



# **Active Front End (AFE) Modbus Register Profile**

Functional Specification  
FS-0058

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## 1. Introduction

This document is intended to provide the register map used to communicate with the Oztek Active Front End (AFE) control firmware using the Modbus communication protocol. It provides the Modbus address for each of the registers supported by the firmware. Application details for the registers themselves including scaling, bit assignments, etc., can be found in the AFE User's Manual (UM-0021). Details of the actual Modbus protocol implemented in Oztek firmware, the Oztek Modbus Module (OMM), can be found in the complementary specification: FS-0053 – Modbus Protocol Function Specification.pdf.

### 1.1 Referenced Documents

Ref.	Document	Description
[1]	<a href="http://www.modbus.org/specs.php">www.modbus.org/specs.php</a>	Modbus specification
[2]	FS-0053	Modbus Protocol Functional Specification
[3]	UM-0021	Oztek AFE Controller Users Manual

### 1.2 Definitions

AFE	Active Front End
CAN	Controller Area Network
DSP	Digital signal processor
EEPROM	Electrically Erasable Programmable Read Only Memory
EMC	Electro-magnetic compatibility
EMI	Electro-magnetic interference
GND	Ground, low side of input power supply
GTI	Grid Tied Inverter
GUI	Graphical User Interface
HMI	Human Machine Interface
IPM	Intelligent Power Module
N.C.	Not connected
OMM	Oztek Modbus Module
PCB	Printed Circuit Board
PCC	Power Control Center
PID	Parameter Identifier
PLC	Programmable Logic Controller
PLL	Phase Locked Loop
POR	Power On Reset
PWM	Pulse width modulation
SVM	Space Vector Modulator

## 2. Overview

The OMM is a simplified version of the industry standard Modbus protocol. It provides support for a 2-wire, RS-485 physical layer and the RTU transmission mode. More specifically, it provides the following functions:

- Control
- Configuration
- Instrumentation/Monitoring

### 2.1 Handling 32 bit Values

By protocol, each addressable Modbus register holds a 16-bit quantity. In order to write or read 32-bit quantities, the least significant (LSW) and most significant words (MSW) must be written independently.

## 3. Command Registers

**Table 1 – Command Register Set**

Modbus Address		PID	Description
Decimal	Hex		
1	0x0001	0x0000	On/Off Control
2	0x0002	0x0001	Mode Control
3	0x0003	0x0002	DC Link Voltage Setpoint
4	0x0004	0x0003	Grid Current Setpoint, Real
5	0x0005	0x0004	Grid Current Setpoint, Reactive
6	0x0006	0x0005	Power Factor Setpoint
7	0x0007	0x0006	Fault Reset
8	0x0008	0x0007	Configuration Password
9	0x0009	0x0008	Configuration Reset
10	0x000A	0x0009	Configuration Reload
11	0x000B	0x000A	Stand Alone AC Voltage Setpoint (Vrms)
12	0x000C	0x000B	Isolated Digital Output Control
13	0x000D	0x000C	Charge Command

## 4. Instrumentation Registers

Table 2 – Instrumentation Register Set

Modbus Address		PID	Description
Decimal	Hex		
2048	0x0800	0x4000	AFE Operating State
2049	0x0801	0x4001	AFE Operating Mode
2050	0x0802	0x4002	DC Link Voltage
2051	0x0803	0x4003	AC Line Voltage, Phase A to B
2052	0x0804	0x4004	AC Line Voltage, Phase B to C
2053	0x0805	0x4005	AC Line Voltage, Phase C to A
2054	0x0806	0x4006	AC Line Current, Phase A
2055	0x0807	0x4007	AC Line Current, Phase B
2056	0x0808	0x4008	AC Line Current, Phase C
2057	0x0809	0x4009	AC Line Frequency
2058	0x080A	0x400A	Power Factor
2059	0x080B	0x400B	PLL Status
2060	0x080C	0x400C	Inverter Temperature
2061	0x080D	0x400D	Auxiliary Temperature
2062	0x080E	0x400E	Contactors Status
2064	0x0810	0x400F	Warning Status
2065	0x0811		
2066	0x0812	0x4010	Fault Status 1
2067	0x0813		
2068	0x0814	0x4011	Register Operation Status
2069	0x0815	0x4012	DSP Software Revision – Major
2070	0x0816	0x4013	DSP Software Revision – Minor
2071	0x0817	0x4014	FPGA Revision – Major
2072	0x0818	0x4015	FPGA Revision – Minor
2073	0x0819	0x4016	PCB Hardware Revision
2074	0x081A	0x4017	Inverter A Current, Phase A
2075	0x081B	0x4018	Inverter A Current, Phase B
2076	0x081C	0x4019	Inverter A Current, Phase C
2077	0x081D	0x401A	Inverter B Current, Phase A
2078	0x081E	0x401B	Inverter B Current, Phase B
2079	0x081F	0x401C	Inverter B Current, Phase C
2080	0x0820	0x401D	Inverter B Temperature
2081	0x0821	N/A	<i>unused</i>
2082	0x0822	0x401E	Fault Status 2
2083	0x0823		
2084	0x0824	0x401F	Isolated Digital Input Status

