

Thyro-PX[®] Electrical-Optical-Electrical Interface Boards

User Guide

57010253-00A

June 2022

Related Documentation

For complete information on the Thyro-PX unit, see the user manual for the unit.

DESCRIPTION

The AE Electrical-Optical-Electrical Interface boards are an optional accessory for the Thyro-PX power controller. For high-power applications, these boards provide optical isolation between the power controller and up to six water-cooled thyristor pairs.

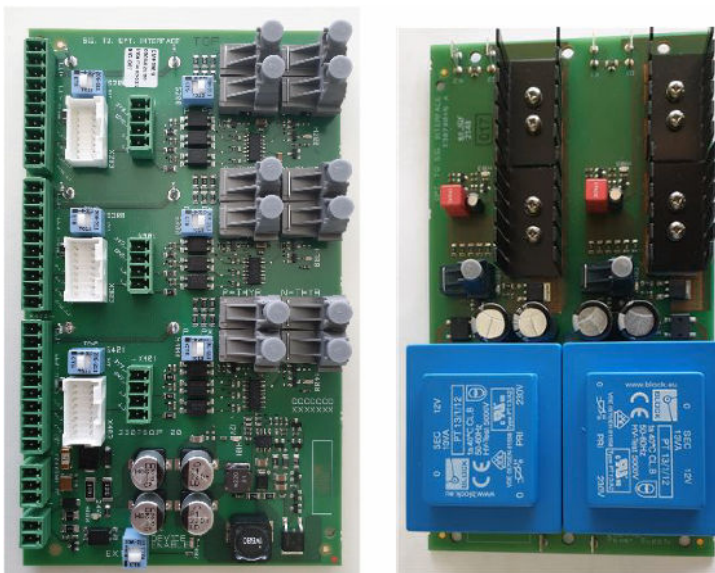


Figure 1. Interface boards

Related Links

- [“Typical Applications” on page 2](#)
- [“Electrical-Optical Interface Installation” on page 4](#)
- [“Optical-Electrical Interface Installation” on page 7](#)
- [“B6C Voltage and Current Measurement Installation” on page 9](#)
- [“W3C Voltage and Current Measurement Installation” on page 10](#)
- [“Configuration” on page 11](#)
- [“Operation” on page 11](#)
- [“Technical Support” on page 13](#)

TYPICAL APPLICATIONS

DC Output Configuration

The following figure shows thyristor stacks combined to a B6C rectifier circuit for 3-phase SCR with DC output. The control functions are implemented using an AE Thyro-PX controller and interface boards, as described in this guide.

