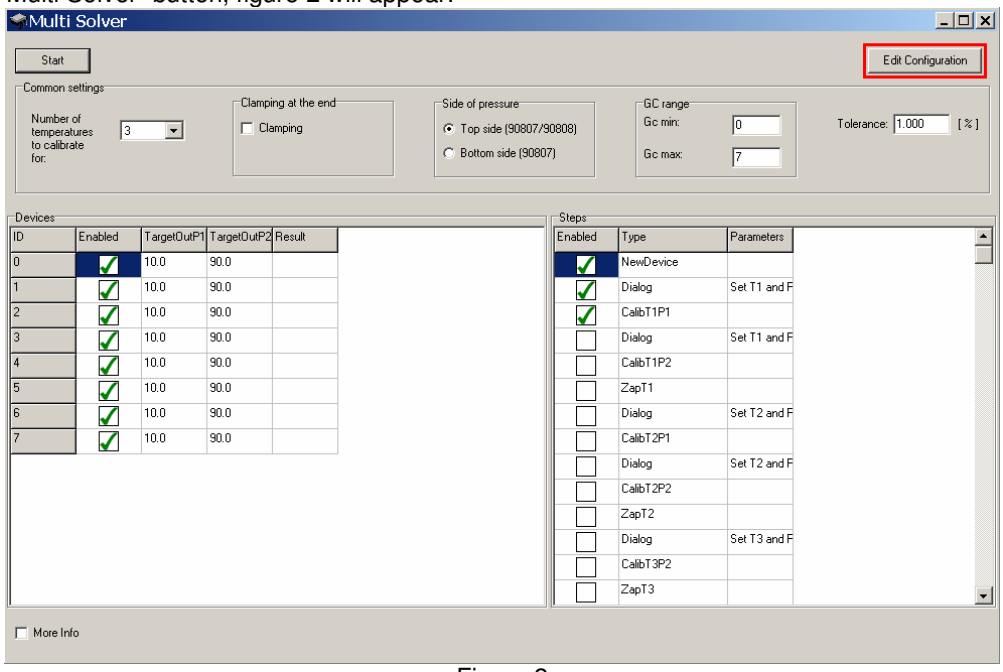


Figure 2

Click the “Edit Configuration” button shown in figure 2, configuration changes are available.

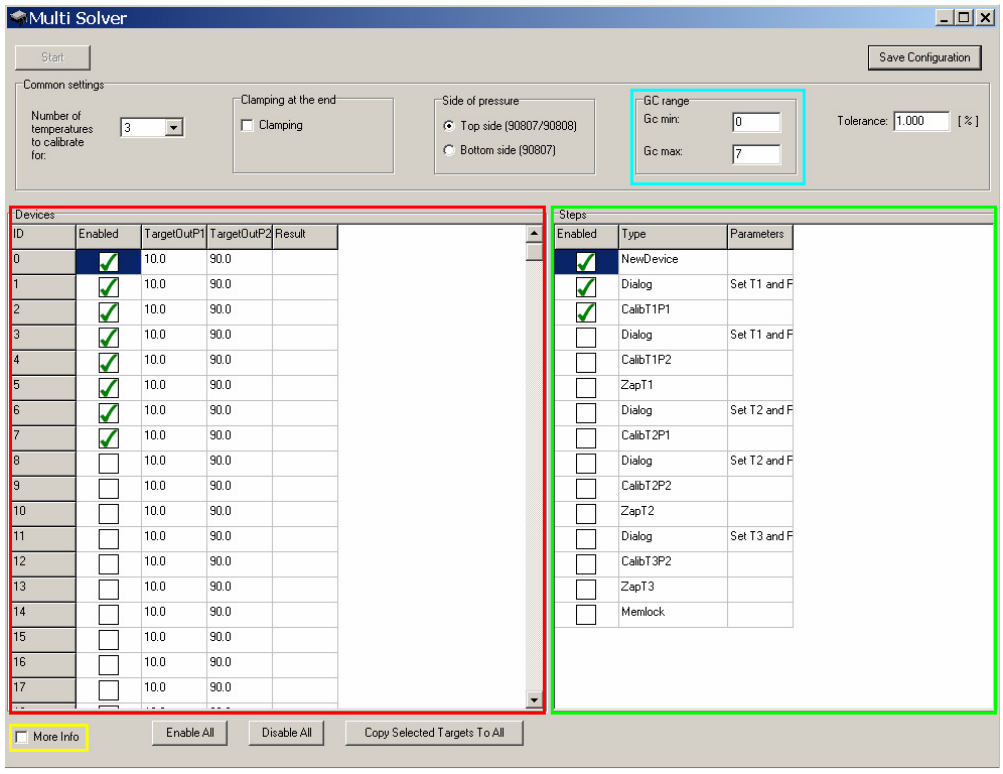


Figure 3

In the “Devices” block, shown in figure 3, ID No. from 0 to 63 can be enabled or disabled. It depends on the amount of parts that will calibrated at one time, a maximum of 64 devices can be controlled with 1 ptc-04. To control more then one sensor an additional piece of hardware should be connected to the programming tool. The PTC04_sensors_multi_calibration_board has been developed to control multiple sensors. Enable the “More Info” option, shown in figure 3, to monitor the execution of all the enabled steps in the “Devices” block.

