



# OZSCR2x00 Quick Start Guide

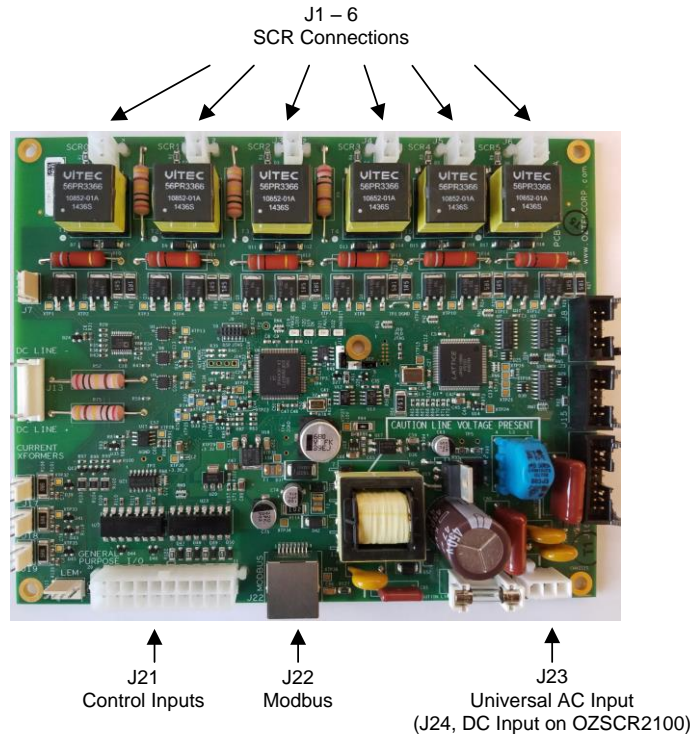
## Introduction

The OZSCR2000 and '2100 are state of the art, multifunction, digital SCR firing and control boards. They are ideally suited for a wide range of system applications including:

- Three Phase AC Switch
- Three Phase 6-Pulse Rectifiers
- Single Phase Rectifiers
- Independent Single Phase AC Switches

Configuration and operating parameters are easily changed using the RS485 Modbus interface and the Power Studio Configuration Tool.

This Quick Start guide provides step-by-step guidelines on how to get the a OZSCR2x00 up and running in a simple phase angle control configuration, as well as instructions on how to use the Configuration Tool to change some of the common configuration parameters.



Innovative Thinking for Power Control

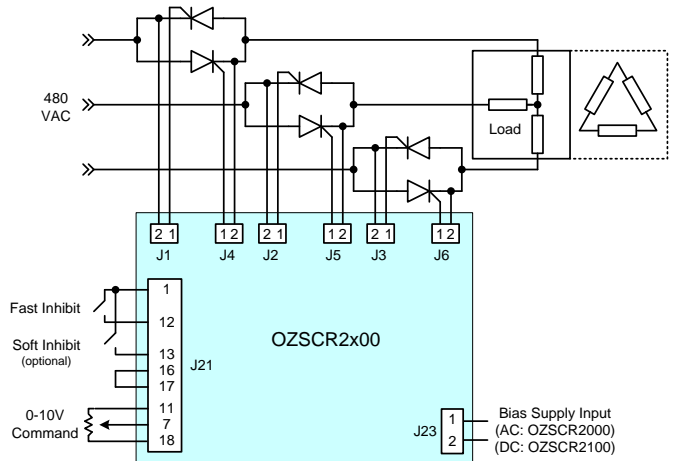
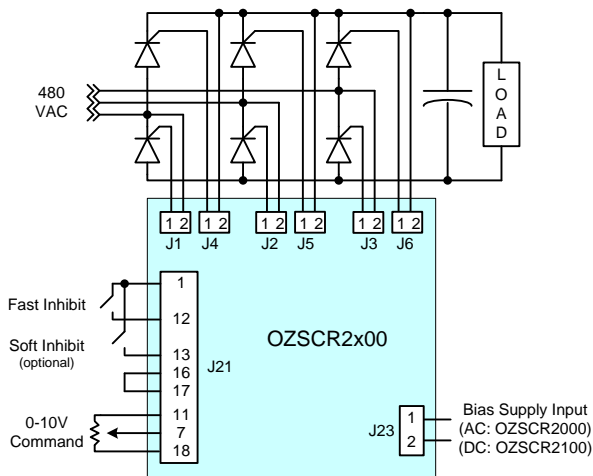
## Getting Started – Phase Angle Operation

