

RTI DRIVER USER MANUAL

SINOPE THERMOSTATS

DRIVER VERSION: 1.X



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Revision history

Rev	ECD	Date (yyyy-mm-dd)	Revised by	Description
1	---	2016-02-18	OG	Document issue
2	---	2016-02-26	OG	Added more information on driver configuration

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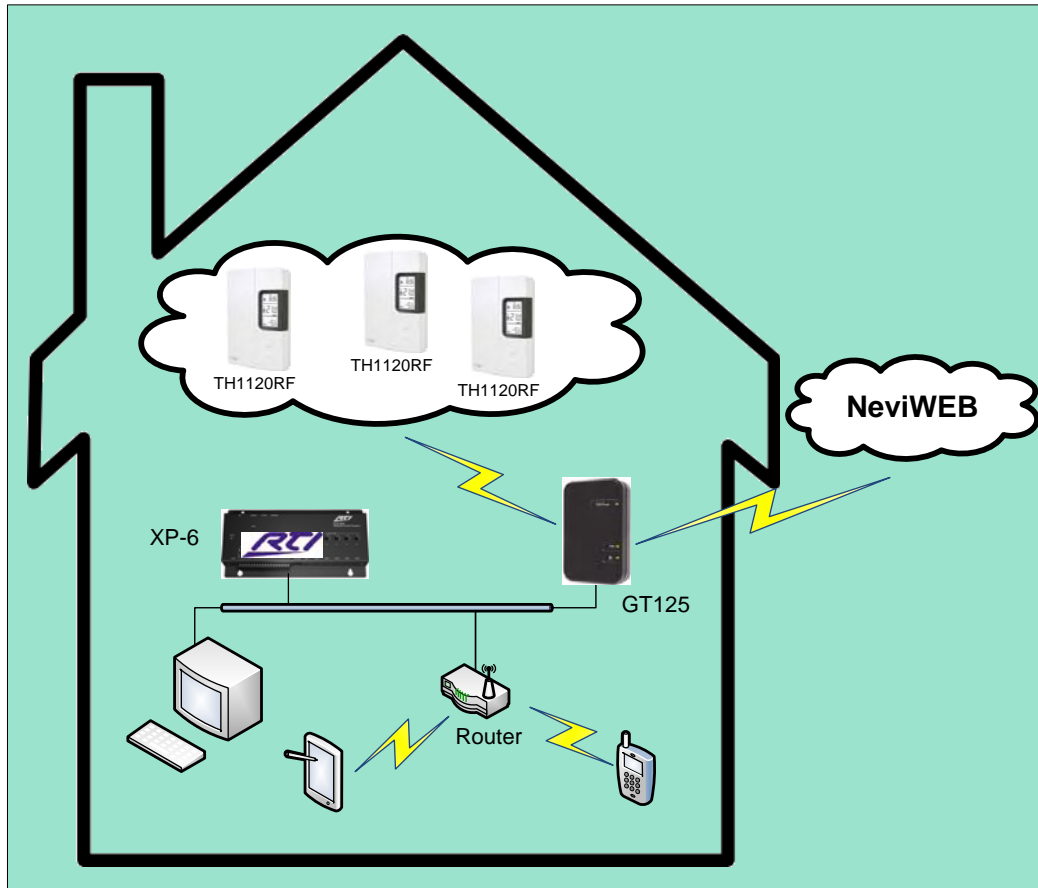
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1. Sinope overview

Sinope TH1120 series thermostats were designed to directly control line heat thermostats on the following operating voltage: 120/208/240VAC, 60Hz. Thermostat can be used with baseboard heaters, convectors (short cycle) and fan-forced convectors (long cycle).

1.1 GT125 installation

The following chart shows typical network installation for Sinope product.



Sinope wireless devices such as thermostats, floor thermostat, lights etc organized in the mesh network to allow network control messages propagate everywhere in the house. GT125 used as a point of communication with such mesh network and acts as a gateway between home Ethernet network and Sinope wireless mesh network.

Usually RTI XP processor and Sinope GT125 gateway would have static IP addresses assigned by router based on XP and GT125 MAC addresses. Write down the GT125 IP address as it will be required for the driver integration.

1.2 Thermostat Installation

Sinope thermostat is very easy to install. It is suitable for direct replacement of any existing thermostats and fits directly in the existing electrical box. No additional power required. Once

installed and even before integration in Sinope network, it acts as a traditional electronic thermostat that maintains the temperature based on the local setpoint.

1.3 Thermostat setup

Sinope thermostat network requires at least one Sinope GT125 WEB interface gateway that provides an interface between RTI controller, WEB API and all thermostats installed in the same network. It is possible to create multiple zones managed by different GT125 devices, for example in small commerce, hotels, condos and multi-family residential properties.

Once GT125 is configured / integrated into network, each thermostat can be added by a matter of simple button pressed.