The “Steps” block shown in figure 3, 15 calibration steps are available. Users can select the steps according to their needs. A default flow is visible in figure 4, to disable the calibration at low temperature the function CalibT3P2 and ZapT3 can be disabled. “CG range” option which is used to limit the coarse gain sweep range shown in figure 3 can make the calibration more efficient. Cfr. Advanced Calibration options

Select one target as shown in figure 4, click “Copy Selected Targets To All” button shown in figure 4, the target selected will be copied to all the other targets. It offers an easy way to change all the targets.

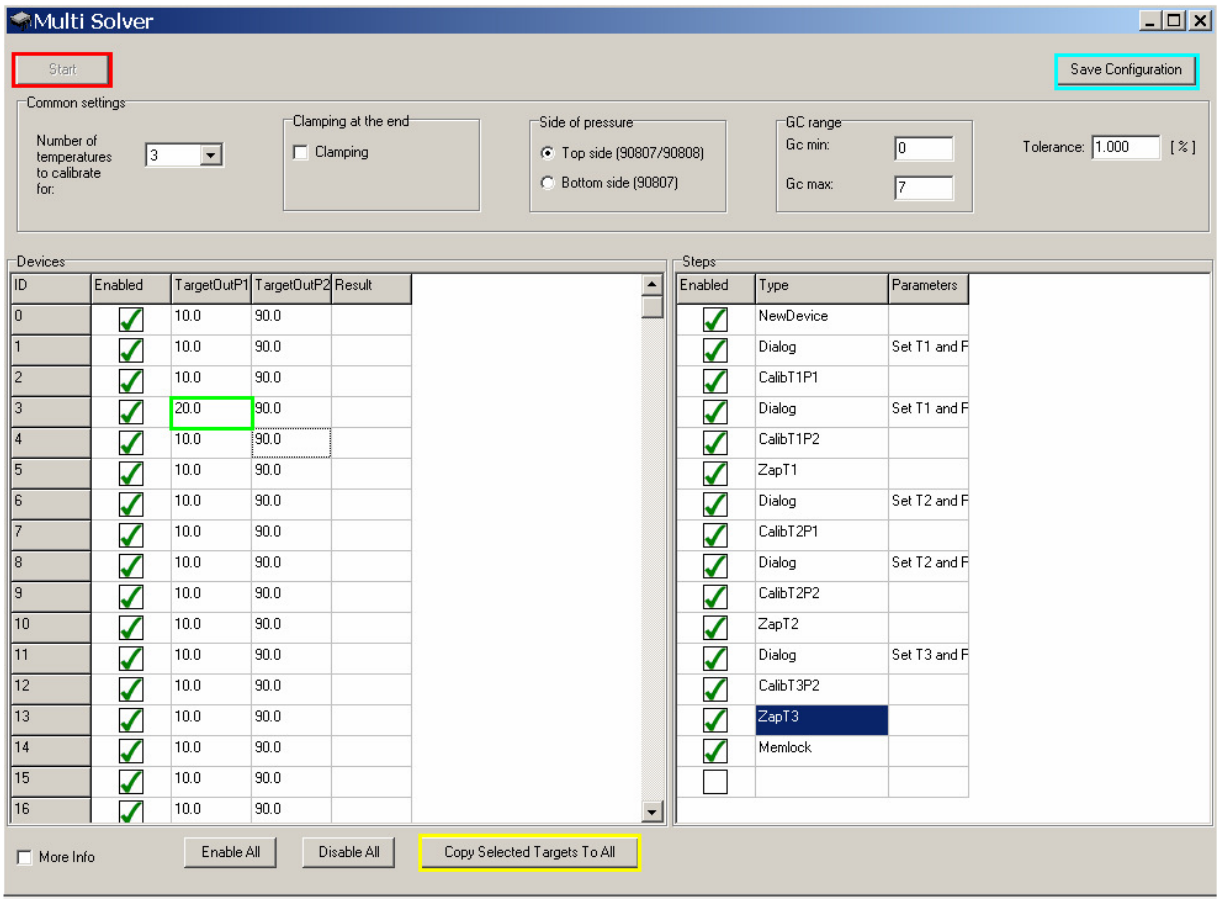


Figure 4

After all the configurations are set correctly, click “Save Configuration” button shown in figure 4 to save all the configurations.
