

Oztek Power Studio

User's Manual UM-0052

11 Continental Blvd Merrimack NH 03054 v. (603) 546-0090 f. (603)386-6366 oztekcorp.com

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Date and Revision March 2022 Rev H

Part Number UM-0052

Contact Information USA

Telephone: 603-546-0090 Email: techsupport@oztekcorp.com

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1 Introduction

This document is intended to provide instruction on how to use the Oztek Power Studio application (SW-90216). The application is a Microsoft Windows based Graphical User Interface (GUI) that provides the user a simple graphical interface for interacting with Oztek's embedded power control products. This document is meant to provide installation instructions as well as detailed descriptions of the available features and how they can be applied in an engineering environment.

1.1 Referenced Documents

Ref.	Document	Description
[1]	FS-0046	OzCAN Protocol Functional Specification
[2]	www.modbus.org/specs.php	Modbus Specification

1.2 Definitions

CAN Controller Area Network	
DSP	Digital Signal Processor
GUI	Graphical User Interface
XML	Extensible Markup Language

1.3 Requirements

1.3.1 System Requirements

The application requires the following hardware and software configuration:

- 1. Microsoft Windows (7 or newer) based PC with an available USB port
- 2. .NET (4.8 or higher) Runtime (available via http://www.microsoft.com)

1.3.2 Supported Protocols and Hardware

1.3.1.1 CAN

The application supports the OzCAN protocol (reference [1]), and the following CAN to USB hardware devices:

Vendor	Device		
Vector	CANcaseXL		
Peak / Grid Connect	PCAN-USB		

1.3.1.2 Modbus

The application supports the Modbus RTU serial interface protocol (reference [2]) as well as Modbus TCP. There are no vendor specific hardware requirements for serial Modbus. However, Power Studio has been tested and found to be compatible with the following devices:

Vendor	Device	Description		
Advantech B+B	USPTL4-LS	USB to RS-485 Converter		
Anybus	AB7702	Modbus RTU to TCP Gateway		

2 Installation Procedure

Before installing Power Studio, be sure to install all the necessary drivers for the chosen communication device. For instructions on how to install the drivers, please refer to the product's documentation.

After successfully installing a communications device, launch the Power Studio installer by running the SW90216_setup_revMM_mm.exe executable. Note that *MM* represents major revision and *mm* minor revision.

3 Overview

Power Studio is an engineering tool that provides a standard interface to the many DSP-based power control products that Oztek produces. Examples of these products include Grid Tie / Active Front Ends (AFEs), Motor Controllers, and DC/DC converters. Power Studio supports communicating with multiple instances of a device.

Power Studio consists of a main window with tabs that provide specific functionality such as "Dashboard," "Instrumentation," "Register Map," "Software Upgrade," and "Data Logging". A menu bar is provided across the top of the window for configuring the tool.

3.1 Target Profiles

Power Studio is customized for a particular product using Target Profile files. Target Profiles are XML files used to configure Power Studio with the data, commands, and options that apply to a particular product. They are custom files that are provided by Oztek and can be found at <u>www.oztekcorp.com</u>.

3.2 Configuration and Register Map Files

Prior to version 5.0, Power Studio utilized Oztek Configuration files (.ozCfg) to document configuration register details including register addresses, data types, default, and user values. In version 5.0, Power Studio's register access was expanded to include all product registers including volatile command and instrumentation registers in addition to the configuration

registers. In doing so a new file type was created, Oztek Register Map files (.ozReg), which includes additional information to support the new features.

Moving forward, Oztek will only provide register map files for new products. However, Power Studio does provide backward compatibility, allowing users to continue to use Oztek Configuration files for existing product families.

3.3 Sessions

Session files can be created to store communication settings when connecting to multiple devices. Using a session file saves the time of having to add each of the multiple Target Profiles every time the tool is started. Instead, a single session file can be loaded. Session files can also be used with a single device to store the loaded configuration or register map file, as well as real time graph setup.

3.4 Basic View



Figure 1 - Initial Launch

When opening the tool, the main area is blank until either a Target Profile is loaded using the button on the shortcut bar, or Session file is loaded using the is displayed in the bottom left corner. It will display "Disconnected" when not connected to a target and "Connected to <name of communication device>" when connected to a target. The colored circle indicates a more detailed status:

- Green 🖭: Power Studio is communicating successfully with the target device
- Orange 🙁: An error was detected in a reply from the target device
- Red E: Did not receive a reply from the target or Power Studio is disconnected from the target device

3.5 Getting Started

To get started using the tool, follow these simple steps:

- Click the
 button on the shortcut bar and select the appropriate Target Profile for the product you are working with
- Use the "Connection→Select Port" menu item to select the communication port you are using to interface with the product
- Click on the O Connect button

4 Menu Strip

The menu strip contains menu items that allow the user to configure Power Studio. These items include loading a Session file, connecting to a target, configuring connection settings, and reading from and writing to individual registers.

4.1 File Menu

This menu contains options to load or save a Session file and close the GUI. Session files allow the user to save connection settings when connecting to multiple devices, as well as opened OzCfg or OzReg file options.

4.1.1 Open Session

This item is used to browse for and select a Session file that defines a list of target devices and their communication settings. Session files must be created by the user by adding targets via the ^① button on the shortcut bar, then using the "Save Session" menu item once the devices have been configured. See section 4.6.1 for details about adding target devices.

Oztek Power Studio							
erview 🗙	Target 1		Target 2		Bro	padcast Commands	
get 1	PCS State		PCS State	A			
012	Power - Real	kW.	Power - Real	₽W.		Disconnect	Connect
	Power - Reactive	kvar	Power - Reactive	kvar			
	PCS Faults		PCS Faults			stop	Start
			1001000				
						Standby	Run
						%	Pwr - Real
							Pwr - Reac
							Reset Faults

Figure 2 - Open Session File

A panel on the left-hand side will appear if multiple targets are defined in the session. If supported, an Overview page is created with a summary of each device status and commands that are used to send broadcast messages to every device on the list simultaneously.

4.1.2 Save Session

This item saves a Session file containing information about each target that has been added. This can be used after every target device in a system is added to Power Studio to store the system configuration.

4.1.3 Exit

This item closes the GUI. It is identical to clicking the "X" in the top right-hand corner of the GUI.

4.2 Connection Menu

This menu contains options to connect to and disconnect from a target and configure connection parameters.

4.2.1 Select Port

This item is used to select a communication port to connect to a target device. It is disabled until a Target Profile is loaded. Once enabled, click on the port in the "Connection-Select Port" submenu to make a port selection. When a single port is found, it is automatically selected. If the desired connection port does not show up in the submenu, click "Connection-Select Port-Refresh" to get a new list of available ports. Once connected to a target, this item is disabled until the connection is disconnected.

4.2.2 Connect

This item is used to connect to a device via the selected communication port. Upon a successful connection, buttons and data that were previously disabled will be enabled and the GUI will start reading data from the target device. If no data appears, disconnect and check the connection settings under "Connection \rightarrow Configure" or try connecting to another port.

4.2.3 Disconnect

This item is used to disconnect from a target. It is only available when connected to a target and it is disabled otherwise.

4.2.4 Device ID

This item is used to change the destination device ID.

4.2.5 Configure

This menu item is used to change connection settings if needed. It should only have to be used if the target's configuration has been changed from the default settings, as the default Target Profile should contain the correct information. Once the connection settings have been altered, click "Apply" to save the settings

4.2.5.1 Modbus Settings

•				
💽 Edit General .	— 🗆 🗙		📀 Edit General.	– 🗆 🗙
Modbus			Modbus	
Interface	Serial V		Interface	RTU Over Ether ${\scriptstyle\checkmark}$
Device ID			Device ID	
Baud Rate	57600		IP Address	192.168.1.134
Parity	None \sim		Port	26
Stop Bits	One 🗸			
Data Bits	8			
Handshake	None \sim			
Apply	Cancel		Apply	Cancel
		_		

Figure 3 - Example Modbus Settings

Serial:

- Device ID: the Modbus address of the target device
- Baud Rate: the baud rate that matches the target device
- Parity: the parity that matches the target device's configuration
- Stop Bits: the stop bits that match the target device's configuration
- Data Bits: how many data bits the target device expects per message
- Handshake: if a handshake is required, this can set the handshake type

RTU Over Ethernet/TCP:

- Device ID: the Modbus address of the target device
- IP Address: IP Address of the converter/gateway
- Port: Port number

If these settings are not correctly set from the Target Profile file, they can be found in the target device's user manual or functional specification.