## 5. Non-Volatile Configuration Registers

### 5.1 Configuration Control Parameters

**Table 3 – Configuration Control Register Set**

Modbus Address		PID	Description
Decimal	Hex		
4096	0x1000	0x8000	EEPROM Header
4097	0x1001	0x8001	Factory Configuration revision - Major
4098	0x1002	0x8002	Factory Configuration revision - Minor
4099	0x1003	0x8003	Application Configuration Data Revision
4100	0x1004	0x8004	Hardware Configuration
4101	0x1005	0x8005	User Configuration Revision
4102	0x1006	0x8006	Configuration Password

### 5.2 CAN Interface Parameters

**Table 4 – CAN Interface Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4112	0x1010	0x8010	CAN Automatic Alarm Transmit Enable
4113	0x1011	0x8011	CAN Timeout
4114	0x1012	0x8012	CAN Group ID
4115	0x1013	0x8013	CAN Module ID
4116	0x1014	0x8014	CAN Baud Rate
4117	0x1015	0x8015	CAN Status Destination Group ID
4118	0x1016	0x8016	CAN Status Destination Module ID
4119	0x1017	0x8017	CAN Update Rate – DC Link Status
4120	0x1018	0x8018	CAN Update Rate – Grid Voltage Status
4121	0x1019	0x8019	CAN Update Rate – Inverter Current Status
4122	0x101A	0x801A	CAN Update Rate – Grid Status
4123	0x101B	0x801B	CAN Update Rate – System Status
4124	0x101C	0x801C	CAN Update Rate – Alarm Status
4125	0x101D	0x801D	CAN Broadcast Message Receive Enable
4126	0x101E	0x801E	CAN Update Rate – Alarm2 Status



### 5.3 System Measurement Scaling Parameters

Table 5 – System Measurement Scaling Parameter Summary

Modbus Address		PID	Description
Decimal	Hex		
4128	0x1020	0x8020	DC Link Voltage Measurement – Full Scale
4129	0x2021	0x8021	Line Voltage Measurement – Full Scale
4130	0x1022	0x8022	Inverter Current Measurement – Full Scale
4131	0x1023	0x8023	Inverter Current Measurement Polarity
4132	0x1024	0x8024	Inverter Current Measurement Auto Calibration

### 5.4 Default Operating Parameters

Table 6 – Default Operating Parameter Summary

Modbus Address		PID	Description
Decimal	Hex		
4144	0x1030	0x8030	Default Control Mode
4145	0x1031	0x8031	Default DC Link Voltage Setpoint
4146	0x1032	0x8032	Default Real Current Setpoint
4147	0x1033	0x8033	Default Reactive Current Setpoint
4148	0x1034	0x8034	Voltage Mode Current Limit Max
4149	0x1035	0x8035	Voltage Mode Current Limit Min
4150	0x1036	0x8036	Default Power Factor Setpoint
4151	0x1037	0x8037	Default Stand Alone Voltage Setpoint

### 5.5 Grid Monitor and Protection Parameters

Table 7 – Grid Monitor & Protection Parameter Summary

Modbus Address		PID	Description
Decimal	Hex		
4160	0x1040	0x8040	Grid Fast Under-Voltage Threshold
4161	0x1041	0x8041	Grid Slow Under-Voltage Threshold
4162	0x1042	0x8042	Grid Fast Over-Voltage Threshold
4163	0x1043	0x8043	Grid Slow Over-Voltage Threshold
4164	0x1044	0x8044	Grid Fast Under-Frequency Threshold
4165	0x1045	0x8045	Grid Slow Under-Frequency Threshold

