Thyro-PX® Water-Cooled Stack

User Guide

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Related Documentation

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

DESCRIPTION

The AE Water-Cooled Stack provides a water-cooled thyristor pair for high-power applications.

The unit can be controlled by the Thyro-PX power controller. If optical isolation between the power controller and the stack is needed, you can use the electrical to optical interface and optical to electrical interface boards.

- Power output: > 2000 A, > 1500 kW per bridged rectifier
- Mains voltage: up to 690 V AC
- Normally-closed overtemperature switch: +85°C (+185° F)
- Maximum ambient temperature: +35°C (+95° F)
- Heat sink: Copper alloy with polyurethane hoses and stainless steel hose fittings
- Coolant: Water, deionized water, or water with 40% glycol
- Coolant flow rate: ≤ 10 lpm (2.6 gpm) per thyristor

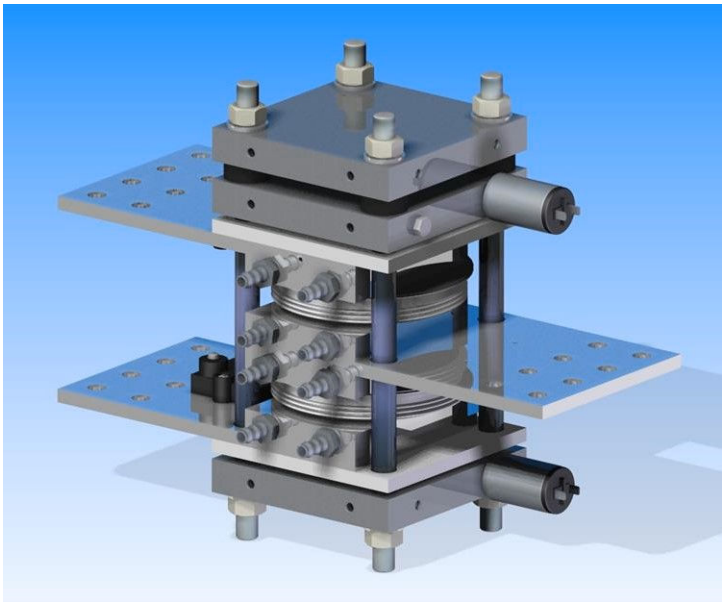


Figure 1. Water-Cooled Stack accessory

Advanced Energy

Related Links

- "Typical Applications" on page 2
- "Cooling" on page 3
- "Water-Cooled Stack Installation" on page 4
- "Technical Support" on page 8

TYPICAL APPLICATIONS

DC Output Configuration

The following figure shows thyristor stacks combined to a B6C circuit for 3-phase SCR with DC output. The control functions are implemented using an AE Thyro-PX controller and interface boards, which are available separately.

