

Thyro-PX[®] DC Elimination Card

User Guide

57010183-00A

June 2018

Related Documentation

For complete information on the Thyro-PX unit, see the user manual that accompanied the system. In particular, reference the safety information in Chapter 1 of the user manual for the Thyro-PX unit.

DESCRIPTION

The AE DC Elimination Card is an optional accessory for the Thyro-PX power controller.

A DC offset can be caused by power grid irregularities, induced transients, and power controller operation. It can cause electrode corrosion in direct melting applications, and higher heat dissipation in transformers.

The DC Elimination Card accessory measures the DC offset at the power controller output and communicates with the power controller to adjust the phase angle to eliminate the DC offset.



Figure 1. DC Elimination Card accessory

Related Links

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INSTALLATION

**DANGER:**

RISK OF DEATH OR BODILY INJURY. Disconnect and lockout/tagout all sources of input power before working on this unit or anything connected to it.

**DANGER:**

Personnel must receive proper training before installing or troubleshooting high-energy electrical equipment. Potentially lethal voltages could cause death, serious personal injury, or damage to the equipment. Ensure that all appropriate safety precautions are taken.

**WARNING:**

These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

1. Mount the DC Elimination Card accessory near the Thyro-PX power controller.
2. Connect **X4** on the power controller to **X4** on the accessory using a customer-supplied RJ-45 patch cable.
3. Connect the customer-supplied 24 VDC, 200 mA power supply to **X3** on the DC Elimination Card accessory.
4. Connect a fuse holder to each terminal of the load.
5. Connect the twisted-pair measurement conductors from the fuse holders to **X1** on the DC Elimination Card accessory. Maximum wire size is 2.5 mm² (14 AWG).
6. Install a 2 A slow acting fuse in each fuse holder.
7. If needed, make the alarm relay connection to **X21**

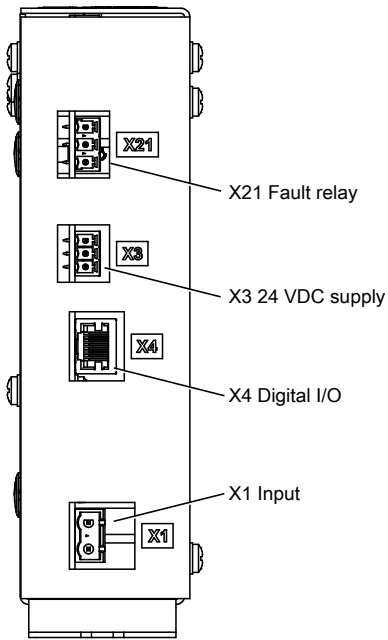


Figure 2. Bottom connectors

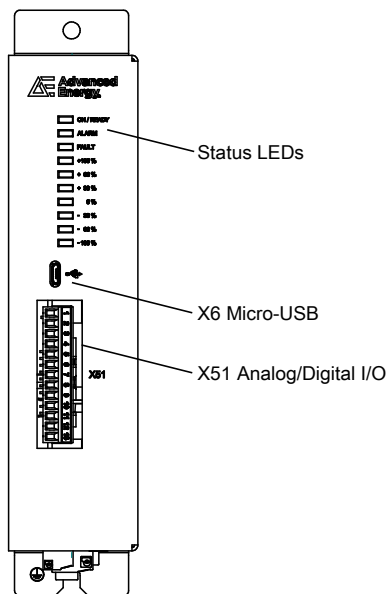


Figure 3. Front connectors

The analog/digital I/O connector **X51** on the front of the accessory is not used for a typical installation. Contact AE Global Services for additional information.