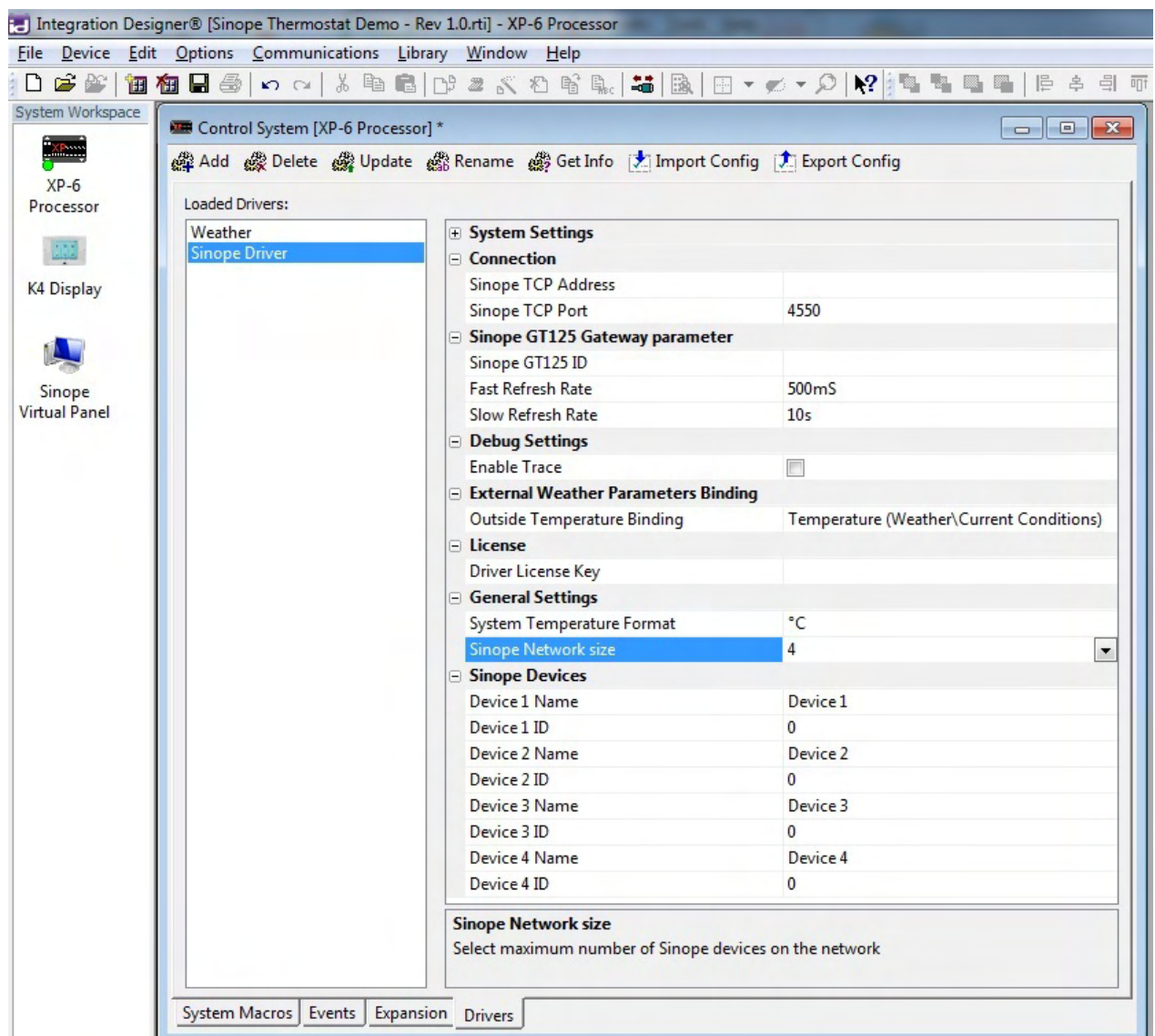
2. Driver Setup

RTI driver provides an interface between Sinope GT125 gateway and point of control supported by RTI and other third-party drivers. RTI driver will ensure acquisition of all data from each thermostat on the network and will provide the interface to control each individual thermostat as well as entire network by simply and intuitive way.

2.1 Driver Installation

Driver shall be installed under Drivers tab of Integration Designer. To do that, click on XP processor icon in the system workspace then from the popup window select Drivers tab and click on the Add menu. Browse to the location where Sinope driver was saved and select it.

Once opened the driver will looks similar to the following snapshot:



2.2 Driver Configuration

There are few configuration steps required to make the driver work. These steps will be described below.

2.2.1 Connection

The first step is to specify the IP address of the Sinope Gateway. The Sinope Gateway address shall not be changed during daily operation and therefore it shall be statically populated in the network gateway. Please, enter the Sinope IP address in the configuration field named "Sinope TCP Address". Live Sinope TCP port assigned to 4550, this is the only port Sinope Gateway will listen to.