4.2.5.2 CAN Settings

📀 Edit General — 🗆 🗙	💽 Edit General — 🗆 🗙
CAN	J1939
Bit Rate 250 Kbps 🗸	Bit Rate 250 Kbps 🗸
Src Module ID 1	Msg ID Format 29-Bit 🗸
Src Group ID 1	Endianness Little 🗸
Dest Module ID 1	Param Read Rqst 0x1822C1A7
Dest Group ID 2	Param Read Resp 0x1823A7C1
	Param Write Rqst 0x1824C1A7
	Param Write Resp 0x1825A7C1
Apply Cancel	Apply Cancel

Figure 4 - Example CAN Settings

CAN:

- Bit Rate: the bit rate that the target device is configured for
- Source Module ID: the module ID of Power Studio
- Source Group ID: the group ID of Power Studio
- Destination Module ID: the module ID of the target device
- Destination Group ID: the group ID of the target device

J1939/Custom CAN:

- Bit Rate: the bit rate that the target device is configured for
- Msg ID Format: 11-bit or 29-bit message ID
- Endianness: Little or Big Endian
- Parameter Read/Write Request and Responses: Message ID's for Oztek Parameter Read/Write request and response messages

If these settings are not correctly set from the Target Profile file, they can be found in the target device's user manual or functional specification.

4.2.6 Connection Log

The Connection Log Shows the number of successful messages, as well as the number of errors.



The most common messages are:

Message	Meaning
Success	The message was received successfully
No Response from Target Device	A response to a message sent by Power Studio was not received from the target. Check the configured communication settings or cable hardware
Illegal Data Address	The PID or address that was requested is not valid in the register map
Slave Device Failure	The message could not be acted upon, most likely due to write data being out of range or an invalid password

4.3 Tools Menu

This menu contains other engineering tools that are not a main function of Power Studio.

4.3.1 Register Read/Write

This item allows reading from and writing to specific register addresses. It is only enabled when connected to a target device.

Register Read/Write - Targ Password Password	et 1 🔽 🖉 🗙
Register Read Data Type U16 Address	Register Write Data Type U16 Address
Read Register	Value Write Register

Figure 5 - Register Read/Write Form

Password Section: The password section allows access to password-protected registers. If a password register is not defined in the Target Profile or if there are multiple password registers, a dropdown box will be displayed to input or select the password register address.

Register Read Section: This section allows for a specific register to be read. Entering the register address in the "Address" textbox and clicking "Read Reg" will display the raw register value in the bottom textbox. If the "Show in Hex" checkbox is checked the result will be displayed in hex, otherwise it will be displayed in decimal. The success or failure status of the read will be displayed in the bottom status bar.

Register Write Section: This section allows for a specific register to be written to. Enter the register address in the "Address" textbox, the value to write to it in the "Value" textbox, and click "Write Reg." The success or failure status of the write will be displayed in the bottom status bar. Note that no scaling is applied to the value, so any required scaling needs to be considered when entering the number.

4.3.2 Verify Config

This item allows the user to compare a device's configuration to a loaded OzCfg or OzReg file and will display a matching or non-matching result. This only compares configuration values, command and instrumentation registers are ignored.

To use this feature, switch to the Register Map tab, open an OzCfg or OzReg file and connect to the target device. Once connected, click the "Tools \rightarrow Verify Config" button and the tool will compare the device's configuration to the loaded file. When completed, a message will be displayed with the results of the comparison.

4.3.3 Real Time Graph

The graphing tool provides a means to plot parameters live, while a target is operating. All the device registers defined in the OzReg file are available for plotting. Custom parameters can also be created where the user is allowed to apply scaling to display real world values or apply masks and shifts to display certain bits in bitfields. After a graph is stopped, values can be saved to a CSV file, or the graph can be saved as an image. Note that the graphing is only supported for products with a corresponding OzReg Register Map file. The graphing feature does not support OzCfg files.



Figure 6 – Real Time Graph Window

4.3.3.1 Configure

Use this menu item to configure the graph, including the amount of time to store data for and which parameters to graph.



Figure 7 – Initial Graph Setup Form

Global Timing Configuration

The "Global Timing Configuration" section configures the following:

- Displayed Duration The amount of time in seconds that is displayed on the live graph.
- Stored Duration The total amount of time in seconds to store data for. Since the
 amount of data displayed affects performance, set this longer than the Displayed
 Duration when larger amounts of data need to be captured but not all of it needs to be
 displayed at once.
- Poll Rate How often, in milliseconds, the list of parameters is polled. Faster poll rates will impact communication bandwidth. The fastest allowable poll rate is 50 milliseconds (20 Hz).

Adding Parameters

The menu section at the bottom of the Graph Setup window is used to select and add parameters to the graph. Selected parameters are displayed in the parameter table located in the middle of the window. If Power Studio is connected to multiple targets, the dropdown next to the "Target" label can be used to select the desired target. Once the desired target device is selected, click the "Browse" button and open the device's OzReg file to populate the list of parameters to choose from.

📀 Graph	Setup							_	
-Global Tir Displa Sto	ning Configuration ayed Duration (sec) pred Duration (sec)	10 15	Poll Ra	ate (msec) 20	10				OK Cancel
Graph									
Address	Target	Parameter			Display Nam	e			
41720	Target 1	DC Voltage			DC Voltage				
40120	Target 1	Temperature - Cabinet	(Oulet for EP40	- internal for R	S40) Temperature - C	abinet			
<				_					>
					Custom Paramete	rs	Search		
Target 1	Farget 1	~	Browse	ozReg File:	REG-90261-0000_re	ev.ozReg	Comman	ds 💿 Instrumentatio	n 🔿 Config
🗌 SunSp	pec ID		Model 701	Identifier		Active Power		Line Frequency	^
Model	1 Identifier		Model 701	Length (# of 10	6-bit registers to follow) Apparent Powe	er	Temperature - A	mbient (Inlet
Model	I 1 Length (# of 16	bit registers to follow)	AC Wiring	Туре		Reactive Pow	er	Temperature - C	abinet (Oulet
Model	17 Identifier			State		Power Factor		Temperature - Ir	nverter Heat
Model	17 Length (# of 1	6-bit registers to follow)	Grid Conne	ction State		AC Current (su	m of all phases)	Temperature - N	Max Estimated
Interfa	асе Туре		DER Alarm	Bitfield		Average AC Li	ne-to-Line Voltag	e 🗌 AC Current - Pha	ase A
Protoc	col		DER Opera	ational Characte	eristics	Average AC Li	ne-to-Line Voltag	e 🔲 AC Voltage - AB	· ·

Figure 8 – Graph Setup

Click the checkboxes to add up to ten parameters to the graph. After being added, the Display Name can be changed as desired. In Figure 8, two parameters have been added to the graph, as displayed in the parameter table located in the middle of the window. As an example, the display name of the Cabinet Temperature has been changed to be more concise.

Filters

The radio buttons on the right can be used to display either command, instrumentation, or configuration parameters. Consult the target device's user manual to determine a given parameter's designation.

The search box can be used to quickly find a desired parameter. Note that the search box ignores the radio button values and will display any parameter that matches the text.

Custom Parameters

Custom parameters can be created via the Custom Parameters button to apply scaling, bit shifting, and masking. Once created, they will show in the checklist all the way to the right.

💁 Manage Custom Parar	neters						- 🗆	×
Parameter Name	Address	Data Type		Scale Factor	Number of Decimal Places	Mask	Bit Shift Right	
AC Current B Scaled	40153	S16	\sim	0.1	1	0xFFFF	0	
High AC Current Warning	40131	U32	\sim	1	0	0×1	1	
Add Remove	Selected	ОК	(Cancel				

Figure 9 – Custom Parameters

The plotted parameter is scaled according to the operator precedence in the following formula, in order from left to right:

Display value = register value >> bitshift & mask x scale factor.

In Figure 9, if a value of 500 is read from the "AC Current B" register, it would be multiplied by 0.1 with 1 decimal place and be displayed as 50.0. Similarly, assume the "High AC Current

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Warning" bit was bit 1 (0x2) of register 40131. Applying the Shift value of 1 and Mask of 0x1 would right justify and isolate that bit in the register such that the displayed value would only ever be 0 or 1.

4.3.3.2 Graphing

After configuring the graph and clicking OK, the Real Time Graph window will display the selected parameters listed on the righthand side. The checkboxes next to the names can be used to show or hide each parameter.



The Play button on the top bar enables live updating of the graph while the Stop button disables live updates. When stopped, sample points are displayed which, when hovered over, show the X and Y data for each sample.

When stopped, the graph can be saved to a CSV file through the "File->Save Data to CSV" menu item, or to an image through the "File->Save Graph as Image" menu item.

Zooming options will also become unlocked when the graph is stopped. Use the dropdown next to "All Graphs" on the toolstrip bar to select which parameters the zooming buttons will affect.