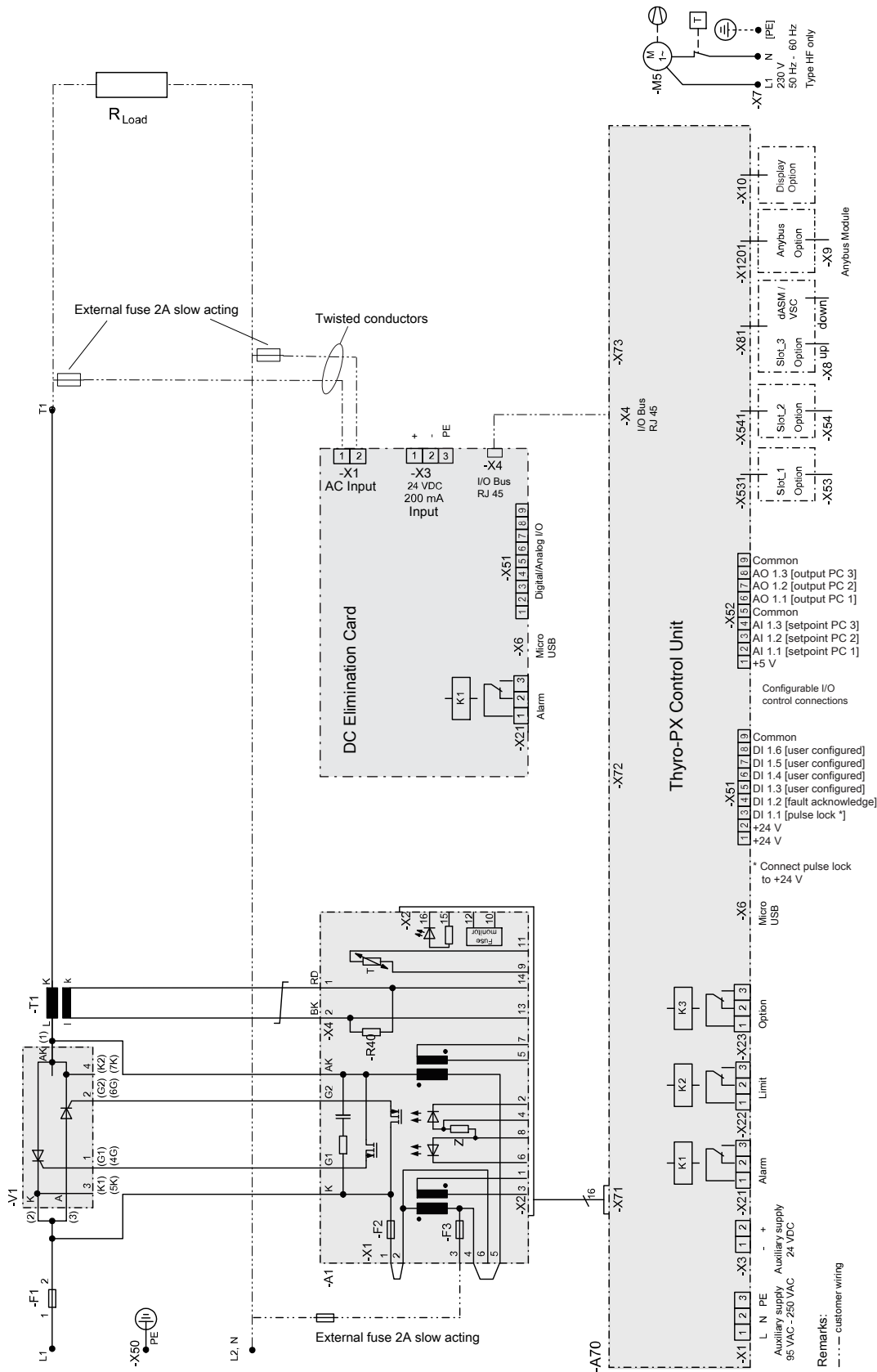


Figure 4. Connection diagram

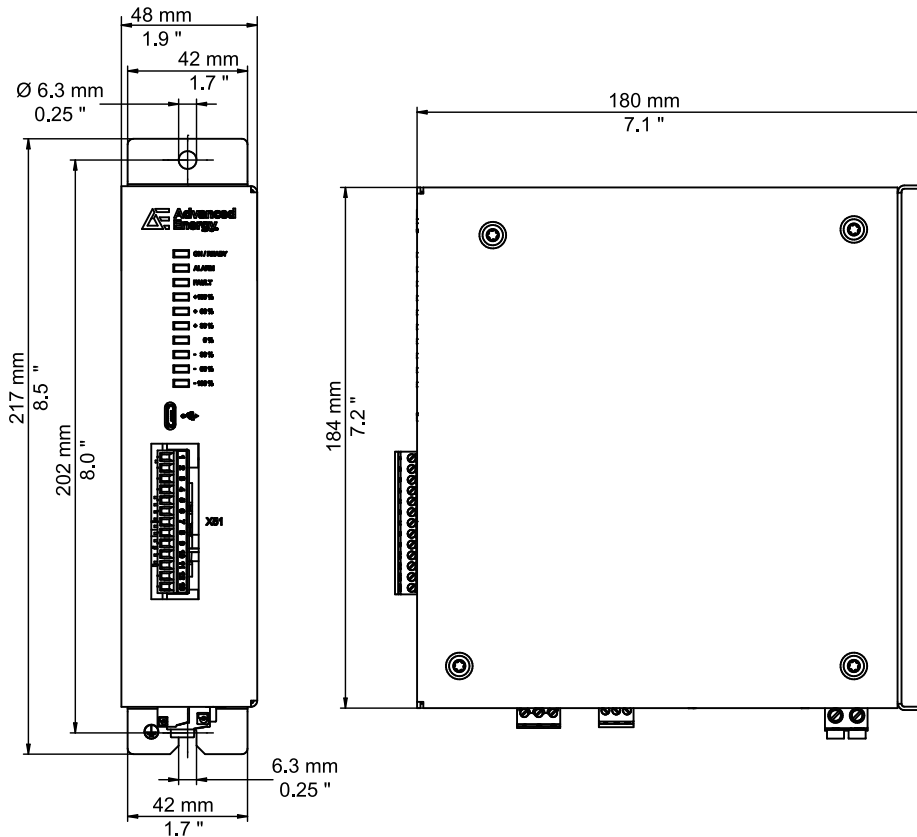



Figure 5. Mechanical drawing

CONFIGURATION

1. Apply power to the Thyro-PX power controller and DC Elimination Card accessory.
2. Configure the power controller using the Thyro-Tool Pro software.
 - a. Start the software.
 - b. Connect to the Thyro-PX power controller via USB.
 - c. Open the unit in the **Port Explorer** tab of the software.
 - d. Select **Tools** → **Enable extended range of functions**.
 - e. Enter password `AEIddhh`, where `dd` is the day number and `hh` is the hour from the PC clock.