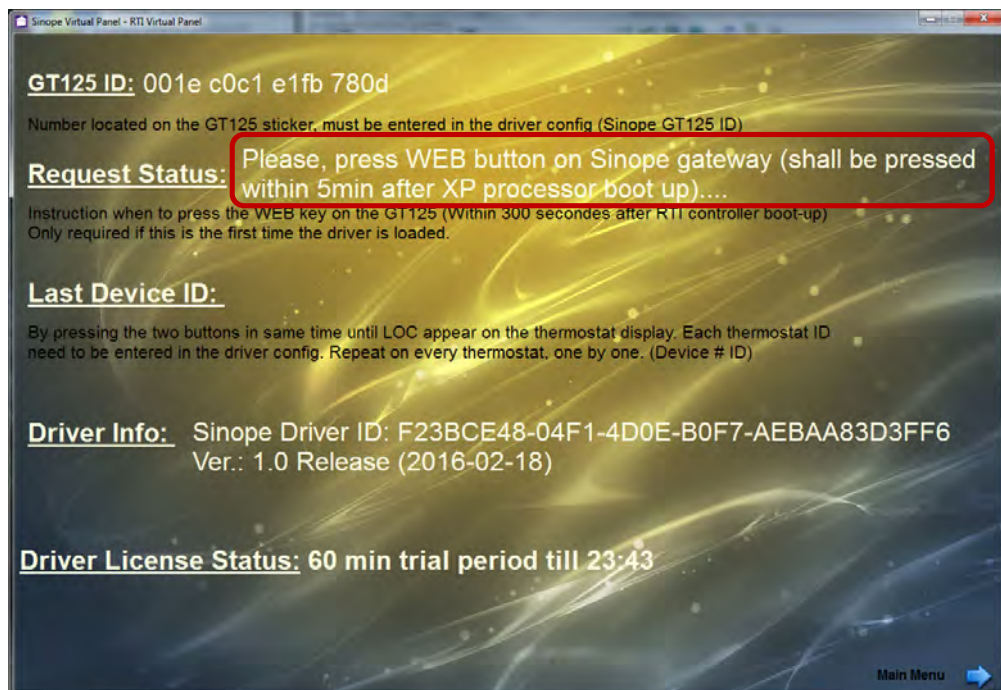
2.2.2 Sinope Hardware ID

Enter Sinope Hardware ID written on the back of Sinope GT125 gateway into Sinope GT125 ID field. This Hardware ID will be used every XP processor boot up in order to determine if new pairing is required with Sinope GT125 gateway. In case XP processor needs to remove previously stored pairing information (GT125 Hardware ID, API key etc) simply leave this field empty, update the driver and XP processor will erase all previously stored information.