Modbus Address		PID	Description
4166	0x1046	0x8046	Grid Over-Frequency Threshold
4167	0x1047	0x8047	Grid Fast Under-Voltage Clear Time
4168	0x1048	0x8048	Grid Slow Under-Voltage Clear Time
4169	0x1049	0x8049	Grid Fast Over-Voltage Clear Time
4170	0x104A	0x804A	Grid Slow Over-Voltage Clear Time
4171	0x104B	0x804B	Grid Fast Under-Frequency Clear Time
4172	0x104C	0x804C	Grid Slow Under-Frequency Clear Time
4173	0x104D	0x804D	Grid Over-Frequency Clear Time
4174	0x104E	0x804E	Grid Reconnect Delay Time

## 5.6 Fault and Warning Parameters

Table 8 – Fault and Warning Parameter Summary

Modbus Address		PID	Description
Decimal	Hex		
4176	0x1050	0x8050	DC Link Over-Voltage Fault Threshold
4177	0x1051	0x8051	DC Link Over-Voltage Warning Threshold
4178	0x1052	0x8052	DC Link Over-Voltage Recover Threshold
4179	0x1053	0x8053	Grid Over-Current Fault Threshold
4180	0x1054	0x8054	Grid Over-Current Warning Threshold
4181	0x1055	0x8055	Grid Over-Current Recover Threshold
4182	0x1056	0x8056	Inverter Temperature Fault Threshold
4183	0x1057	0x8057	Inverter Temperature Warning Threshold
4184	0x1058	0x8058	Inverter Temperature Recover Threshold
4185	0x1059	0x8059	Auxiliary Temperature Fault Threshold
4186	0x105A	0x805A	Auxiliary Temperature Warning Threshold
4187	0x105B	0x805B	Auxiliary Temperature Recover Threshold
4188	0x105C	0x805C	Inverter Error Pin Active High
4189	0x105D	0x805D	Inverter Over Temp Pin Active High
4190	0x105E	0x8111	DC Link Under-Voltage Fault Threshold
4191	0x105F	0x8112	DC Link Under-Voltage Warning Threshold
4192	0x1060	0x8113	DC Link Under-Voltage Recover Threshold

## 5.7 Converter Control Parameters

**Table 9 – Converter Control Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4199	0x1067	0x8060	Pulse Width Modulation Frequency
4200	0x1068	0x8061	Pulse Width Modulation Deadband Enable
4201	0x1069	0x8062	Pulse Width Modulation Deadband Time
4202	0x106A	0x8063	Pulse Width Modulation Max Duty Cycle
4203	0x106B		
4204	0x106C	0x8064	Pulse Width Modulation Min Duty Cycle
4205	0x106D		
4206	0x106E	0x8065	Pulse Width Modulation Action
4207	0x106F	0x8066	Grid Voltage Line Sensing Select
4208	0x1070	0x8067	Automatic Grid Fault Recovery
4209	0x1071	0x8068	Use Power Factor Setpoint
4210	0x1072	0x8069	Total Line Filter Inductance
4211	0x1073		
4212	0x1074	0x806A	Nominal Grid Frequency
4213	0x1075	0x806B	Inverter Power Stage Dead Time
4214	0x1076	0x806C	Output Modulation Type
4215	0x1077	0x806D	Hardware On/Off Pin Control

## 5.8 Inverter Temperature Monitor Parameters

**Table 10 – Inverter Temperature Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4224	0x1080	0x8070	Inverter Temperature Coefficient C0
4225	0x1081		
4226	0x1082	0x8071	Inverter Temperature Coefficient C1
4227	0x1083		
4228	0x1084	0x8072	Inverter Temperature Coefficient C2
4229	0x1085		
4230	0x1086	0x8073	Inverter Temperature Coefficient C3
4231	0x1087		