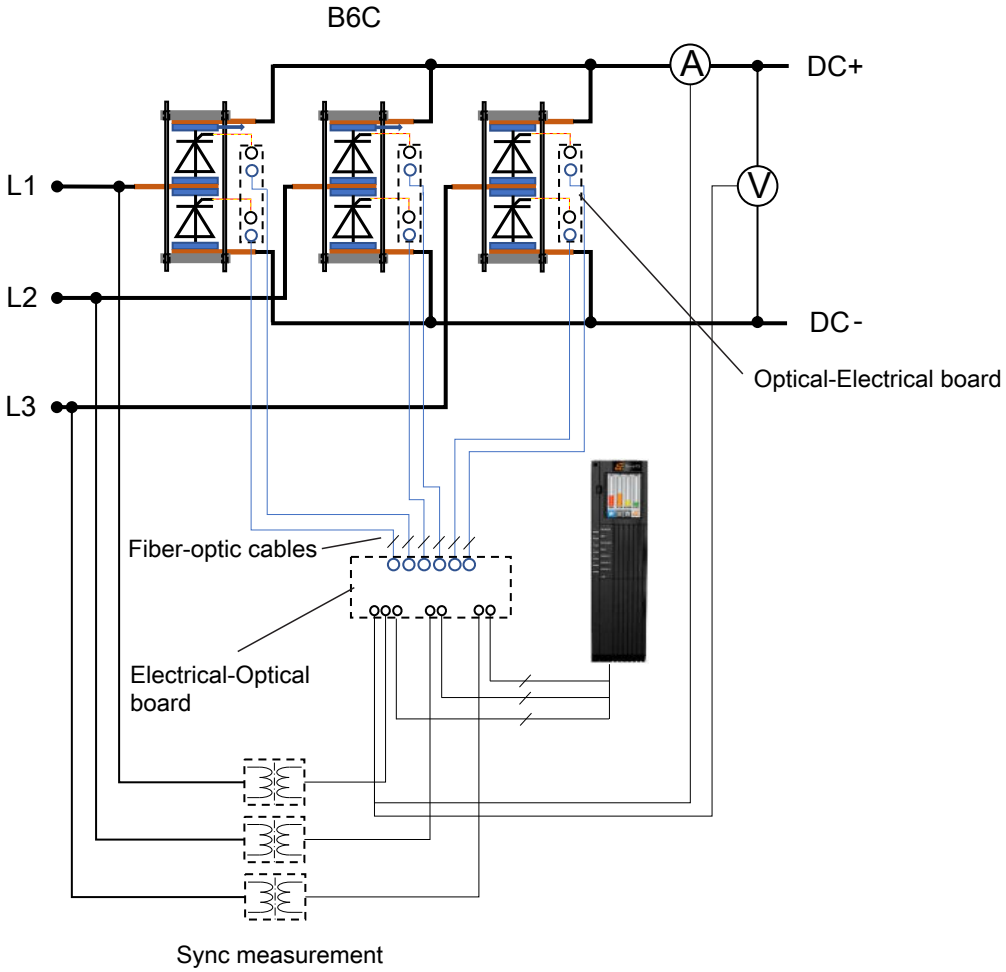


Figure 2. DC output

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, which are available separately.