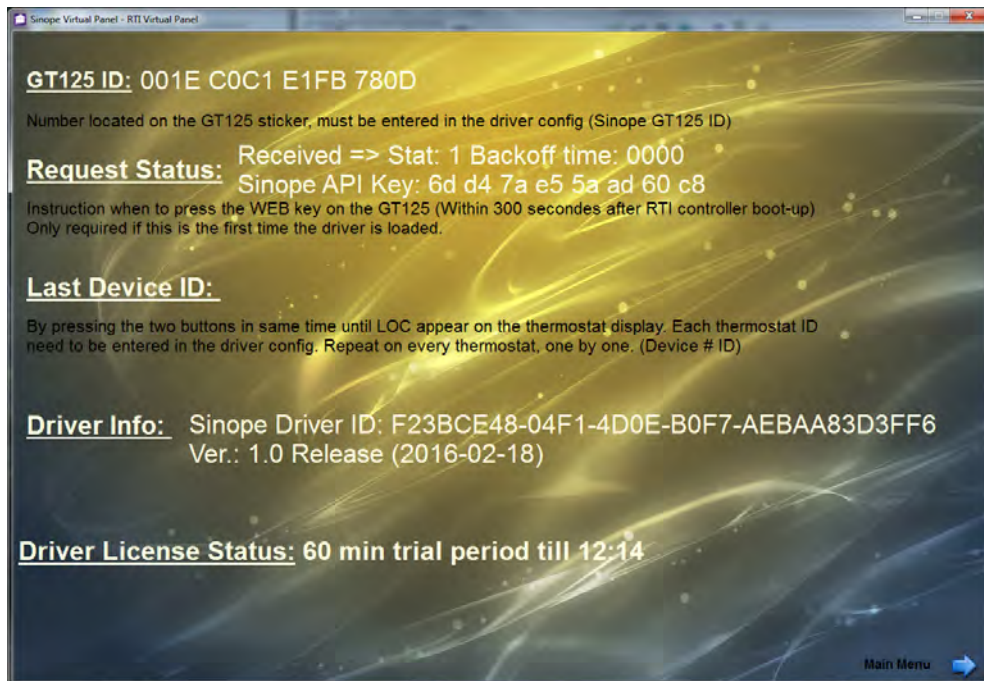
2.2.3 Pairing GT125 and XP processor

Sinope GT125 has been designed to maintain one TCP open connection with XP processor. Therefore the driver can handle one GT125 gateway per each driver's instance and the XP processor shall be paired with specific GT125 gateway. This is normally achieved by the procedure when XP processor sends to GT125 gateway the special API Key request using the hardware ID code written on the back of this specific GT125 gateway. Upon reception of the API Key request with valid GT125 hardware ID, the GT125 will return API Key that will be stored in XP processor. This API Key is used during login procedure that is required for successful pairing XP processor and GT125 gateway. XP processor will initiate login protocol by sending login request using both GT125 hardware ID and received API Key. GT125 will validate these parameters and on successful login will grant access for communications with Sinope network controlled by this GT125 gateway. Once paired, there is no future needs to repeat this process unless changing GT125 gateway or/and XP processor.

The process of pairing XP processor and GT125 gateway is automated by this driver. All what is needed is to press the Web button on the GT125 gateway within 5 minutes following first time driver upload. The message that will be displayed in the Driver Config page Request Status (see below) in the Integration Designer's demo project:



After pressing the Web button on GT125 gateway, the driver will receive API Key from GT125 and will pair the driver with GT125 gateway. The screen should change as on the following screenshot:



After the pairing was done, all future XP processor boot ups will not require anymore pairing as all information will be stored in the XP processor. In case the processor memory need to be reset, the driver with empty hardware ID shall be loaded into XP processor, which will erase any previous settings of API Key configuration.

2.2.4 Poll rate

Driver was designed to poll each thermostat in the network by sending parameter read requests to GT125 gateway that in turn will request this information from specific thermostat. Same way any data that shall be written into specific thermostat will be sent to GT125 gateway that will forward it to the thermostat. Due to the mesh network topology there will be some propagation delay depends on the number thermostats in the network and by the propagation delay of each thermostat. In average, each command takes about 300 mS to travel to destination and get back to RTI. Therefore to minimize the payload for the network, commands were split onto most important and less important commands. Most important commands are SETPOINT MODE, ROOM SETPOINT and HEAT LEVEL as they may change rapidly as a result on the customer control request. All remaining commands were grouped under slow poll.

The following two settings allow to adjust fast and slow poll rate depends on the customer's network configuration.

2.2.5 Fast Refresh Rate

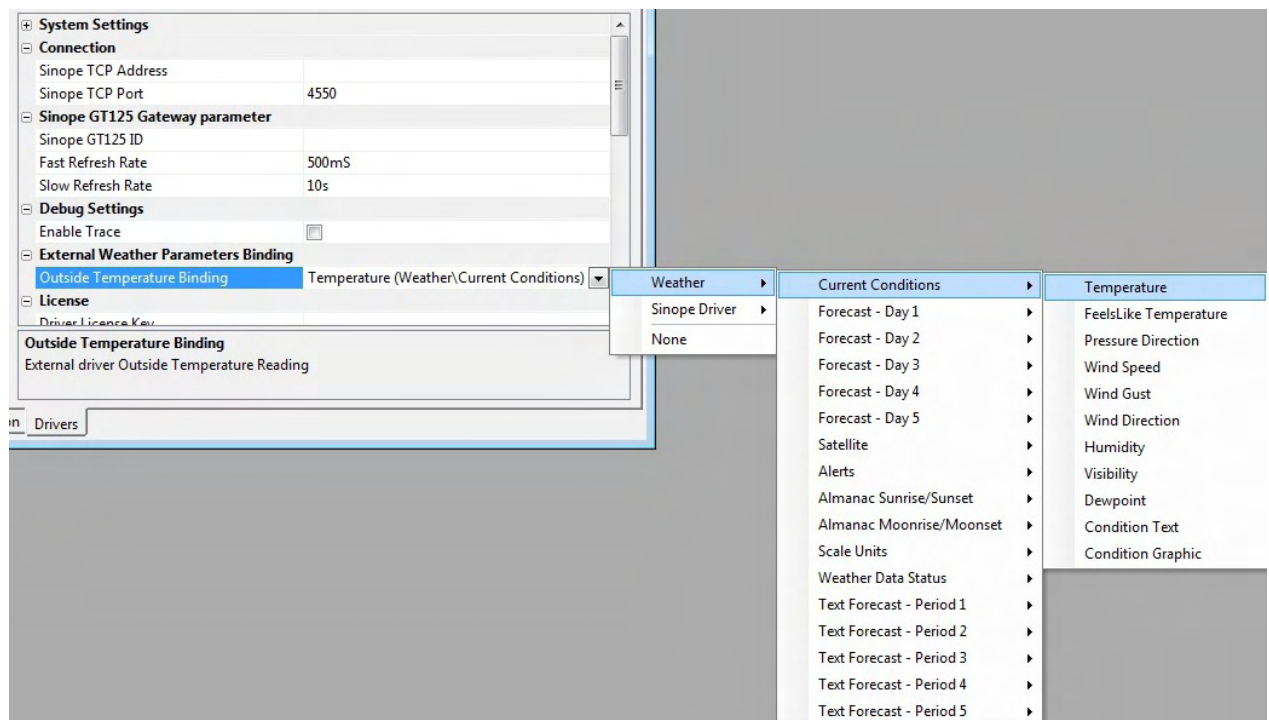
Select desired fast poll rate. Too fast poll may cause thermostat become non-responsive therefore the rule of thumb is to allocate 0.3s per each thermostat. For example, for 5 thermostats, 1.5 seconds will be required. Therefore, the next higher value rating of 3 seconds shall be selected.