After saving configurations, click “Start” button shown in figure 4 to start calibration steps. It will automatically start with step “New Device”. If the communication is OK, it will be shown in “Devices” block as shown in figure 5. After all the communication checks complete, the second step “Set T1 and P1” will jump automatically as shown in figure 5 to remind user to set temperature T1(typically room temperature) and pressure P1. If all the communication checks success, click “OK” shown in figure 5.

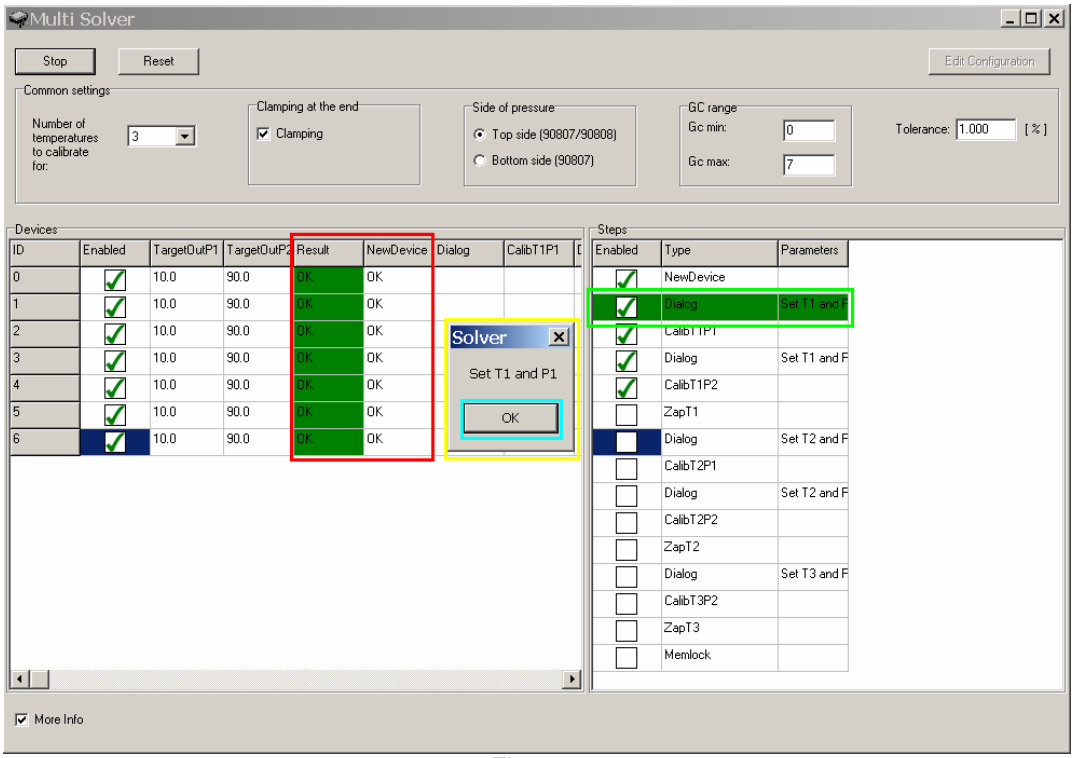


Figure 5

3.9 Logging

Data logging for each device will be shown in the “data log” panel of “Melexis Programmable Toolbox”, take “Device 5” for example shown in figure 6. Step “New Device” not only checks the communication, but also reads back the content in the memory if communication is OK.

Figure 6

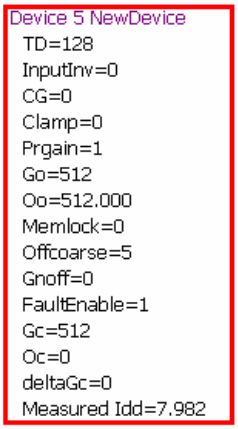


Figure 7

3.10 Debug

If there is one chip can not communicate, take device 7 for example, “Bad Contact” will be warned as shown in figure 8.