## 5.9 Auxiliary Temperature Monitor Parameters

**Table 11 – Auxiliary Temperature Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4232	0x1088	0x8079	Auxiliary Temperature Coefficient C0
4233	0x1089		
4234	0x108A	0x807A	Auxiliary Temperature Coefficient C1
4235	0x108B		
4236	0x108C	0x807B	Auxiliary Temperature Coefficient C2
4237	0x108D		
4238	0x108E	0x807C	Auxiliary Temperature Coefficient C3
4239	0x108F		
4240	0x1090	0x8078	Auxiliary Temperature Sensor Enable

## 5.10 Voltage Regulator Parameters

**Table 12 – Voltage Regulator Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4255	0x109F	0x8080	Voltage Command Slew Limit
4256	0x10A0	0x8081	Kp – Voltage Controller
4257	0x10A1		
4258	0x10A2	0x8082	Ki – Voltage Controller
4259	0x10A3		
4260	0x10A4	0x8083	Voltage Droop Control Gain
4261	0x10A5		

## 5.11 Current Regulator Parameters

**Table 13 – Current Regulator Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4265	0x10A9	0x8090	Current Command Slew Limit
4266	0x10AA	0x8091	Kp – Current Controller
4267	0x10AB		
4268	0x10AC	0x8092	Ki – Current Controller
4269	0x10AD		
4270	0x10AE	0x8093	Turn-off Current Slew Rate
4271	0x10AF	0x8094	Iq Current Command Offset
4272	0x10B0	0x8095	Nominal DC Link Voltage

## 5.12 Phase Lock Loop (PLL) Parameters

**Table 14 – PLL Control Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4278	0x10B6	0x80A0	Kp – Phase Locked Loop, Unlocked
4279	0x10B7		
4280	0x10B8	0x80A1	Ki – Phase Locked Loop, Unlocked
4281	0x10B9		
4282	0x10BA	0x80A2	Kp – Phase Locked Loop, Locked
4283	0x10BB		
4284	0x10BC	0x80A3	Ki – Phase Locked Loop, Locked
4285	0x10BD		
4286	0x10BE	0x80A4	PLL Output Range
4287	0x10BF	0x80A5	PLL Phase Detector Error Threshold
4288	0x10C0	0x80A6	PLL Lock Indicator AC Line Count
4289	0x10C1	0x80A7	PLL Unlock Indicator AC Line Count
4290	0x10C2	0x80A8	PLL Phase Lag Adjustment
4291	0x10C3	0x80A9	PLL Phase Error LPF Cutoff Frequency
4292	0x10C4	0x80AA	PLL Auto Gain Control Filter Constant
4293	0x10C5		
4294	0x10C6	0x80AB	PLL Capacitor Sensing Adjustment
4295	0x10C7		

### 5.13 Pre-charge Parameters

**Table 15 – Pre-charge Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4304	0x10D0	0x80B0	DC Link Pre-charge Mode
4305	0x10D1	0x80B1	DC Link Pre-charge Threshold
4306	0x10D2	0x80B2	Contactorm Debounce Time
4307	0x10D3	0x80B3	Contactorm Close Time
4308	0x10D4	0x80B4	Precharge Timeout Threshold
4309	0x10D5	0x80B5	Contactorm Monitor Enables
4310	0x10D6	0x80B6	Grid Contactorm Enable

### 5.14 Instrumentation Parameters

**Table 16 – Instrumentation Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4320	0x10E0	0x80C0	Instrumentation Interrupt Rate
4321	0x10E1	0x80C1	Low Pass Cutoff Freq - V DC Link Instrumentation
4322	0x10E2	0x80C2	Low Pass Cutoff Freq - V DC Link Feedback
4323	0x10E3	0x80C3	Low Pass Cutoff Freq - Grid Voltage
4324	0x10E4	0x80C4	Low Pass Cutoff Freq - Grid Current
4325	0x10E5	0x80C5	Low Pass Cutoff Freq - Grid Frequency
4326	0x10E6	0x80C6	Low Pass Cutoff Freq - Temperatures
4327	0x10E7	0x80C7	Low Pass Cutoff Freq - Grid Voltage Feedforward

### 5.15 Dual Interleaved Parameters

**Table 17 – Dual Interleaved Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4336	0x10F0	0x80D0	Dual Interleaved Inverter Enable
4337	0x10F1	0x80D1	Zero Sequence Current Control Enable
4338	0x10F2	0x80D2	Kp – Zero Sequence Current Controller
4339	0x10F3		
4340	0x10F4	0x80D3	Ki – Zero Sequence Current Controller
4341	0x10F5		

