

ITS solar CtrlPro 3050 manual

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ITS recommends that the installation be done by a person with knowledge and experience in the electrical/electronic field. This manual is written to help such a person understand how this system fits together and not give a step by step beginners guide to controller installation and functioning.

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1 CUSTOMER INFORMATION

Dear customer. Thank you for choosing the ITS Control-Pro 3050 micro controller based differential temperature solar controller! Some of the key features of this controller are:

- Advanced control features.
- Advanced protection features.
- Incredible value for money.

All control parameters are based on international standards and have been pre-programmed into the controller. Should a specific installation require these parameters to be altered it can be done by ITS. The controller has a programming interface that can be used to upload new control parameters on site. The controller should be installed by a qualified person.

2 PC SOFTWARE INSTALLATION

The PC software consists of 2 parts. Part one is the installation of the CP2101 USB driver and part 2 is the actual CtrlPro 3050 program. Do not connect the USB remote to your PC before the software installation is complete.

2.1 Extract all Virtual COM Port Drivers

Initial software setup requires running **CP2101_Drivers.exe** to extract all of the device drivers (Windows and Macintosh). After following the prompts, the utility will copy the driver files to a specified directory or the default directory, “C:\Cygna\CP2101”. Each set of drivers will be extracted to an appropriately named directory, for example WIN, MAC9, and MAC10

2.2 Install Windows Virtual COM Port Driver

To install the Windows virtual COM port driver, run **Setup.exe** located in the WIN directory created in Section 2.1. Driver files are installed into the “C:\Program Files\Cygna\CP2101 USB to UART Bridge Controller” directory. COM port properties for the device can be selected in the device manager (COM port number, baud rate etc.). The baud rate should be set to 9600.

2.3 Install Macintosh Virtual COM Port Driver

To install the Macintosh OSX virtual COM port driver, extract the **cardinal-osx-V1_00c-release.zip** file located in the MAC10 directory created in Section 2.1. Next, run the extracted file **CygnaUSBToRS232Installer**.

To install the Macintosh OS9 virtual COM port driver, extract the **cardinal-os9-V3_00a-free.sit** file located in the MAC9 directory created in Section 2.1. Next, run the extracted file **Installer**.

2.4 Install CtrlPro 3050

To install the CtrlPro 3050 program simply copy the CtrlPro3050.exe file from the installation disk to preferred directory. Please note that when downloading stored information from the CtrlPro 3050 controller it will be saved as a .CSV file in the same directory that CtrlPro3050.exe is.

The USB remote can now be plugged in and CtrlPro3050 can be started by running CtrlPro3050.exe.

3 INSTALLING THE CONTROLLER

Installation of the controller should be done in accordance to the system diagram for the software loaded on the controller.

The AC terminals should be connected to 220V mains. The cable used should be able to handle all the output loads the controller must drive.

The temperature sensor inputs are labelled T0 to T5.

T0 and T1 (if populated) is for connection to PT1000 sensors only.

T2 to T5 are for NTC10K sensors only.

The controller outputs are labelled OP1 to OP7. All outputs are 220V with a maximum current rating of 5A.

Outputs OP2, OP3, OP6 and OP7 are 2 way outputs. On all these the terminal number 2 is the N line while terminal 1 is the normally open (only Live 220V when the relevant output is switched on) and terminal 3 is the normally closed output (only Live 220V when the relevant output is switched off).

When powering the controller the red status LED on the controller should be flashing. This means that the controller is running through the normal program. If the red light is on all the time it means that the controller is in the bootloader state and waiting for software to be uploaded.

The RF Link RX and TX LEDs will only flash while the controller is communicating via the RF dongle with the PC.

4 OPERATING YOUR CTRLPRO3050

The USB remote can now be plugged in and CtrlPro3050 can be started by running CtrlPro3050.exe. The USB remote will register on your PC as a COM PORT. The COM PORT number can be changed under device manager to this.