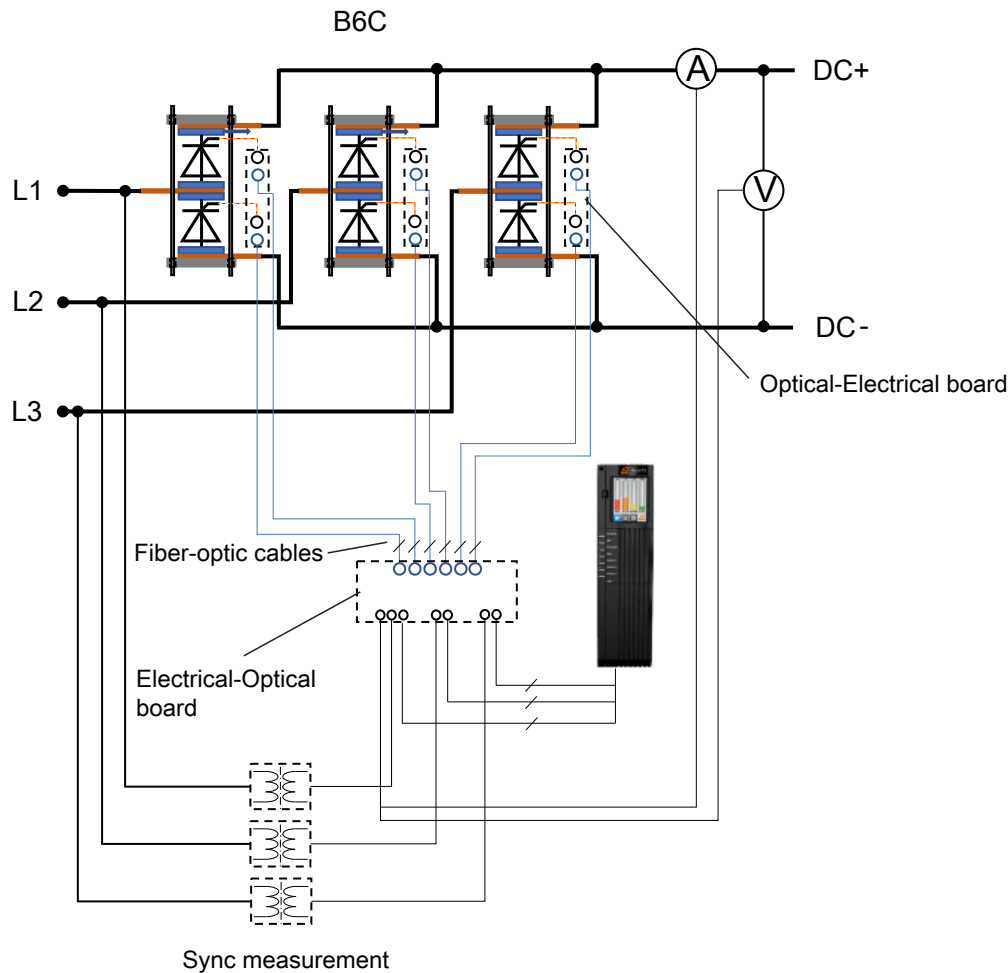


Figure 2. DC output

AC Output Configuration

The following figure shows thyristor stacks combined to a W3C circuit for 3-phase SCR with AC output. The control functions are implemented using an AE Thyro-PX controller and interface boards, as described in this guide.