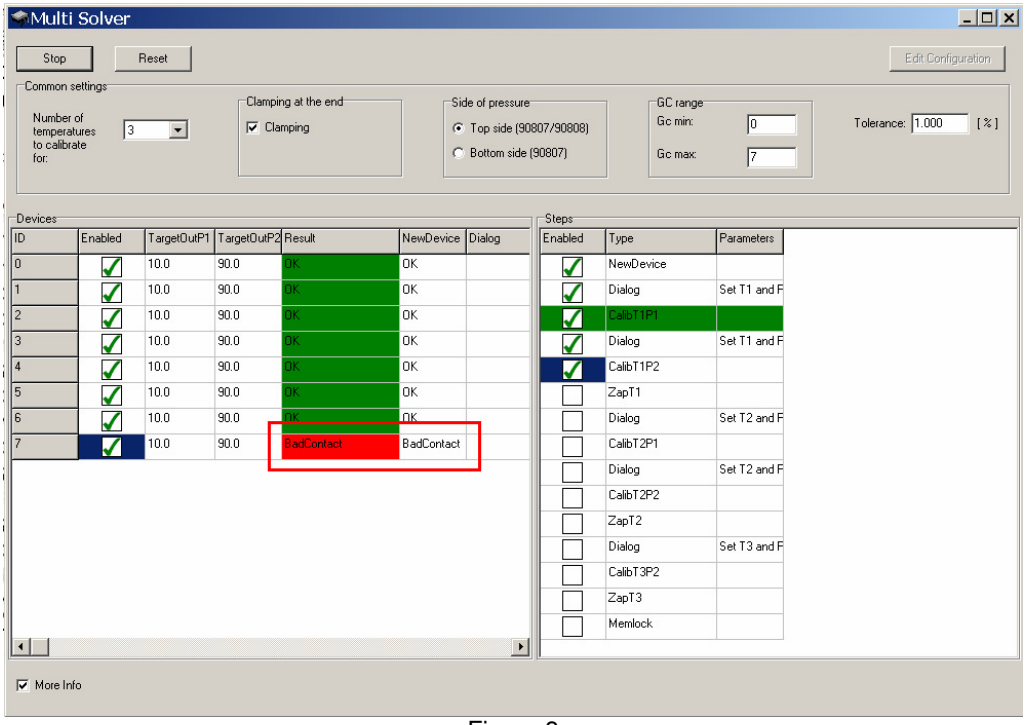


Figure 8

User can open the MLX90807 PTC-04 to debug the device separately by selecting the device No. as shown in figure 9.

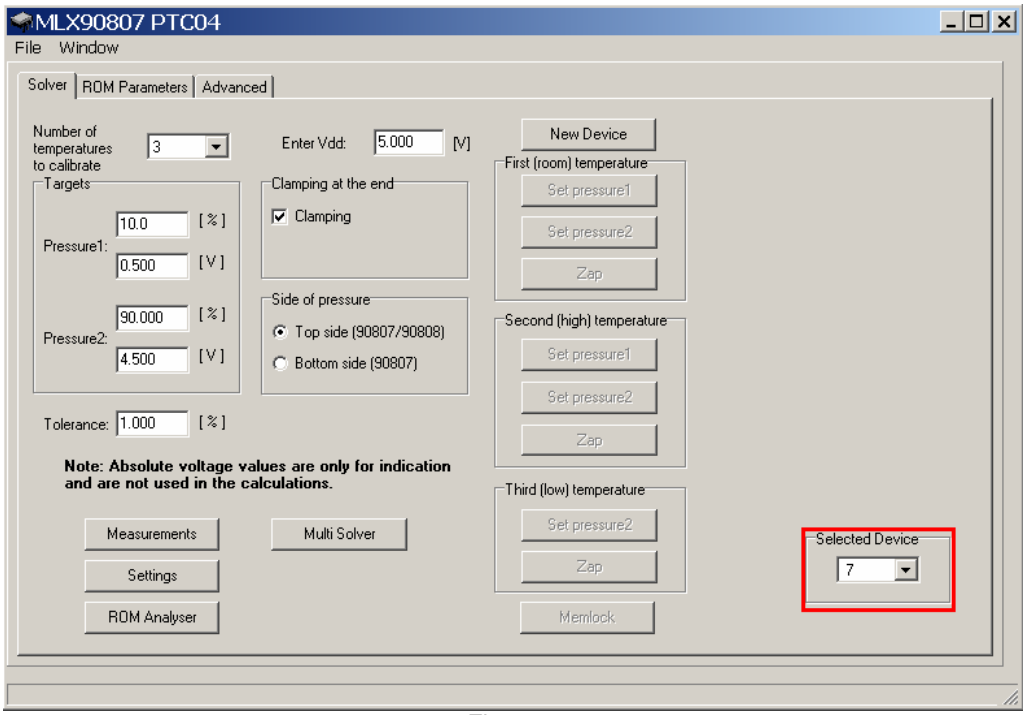


Figure 9