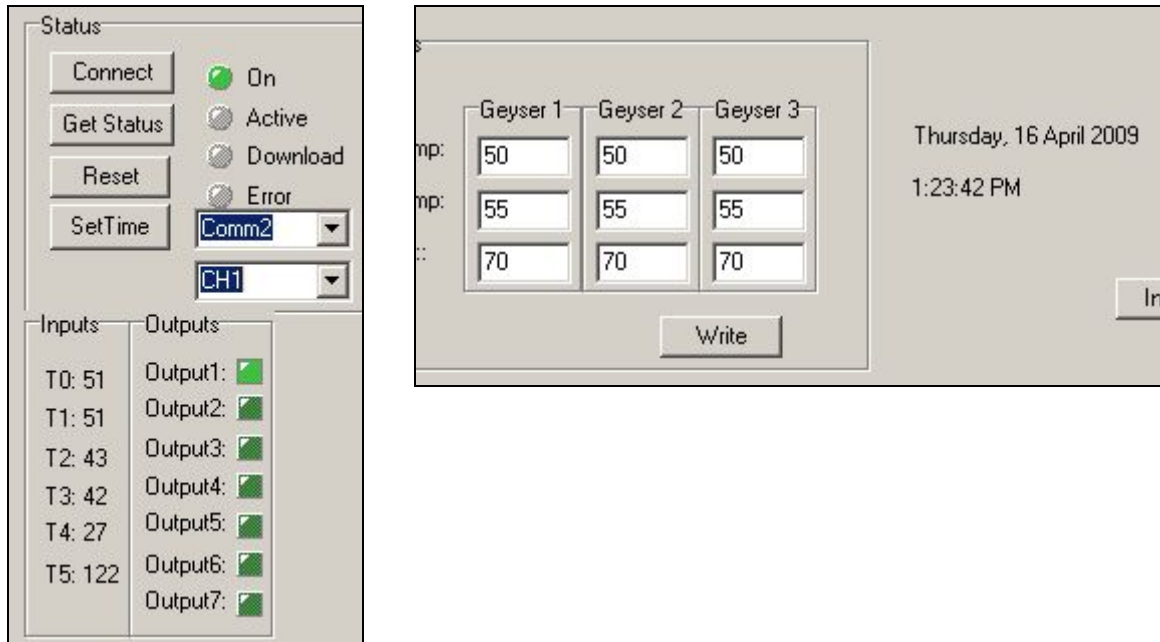


Figure 1: Status after Connect showing temperatures, time & date and output status

On the main page of the CtrlPro3050 you can select the COM port to connect to as well as the channel as shown in Figure 1.

Select the ComPort that the USB remote registered as.

Also select the channel (default is CH1).

Click connect to connect to this port.

Now click on "Get Status".

Now the current status of the controller (temperatures of different sensors (T0 to T5), output statuses, Geyser Temperature settings and current time should be displayed as shown in Figure 1. If temperature sensors are not connected the temperature value might "float". T5 shows 122°C as no sensor is connected to the T5 input.

Please note that the RF link has a line-of-sight range of about 100 meters but inside a building and with other RF interference the link distance might be as low as only a couple of meters. When sending a command the RF Link TX LED on the USB dongle should flash. If the command was received by the controller and it responded the green RX LED on the USB dongle should flash. If the TX LED flashes but not the RX LED try and move closer to the controller. Always try to have the USD dongle as far away as the cable allows from your PC as the PC tends to generate a lot of RF interference.

4.1 Programming the geyser temperatures

The CtrlPro 3050 allows for the temperatures of up to 3 geysers to be set. The specific software loaded on the controller is always accompanied by a system diagram. This diagram will have the geyser numbering on.

| | Geyser 1 | Geyser 2 | Geyser 3 |
|------------------------|----------|----------|----------|
| Electrical Start Temp: | 50 | 50 | 50 |
| Electrical Stop Temp: | 55 | 55 | 55 |
| Max Geyser Temp: | 70 | 70 | 70 |

Write

Figure 2: Geyser electrical backup heating and geyser maximum temperature.