2.2.6 Slow Refresh Rate

Select desired slow poll rate. Similar to the previous setting, too low rating may cause buffer overflow as the propagation delay may slow down the reception of data. The rule of thumb for slow rate is to select 2.5 seconds per each thermostat on the network plus the value selected in the previous step (fast rate). For the same example, 5 thermostats will require $5 \times 2.5 = 12.5$ seconds plus 3 seconds, which gives us 15.5 seconds. 20 seconds slow refresh rate will be selected.

2.2.7 Outside temperature binding

Sinope thermostats can display external temperature that is useful feature: provides quick advise when selecting your dress or selecting energy saving temperature for extreme cold conditions. There are multiple sources of the outside temperature. By default, Sinope cloud server broadcasts outside temperature based on the information set in WEB API. Or this temperature can be obtained from other driver. In this case this external driver temperature shall be connected with Sinope driver via Outside temperature binding. Prior to do so, the external driver containing outside temperature shall be installed. RTI provides very powerful weather driver that can be used for this purpose. Once install, the current outside temperature can be bound using the Outside Temperature Binding selector. See the following snapshot for more details:



2.2.8 Driver License Key

RTI driver for Sinope thermostats can be tested during trial period (1 hour) with all functionality available. Upon reaching the end of the trial period the valid driver license key shall be entered here to unlock the trial version. License key is generated for the specific RTI processor MAC address. For driver license availability, please, contact OD Control team via email: info@odcontrol.com

2.2.9 System Temperature Format

Sinope thermostats internally always keep temperature readings in °C. RTI driver provides the option that allows displaying all temperatures in °F for all thermostats. Select desired temperature format for the entire Sinope network using the System Temperature Format selector. In addition, each individual thermostat can be selected to display temperature in desired format using local thermostat control buttons (will be discussed below).

2.2.10 Sinope Network size

Specify maximum number of Sinope thermostats in the network. This driver supports up to 64 thermostats per each GT125 gateway. Higher thermostats quantities may become less practical due to high propagation delay causing by polling of high number of Sinope devices. Should the higher number of thermostats required in the network, multiple GT125 gateways shall be used for this purpose.

Once number of thermostats will be selected, they will be show up in the section below, where each individual thermostat can be specified.

2.2.11 Sinope Thermostat Devices

Each thermostat shall be mapped/paired to the network. This process includes providing Name and Network ID for each thermostat.

2.2.12 Device Name

Each thermostat shall have its name, which can be changed in Integration Designer based on customer's needs. This name lately will appear in Integration Designer while designing pages for various Displays and Virtual Panels.

2.2.13 Device ID


This network Device ID corresponding to Device Name. It shall be obtained when pairing (linking) each thermostat with GT125 gateway. This ID will be obtained during linking process. If there is no device used under the Device Name leave Device ID at zero. None-zero Device ID will automatically engage polling this device, which will slow down TCP communication if no such device exists in the network.