 - f. Select **Parameters** → **Controller #1** → **DC Elimination** → **Activate DC reduction**.
 - g. The software will display `Virtualize parameter?` Click **OK**.
 - h. Select **Parameters** → **Hardware config. (gen.)** → **External I/O**.
 - i. Select **DC elimination** from the drop down list.
 - j. Click the save icon .

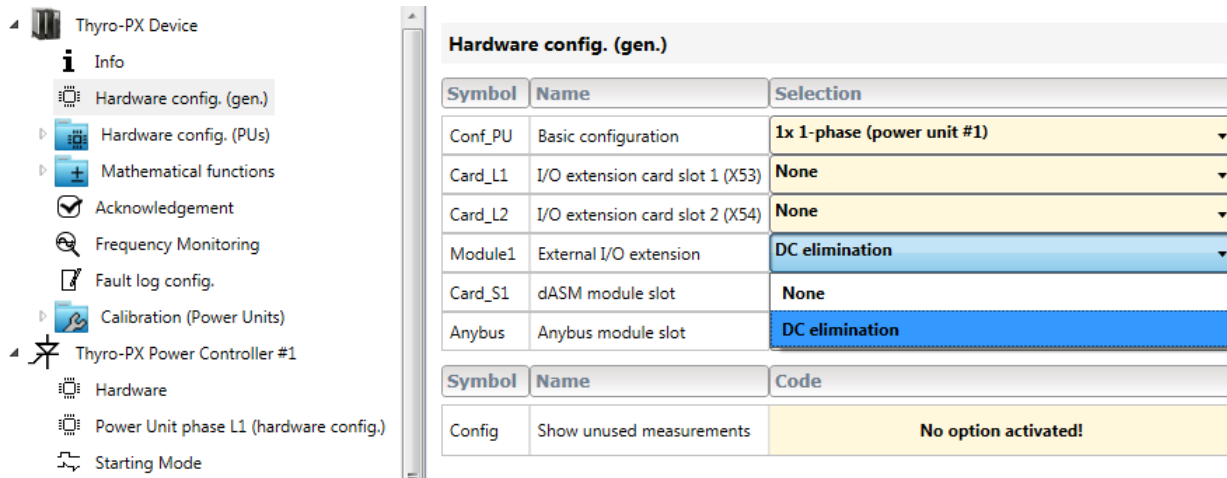



Figure 6. Power controller configuration

3. Configure the DC Elimination Card accessory using the Thyro-Tool Pro software.

The only parameter requiring configuration is the AC voltage range.