- ↔ When this is selected (surrounded by a blue square), scrolling with the mouse wheel and dragging the mouse affects the X axis
- 1 When this is selected (surrounded by a blue square), scrolling with the mouse wheel and dragging the mouse affects the Y axis

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- ^① Zoom in on the selected axis
- Q Zoom out on the selected axis
- **〈** Shift the data to the left
- > Shift the data to the right
- ^ Shift the selected data up
- Y Shift the selected data down
- C Reset the zoom on the selected parameter and axis

If more than the displayed amount of data is captured (Stored Duration is greater than Displayed Duration), select the horizontal arrows and use either the mouse or shift buttons to scroll through previous data.

4.4 View Menu

This menu contains items used to show or hide components on the GUI.

4.4.1 Target List

This item shows or hides the list of target devices that have been added to the session on the left-hand side of the GUI. The list allows the user to switch to different devices.

4.5 Help Menu

This menu contains items used to display information about Power Studio.

4.5.1 About

This item displays the Oztek part number, version, and description of Power Studio.

4.5.2 User Manual

This item opens this User Manual.

4.6 Shortcut Menu Strip

The Shortcut Strip provides shortcut buttons for common tasks as follows:

- ■: File→Open Session
- \bigcirc : Connection \rightarrow Connect
- **O**: Connection \rightarrow Disconnect
- 1: Help \rightarrow User Manual

4.6.1 Add/Remove Target

Use the 🔁 and 🗢 buttons to add and remove targets respectively. Adding a target will prompt for a Target Profile file location and will allow the user to configure connection settings. The dropdown menu adjacent to these buttons provides a means to select a target to communicate with from a list of targets in the session.

Target Profile files define fault, warning, command, instrumentation, and connection data for each target device in a system. The data in this file is loaded into the tool and is used to query the target.

Oztek Power Studio					- 🗆	>
le Connection Tools	View Help					
🔂 🖨 Target 1	• 0 0 0					
shboard Instrumentation Reg	gister Map Software Upgrade Data Logging About					
aults	Status		Commands			
	PCS Model	^	RS40	\sim	PCS Model	12
	PCS State			_		1
	PCS Mode		Grid Tie	\sim	PCS Mode	4
	AFE Mode		Serv Disable		Serv Enable	11
	DC/DC Mode		- Ci			1
	DC/DC State		Disconnect		Connect	4
					Run	1
	DC Input Voltage	V				1
	DC Input Current	A				
	DC Input Power	kW		%	Grid Tie P	
	DC Link Voltage	V		%	Grid Tie Q	
Varnings	Grid Voltage - Vab	Vrms			Set PF Cmd	
	Grid Voltage - Vbc	Vms		Vms	Island Volt	
	Grid Voltage - Vca	Vms				
	Pos Seq Voltage	V		Hz	Island Freq	
	Neg Seq Voltage	V				
	Grid Current - A	Ams	Reset Faults		Reset Logs	L
	Grid Current - B	Ams			Cat DTC	
	Grid Current - C	Ams			SecRIC	
	Pos Seq Current	A				
	Neg Seq Current	A	2014		T	1
	Zero Seq Current	A	DC Voltage	~	lest Mode	
			DC Voltage	\sim	DC Mode	
	Girld Frequency	Hz 🗸				1

Figure 10 - Target Profile Opened

When a Target Profile is opened, the GUI is populated with fields specific to that target. Most of the populated GUI items will be disabled (grayed out) until connected to a target.

5 Dashboard

The Dashboard tab is split up into four sections: Faults, Warnings, Status, and Commands. It is meant to provide general target device status and displays basic overall operational information. The selection of what data is displayed on this tab is defined in the Target Profile file provided by Oztek.

e Connection Tools View	Help						
larget i							
shboard Instrumentation Register N	lap Software Upgrade Data Loggin	ng About					
aults	Status			Commands			
C Under Voltage	PCS Model	RS40		^ RS40	\sim	PCS Model	
STOP	PCS State	Powering Down		Cold To		PCS Mode	1
actory Fault	PCS Mode	Grid Tie		and he	~	PC3 Mode	
actory DC OC - A	AFE Mode	Grid Power		Serv Disable		Serv Enable	
actory DC Curr Imb - A	DC/DC Mode	Volt Ctrl		Discount			
actory DC Curr Imb - B	DC/DC State	Fault		Disconnect		Connect	
actory DC Curr Imb - C				Standby		Run	
actory 24V Bias UV	DC Input Voltage	1.9	V				1
ower Down Error	DC Input Current	42.6	A				
actory Calibration Error	DC Input Power	0.08	kW		%	Grid Tie P	1
	DC Link Voltage	2.0	V		%	Grid Tie Q	1
Varnings	Grid Voltage - Vab	0.0	Vms			Set PF Cmd	1
ow DC Voltage	Grid Voltage - Vbc	0.0	Vms		Vims	Island Volt	
TOO bid	Grid Voltage - Vca	0.0	Vms				1
	Pos Seq Voltage	0.0	V		Hz	Island Freq	
an Warning	Neg Seq Voltage	0.0	V				
actory High DC Curr - A	Grid Current - A	42.7	Ame	Reset Faults		Reset Logs	i l
actory High UC Curr Imb - A	Grid Current - B	0.0	Arms				
actory High DC Cuir Imb - B	Grid Current - C	0.0	Arms			Set RTC	
actory High DC Curr Imb - C	Pos Sea Current	0.0	A				
actory 5V OUT inv Isense	Neg Seg Current	0.0	A				
actory 5V OUT Grid Isense	Zero Sen Current	0.0	A	DC Voltage	\sim	Test Mode	
actory 5V OUT DC Isense		0.0		DOWN		DC Made	1
an TNot Spinning	Grid Frequency	0.18	Hz	V Voltage	~	DC Mode	

Figure 11 - Active Dashboard

Fault Section: This section is used to display active faults on the target device. Active faults are displayed on individual lines in red. If no faults are active, "No Faults" will be displayed in green.

Warning Section: This section is used to display active warnings on the target device. Active warnings are displayed on individual lines in orange. If no warnings are active, "No Warnings" will be displayed in green.

Status Section: This section is used to display the main instrumentation data on the target device. It is split up into three columns: register description, value, and units. Values are either raw register values, enumerated values, or scaled values depending on input from the Target Profile. These values are updated at a rate specified in the Target Profile.

Command Section: This section allows specific commands to be sent to the target device. There are three types of command controls: button, textbox, and dropdown.

- Button: Sends a single value to a specific register
- Textbox: Sends the numeric value entered into the textbox when the corresponding button is clicked. This value is checked against minimum and maximum values, scaled to match what the target device expects, and then sent out if it passes the min/max check
- Dropdown: Sends a value to a specific register based on the chosen enumerated value when the corresponding button is clicked

6 Instrumentation

The Instrumentation tab is used for displaying instrumentation data in more detail than what may be shown on the Dashboard tab. The parameters displayed on this tab are specified in the Target Profile file. Items are disabled and not updated when disconnected from a target device.

File Connection T	ools View Hel	p									
Target 1	• 0	00									
Dashboard Instrumentatio	Register Map So	oftware Upgrade	e Dat	a Logging About							
Dashboard Data				Various Data				Various Data (continued)			
PCS Status			^	Fault Status			^	Analog Inputs			
PCS State	Powering Dow	n		PCS Faults	0x2501000			AC Vline - A	-0.6	V	_
PCS Mode	Grid Tie			PCS Warnings	0x89100			AC Vine - B	-0.4	V	
AFE Mode	Grid Power			Temperature Status	0×0			AC Vine - C	-0.5	V	
DC/DC Mode	Volt Ctrl			Factory Faults	0x820E40			Inv Current - A	63.9	А	
DC/DC State	Fault			Factory Inv Warnings	0x600880			Inv Current - B	0.0	A	
				Factory DC Warnings	0xE001107	1		Inv Current - C	0.0	A	
DC Status								Grid Current - A	42.7	А	
DC Link Voltage	2.0	V		Temperature Status				Grid Current - B	0.0	A	
DC Link - Top	1.0	V		Inv HS Temp - A	-40	С		Grid Current - C	0.0	А	
DC Link - Bottom	0.9	V		Inv HS Temp - B	-40	С		DC/DC Current - LO A	0.0	A	
				Inv HS Temp - C	-40	С		DC/DC Current - LO B	0.0	А	
DC Input Voltage	1.9	V		DC HS Temp - A	-40	С		DC/DC Current - LO C	0.0	A	
DC Input Current	42.6	Α		DC HS Temp - B	-40	С		DC/DC Current - HI A	42.7	А	
DC Input Power	0.08	kW		DC HS Temp - C	-40	С		DC/DC Current - HI B	0.0	A	
				Inv IGBT Temp	-40	С		DC/DC Current - HI C	0.0	А	
Grid Status				DC IGBT Temp	-40	С		24V Bias	0.03	V	
Grid Frequency	0.184	Hz		Ambient Temp	0	С		1.5V Vref	1.49	V	
Grid Voltage - Vab	0.0	Vms		Cabinet Temp	26	С		5V - Inv I-sense	0.01	V	
Grid Voltage - Vbc	0.0	Vms		Fan Speed CMD	0.0	%		5V - Grid I-sense	0.02	V	
Grid Voltage - Vca	0.0	Vms		Fan 1 Speed	117	RPM		5V - DC/DC I-sense	0.01	V	
Grid Voltage - Van	0.0	Vms		Fan 2 Speed	117	RPM					
Grid Voltage - Vbn	0.0	Vms		Fan 3 Speed	117	RPM		Digital Inputs			
Grid Voltage - Vcn	0.0	Vms						FPGA_INTn	1		
Pos Seq Voltage	0.0	V		ID and Revision Data				BIAS_ENn	1		
Neg Seq Voltage	0.0	V		PCS Model	OZpcs-RS4	0-FA1		AFE_TRIPn	1		
			~	PCS Firmware Rev	01.00.01.00	ŀΕ	~	ESTOP	1		