As shown in Figure 2 there is an electrical start and stop temperature for each geyser. These temperatures define at what temperature the electrical element of the geyser will switch on and what temperature the geyser must reach before it switches off again. For the values in Figure 2 the geyser element will only switch on if the geyser temperature falls below 50 °C and will remain on until the geyser temperature has reached 55°C. Of course this will only function if the time window is active.

The “Max Geyser Temp” parameter defines to what temperature the solar system is allowed to heat the geyser. So in the case in Figure 2 the solar system will be deactivated once the geyser has reached 70°C. This could mean that the circulation pump is either stopped, or the divert valves are activated to switch the solar bank to heat another application such as the swimming pool or underfloor heating.

All the values in Figure 2 can be edited by typing over the existing value and then clicking on the “Write” button.

4.2 Programming the Time Windows

The CtrlPro3050 has 3 time windows for every day for both the electrical element heating as well as the hot water ring (ringmains) pump.

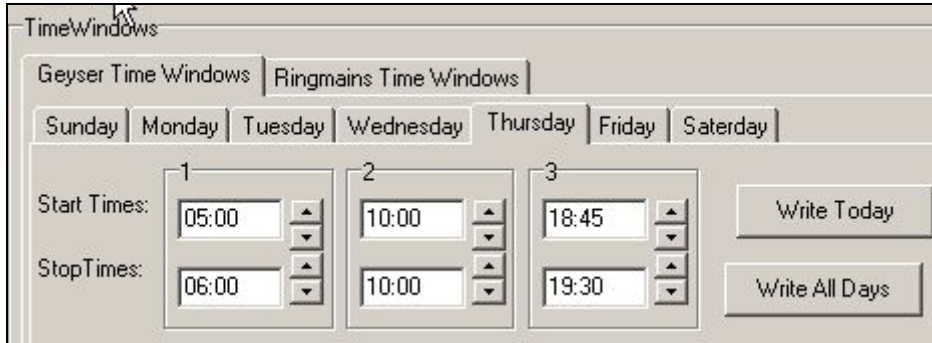


Figure 3: Geyser electrical backup and Ringmains time windows

To set the geyser electrical element times click on the “Geyser Time Windows” tab. Then click on the day to be set. Every one of the 3 windows for the day has a Start and a Stop time. These values can be edited and then saved by clicking on “Write Today”. If the same values are to be used for all days “Write All Days” can be clicked and the current day values will be saved to all the days of the week.

The setting in Figure 3 implies in practice is that between 05:00 and 06:00 in the morning and between 18:45 and 19:30 in the evening the geyser element will be allowed to switch on if the temperature is below the “Electrical Start Temp” temperature set in Figure 2. The element will continue to heat the geyser until it reaches the “Electrical Stop Temp” or the stop time of the time window.

4.3 Uploading software

Software uploading can only be done on Channel 1, which is the default channel. This should only be changed in situations where there is more than one controller operating in the same vicinity. On the "Setup" tab select "Upload Hex" and select the relevant xxx.hex file.

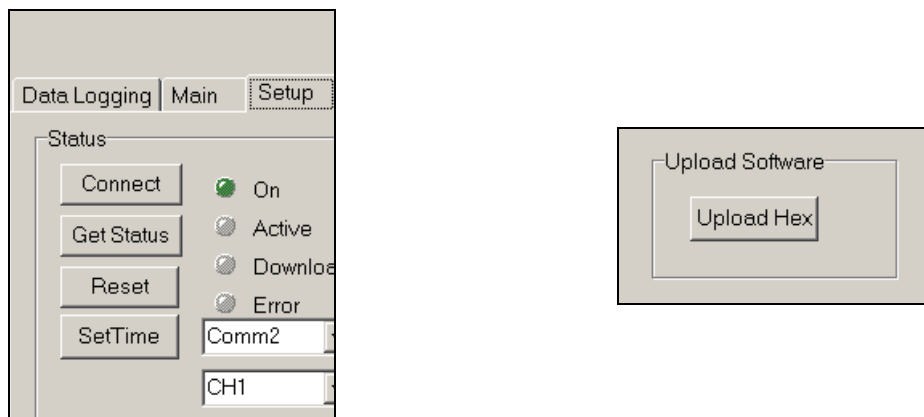


Figure 4: Uploading software to the controller

4.4 Data Logging

The CtrlPro3050 has a data logging feature which stores all the Temperature sensor values and Output statuses according to the logging interval. The logging interval can range from 1 minutes to 30 minutes.