## 5.16 ModBus Parameters

**Table 18 – Modbus Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4352	0x1100	0x80F0	ModBus Address
4353	0x1101	0x80F1	Modbus Baudrate
4354	0x1102	0x80F2	Modbus Parity

## 5.17 Stand Alone Voltage Mode Parameters

**Table 19 – Stand Alone Voltage Mode Parameter Summary**

Modbus Address		PID	Description
Decimal	Hex		
4368	0x1110	0x8100	Resonant Control Fundamental Gain
4369	0x1111	0x8101	Resonant Control Fundamental Phase
4370	0x1112	0x8102	Resonant Control Fundamental Max Output
4371	0x1113	0x8103	Resonant Control Fundamental Min Output
4372	0x1114	0x8104	Resonant Control 3 <sup>rd</sup> Harmonic Gain
4373	0x1115	0x8105	Resonant Control 3 <sup>rd</sup> Harmonic Phase
4374	0x1116	0x8106	Resonant Control 3 <sup>rd</sup> Harmonic Max Output
4375	0x1117	0x8107	Resonant Control 3 <sup>rd</sup> Harmonic Min Output
4376	0x1118	0x8108	Resonant Control 5th Harmonic Gain
4377	0x1119	0x8109	Resonant Control 5th Harmonic Phase
4378	0x111A	0x810A	Resonant Control 5th Harmonic Max Output
4379	0x111B	0x810B	Resonant Control 5th Harmonic Min Output
4380	0x111C	0x810C	Resonant Control 7th Harmonic Gain
4381	0x111D	0x810D	Resonant Control 7th Harmonic Phase
4382	0x111E	0x810E	Resonant Control 7th Harmonic Max Output
4383	0x111F	0x810F	Resonant Control 7th Harmonic Min Output
4384	0x1120	0x8114	Stand Alone Hi Pass Filter A0 Coefficient
4385	0x1121		
4386	0x1122	0x8115	Stand Alone Hi Pass Filter A1 Coefficient
4387	0x1123		
4388	0x1124	0x8116	Stand Alone Hi Pass Filter A2 Coefficient
4389	0x1125		
4390	0x1126	0x8117	Stand Alone Hi Pass Filter B0 Coefficient
4391	0x1127		

Modbus Address		PID	Description
Decimal	Hex		
4392	0x1128	0x8118	Stand Alone Hi Pass Filter B1 Coefficient
4393	0x1129		
4394	0x112A	0x8119	Stand Alone Hi Pass Filter B2 Coefficient
4395	0x112B		
4396	0x112C	0x8110	Stand Alone Voltage Command Slew Rate

## 5.18 Stand Alone Current Overload Parameters

Table 20 – Dual Interleaved Parameter Summary

Modbus Address		PID	Description
Decimal	Hex		
4416	0x1140	0x8120	Rated RMS Output Current
4417	0x1141	0x8121	I2T Trip Time
4418	0x1142	0x8122	10% Overload Trip Time
4419	0x1143		
4420	0x1144	0x8123	20% Overload Trip Time
4421	0x1145		
4422	0x1146	0x8124	30% Overload Trip Time
4423	0x1147		
4424	0x1148	0x8125	40% Overload Trip Time
4425	0x1149		
4426	0x114A	0x8126	50% Overload Trip Time
4427	0x114B		
4428	0x114C	0x8127	60% Overload Trip Time
4429	0x114D		
4430	0x114E	0x8128	70% Overload Trip Time
4431	0x114F		
4432	0x1150	0x8129	80% Overload Trip Time
4433	0x1151		
4434	0x1152	0x812A	90% Overload Trip Time
4435	0x1153		
4436	0x1154	0x812B	100% Overload Trip Time
4437	0x1155		



## 5.19 Emergency Off Parameters

Table 21 – Emergency Off Parameter Summary

Modbus Address		PID	Description
Decimal	Hex		
4440	0x1158	0x8130	Emergency Off Enable
4441	0x1159	0x8131	Emergency Off Debounce Time

# 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 your OZDSP3000 controller. 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](mailto: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.