Figure 12 - Active Instrumentation

Instrumentation values are displayed on this tab using multiple sections. Each section is split up into three columns: register description, value, and units. Values are either enumerated values, raw register values, or scaled values. These values are updated at a rate specified in the Target Profile.

7 Register Map

The Register Map tab allows viewing and modifying parameters within the target itself. These parameters are read in through an Oztek Config (.ozCfg) file or a Register Map (.ozReg) file provided by Oztek. Consult the product's user manual or functional specification for details regarding a particular target device's register map. Note that when first switching to the Register Map tab, some options are disabled until the tool is connected to a target device.

Cztek Power Studio											_		×
File Connection	Tools View	Help											
	•	00	0										
Dashboard Instrumentat	on Register Ma	Softwar	e Upgrade	Data Logging Abo	out								
	Edit	Device's		Device's	D		Data		D 11 T		Filter Options		
PID Descrip	tior Value	Value	Units	Default	Device's Min	Device's Max	Туре	Access	Register Type		Search:		
											Register Type		
											 All 		
											Configuration		
											Parameter Selection		
											Advanced		
Write All Config	Reboot Target						File:						
Restore Defaults	Device			Password:			Op	oen File	Save to File		Collapse All E	xpand All	
Connected to COM3 🧕										TPR-9	0216-90261-001-En	gineering	J.xml 🔡

Figure 13 - Initial Register Map Tab

7.1 Open File

This button is used to browse for and open an OzCfg or OzReg file which is used to populate the list of available registers. The file may take several seconds to open.

	nstrumentation Register Map Software Upgrade Da	ta Logging Abo	ut								
PID	Description	Edit Value	Device's Value	Units	Device's Default	Device's Min	Device's Max	Data Type	Access	Register ^ Type	Filter Options
40068	Modbus Device Address	1						U16	RW	Configuration	Search:
40076	Baud Rate	57600		bps				U32	RW	Configuration	
40079	Party	0						U16	RW	Configuration	
40265	Setting for Maximum Active Power	4000		10 W				U16	RW	Configuration	
40270	Setting for Maximum Apparent Power	4000		10 VA				U16	RW	Configuration	Register Type
40271	Setting for Maximum Injected Reactive Power	4000		10 VAR				U16	RW	Configuration	() Al
40272	Setting for Maximum Absorbed Reactive Power	4000		10 VAR				U16	RW	Configuration	 Configuration
10277	Nominal AC Voltage Setting	4800		0.1 Vms				U16	RW	Configuration	
40280	Setting for Maximum AC Current	500		0.1 A				U16	RW	Configuration	
10293	Permit Enter Service	1		ENUM				U16	RW	Configuration	Parameter Colorian
10294	Enter Service High Voltage Threshold (% of Vnom)	1050		0.1 %				U16	RW	Configuration	Basic
10295	Enter Service Low Voltage Threshold (% of Vnom)	<i>917</i>		0.1 %				U16	RW	Configuration	Advanced
0296	Enter Service High Frequency Threshold	6010		0.01 Hz				U32	RW	Configuration	
10298	Enter Service Low Frequency Threshold	5950		0.01 Hz				U32	RW	Configuration	
10300	Enter Service Delay Time	300		sec				U32	RW	Configuration	
40302	Enter Service Random Delay	0		sec				U32	RW	Configuration	
10304	Enter Service Ramp Time	300		sec				U32	RW	Configuration	
40312	Power Factor Enable - Injecting Watts	1		ENUM				U16	RW	Configuration	
40318	Power Factor Enable - Absorbing Watts	1		ENUM				U16	RW	Configuration	

Figure 14 – Configuration File Opened when Disconnected from Target

After a file is opened, its name is displayed above the "Save to File" button. If not connected to a target, the resulting Device's Value column will contain "---."

📀 Oztek P	ower Studi	0										- 1	o x
File Co	nnection	Tools View Help											
• •	🔵 Target	en 🔹 🔘 🔘 📵											
Dashboard	Instrumenta	ation Register Map Software Upgrade Data Logging About											
	PID	Description	Edit Value	Device's Value	Units	Device's Default	Device's Min	Device's Max	Data Type	Access	Register ^ Type	Filter Options	
+	40000	SunSpec Header										Search:	
+	40002	Model 1 - Common Model											
+	40070	Model 17 - Serial Interface											
+	40084	Model 701 - DER AC Measurement										Desister Trees	
+	40239	Model 702 - DER Capacity										Hegister Type	
+	40291	Model 703 - Enter Service											
+	40310	Model 704 - DER AC Controls											
+	40377	Model 705 - DER Volt-VAR											
+	40452	Model 706 - DER Volt-Watt											
+	40517	Model 707 - DER Trip Low Voltage										Parameter Selection	
+	40750	Model 708 - DER Trip High Voltage										Basic	
+	40983	Model 709 - DER Trip Low Frequency										Advanced	
+	41288	Model 710 - DER Trip High Frequency											
+	41593	Model 711 - DER Frequency Droop											
+	41627	Model 712 - DER Watt-VAR							_				
+	41689	Model 714 - DER DC Measurement			_				_				
+	41734	Model /15 - DER Control			_				_				
+	41743	Model 64340 - Oztek PCS Control and Status Registers (1547 Model)											
<		Contraction of the second s									>		
							D 1-1	DEC 00001	0000				
Write /	VI Config	Reboot Target	_				nië:	ncG-90261	-uuuu_rev.ozH	eg			
Restore	Defaults	Password:					Open Fi	ile Save	e to File			Collapse All Expa	ind All
Connected t	o COM3	•									TPR	-90216-90261-001-Engin	eering.xml ,

Figure 15 – Register Map File Opened when Disconnected from Target

OzReg files are more comprehensive than OzCfg files and display header groups for parameters. The "+" and "-" symbols to the left headers may be clicked to expand and collapse groups. The file opens with all groups collapsed, as shown in Figure 15.

	ation register hep Software opgrate Data Logging About											
PID	Description	Edit Value	Device's Value	Units	Device's Default	Device's Min	Device's Max	Data Type	Access	Register ^ Type	Filter Options	
40277	Nominal AC Voltage Setting	4800	4800	0.1 Vms	4800	2080	4800	U16	RW	Configuration	Search:	-
40280	Setting for Maximum AC Current	500	500	0.1 A	500	0	500	U16	RW	Configuration		_
40284	Scale Factor - Active Power		1		1	n/a	n/a	S16	R	Instrumentation		
40285	Scale Factor - Power Factor		-3		-3	n/a	n/a	S16	R	Instrumentation		
40286	Scale Factor - Apparent Power		1		1	n/a	n/a	S16	R	Instrumentation	Register Type	
40287	Scale Factor - Reactive Power		1		1	n/a	n/a	S16	R	Instrumentation	• AI	
40288	Scale Factor - AC Voltage		-1		-1	n/a	n/a	S16	R	Instrumentation	 Configuration 	
40289	Scale Factor - AC Current		-1		-1	n/a	n/a	S16	R	Instrumentation		
40290	Scale Factor - Susceptance		0		0	n/a	n/a	S16	R	Instrumentation		
40291	Model 703 - Enter Service										Parameter Selection	
40291	Model 703 Identifier		703		703	n/a	n/a	U16	R	Instrumentation	Basic	
40292	Model 703 Length (# of 16-bit registers to follow)		17		17	n/a	n/a	U16	R	Instrumentation	Advanced	
40293	Permit Enter Service	1	1	ENUM	1	0	1	U16	RW	Configuration		
40294	Enter Service High Voltage Threshold (% of Vnom)	1050	1050	0.1 %	1050	1000	1200	U16	RW	Configuration		
40295	Enter Service Low Voltage Threshold (% of Vnom)	<i>917</i>	917	0.1 %	917	0	1000	U16	RW	Configuration		
40296	Enter Service High Frequency Threshold	6010	6010	0.01 Hz	6010	5000	9000	U32	RW	Configuration		
40298	Enter Service Low Frequency Threshold	<i>5950</i>	5950	0.01 Hz	5950	3000	6000	U32	RW	Configuration		
40300	Enter Service Delay Time	300	300	sec	300	0	3600	U32	RW	Configuration		
40000	Fata Cantas Dandas Dalas	0	0		0	0	2000	LINN	DW	C		

Figure 16 – Register Map When Connected to Target

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Once connected, Power Studio will read each of the parameters displayed in the window and display the result. If a Configuration value in the Edit Value column does not match a value read from the target and displayed in the Device's Value column, the value in the Edit Value column will be displayed in red. Parameters that are read-only do not show a value in the Edit Value column and cannot be written to.