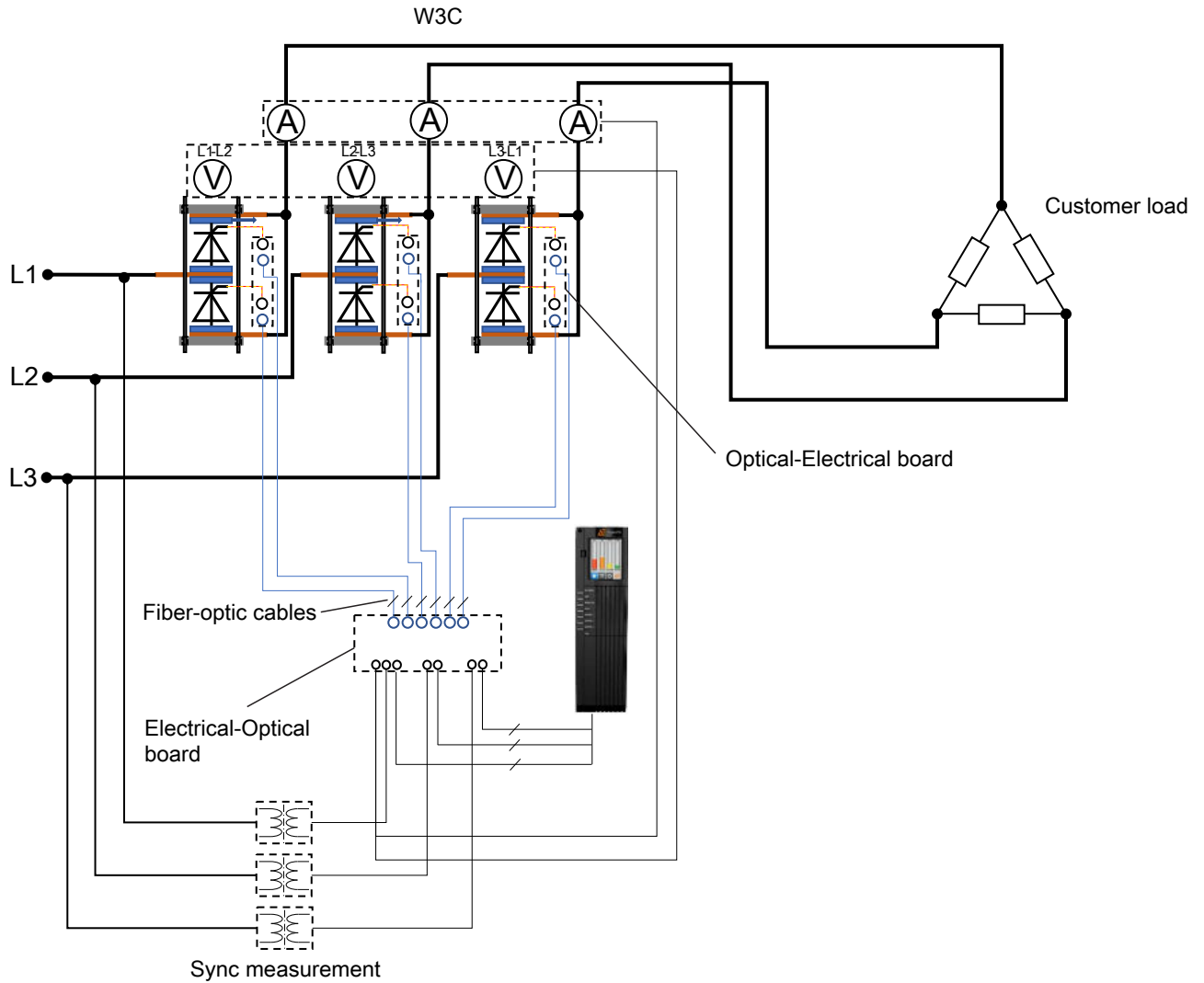


Figure 3. AC output

Power Supply Requirements

Power supply for the Thyro-PX controller:

- 24 V DC with at least 500 mA inrush current, operating current 150 mA, or 230 V AC (90 – 265 V AC).
- For further information, refer to the Thyro-PX manual.

Power supplies for the Electrical-Optical board:

- 24 V DC, 100 mA.
- An additional supply with these specifications can be used for external release.

Power supply for the Optical-Electrical board:

- 230 V AC $\pm 10\%$, 250 mA.

Fiber-Optic Cable Requirements

2x Simplex LC to LC style fiber-optic patch cables of appropriate length.

Electrical Data and Settings

Table 1. Electrical and data settings

Function	Terminal	Value/Description
Electrical-Optical board supply voltage	X101	15 – 27 V DC Current consumption: 100 mA at 24 V DC
Optical-Electrical board supply voltage	X1, X2	230 V AC ± 10%, 250 mA
External release	X102	0 – 27 V DC: <ul style="list-style-type: none"> • Voltage < 3 V DC, board disabled • Voltage > 5 V DC, board released • Current consumption: 20 mA at 24 V DC
External release	S100	Alternative release if X102 is not used S100 = ON, board released.
Thyro-PX selection	S200, S300, S400	S200 for Channel 1, S300 for Channel 2, S400 for Channel 3 Selection DIP switch = ON
Temperature sensor selection	S201, S301, S401	S201 for Channel 1, S301 for Channel 2, S401 for Channel 3 On-board NTC DIP switch = ON External PT1000 DIP switch = OFF

ELECTRICAL-OPTICAL INTERFACE INSTALLATION

The Electrical-Optical interface board converts the thyristor gate-control signals from the Thyro-PX power controller to an optical signal transmitted using a fiber-optic cable.

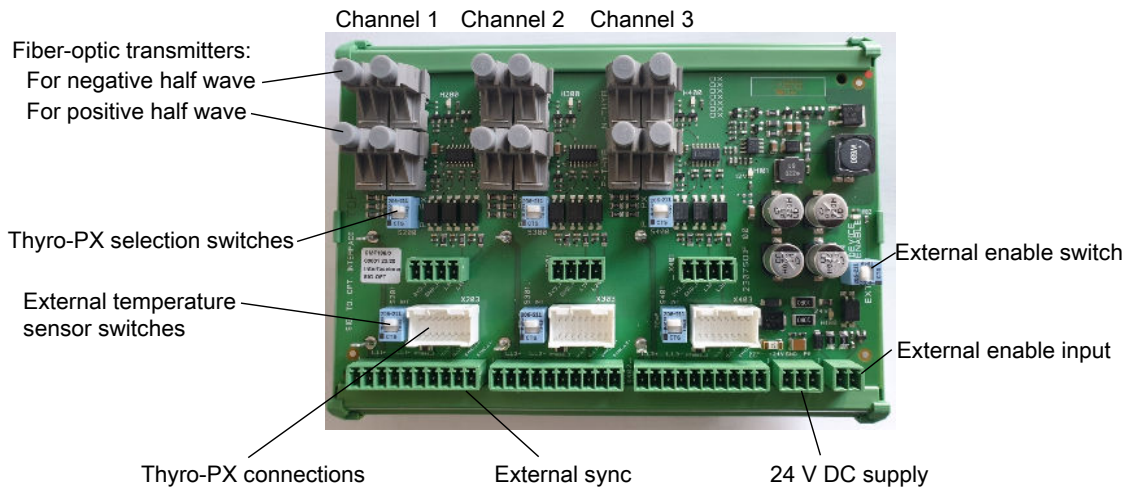


Figure 4. *Electrical-Optical interface board*



DANGER:

RISK OF DEATH OR BODILY INJURY. Follow your local jurisdiction requirements for lockout/tagout prior to connecting or disconnecting all input power sources and output connections.