The memory on the controller is a circular buffer that can accommodate 3275 entries before it loops back and over write itself. Thus if you have a logging interval of 1 minute and you download the log from the controller to your PC you will see the minute to minute activity of the system for the previous 3275 minutes (2.27 days). If the log interval is set to 10 minutes you will have the 22.7 days of information.

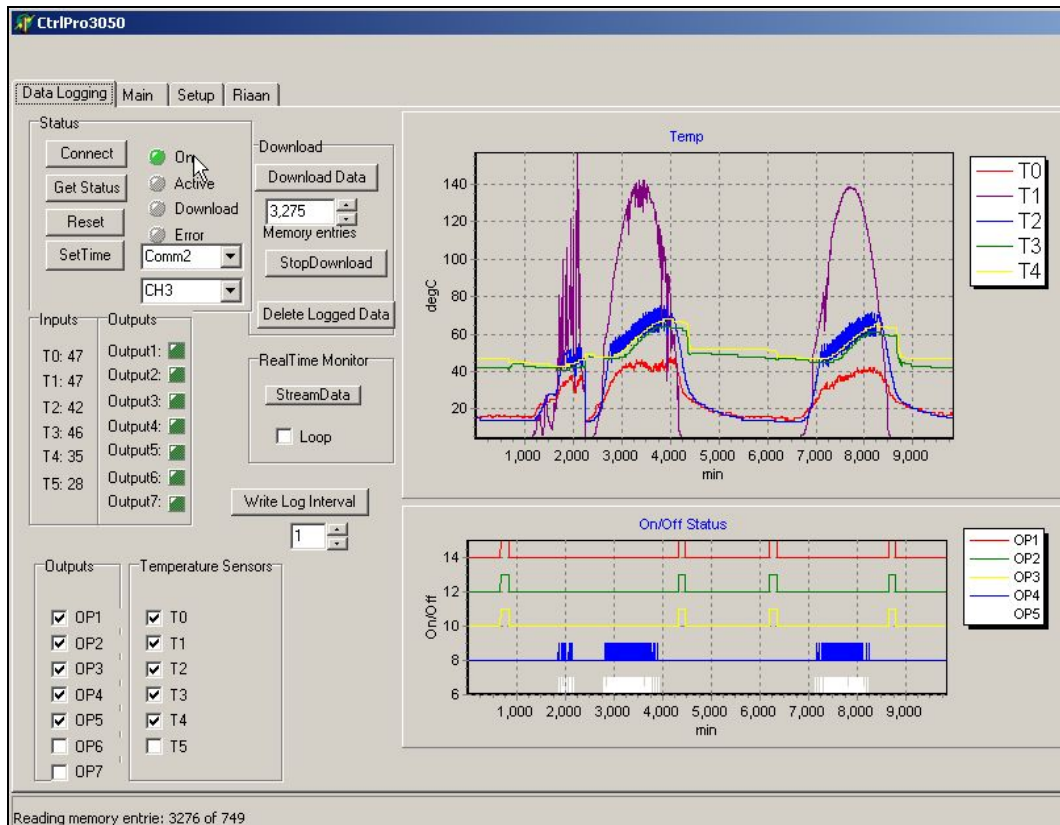


Figure 5: Logged data of temperatures and output states

Figure 5 shows the data logging tab of your CtrlPro3050 software. It has the same Status, Inputs and Outputs block as the Main tab. At the bottom left there are 2 block called Outputs and Temperature Sensors. In these blocks you can select what data you want the graphs on the right hand side to display. Now by clicking on “Download Data” the software will start to download data from the controller and plot it on the graphs. Right in the bottom left corner of Figure 5 you will see a status message “Reading memory entries 3276 of 749”. This indicates that all memory entries have been downloaded but at the time this specific download took place the circular memory buffer was at position 749. Therefore 749 was the last entry so to unwrap the data you would count back from there through 0 to 750. The Temperature graph shows the temperature sensor values and the On/Off status graph shows the statuses of the outputs of the controller.