7.2 Save to File

This button allows the user to save an OzCfg or OzReg file based on the file type that was originally opened. Files can be saved with either the Edit Value column to capture custom user settings or the Device's Value column to capture the target device's settings. Note that when saving device settings, all device values must be read, which may take a minute or longer on some targets.

7.3 Writing Single Values

To write a single value to the target, enter the desired value in the Edit Value column and leave the cell or press "Enter." The value will be checked against the minimum and maximum values and then it will be sent to the device if it passes the check. After the value is written, it will be read back and displayed in the Device's Value column. The target must be connected to write values. Note that some products include registers that only update working values on power up. For these registers the "Reboot Target Device" button will need to be pressed or power will need to be cycled for changes in the target's operational control variables to take effect. Consult your products User Manual to identify registers with this constraint.

7.4 Write All

The "Write All" button will attempt to write all Configuration values in the Edit Value column to the device. This is useful when commissioning a product by loading a previously saved, custom configuration. Generally, it is good practice to press the "Reboot Target Device" button or cycle power after performing a "Write All" to ensure all changes take effect.

7.5 Reboot Target Device

Pressing this button sends the "Configuration Reload" command which causes the target to load the configuration parameters from non-volatile memory into the internal operating control variables in RAM.

7.6 Restore Defaults

This button sends the "Restore Defaults" command to the device. This causes the device to reset all configuration parameters back to their factory default settings. Pressing this button

resets the Device's Value column. Note that this command may require a password to be typed into the Password textbox.

7.7 Filter Options

The "Filter Options" section allows the user to selectively show or hide parameters either by specifying key words in the Description column or by selecting which register type or group to show.

7.7.1 Show Filter

Use the textbox to show only the parameters that contain the text in the Description column. For example, typing "Volt" will display any parameters that contain "Volt" in the description and still match the rest of the filter options.

7.7.2 Register Type

These radio buttons filter on the Register Type column in the grid view. The options are to show all parameters or only ones that are Configuration values.

7.7.3 Basic/Advanced Checkboxes

These checkboxes toggle the visibility of basic and advanced parameters. Parameters can be grouped into basic parameters which change generic operational settings and advanced parameters which change specific application-related settings. Advanced parameters will show up in Power Studio as a different color than basic parameters (blue). See a product's user manual for a list of parameters in each group. If a user manual does not mention these groups, it is assumed all the parameters are basic parameters.

7.7.4 Expand and Collapse All

Use these buttons to expand or collapse all header groups when using an OzReg file. These buttons have no effect when using an OzCfg file.

8 Software Upgrade

The Software Upgrade tab is used to download an application using the target's embedded bootloader.

The steps to download an image are as follows and are expanded upon within this section:

- 1. Connect to a communication port.
- 2. Select an image to download.
- 3. Download an image.



Figure 17 - Software Upgrade Tab

8.1 Selecting an Image to Download

Use the "Browse" button to browse for and select an image to download. The selected file should be in the format of "SW90***_revX_Y.out" or "SW90***_revX_Y.hex" where *** is the Oztek software number, X is the major software revision, and Y is the minor software revision. The selected file path will be shown in the textbox next to the "Browse" button.

8.2 Using the Bootloader

The target's embedded bootloader can be launched using one of two possible methods depending on what the device supports:

- With the device powered off, connect to the communication port using the "Connection→Connect" menu item. With an image selected, click "Download" and the text "Searching for Bootloader..." will appear in the middle of the GUI. Wait 4 seconds and power on the device and the bootloader should run and connect.
- 2.
- 3. While the device is powered on but not running, use the "Connection→Connect" menu item to connect to the device's communication port. With an image selected, click "Download" and the text "Searching for Bootloader..." will appear in the middle of the GUI and the bootloader will be launched. If the bootloader does not connect and the "Searching for Bootloader..." text persists, then the device may not support this method and method 1 will have to be used. Figure 18 illustrates Power Studio searching for the bootloader.

Oztek Power Studio	View Help			
Target 1	- 000			
Dashboard Instrumentation Co	nfiguration Software Upgrade	Data Logging		
	H:\PCS.hex		Browse	
			Cancel	
	Searching fo	r Bootloader		
	Could might			
onnected to COM19 🌘				

Figure 18 - Searching for Bootloader

Once Power Studio connects to a bootloader, the bootloader version is displayed, and the download process starts automatically.

The download consists of two phases: Clearing Memory and Programming. A progress bar is shown during each phase.

C Oztek Power Studio	
File Connection Tools View Help	
Target 1 • O O 0	
Dashboard Instrumentation Configuration Software Upgrade Data Logging	
H:\PCS.hex Browse	
Download	
Clearing memory	
Connected to Bootloader Version 1.0	
Connected to COM19 🧶	

Figure 19 - Clearing Memory Phase

Oztek Power Studio		
File Connection Tools	View Help	
Target 1	· 🔘 🔘 📵	
Dashboard Instrumentation Co	figuration Software Upgrade Data Logging	
	UNDCC have	
	H. VrC3.nex	
	Down	load
	Programming File	
	Connected to Bootloader Version 1.0	

Figure 20 - Programming Phase

If an error occurs during either of these phases, it is displayed in the middle of the GUI. Otherwise, "Programming Completed" is shown.

🕑 Oztek Power Studio	
File Connection Tools View Help	
Target 1	
Dashboard Instrumentation Configuration Software Upgrade Data Logging	
H:\PCS.hex Browse Download Programming Completed.	
Connected to COM19 🜔	

Figure 21 - Programming Completed

Once a download is complete, the downloaded application is automatically launched. If the application does not launch within a few seconds, the target will need to be power cycled for it to run.

If an error is detected during programming, a Clear Memory command will be sent to wipe the target device of any partial image. If this happens, check the physical device connections, and try downloading the application image again.

Oztek Power Studio User's Manual

9 Data Logging

The Data Logging tab is only visible if the target device supports the data logging features. The various features are listed on the left-hand side and only the supported features are enabled.

9.1 Fault Log

The Fault Log reads a log consisting of samples taken when a fault occurs. The number of samples captured before or after a fault occurs is device-specific, as well as the maximum number of logs that can be stored.

Connection Target	100Is View									
board Instrumenta	ation Configuration	Software Upprade	Data Logging							
Fault Log	lap 01 0.02:04	-20								Controls
Uper Log	Date: Jac 01 0		Time: 02:04:20		Semala Causti 72		Sample Pariadi 10 ma			Commands
USEI LOG	Date: Jan 01, 0		Time: 02.04.30		Sample Count. 75		Sample Penou. To his		-	Get Log Lis
perating History	Timeline	PCS State	PCS Faults	PCS Warnings	DC Voltage	DC Current	AC Voltage AB	AC Volta BC		Jan 01, 0 02:04:30
Fault History	0.630	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		Re-read Lo
	0.620	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9	=	
	0.610	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		Save Log
	0.600	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		Log Status
	0.590	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		Available Logs:
	0.580	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.570	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.560	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.550	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.540	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.530	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.520	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.510	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.500	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.490	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.480	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.470	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.460	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9		
	0.450	Fault	0x2100000	0x9101	2.3	42.5	0.9	0.9	-	
	۰ III						1	•		

Figure 22 - Fault Log

A log header is read and displayed across the top of the log detailing the date and time of the fault as well as the number of samples (rows) captured. A timeline is shown in the first column. Positive numbers indicate the time in seconds after the fault occurred and negative numbers indicate the fault.

The controls are shown on the right-hand side, along with the number of logs currently stored on the device. Use the "Get Log List" button to read the timestamp for each log and select which log to read using the dropdown menu. Reading a log can be paused and resumed and the log can be saved to a CSV file once reading is completed.