DANGER:

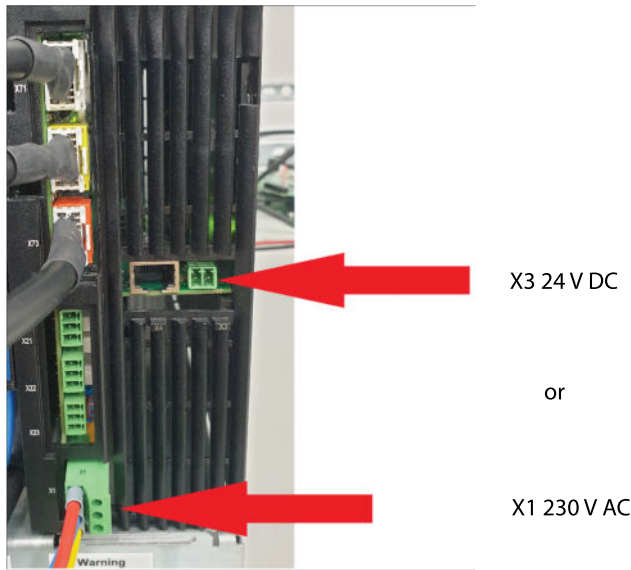
Personnel must receive proper training before installing or troubleshooting high-energy electrical equipment. Potentially lethal voltages could cause death, serious personal injury, or damage to the equipment. Ensure that all appropriate safety precautions are taken.



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.

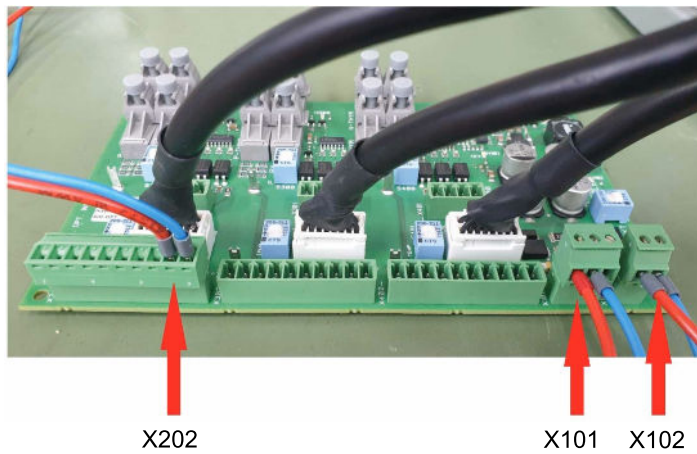
1. Mount the Thyro-PX power controller in the control cabinet.
2. On the front of the power controller, connect the series-connected thermal switches on the WC Stacks to pin 51.1 (+24 V) and pin 51.3 (PULSE LOCK) of X51.
3. On the bottom of the power controller, connect a 24 V DC power supply to X3, or connect a 230 V AC power supply to X1.



4. Mount the Electrical-Optical interface board in the control cabinet near the Thyro-PX power controller.

The provided cables are 450 mm (17.7") long.

5. Connect a 24 V DC power supply to **X101** using the provided cable (part number 18790).



6. If the optional external release voltage is not used, set **S100** to **ON**.
7. If the optional external release voltage is used, connect the optional external release voltage (enable) to **X102**. Set **S100** to **OFF**.
8. Connect the Electrical-Optical interface board to the power controller using the three provided cables (part number 33407952-00).
 - a. Connect Thyro-PX **X71** to interface board **X203**.
 - b. Connect Thyro-PX **X72** to interface board **X303**.
 - c. Connect Thyro-PX **X73** to interface board **X403**.



Interface board

Power controller

OPTICAL-ELECTRICAL INTERFACE INSTALLATION

The Optical-Electrical interface board receives thyristor gate-control signals from a fiber-optic cable, and converts these to electrical signals to control the thyristor gates in the water-cooled stack.