The “Write Log Interval” is used to change the logging interval of the controller.

Real time data streaming can be done by ticking the loop block in the Real Time Monitor box and then clicking on “Stream Data”. The PC interface will now get the status every second and plot the information. You can stop the streaming by un-ticking the loop block again.

4.5 System Setup

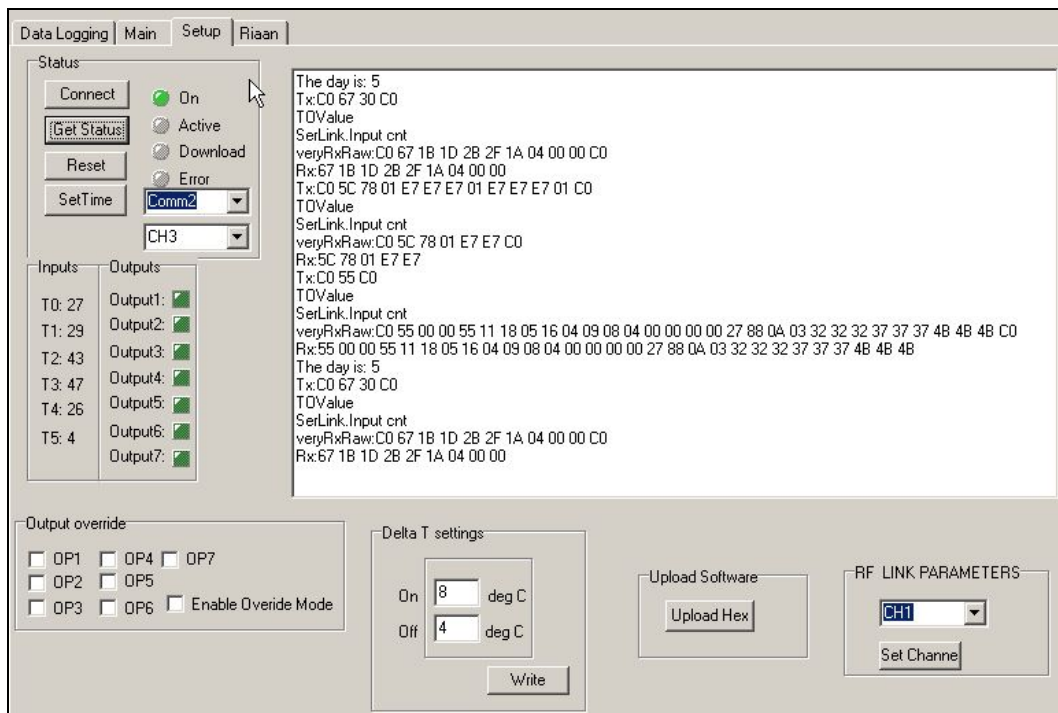


Figure 6: Controller setup interface

Figure 6 shows the Setup tab page of the CtrlPro3050 software. It has the same Status, Inputs and Outputs block as the Main tab page. This page is intended for use by the installer only and is only available on the installer version of the software.

The controller has 5 different frequency channels that it can operate on. The default is channel 1. When more than one controller is used within about 300m from each other you will need to program them to operate on different frequency channels. In the Status block you can select the channel that the PC interface operates on. In the above installation the controller used was programmed to CH3 and therefore to be able to communicate with it CH3 had to be selected and then “Connect” has to be clicked. After this the normal “Get Status etc can be used. To change the channel on which the controller communicates simply select a new channel in the “RF Link Parameters” block and click on “Set Channel”. Now click on “Reset” in the “Status” box. The controller will now be on the new channel so. To now communicate with this controller you have to select that channel in the “Status” box and then click on “Connect”.