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9.2 User Log

The User Log allows the user to collect data based on a configurable event. This data is stored in volatile memory so it will not persist between device POR's.

Image: Second	Sample Count: 57 PCS Warnings Di 0x9101 2.4	22 C Voltage [4 4 4; 4 4; 4 4 4; 4 4	Sample Period: 11 DC Current 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5	AC Voltage ^ AB ^ 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	Controls Commands Config Select Run	ure Trigger t Variables
board Instrumentation Configuration Software Upgrade Data Logging Fault Log Date: Jan 01.0 Time: 02:48:28 Time: 02:48:28 perating History 5:210 Fault 0x2100000 0 Fault History 5:200 Fault 0x2100000 0 5:180 Fault 0x2100000 0	Sample Court: 57 PCS Warnings Di 0x9101 2.4	22 C Voltage C 4	Sample Period: 10 DC Current 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5	AC Voltage ^ AB ^ 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	Controls Commands Config Select Run	ure Trigger t Variables
Fault Log Date: Jan 01.0 Time: 02:48:28 User Log Timeline PCS State PCS Faults perating History 5:200 Fault 0x2100000 0 Fault History 5:200 Fault 0x2100000 0 5:190 Fault 0x2100000 0 5:180 Fault 0x2100000 0 5:160 Fault 0x2100000 0 5:170 Fault 0x2100000 0 5:160 Fault 0x2100000 0 5:170 Fault 0x2100000 0 5:180 Fault 0x2100000 0 5:170 Fault 0x2100000 0 5:180 Fault 0x2100000 0 5:170 Fault 0x2100000 0 5:180 Fault 0x2100000 0 5:100 Fault 0x2100000 0 5:000 Fault 0x2100000 0 5:090 Fault 0x2100000 </th <th>Sample Court: 57 PCS Dr 0x9101 2.4 0x9101 2.4</th> <th>IC Voltage E 4 4: 4 4: 4 4: 4 4: 4 4: 4 4: 4 4: 4</th> <th>Sample Period: 10 DC Current 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5</th> <th>0 AC Voltage AB 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9</th> <th>Controls Commands Config Select Run</th> <th>ure Trigger t Variables</th>	Sample Court: 57 PCS Dr 0x9101 2.4 0x9101 2.4	IC Voltage E 4 4: 4 4: 4 4: 4 4: 4 4: 4 4: 4 4: 4	Sample Period: 10 DC Current 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	0 AC Voltage AB 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	Controls Commands Config Select Run	ure Trigger t Variables
User Log Timeline PCS State PCS Faults iperating History 5/210 Fault 0x2100000 0 Fault History 5/200 Fault 0x2100000 0 5/100 Fault 0x2100000 0 5/100 Fault 0x2100000 0 5/180 Fault 0x2100000 0 5/180 Fault 0x2100000 0 5/160 Fault 0x2100000 0 5/160 Fault 0x2100000 0 5/150 Fault 0x2100000 0 5/160 Fault 0x2100000 0 5/160 Fault 0x2100000 0 5/170 Fault 0x2100000 0 5/180 Fault 0x2100000 0 5/170 Fault 0x2100000 0 5/100 Fault 0x2100000 0 5/100 Fault 0x2100000 0 5/090 Fault 0x2100000	PCS Warnings Di 0x9101 2.4	C Voltage E 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	DC Current 12.5 (1 12.5 (1 12.5 (1 12.5 (1 12.5 (1 12.5 (1) 12.5 (1)	AC Voltage AB 0.9 0.9 0.9 0.9 0.9 0.9 0.9	Commands Config Select Run	ure Trigger t Variables
S210 Fault Gx2100000 Gx21000	Dx9101 2.4 0x9101 2.4	4 4; 4 4; 4 4; 4 4; 4 4; 4 4; 4 4; 4 4;	2.5 (2.5 (2.5 (2.5 (2.5 (2.5 (2.5 (2.5 (0.9 0.9 0.9 0.9 0.9	Select	t Variables
Fault History 5.200 Fault 0x210000 0 5.190 Fault 0x210000 0 5.180 Fault 0x210000 0 5.180 Fault 0x210000 0 5.170 Fault 0x210000 0 5.160 Fault 0x210000 0 5.150 Fault 0x210000 0 5.130 Fault 0x210000 0 5.130 Fault 0x210000 0 5.120 Fault 0x210000 0 5.130 Fault 0x210000 0 5.100 Fault 0x210000 0 5.090 Fault 0x210000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 4: 4: 4 4: 4: 4 4: 4: 4 4: 4: 4 4: 4: 4 4: 4:	2.5 (2.5 (2.5 (2.5 (2.5 (2.5 (0.9 0.9 0.9 0.9	Run	t Variables
5.190 Fault 0x210000 0 5.180 Fault 0x210000 0 5.170 Fault 0x210000 0 5.170 Fault 0x210000 0 5.160 Fault 0x210000 0 5.150 Fault 0x210000 0 5.140 Fault 0x210000 0 5.130 Fault 0x210000 0 5.120 Fault 0x210000 0 5.110 Fault 0x2100000 0 5.110 Fault 0x2100000 0 5.100 Fault 0x2100000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 4; 4 4; 4 4; 4 4; 4 4;	2.5 (2.5 (2.5 (2.5 (0.9 0.9 0.9	Run	
5.180 Fault 0x210000 0 5.170 Fault 0x210000 0 5.160 Fault 0x210000 0 5.160 Fault 0x210000 0 5.150 Fault 0x210000 0 5.140 Fault 0x210000 0 5.130 Fault 0x210000 0 5.120 Fault 0x210000 0 5.110 Fault 0x210000 0 5.030 Fault 0x2100000 0 5.030 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4 0x9101 2.4 0x9101 2.4 0x9101 2.4 0x9101 2.4	4 42 4 42 4 42 4 42	2.5 (2.5 (2.5)	0.9	Run	
5.170 Fault 0x210000 0 5.160 Fault 0x210000 0 5.150 Fault 0x210000 0 5.140 Fault 0x210000 0 5.130 Fault 0x210000 0 5.120 Fault 0x210000 0 5.110 Fault 0x210000 0 5.090 Fault 0x2100000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4 0x9101 2.4 0x9101 2.4	4 42 4 42	2.5	0.9		Stop
5.160 Fault 0x2100000 0 5.150 Fault 0x2100000 0 5.140 Fault 0x2100000 0 5.130 Fault 0x2100000 0 5.120 Fault 0x2100000 0 5.120 Fault 0x2100000 0 5.110 Fault 0x2100000 0 5.100 Fault 0x2100000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4 0x9101 2.4	4 43	2.5		(Bead Log
5.150 Fault 0x2100000 0 5.140 Fault 0x2100000 0 5.130 Fault 0x2100000 0 5.120 Fault 0x2100000 0 5.110 Fault 0x2100000 0 5.100 Fault 0x2100000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4			0.9	L L	Head Log
5.140 Fault 0x210000 0 5.130 Fault 0x210000 0 5.120 Fault 0x210000 0 5.110 Fault 0x210000 0 5.100 Fault 0x210000 0 5.000 Fault 0x210000 0 5.080 Fault 0x210000 0 5.070 Fault 0x210000 0 5.060 Fault 0x210000 0		4 4	2.5	0.9		Save Log
5.130 Fault 0x210000 0 5.120 Fault 0x210000 0 5.110 Fault 0x210000 0 5.100 Fault 0x210000 0 5.100 Fault 0x210000 0 5.090 Fault 0x210000 0 5.080 Fault 0x210000 0 5.070 Fault 0x210000 0 5.060 Fault 0x210000 0	0x9101 2.4	4 43	2.5	0.9	Log Status	
5.120 Fault 0x210000 0 5.110 Fault 0x210000 0 5.100 Fault 0x210000 0 5.090 Fault 0x210000 0 5.080 Fault 0x210000 0 5.070 Fault 0x210000 0 5.060 Fault 0x210000 0	0x9101 2.4	4 43	2.5	0.9	Finished	
5.110 Fault 0x2100000 0 5.100 Fault 0x2100000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 42	2.5	0.9		
5.100 Fault 0x2100000 0 5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 43	2.5	0.9		
5.090 Fault 0x2100000 0 5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 42	2.5	0.9		
5.080 Fault 0x2100000 0 5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 43	2.5	0.9		
5.070 Fault 0x2100000 0 5.060 Fault 0x2100000 0	0x9101 2.4	4 42	2.5	0.9		
5.060 Fault 0x2100000 (0x9101 2.4	4 43	2.5	0.9		
	0x9101 2.4	4 43	2.5	0.9		
5.050 Fault 0x2100000 (0x9101 2.4	4 42	2.5	0.9		
5.040 Fault 0x2100000 0	0x9101 2.4	4 42	2.5	0.9		
5.030 Fault 0x2100000 0	0x9101 2.4	4 42	2.5	0.9		
5.020 Fault 0x2100000 0	0x9101 2.4	4 42	2.5	0.9		
5.010 Fault 0v2100000 0	0v9101 24	4 4	12.5	n 9		

Figure 23 - User Log

Like the Fault Log, the User Log displays a log header above the table of data detailing the date and time as well as the number of samples (rows) captured.