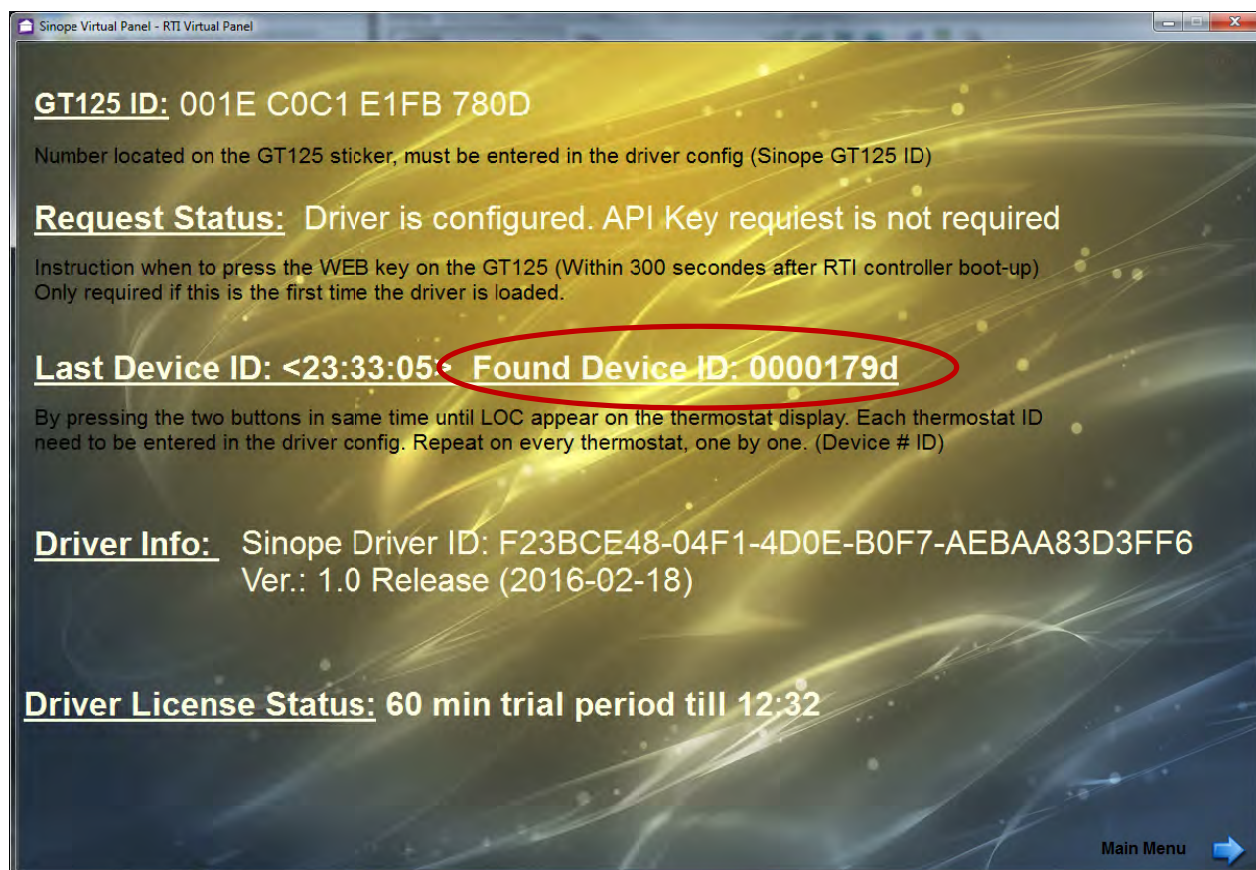
2.3 Sinope Thermostat pairing (linking) to GT125

Prior to start adding thermostats to the network, upload RTI-Sinope driver with configured IP address to the RTI processor. Open Virtual Pane demo system file (Sinope Thermostat Demo.rti) and save the Virtual Panel into executable file. Start this file and open Driver Config Page.

To start pairing/linking process, press link button  on the GT125 device. The green LED will start flashing indicating that GT125 is in pairing/ linking mode.

Then press simultaneously two buttons on the thermostat that needs to be linked with GT125. The