Figure 5. Optical-Electrical interface board



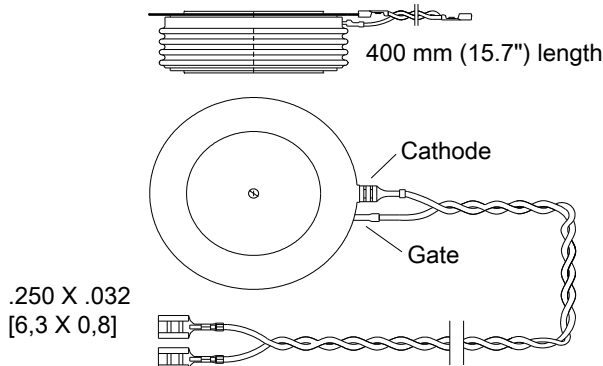
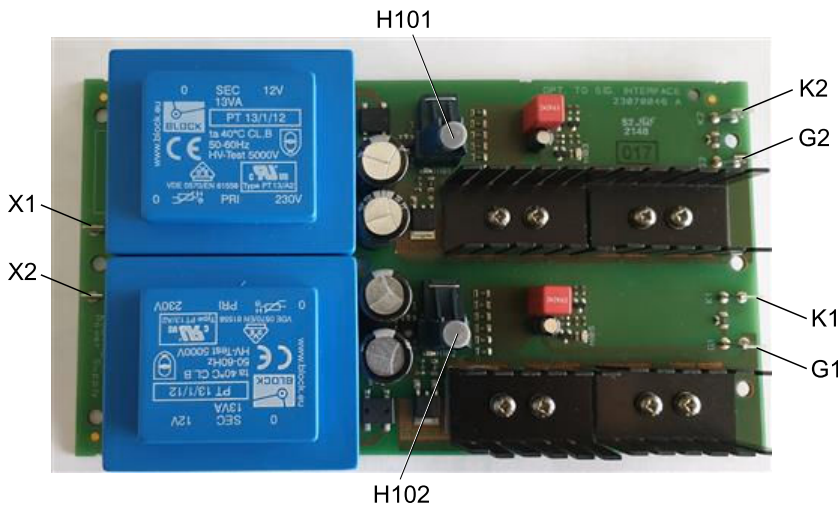
DANGER:

RISK OF DEATH OR BODILY INJURY. Follow your local jurisdiction requirements for lockout/tagout prior to connecting or disconnecting all input power sources and output connections.

⚠ 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 Optical-Electrical interface board near the water-cooled stack.
2. Connect the 230 V AC, 250 mA power supply to terminals **X1** and **X2**.
3. Connect the positive-thyristor gate and cathode terminals to **K1** and **G1**.
4. Connect the negative-thyristor gate and cathode terminals to **K2** and **G2**.
5. In the control cabinet, connect the fiber-optic cables between the Optical-Electrical interface board and the Electrical-Optical interface board.
 - a. Connect **H101** to **N-THYR** on the Electrical-Optical interface board.
 - b. Connect **H102** to **P-THYR** on the Electrical-Optical interface board.



B6C VOLTAGE AND CURRENT MEASUREMENT INSTALLATION

Near the water-cooled stacks, install the voltage, current, and optional sync devices.

**DANGER:**

RISK OF DEATH OR BODILY INJURY. Follow your local jurisdiction requirements for lockout/tagout prior to connecting or disconnecting all input power sources and output connections.

**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. Connect the overtemperature switches on the water-cooled stack to the *PULSE LOCK* terminals of the Thyro-PX power controller.
 - a. Remove the *PULSE LOCK* jumper (if present) from the power controller **X51.2 - X51.3**.
 - b. Connect each of the heat sink temperature switches in series.
 - c. Connect the switches to **X52.2** and **X52.3** on the power controller.
2. Mount the customer-supplied current transformer on the water-cooled stack positive output conductor.

AE recommends using the RITZ Instrument Transformers, GTSO series.

https://ritz-international.com/wp-content/uploads/2015/12/RITZ-Ring_Core_Current_Transformer_for_Currents_up_to_10000A-GTSO_GER-ENG_2013-02.pdf
3. Connect the output of the current transformer to the Electrical-Optical interface board **X202-1** and **X202-2**.
4. Mount the customer supplied voltage-measurement module near to the positive and negative water-cooled stack output conductors.
 - a. Mount the voltage-measurement module on a DIN rail.
 - b. Connect module power and ground to the 24 V DC power supply in the control cabinet.
 - c. Connect the high-voltage-twisted-pair cable between the voltage-measurement module input and the positive and negative water-cooled stack output conductors.

- d. Connect the low-voltage-twisted-pair cable between the voltage-measurement module output and the Electrical-Optical interface board **X202-7** and **X202-8**.