By default, the OZSCR2x00 is configured to operate in open loop phase control mode with the following settings:

- 0-10V Control Input
- Soft Start/Stop Disabled
- 3-Phase Bridge Converter

The figures below provide system wiring diagrams for phase control of both rectifier and AC switch applications.

*Note: If you are operating as an AC switch instead of a bridge converter or if you want to enable Soft Inhibit, please refer to the section below on how to use the Power Studio to change the appropriate parameters.*



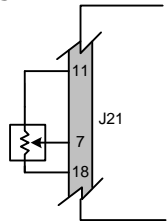
### Step 1: Making the Necessary Connections

1. **SCR Connections:** The 2 pin connectors J1-J6 are used to provide the drive signals to the SCR. Pin 2 should be connected to the cathode of the device and pin 1 to the gate.

Note: J1, J2, and J3 are used for line synching and must have their cathodes connected to the AC line. J4, J5, and J6 should be wired to the complementary devices of J1, J2, and J3, respectively.

2. **Control Connections:**

- a. **Fast Inhibit:** Provide a single pole, single throw (SPST) switch between pins 1 and 12 of J21. When the switch is open firing will be inhibited.
- b. **Soft Inhibit (optional):** Provide a SPST switch between pins 1 and 13 of J21. When the switch is open firing will be inhibited. This input must be enabled using the Configuration Tool described later in this guide.
- c. **Inhibit Return:** Provide a connection between pins 16 and 17 for the digital ground.
- d. **Phase Angle Control:** A 0-10V control signal can be derived using a potentiometer wired according to the figure below.



3. **Bias Power Connection (OZSCR2000):** Connect J23 to Universal Input Power (100-240 Vac / 50-60 Hz).
4. **Bias Power Connection (OZSCR2100):** Connect J24 pin 1 to +24VDC, and pin 2 to 24V return.

### Step 2: Applying Power



**CAUTION:** Before applying power ensure that the Fast and Soft Inhibit switches are in the open position and the potentiometer is set to the extreme, such that 0V is applied to the control pin 7, i.e. zero ohms between pins 7 and 18.

1. **Apply Bias Power to J23 or J24:** This will power up the OZSCR2x00 control circuitry. There are four LEDs on the board:

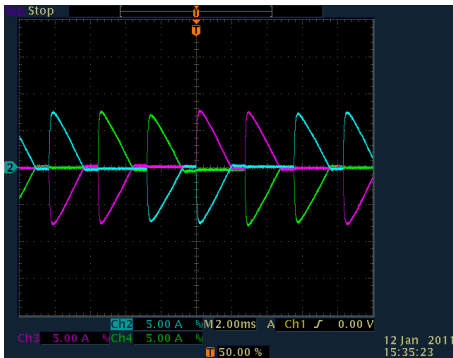
- SYS\_OK Heart Beat – Green
- INHIBIT – Red
- PHASE\_LOSS – Red
- FAULT – Red

At this point the "SYS\_OK" LED should be blinking green to indicate that the OZSCR2x00 passed all self health checks and is operating normally. The "INHIBIT" LED should be lit since both the Fast and Soft inhibit switches are open and therefore active. The "PHASE\_LOSS" LED should also be lit since the AC mains have not yet been applied to the board. The "FAULT" LED should not be lit as there should be no hardware faults at this point.