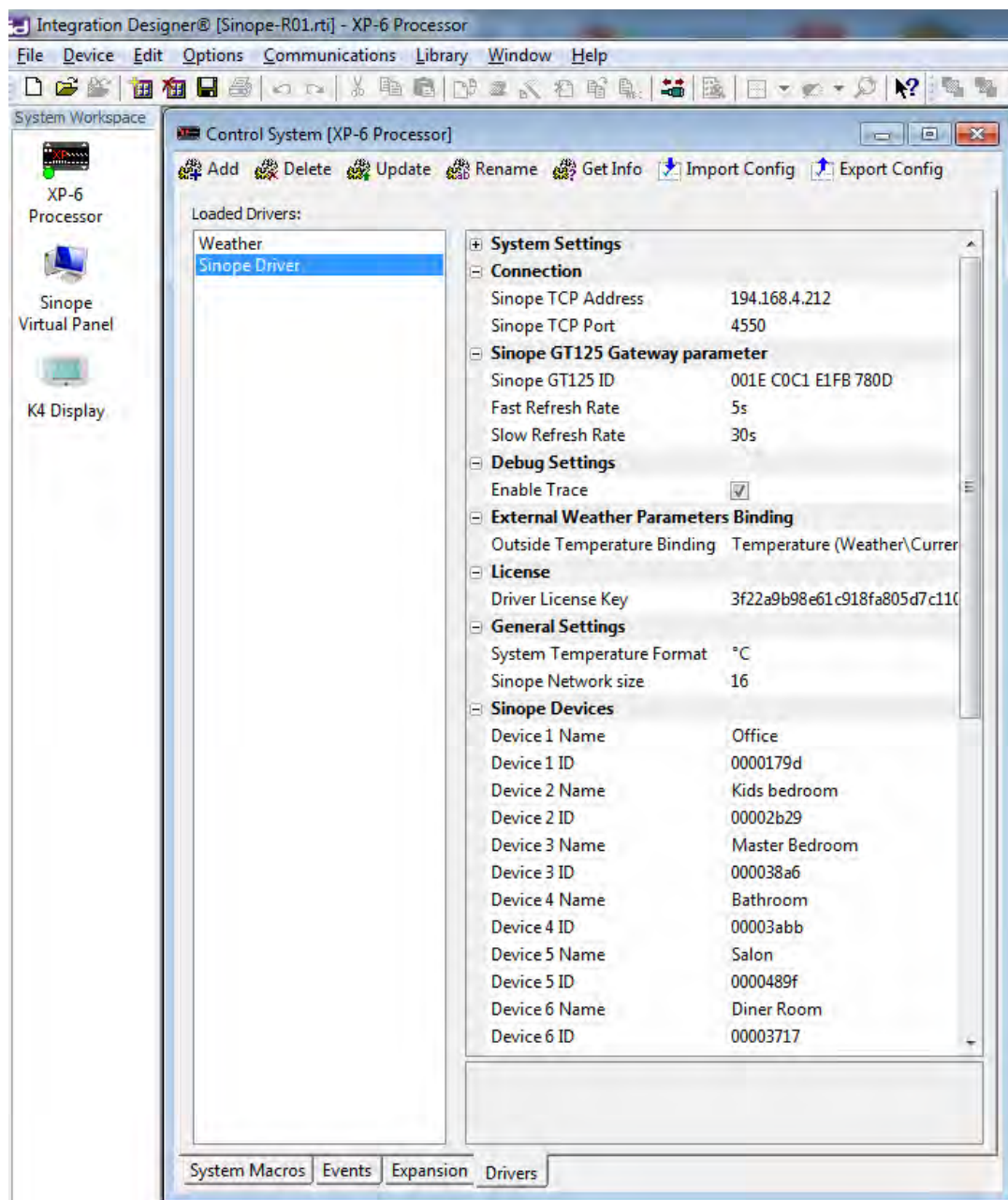
thermostat will show symbol  that indicates that the linking is in process. Monitor Last Device ID field at the Driver Config Page until thermostat network ID will appear. Note this 8-digit number (similar to 00002ba5) and enter it in the Device ID field below the device name corresponding to the selected thermostat. See the following snapshot as an example of the thermostat response on the pressing two buttons on the thermostat:



Repeat this step (pressing two buttons and entering ID) for all thermostats that shall be connected to the GT125 gateway (enter each thermostat to Sinope network).

Once completed, Sinope thermostat network is ready to be used.

The driver's configuration shall look similar to the following screenshot:



3. Driver System Variables

3.1 System Variables overview

Sinope driver has 19 system variables per each thermostat, 11 general system variables and one communication status system variable.

3.2 Thermostat system variables

The following table provides an overview on thermostat system variables.

System Variable	Format	Description
Room Temperature	integer	Room temperature in increments of 0.01 degrees. Example, 25°C = 2500, 72°F = 7200
Outdoor Temperature	integer	Outdoor temperature in increments of 0.01 degrees. Example, -15°C = -1500, 100°F = 10000
Room Setpoint	integer	Room setpoint in increments of 0.01 degrees. Example, 25°C = 2500, 72°F = 7200. Min value: 500 (5°C/F). Max value: 8600 (86°F). If measuring in °C, the max value will be limited to 30°C by software.
Min Setpoint	integer	Room minimum setpoint in increments of 0.01 degrees. Example, 25°C = 2500, 72°F = 7200. Min value: 500 (5°C/F). Max value: 8600 (86°F). If measuring in °C, the max value will be limited to 30°C by software.
Max Setpoint	integer	Room maximum setpoint in increments of 0.01 degrees. Example, 25°C = 2500, 72°F = 7200. Min value: 500 (5°C/F). Max value: 8600 (86°F). If measuring in °C, the max value will be limited to 30°C by software.
Away Setpoint	integer	Room away setpoint in increments of 0.01 degrees. Example, 25°C = 2500, 72°F = 7200. Min value: 500 (5°C/F). Max value: 8600 (86°F). If measuring in °C, the max value will be limited to 30°C by software.
Setpoint Mode	integer	Setpoint mode: 0 – OFF 1 – Freeze Protect 2 – Manual (Hold) 3 – Auto (Schedule) 5 – Away 129 – Bypass Freeze Protect 131 – Bypass Auto 133 – Bypass Away
Heat Level	integer	Heat level in % of full load. Value range: 0-100
Cycle Length	boolean	Heat cycle length: false (0) – Baseboard short cycle true (1) – Fan-forced long cycle (15 min)
Local Time	string	Local time in format: hh:mm:aa
Local Date	string	Local date in format: yyyy/mm/dd
Occupancy Setback	boolean	Occupancy setback: False (0) – None True (1) – Away
Display Format	boolean	Display format: False (0) - °C True (1) - °F
Time Format	boolean	Time format: False (0) – 24hr True (1) – 12hr (am/pm)