AE recommends using the IsoBlock® V-1c (750 V 10 V) voltage-measurement module.

<https://verivolt.com/shop/product/isoblock-v-1c-310>

5. For mains synchronization, install and connect the optional voltage-transducer boards (AE PN 2000000399) near each line input.
 - a. Mount a voltage-transducer board for each phase on a DIN rail.
 - b. Connect the primary input **X1-1**, **X1-3** of each board to each mains phase.
 - c. For phase 1, connect the secondary **X3-5**, **X3-6** to the Electrical - Optical interface board **X202-9**, **X202-10**.
 - d. For phase 2, connect the secondary **X3-5**, **X3-6** to the Electrical - Optical interface board **X302-9**, **X302-10**.
 - e. For phase 3, connect the secondary **X3-5**, **X3-6** to the Electrical-Optical interface board **X402-9**, **X402-10**.

W3C VOLTAGE AND CURRENT MEASUREMENT INSTALLATION

Near the water-cooled stacks, install the voltage, current, and optional sync devices.



DANGER:

RISK OF DEATH OR BODILY INJURY. Follow your local jurisdiction requirements for lockout/tagout prior to connecting or disconnecting all input power sources and output connections.



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.

Follow these steps for W3C installations.

1. Connect the overtemperature switches on the water-cooled stack to the *PULSE LOCK* terminals of the Thyro-PX power controller.
 - a. Remove the *PULSE LOCK* jumper (if present) from the power controller **X51.2** - **X51.3**.
 - b. Connect each of the heat sink temperature switches in series.

- c. Connect the switches to **X52.2** and **X52.3** on the power controller.
2. Mount a customer-supplied current transformer on each of the water-cooled stack positive output conductors.

AE recommends using the RITZ Instrument Transformers, GTSO series.

https://ritz-international.com/wp-content/uploads/2015/12/RITZ-Ring_Core_Current_Transformer_for_Currents_up_to_10000A-GTSO_GER-ENG_2013-02.pdf

- a. For phase 1, connect the current-transformer output to the Electrical - Optical interface board **X202-1, X202-2**.
 - b. For phase 2, connect the current-transformer output to the Electrical - Optical interface board **X302-1, X302-2**.
 - c. For phase 3, connect the current-transformer output to the Electrical - Optical interface board **X402-1, X402-2**.
3. For mains synchronization, install and connect the optional voltage-transducer boards (AE PN 2000000399) near each line input.
 - a. Mount a voltage-transducer board for each phase on a DIN rail.
 - b. Connect the primary input **X1-1, X1-3** of each board to each mains phase.
 - c. For phase 1, connect the secondary **X3-5, X3-6** to the Electrical - Optical interface board **X202-9, X202-10**.
 - d. For phase 2, connect the secondary **X3-5, X3-6** to the Electrical - Optical interface board **X302-9, X302-10**.
 - e. For phase 3, connect the secondary **X3-5, X3-6** to the Electrical-Optical interface board **X402-9, X402-10**.

CONFIGURATION

1. Apply power to the Thyro-PX power controller and Electrical-Optical-Electrical Interface accessory.
2. Configure the power controller using the Thyro-Tool Pro software.

OPERATION

On delivery, the power controller is parameterized to the respective power section, and the TAKT operating mode is set. You should review these standard parameters, and, if necessary, adjust them for your application.

To Operate the Thyro-PX Unit with the Electrical-Optical-Electrical Interface 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.

 **Important**

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

TECHNICAL SUPPORT

For help using or troubleshooting products, contact the Advanced Energy Technical Support Organization (TSO). Proceed as follows:

1. Make a note of the serial number (SN) and part number (PN) listed on the product label.
2. To contact the TSO by email, address your message to <mailto:technical.support@aei.com>. In the body of the email, include the serial number (SN) and part number (PN) of the product and a description of your problem.
3. To contact the TSO by telephone, dial +1.866.865.5180 (toll-free in the United States of America).
4. To contact the TSO at its business address, write to:
AE World Headquarters
1625 Sharp Point Drive
Fort Collins, CO 80525 USA

Power Control Modules

For 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>

TRADEMARKS

All Advanced Energy trademarks are the property of Advanced Energy Industries, Inc. For the list of Advanced Energy trademarks, visit: <https://www.advancedenergy.com/legal/>. Any unauthorized use of Advanced Energy trademarks is prohibited.

All other trademarks are the property of their respective owners.