- a. Connect to the accessory via USB.
- b. Open the accessory in the **Port Explorer** tab of the software.
- c. Select **Parameters** → **Hardware**.
- d. Select the appropriate voltage range from the drop down list.
- e. Click the save icon .

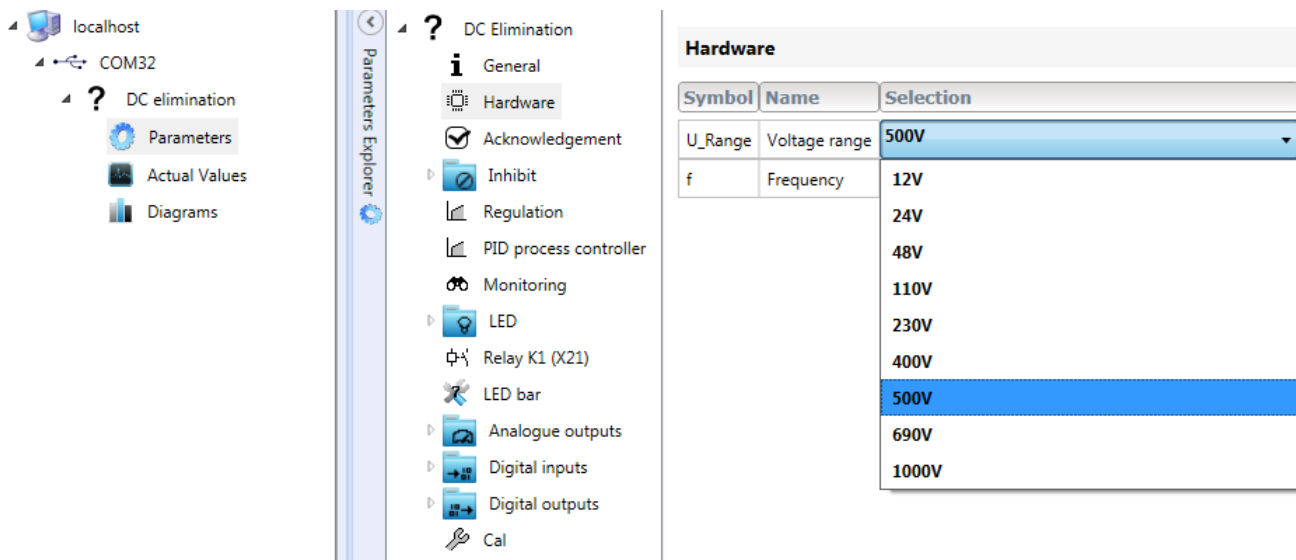


Figure 7. Accessory configuration

OPERATION

On delivery, the power controller is parameterized to the respective power section, and the TAKT operating mode is set. The operating mode must be changed to VAR to allow the DC Elimination Card accessory to operate. You should review these standard parameters, and, if necessary, adjust them for your application.

To Operate the Thyro-PX Unit with the DC Elimination Card Accessory

1. Install the unit according to the installation procedures in this user guide.

The minimum connections are power, load, *SETPOINT*, and *PULSE LOCK* jumper.

 **Important**

By default, the unit is configured to require a customer supplied *PULSE LOCK* jumper. The unit may be customer configured to not require this jumper.

2. Turn on the system circuit breakers and apply AC input to the unit and accessory.

When the power controller receives AC input, it performs self-diagnostics. If the unit detects an error, the unit sets the respective fault bits and lights either the **FAULT** LED or the light green **ON / READY** LED if the fault is severe. You will not be able to apply power to the load until you clear the fault.

3. Verify that the light green **ON / READY** LED is lit.
4. Verify that the **LIMIT** LED is not lit.
5. Verify that the **PULSE LOCK** LED is not lit.
6. Verify that the **FAULT** LED is not lit.
7. Verify that an increase in setpoint applies power to the load.
8. On the accessory, verify that the **ON / READY** LED is lit, and that the **FAULT** and **ALARM** LEDs are not lit.

If the Thyro-PX unit is delivering power and the **LIMIT** LED is not lit, the unit is functioning properly. The DC Elimination Card accessory LEDs will indicate the magnitude of the DC offset correction.

 **Important**

AE recommends that you update the firmware to the latest revision using the Thyro-Tool Pro software.