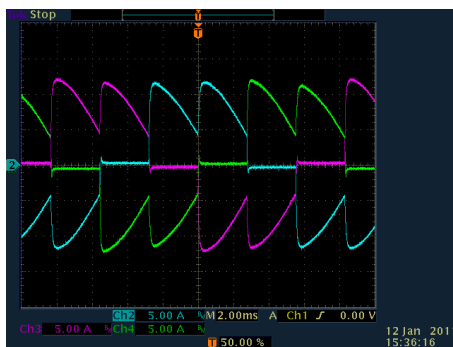
2. **Apply 480 Vac Line Power:** Once line voltage is applied to the system, the OZSCR2x00's phase locked loop (PLL) should synchronize, and the controller is ready for operation. Once synchronized, the "PHASE\_LOSS" LED should now be off.

### Step 3: Enabling the Controller

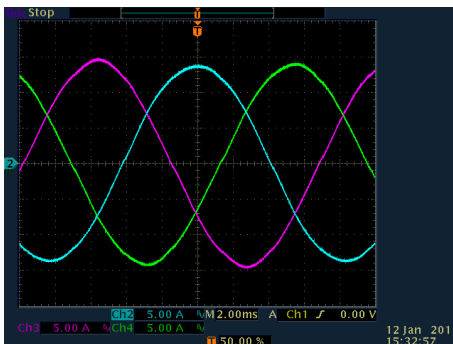
1. **Enable the Controller:** Close the Fast Inhibit switch and the Soft Inhibit switch; the "INHIBIT" LED should turn off. At this point the OZSCR2x00 will provide firing pulses to the SCRs. However, since the potentiometer was set to apply a 0V control signal, the SCRs should not be conducting.



**Figure 1 - 25% Load power**



**Figure 2 - 50% Load Power**



**Figure 3 - 100% Load Power**

2. **Increase the Output Power:** By slowly turning the potentiometer and increasing the control voltage, the SCR firing angle will advance and apply more power to the load. The figures to the left illustrate the input line current waveforms at 25%, 50%, and 100% load power.
3. **Using Soft Inhibit:** If this input has been enabled, opening the switch connected to the Soft Inhibit input on J21 pin 13 will cause the SCR firing angle to increase from the command angle to the maximum phase angle before firing is inhibited.  
  
When the switch is closed, SCR firing will begin at the maximum phase angle and ramp down to the command angle. Note that the soft start and stop ramp rates can be configured using Power Studio.
4. **Using Fast Inhibit:** Opening the switch connected to the Fast Inhibit input on J21 pin 12 will cause the SCR firing to immediately cease.

When the switch is closed, SCR firing will begin at the command angle.

## Using Oztek Power Studio to Change Configuration

Oztek Power Studio is a Windows based Graphical User Interface (GUI) that provides a simple, easy to use method for monitoring and configuring an OZSCR2x00 control board. For details on installation and the complete Power Studio feature set, please refer to the Power Studio User's Manual. For the purposes of this Quick Start Guide, step-by-step instructions will be given to demonstrate how to change two of the most common configuration settings:

- **Operating Mode (switch versus converter control, 3-phase versus single phase)**
- **Soft Inhibit Input Enable**

In addition to the Power Studio software, you will need an RS-485 adapter. There are many different products available for this purpose. Oztek recommends the B&B Electronics USPTL4-LS <http://www.bb-elec.com> .

### **Step 1: Installation & Setup**

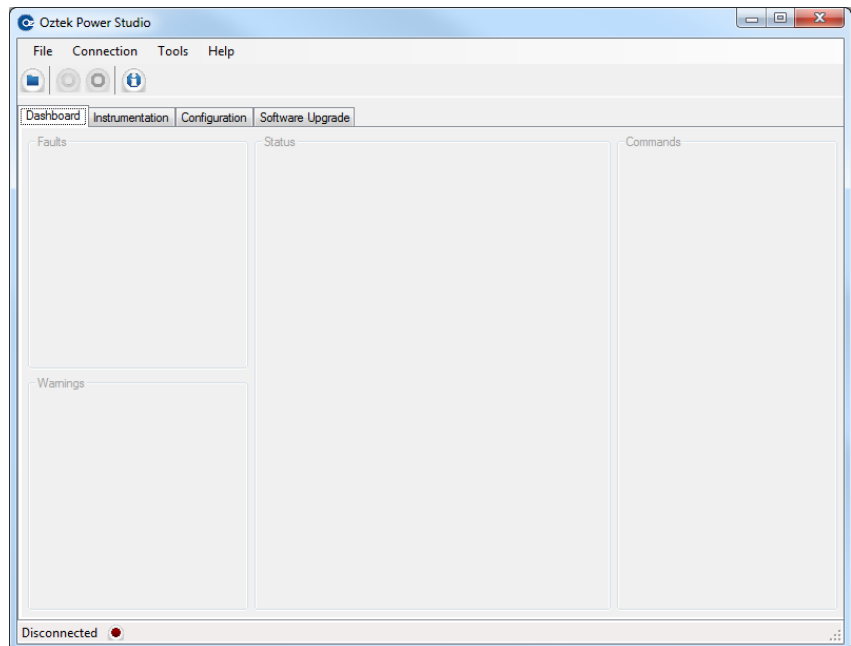
Before installing Power Studio, be sure to install any necessary drivers for the chosen RS-485 adapter. After the drivers are installed, Power Studio can be installed as follows:


1. Download the setup program, *SW90216\_setup\_<version>.exe*, from <http://www.oztekcorp.com>.
2. Double click on *SW90216\_setup\_<version>.exe* to open the installer wizard and follow the step-by-step instructions.

### **Step 2: Using Power Studio**

Power Studio can be launched by clicking on the Desktop shortcut or in the corresponding START menu folder. When Power Studio is launched, the window on the right will be shown. The tool consists of a series of tabs, each with its own functionality. The tool bar and shortcut bar at the top can be used to configure the Tool and access secondary functions. The status bar at the bottom displays operating information.

Before using Power Studio, a Target Profile file must be loaded for the device being used. To load the SCR's Target Profile, use the **File -> Open Target Profile** menu item or the folder button on the shortcut bar and navigate to *TPR-90216-90217-001.xml* which can be downloaded from the Oztek website.

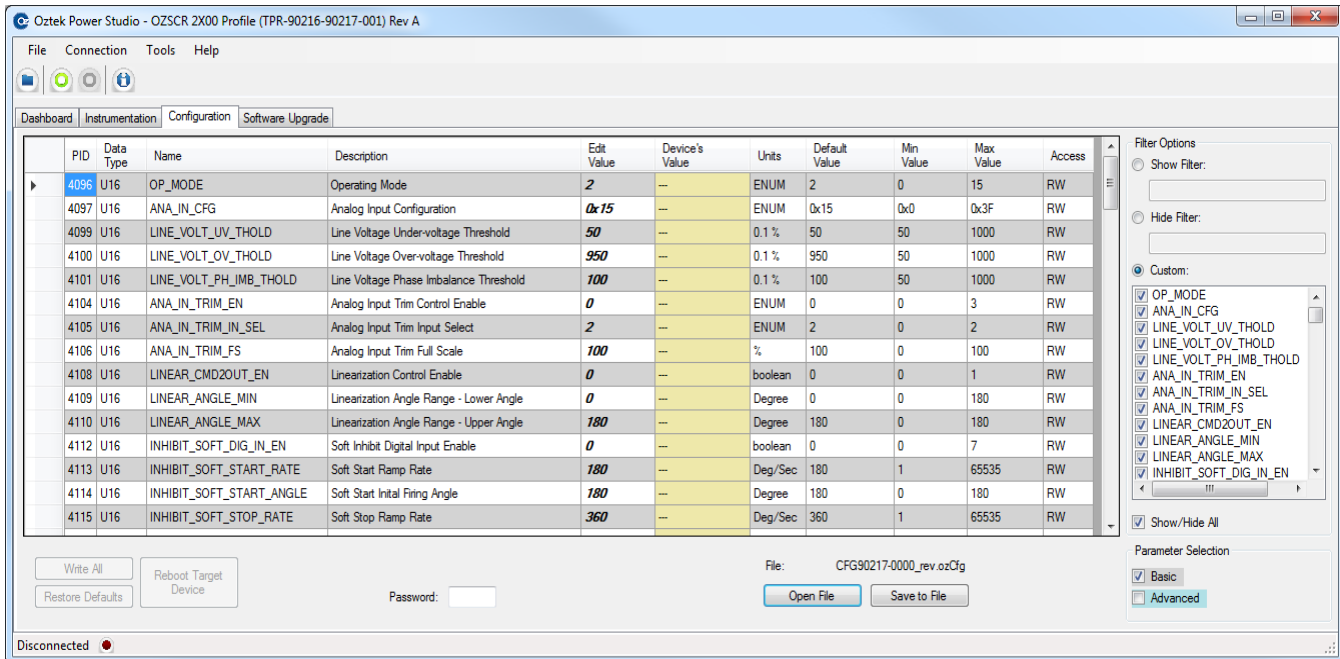


After loading a Target Profile file, communications can be established with the SCR board. This is done by first selecting the correct serial port in the **Connection -> Select Port** menu item and then selecting the **Connection -> Connect** menu item or by pressing the green circle  button on the shortcut bar.

The Configuration Tab can be used to read or modify various configuration settings on the OZSCR2x00 board. Click on the **Configuration** tab to switch to it. All configuration parameters are non-volatile, i.e. they persist even when power is removed from the SCR board. For more details on the OZSCR2x00 configuration parameters, please consult the User's Manual (UM-0054).

### **Step 2: Changing the Operating Mode and Soft Inhibit Enable**

To access configuration parameters, open the configuration file *CFG90217-0000\_rev<revision>.ozCfg* via the **Open File** button. This file can be downloaded from the Oztek website. It is used to display and store parameter settings for the target OZSCR2000 board. Once this file has been opened, the default Configuration view is shown on the right. The Configuration Tab consists of three sections: The Parameter Table, Sort Options, and Control Actions.




Note that the "Device's Value" column is initially a tan color with hyphens for the data. This means that the data has not yet been read from the OZSCR2x00. Connect to the device to read the data and populate this column.