The software on the CtrlPro 3050 controller can be changed by simply uploading a new program via the wireless PC interface. In this way the controller can be “changed” from being a single panel single geyser controller to a East and West facing solar collectors + geysers + swimming pool + underfloor heating system controller. ITS is constantly working on new “standard system” software for the CtrlPro and so we have a whole range of standard system software available. We can also customize the software for non standard systems.

Loading software onto the controller can only be done on CH1. To load new software onto the controller simply click on the “Upload Hex” button inside the “Upload Software” box at the right hand bottom of Figure 6. A window will now open that allows you to select the directory where the new software is stored. Select the program to load (it will be a *.hex file) and click ok. The software will now be loaded.

4.6 Differential Temperature settings

The Delta T for the solar pump on the controller can be changed by editing the values in the “Delta T settings” box and then clicking the “Write” button. These are default set to 4 and 8 which means that the solar pump will begin to circulate once the solar collector is 8°C warmer than the storage tank, and will cease to circulate once the difference reaches 4°C.

4.7 Manual override

One of the very handy features of the CtrlPro3050 is the manual override function. By ticking the “Enable Override Mode” tick in the “Output override” box each of the individual outputs can be switched on or off by ticking the relevant output inside the “Output override” box. This feature makes it very easy to test pump functionality, geyser elements, and motorized valve positions etc. before system commissioning. We recommend that after the override mode is used the controller must be reset by clicking the “Reset” button to avoid accidentally leaving it in this mode.

5 FAULTFINDING/TROUBLESHOOTING:

For faultfinding we recommend the use of a multimeter.

Possible fault conditions:

Nothing happens: See if the red status LED on the controller is flashing. This means that the controller is running through the normal program. If the red light is dead please measure that there is 220V connected to the controller. If there is 220V then check the internal fuse.

Controller not communicating: If the red status LED is flashing on the controller then try and move the USD dongle right next to the controller. Please note that the RF link has a line-of-sight range of about 100 meters, however inside a building and with other RF interference the link distance might be as low as only a couple of meters. When sending a command the RF Link TX led on the USB dongle should flash. If it does not please make sure that the dongle is connected to the PC and that the right serial port is selected. The PC software should also say if it does not see the dongle. If the command was received by the controller and it responded the green RX LED on the USB dongle should flash. If the TX LED flashes but not the RX LED try and move closer to the controller. Always try to have the USD dongle as far away as the cable allows from your PC (PCs tend to generate a lot of RF interference). If this does not help then make sure the dongle is set to CH1 and cycle the power of the controller and then try and Get Status.

Temperature reading wrong: Check the relevant temperature sensor by disconnecting it from the controller and measuring the resistance of the sensor. The tables below give the relevant resistance values for the PT1000 and NTC10K sensors for different temperatures.

PT1000 resistance values:

| | | | | | | | | | | | | | |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| Ω | 1000 | 1039 | 1077 | 1116 | 1155 | 1194 | 1232 | 1270 | 1309 | 1347 | 1385 | 1422 | 1460 |

NTC10K B=3950 resistance values:

| | | | | | | | | | | | | | |
|----|-------|-------|-------|------|------|------|------|------|------|-----|-----|-----|-----|
| °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| Ω | 33620 | 20174 | 12535 | 8037 | 5301 | 3588 | 2486 | 1759 | 1270 | 933 | 697 | 529 | 407 |

Output not working: Check if the relevant output LED on the controller lights up and if you can hear a click sound (relay switching). Measure for 220V on the relevant output terminal.

6 LIABILITY WAIVER

The manufacturer cannot monitor the compliance with these instructions or the circumstances and methods used for installation, operation and utilization of this controller. Improper installation can cause damage to the solar system and personal injury. For this reason we do not take responsibility and liability for losses, damages or cost that might arise due to improper installation, operation or wrong utilization and maintenance or that occur in some connection with the aforementioned. The manufacturer preserves the right to make changes to the product, or installation and operation instructions without prior notice. As soon as it becomes evident that safe operation is no longer possible (e.g. visible damage), please immediately take the device out of operation.