System Variable	Format	Description
Keyboard Lock	boolean	Thermostat keypad lock: False (0) – Unlocked True (1) – Locked
Backlight Idle	boolean	Thermostat backlight idle mode control: False (0) – Off (only On when pressing buttons) True (1) – Full On (Always On)
Secondary Display	boolean	Secondary display: False (0) – Default (room setpoint) True (1) – Outdoor temperature
Early Heat Start	boolean	Anticipated (early) heat start: False (0) – Disabled True (1) – Enabled Once enabled, thermostat will turn heat on to warm up the room to the setpoint value by the time specified in the schedule. Otherwise, the thermostat will turn the heat on at the time specified by the schedule.
Load Value	integer	Load value in watts of the heater (full load value).
Average Room Temperature	integer	Calculated average room temperature of the Sinope network. Takes average of all room temperature readings from all thermostats in this network.

3.3 General system variables

The following table provides an overview on general system variables.

System Variable	Format	Description
Sinope Driver Info	string	Long string providing driver ID, driver version and driver release date
Sinope Driver Version	string	Short string providing driver version and release date
Key Request Status	string	API Key request status and guidance when to press Web button on GT125
Sinope ID	string	GT125 network ID after driver successful login on GT125
Sinope Key	string	API Key value received after pressing Web button on GT125
Sinope number devices on net	integer	Number of Sinope thermostats on the network (should correspond to number of thermostat IDs entered in driver configuration)
Sinope Thermostat ID	string	Status of latest Sinope thermostat reported its link after pressing two buttons on the thermostat
License Status	string	Status of the driver license validity period.
Display Temperature Format	boolean	Global display temperature format for whole system. False (0) - °C True (1) - °F
Data Refresh Rate	integer	Data fast poll refresh rate – shall be the one specified in driver's config
Sinope Command Queue Length	integer	Number of commands in the command queues. Can be used to validate if fast and slow poll rate was selected properly. Properly selected rates will allow command queue length going down to zero. If the queue length never reaches zero, the propagation delay of the entire network is long and doesn't allow empty command buffer fast enough. Polling time shall be increased.
TCP Connection status	string	Driver TCP connection status – Connected/Disconnected

4. Driver System Functions

4.1 System Functions overview

Sinope driver includes two generic commands to control TCP command polling, 3 commands to communicate with GT125 gateway and 6 commands for interface with thermostats.

4.2 Communication Control System Functions

System Function	Parameter	Description
Start Driver	None	Start TCP communication and polling data from thermostats
Stop Driver	None	Stop polling data from thermostats. Will empty command buffer (queue) and switch to idle mode. TCP connection will remain active (connected).

4.3 GT125 Gateway Interface System Functions

The following table provides an overview on GT125 gateway interface system functions.

System Function	Parameter	Description
Read Parameter	Param	Params - parameter to read (selector)
Write Parameter	Param, SingleValue	Param - parameter to write (selector) SingleValue – value of the parameter to be written
Toggle Parameter	Param	Param – on of Boolean parameters to be changed (toggled). Only Occupancy setback is supported by GT125
Set Thermostat Mode	Mode, Device	Mode – one of 8 known mode codes to be written (selector) Device - destination device name which mode will be changed

4.4 TH1120 Thermostat Interface System Functions

The following table provides an overview on thermostat interface system functions.

System Function	Parameter	Description
Read Parameter	Params, Device	Params - parameter to read Device – destination device name containing parameter to read
Write Parameter	Param, SingleValue , Device	Param - parameter to write (selector) SingleValue – value of the parameter to be written Device – destination device name containing parameter to be written to
Change Setpoint	Param, Temperature , Device	Param – on of four temperatures to be changed Temperature – Temperature in °C to be written in the thermostat Device - destination device name containing temperature to be written to
Move Setpoint	Param, Direction, Device	Param – on of four temperatures to be changed Direction – Move setpoint Up or Down Device - destination device name containing temperature to be written to

System Function	Parameter	Description
Toggle Thermostat Parameter	Param, Device	Param – on of Boolean parameters to be changed (toggled) Device - destination device name containing parameter to be changed
Set Thermostat Mode	Mode, Device	Mode – one of 8 known mode codes to be written (selector) Device - destination device name which mode will be changed