After Power Studio reads the device's data, any data in the "Edit Value" column (from the 'ozCfg' file) that does not match the Device's value will be highlighted in red. Hitting the "Write All" button will force the tool to write all of the Edit Value data to the Target. To change just the Operating Mode and Soft Inhibit Enable settings, the instructions are as follows:

- Uncheck the "Show/Hide All" box in the lower right hand corner
- Click the check box next to the following parameters:
  - OP\_MODE
  - INHIBIT\_SOFT\_DIG\_IN\_EN
- At this point only those two parameters should be displayed in the main window
- Connect to the target device if not already connected
- Enter your desired operating mode in the OP\_MODE parameter's "Edit Value" box ('0' for 3-phase AC switch controller with open loop phase control, '2' for 3-phase AC bridge converter with open loop phase control)
- Enter '1' in the INHIBIT\_SOFT\_DIG\_IN\_EN parameter's "Edit Value" box to enable the use of the Soft Inhibit input pin. Entering '0' will disable the Soft Inhibit feature and the corresponding input pin will be ignored
- Hit the **Reboot Target Device** button to load the updated configuration parameters for use by the application (this is normally done automatically by the controller each time the board powers up)

You have now successfully changed the configuration! You can proceed with using the board in the application, leaving the Power Studio tool connected in case you'd like to make further changes, or you can disconnect by

selecting the **Connection -> Disconnect** menu item, pressing the red circle button  on the tool bar, or just closing the application.

## Support Literature

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Document Number	Title
UM-0054	OZSCR2x00 User's Manual
DR-0113	OZSCR2x00 Product Brochure
UM-0052	Power Studio User's Manual
FS-0053	Oztek Modbus Protocol Functional Specification

## Tools and Software

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File Name	Description
SW90216_setup_<version>.exe	Power Studio Installer
TPR-90216-90217-001.xml	SCR2x00 Power Studio Target Profile
CFG90217-0000_rev<revision>.ozCfg	SCR2x00 Configuration File

## OZSCR2x00 Ordering Information

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Model	Part #	Description
OZSCR2000	11205-01	Standard Product
	11205-02	Standard Product with Conformal Coat
OZSCR2100	11206-01	Standard Product
	11206-02	Standard Product with Conformal Coat