Log controls are located on the right-hand side and the status of the data logger is displayed. Use the "Run" button to arm the log and "Stop" button to force it to stop logging. This log can be read with the "Read Log" button and the "Save Log" button can be used to save the data to a CSV file after reading is completed.

The Log Status shows the current state of the User Log:

- Idle: The log is waiting to be armed
- Running (Pre-Trigger): The log is waiting for the trigger to occur
- Running (Post-Trigger): A trigger has occurred, and post-trigger data is being captured
- Finished: The log has finished capturing data and is ready to be read or rearmed

9.2.1 Configure Trigger

Up to two events can be configured as triggers to capture data. Data that is stored can be a mix of before and after the trigger occurs.

Configure Trigger		
General Setup		
Trigger Mode	Continuous 🔻	
Post-Trigger %	0	
Sample Period (ms)	10	
Trigger 1 PCS State	▼ AND Qx0 is < ▼ 0	Hex
Trigger 2 PCS State	→ AND 0x0 is < → 0	Hex
Get Device Values		
	et Trigger Values	

Figure 24 - User Log Trigger Configuration

The "Get Device Values" button can be used to query the device and fill in the fields for the currently selected configuration.

- Trigger Mode: Selects the number of trigger events to use
 - Continuous: No trigger. Data is always being logged until the "Stop" button is pressed
 - Single: Only the criteria for Trigger 1 is used as an event to capture data
 - Trigger 1 OR Trigger 2: Captures data when the criteria for either Trigger 1 or Trigger 2 is met
 - Trigger 1 AND Trigger 2: Captures data when the criteria for both Trigger 1 and Trigger 2 are met simultaneously
- Post Trigger %: The percentage of the maximum number of samples to store after the trigger occurs. This varies by target device
- Sample Period: The time in milliseconds between samples
- Trigger 1 and 2: Sets up the events for each trigger. The variable and value threshold to trigger on can be set and specific bits can be masked

Use the "Set Trigger Values" button to send the configuration to the device.

9.2.2 Select Variables

This form allows the user to select which variables get stored in the log. The number of samples stored depends on how many variables are selected.

DC Votage DC Current AC Votage AB AC Votage BC AC Votage CA AC Votage CA AC Votage CA AC Votage CA AC Votage C AC Current A AC Current B AC Current C AC Power Q AC FFeq AC FF	Air Temp AC Power Q Cmd AC Power Q Cmd AC Current Q Cmd AC Current Q Cmd AC Current Q Cmd AC Current Q AC Voltage D AC Voltage Q Inv Current B Inv Current B Inv Current D Inv Current Q Inv Current Q	DC Current Cnd DC Lunk Voltage DC Link Voltage Top DC Link Voltage Bot Anti Island Power Adjust 24V Bias Factory Faults Inverter Warnings DC/DC Warnings DC/DC State
DCDC Temp A DCDC Temp B DCDC Temp C	DC Current Hi A	

Figure 25 - User Log Variable Selection

Use the "Get Device Values" button to retrieve the currently selected variables on the target device. Once the requested variable checkmarks are checked, use the "Set Variable Selection" button to send the configuration to the device.

9.3 Operating History

The Operating History log consists of three categories which store data over the life of the device. The categories can be accessed via the tabs at the top of the window.

The controls are on the right-hand side of the GUI. The "Read Log" and "Save Log" buttons read data and save data from the currently selected log.

9.3.1 Durations

This log stores the amount of time the device has spent at each operating point in seconds.

Connection Tools View	Help				
		Data La			
oard Instrumentation Configuratio	n Software Upgra				0.11
Fault Log Durations Fau	ult Counts Min/Max	< Data			Commande
User Log Description		Value	Units	A	Dee
Clock Time		03:15:58	Time		nea
Clock Date		Jan 01, 0	Date		Sav
ault History Time Powered		11,749	Sec		
Time in Fault S	itate	11,749	Sec		
Time in Disable	ed State	0	Sec		
Time in Charge	e Wait State	0	Sec		
Time in Chargi	ng State	0	Sec		
Time in Standt	oy State	0	Sec		
Time in Turnor	Delay State	0	Sec		
Time in Online	State	0	Sec		
Time in Offline	State	0	Sec		
Time in Ride T	hru Active State	0	Sec		
Time in Ride T	'hru Passive State	0	Sec		
Time in Stand	Alone State	0	Sec		
Time in Power	Down State	0	Sec		
Time in Test M	lode	0	Sec		
Time DCDC IG	iBT Temp Under 10	8,127	Sec		
Time DCDC IG	BT Temp 10 to 20	0	Sec		
Time DCDC IG	iBT Temp 20 to 30	0	Sec		
Time DCDC IG	iBT Temp 30 to 40	0	Sec		
Time DCDC IG	iBT Temp 40 to 50	0	Sec		
Time DCDC IG	BT Temp 50 to 60	0	Sec		

Figure 26 - Operation Log Durations

9.3.2 Fail Counts

This log stores the number of times each fault has occurred over the life of the device.

C Oztek Power Studio				
File Connection	Tools View Help			
🔳 🖨 🖨 Target	t1 • 🔘 🖸	0		
Dashboard Instrumenta	ation Configuration Software	re Upgrade	Data Logging	
Fault Log	Durations Fault Counts	Min/Max Dat	a	Controls
User Log	Description	Value	×	Commands
Operating History	HW AC Over Curr - A	0	le la	Read Log
	HW AC Over Curr - B	0		Save Log
Fault History	HW AC Over Curr - C	0		
	AC Over Curr - A	0		
	AC Over Curr - B	0	E	
	AC Over Curr - C	0		
	DC Over Curr	0		
	AC Over Voltage - Vab	0		
	AC Over Voltage - Vbc	0		
	AC Over Voltage - Vca	0		
	HW DC Over Voltage	0		
	DC Over Voltage	0		
	DC Under Voltage	5		
	Grid Under Volt	0		
	Grid Over Volt	0		
	Grid Under Freq	1		
	Grid Over Freq	5		
	Island Detected	0		
	PLL Lost Lock	0		
	Over Temperature	0		
	ESTOP	0		
	Comm Timeout	0	· · · · · · · · · · · · · · · · · · ·	
Connected to COM19	۲			

Figure 27 - Operation Log Fault Counts

9.3.3 Min/Max Data

This log stores the minimum and maximum values of various measurements over the life of the device.

Oztek Power Studio					
File Connection	Tools View Help				
🖹 🖨 🖨 Target 1	• 0 0	0			
Dashboard Instrumentati	on Configuration Software (Jograde C	ata Logging		
Fault Log	Duratione Fault Counte Mi	n/Max Data	1	Controls]
				Comman	ids 👘
User Log	Description	Value	Units		Read Log
Operating History	Max AC Voltage RMS AB	4/0.0	V		avelog
Fault History	Max AC Voltage RMS BC	480.0	V		lave Log
	Max AC Voltage RMS CA	490.0	V		
	Max AC Voltage RMS A	390.0	V		
	Max AC Voltage RMS B	394.0	V		
	Max AC Voltage RMS C	398.0	V		
	Max AC Grid Current RMS A	56.6	A		
	Max AC Grid Current RMS B	12.0	A		
	Max AC Grid Current RMS C	14.0	A		
	Max AC Inv Current RMS A	56.8	A		
	Max AC Inv Current RMS B	22.0	A		
	Max AC Inv Current RMS C	24.0	A		
	Max AC Power Real	1,000			
	Max AC Power Reactive	1,200			
	Max AC Frequency	60.0	Hz		
	Max DC Link Voltage	900.0	v		
	Max DC Link Voltage Top	440.0	V		
	Max DC Link Voltage Bot	460.0	V		
	Max DC Voltage In	600.0	v		
	Max DC Current In	56.5	1		
	Max DC Current Hi A	56.6	1		
	Max DC Current Hi B	10.0	1	•	
Connected to COM19					

Figure 28 - Operation Log Min/Max Data

9.4 Fault History Log

This log shows the timestamps of the last few occurrences of each fault. The number of timestamps stored may vary by product.