LEDS, ALARM RELAY, I/O

LEDS

The DC Elimination Card LED status indicators are located on the front panel of the accessory. The LED functions can be changed using the Thyro-Tool Pro software.

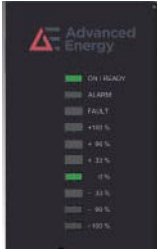


Figure 8. Status LEDs

Table 1. DC Elimination Card status LEDs

LED	Status (Default Configuration)
ON / READY	Green: On, ready for operation Red: On, not ready for operation, check other LEDs Off: No power, hardware fault
ALARM	Red: An alarm condition is present
FAULT	Red: A fault is present
+ 100%	Red: The DC offset is $\geq +0.1 \text{ V}$ ^[1]
+ 66%	Red: The DC offset is $\geq +0.066 \text{ V}$
+ 33%	Red: The DC offset is $\geq +0.033 \text{ V}$
0%	Green: There is no DC offset Red: The DC offset is $< +0.033 \text{ V}$, or $> -0.033 \text{ V}$
- 33%	Red: The DC offset is $\leq -0.033 \text{ V}$
- 66%	Red: The DC offset is $\leq -0.066 \text{ V}$
- 100%	Red: The DC offset is $\leq -0.1 \text{ V}$

¹ The offset voltage is calculated with default scaling, where 100% indicates 0.1 V. The scaling can be changed using the Thyro-Tool Pro software.

Fault relay

The fault relay can be used to signal fault and limit conditions in the DC Elimination Card accessory. The fault relay functions can be changed using the Thyro-Tool Pro software.

Table 2. Fault relay connector X21

Pin Number	Default Function
X21.1	Common
X21.2	Normally closed
X21.3	Normally open

Analog and Digital I/O

The I/O connector can be used to control and monitor the DC Elimination Card accessory. The configuration of each input and output can be changed using the Thyro-Tool Pro software.

Table 3. I/O connector X51

Pin Number	Function	Default Configuration
X51.1	+24 VDC output, 250 mA maximum	
X51.2	Digital input 1	Regulator lock (auto-acknowledgement)
X51.3	Digital input 2	Reg clear
X51.4	Digital input 3	Acknowledgement
X51.5	Signal ground	
X51.6	Digital output 1	Internal communication error, EEPROM or CPU
X51.7	Digital output 2	Status <ul style="list-style-type: none"> • Regulator lock • Reset regulator Monitor <ul style="list-style-type: none"> • Udc < minimum • Udc > maximum • PI Out < minimum • PI Out > maximum • DC elimination < minimum • DC elimination > maximum
X51.8	Digital output 3	Error <ul style="list-style-type: none"> • Internal communication error EEPROM • Internal communication error CPU • Synchronization error Status <ul style="list-style-type: none"> • Regulator lock • Reset regulator
X51.9	Signal ground	
X51.10	Analog output 1	Udc
X51.11	Analog output 2	DC reduction

Table 3. I/O connector X51 (Continued)

Pin Number	Function	Default Configuration
X51.12	Analog output 3	No default
X51.13	Signal ground	

AE GLOBAL SERVICES

Please contact AE Global Services if you have questions or problems that cannot be resolved by working through the provided troubleshooting. When you call Global Services, make sure to have the unit serial number and part number. These numbers are available on unit labels.



Important

For returns and repairs, please call AE Global Services to get the correct shipping address.

Table 4. AE Global Services 24 X 7 contact information

Office	Contact
AE World Headquarters	Address: 1625 Sharp Point Drive Fort Collins, CO 80525 USA Phone (24 hrs/day, 7 days/week): 800.446.9167 or +1.970.221.0108 Email: (We will respond to email by the next business day.) mailto:technical.support@aei.com
Thermal product support	Contact by phone or email: +1.360.694.7871 mailto:thermalapplications@aei.com
Power Control Module product support	Contact by phone or email: +49 (0) 2902 910370 10 (technical support during German business hours) mailto:powercontroller@aei.com
High Voltage product support: HiTek Power, Ltd.	Contact by phone or email: +44 (0) 1903 712400 mailto:support.centre@aei.com
High Voltage product support: UltraVolt, Inc.	Contact by phone or email: +1.631.471.4444 mailto:sales.support-uv@aei.com

Table 4. AE Global Services 24 X 7 contact information (Continued)

Office	Contact
Local or regional sales or service office	Visit the Advanced Energy website for current contact information: http://www.advanced-energy.com

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