Connection To	ols View Help				
C C Target 1	- 00 (3			
board Instrumentation	Configuration Software Upo	arade Data Logging			
Fault Log	Fault	Most Recent		Least Recent	Controls
User Log	HW AC Over Curr - A				Commands
0	HW AC Over Curr - B				Read
Operating History	HW AC Over Curr - C				Save I
Fault History	AC Over Curr - A				
	AC Over Curr - B				
	AC Over Curr - C				=
	DC Over Curr				
	AC Over Voltage - Vab				
	AC Over Voltage - Vbc				
	AC Over Voltage - Vca				
	HW DC Over Voltage				
	DC Over Voltage				
	DC Under Voltage	Jan 01, 0 01:04:14	Jan 01, 0 01:03:48		
	Grid Under Volt				
	Grid Over Volt				
	Grid Under Freq				
	Grid Over Freq	Jan 01, 0 01:04:14	Jan 01, 0 01:03:48		
	Island Detected				
	PLL Lost Lock				
	Over Temperature				
	ESTOP	Jan 01, 0 03:04:30	Jan 01, 0 02:04:30		
	Comm Timeout				
	Power Down Error				
					*

Figure 29 - Fault History Log

The timestamps are read left to right from most recent to least recent and can be read and saved via the buttons on the right.

10 About

The About tab displays information regarding both Power Studio and the Target. Older TPR files do not have support for this page and will only display Power Studio information.

📀 Oztek Power Studio				-		×
File Connection Tools View Help						
🔲 😋 🖵 Target 1 🔹 🔘 🔘 🕻	0					
Dashboard Instrumentation Register Map Software Up	pgrade Data Loggin	g About				
	Power Studio Version	4.3.15.0				
	Target Profile	TPR-90216-90261-001-Engineering xml				
	Carial Mumber	70				
	Model Number	/6				
	AFE SW P/N	261				
	AFE Major Bey	1				
	AFE Minor Rev	0				
	DC/DC SW P/N	257				
	DC/DC Major Rev	1				
	DC/DC Minor Rev	0				
	Bootloader SW P/N	190				
	Bootloader Major Re	/ 1				
	Bootloader Minor Re	/ 1				
	FPGA Rev	239				
Connected to COM3 (●)			TPR-90216-9026	51-001-End	ineering	uxml

Warranty and Product Information Limited Warranty

What does this warranty cover and how long does it last? This Limited Warranty is provided by Oztek Corp. ("Oztek") and covers defects in workmanship and materials in Oztek products. This Warranty Period lasts for 18 months from the date of purchase at the point of sale to you, the original end user customer, unless otherwise agreed in writing. You will be required to demonstrate proof of purchase to make warranty claims. This Limited Warranty is transferable to subsequent owners but only for the unexpired portion of the Warranty Period. Subsequent owners also require original proof of purchase as described in "What proof of purchase is required?"

What will Oztek do? During the Warranty Period Oztek will, at its option, repair the product (if economically feasible) or replace the defective product free of charge, provided that you notify Oztek of the product defect within the Warranty Period, and provided that through inspection Oztek establishes the existence of such a defect and that it is covered by this Limited Warranty.

Oztek will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Oztek reserves the right to use parts or products of original or improved design in the repair or replacement. If Oztek repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of Oztek.

Oztek covers both parts and labor necessary to repair the product, and return shipment to the customer via an Oztek-selected non-expedited surface freight within the contiguous United States and Canada. Alaska, Hawaii and locations outside of the United States and Canada are excluded. Contact Oztek Customer Service for details on freight policy for return shipments from excluded areas.

How do you get service? If your product requires troubleshooting or warranty service, contact your merchant. If you are unable to contact your merchant, or the merchant is unable to provide service, contact Oztek directly at:

USA Telephone: 603-546-0090 Fax: 603-386-6366 Email techsupport@oztekcorp.com

Direct returns may be performed according to the Oztek Return Material Authorization Policy described in your product manual.

What proof of purchase is required? In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Oztek. Proof of purchase may be in any one of the following forms:

- The dated purchase receipt from the original purchase of the product at point of sale to the end user
- The dated dealer invoice or purchase receipt showing original equipment manufacturer (OEM) status
- The dated invoice or purchase receipt showing the product exchanged under warranty

What does this warranty not cover? Claims are limited to repair and replacement, or if in Oztek's discretion that is not possible, reimbursement up to the purchase price paid for the product. Oztek will be liable to you only for direct damages suffered by you and only up to a maximum amount equal to the purchase price of the product. This Limited Warranty does not warrant uninterrupted or error-free operation of the product or cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's

electrical systems. This warranty does not apply to and Oztek will not be responsible for any defect in or damage to:

a) The product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment
b) The product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Oztek product specifications including high input voltage from generators and lightning strikes
c) The product if repairs have been done to it other than by Oztek or its authorized service centers (hereafter "ASCs")

d) The product if it is used as a component part of a product expressly warranted by another manufacturer

e) The product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed

f) The product if it is located outside of the country where it was purchased

g) Any consequential losses that are attributable to the product losing power whether by product malfunction, installation error or misuse.

Disclaimer

Product

THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY OZTEK IN CONNECTION WITH YOUR OZTEK PRODUCT AND IS. WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY. IN NO EVENT WILL OZTEK BE LIABLE FOR: (a) ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, LOST REVENUES, FAILURE TO REALIZE EXPECTED SAVINGS, OR OTHER COMMERCIAL OR ECONOMIC LOSSES OF ANY KIND, EVEN IF OZTEK HAS BEEN ADVISED, OR HAD REASON TO KNOW, OF THE POSSIBILITY OF SUCH DAMAGE, (b) ANY LIABILITY ARISING IN TORT, WHETHER OR NOT ARISING OUT OF OZTEK'S NEGLIGENCE, AND ALL LOSSES OR DAMAGES TO ANY PROPERTY OR FOR ANY PERSONAL INJURY OR ECONOMIC LOSS OR DAMAGE CAUSED BY THE CONNECTION OF A PRODUCT TO ANY OTHER DEVICE OR SYSTEM, AND (c) ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF MISUSE OR ABUSE, OR THE INCORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT. IF YOU ARE A CONSUMER (RATHER THAN A PURCHASER OF THE PRODUCT IN THE COURSE OF A BUSINESS) AND PURCHASED THE PRODUCT IN A MEMBER STATE OF THE EUROPEAN UNION, THIS LIMITED WARRANTY SHALL BE SUBJECT TO YOUR STATUTORY RIGHTS AS A CONSUMER UNDER THE EUROPEAN UNION PRODUCT WARRANTY DIRECTIVE 1999/44/EC AND AS SUCH DIRECTIVE HAS BEEN IMPLEMENTED IN THE EUROPEAN UNION MEMBER STATE WHERE YOU PURCHASED THE PRODUCT. FURTHER, WHILE THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, YOU MAY HAVE OTHER RIGHTS WHICH MAY VARY FROM EU MEMBER STATE TO EU MEMBER STATE OR, IF YOU DID NOT PURCHASE THE PRODUCT IN AN EU MEMBER STATE, IN THE COUNTRY YOU PURCHASED THE PRODUCT WHICH MAY VARY FROM COUNTRY TO COUNTRY AND JURISDICTION TO JURISDICTION.

Return Material Authorization Policy

Before returning a product directly to Oztek you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the wrong location. When you contact Oztek to obtain service, please have your instruction manual ready for reference and be prepared to supply:

- The serial number of your product
- Information about the installation and use of the unit
- Information about the failure and/or reason for the return
- A copy of your dated proof of purchase

Return Procedure

Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging. Include the following:

- The RMA number supplied by Oztek clearly marked on the outside of the box.
- A return address where the unit can be shipped. Post office boxes are not acceptable.
- A contact telephone number where you can be reached during work hours.
- A brief description of the problem.

Ship the unit prepaid to the address provided by your Oztek customer service representative.

If you are returning a product from outside of the USA or Canada - In addition to the above, you MUST include return freight funds and you are fully responsible for all documents, duties, tariffs, and deposits.

Out of Warranty Service

If the warranty period for your product has expired, if the unit was damaged by misuse or incorrect installation, if other conditions of the warranty have not been met, or if no dated proof of purchase is available, your unit may be serviced or replaced for a flat fee. If a unit cannot be serviced due to damage beyond salvation or because the repair is not economically feasible, a labor fee may still be incurred for the time spent making this determination.

To return your product for out of warranty service, contact Oztek Customer Service for a Return Material Authorization (RMA) number and follow the other steps outlined in "Return Procedure".

Payment options such as credit card or money order will be explained by the Customer Service Representative. In cases where the minimum flat fee does not apply, as with incomplete units or units with excessive damage, an additional fee will be charged. If applicable, you will be contacted by Customer Service once your unit has been received.