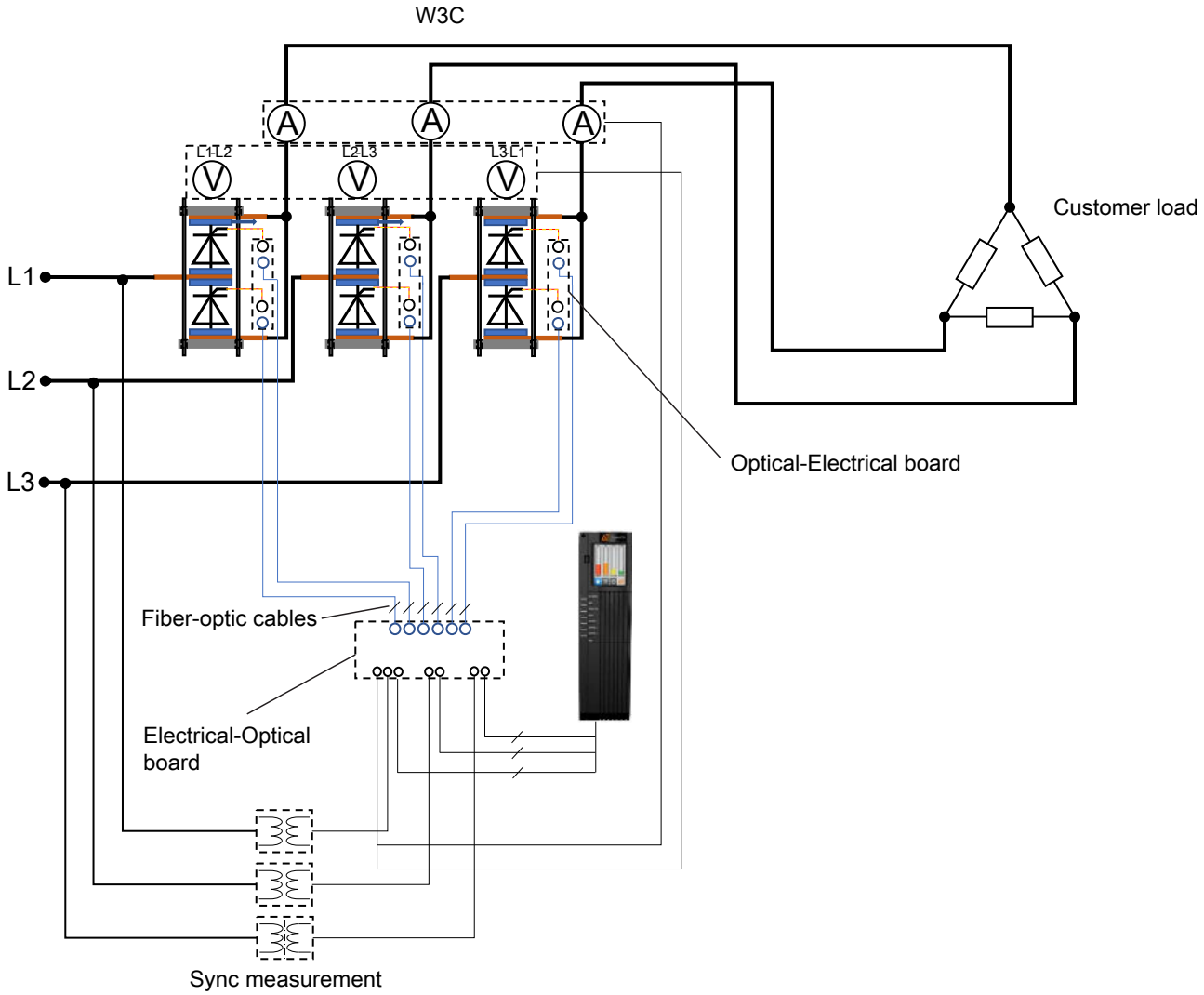


Figure 3. *AC output*

COOLING

The Water-Cooled Stack accessory is liquid cooled. Each thyristor is cooled by two liquid-cooled heat sinks. You can connect the inlet and outlet of each heat sink in many configurations to match the cooling needs of the application. Two of the heat sinks have a normally-closed temperature switch which opens at 85°C (185°F). These switches can be connected into the signal path for alarm or shut down.

For maximum simplicity, you can connect all the heat sinks in series, with the first heat sink inlet connected to the cooling water source, and the next heat sink inlet connected to the outlet of the

previous heat sink. Since the water is heated as it flows through each heat sink, this is the lowest performance configuration.

Performance is improved when both heat sinks of each thyristor are connected in series.

Maximum performance can be achieved by connecting each heat sink inlet to a water source manifold, and each outlet to a water return manifold. In this configuration, all the heat sinks are connected in parallel.

The heat sink hose fittings are optimized for Parker Push-Lok® Hose 838M-6-RL. The minimum bend radius is 70 mm (2.8").

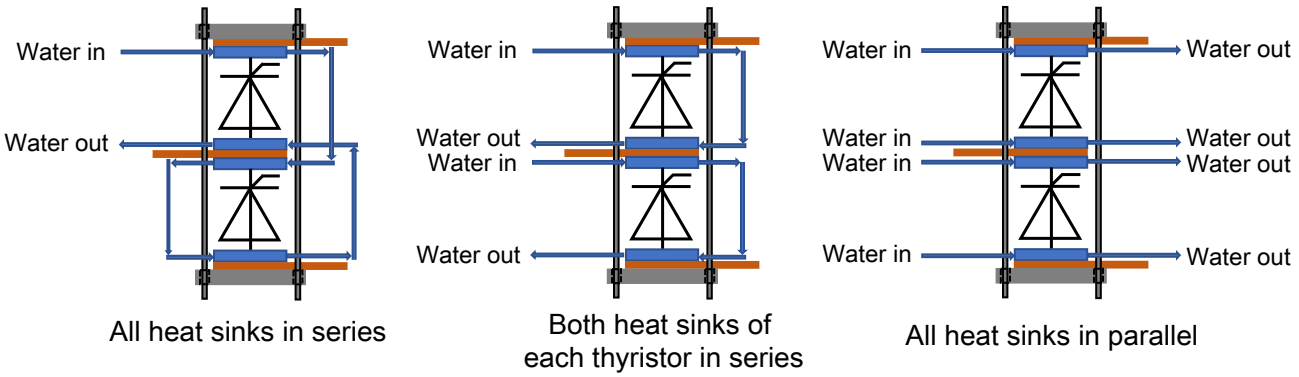


Figure 4. *Plumbing configuration*

The maximum current capability of the water cooled stack is a function of the thyristor selection, plumbing configuration, water temperature, and water flow rate. Contact AE for information.

Cooling water requirements

Water purity:

- Salt content ≤ 1mg/l
- Deionized water, up to 40% glycol

Maximum operating pressure, hose:16 bar (1.6 mPa, 232 psi).

WATER-COOLED STACK INSTALLATION

The AE Water-Cooled Stack provides a water-cooled thyristor pair for high-power applications.

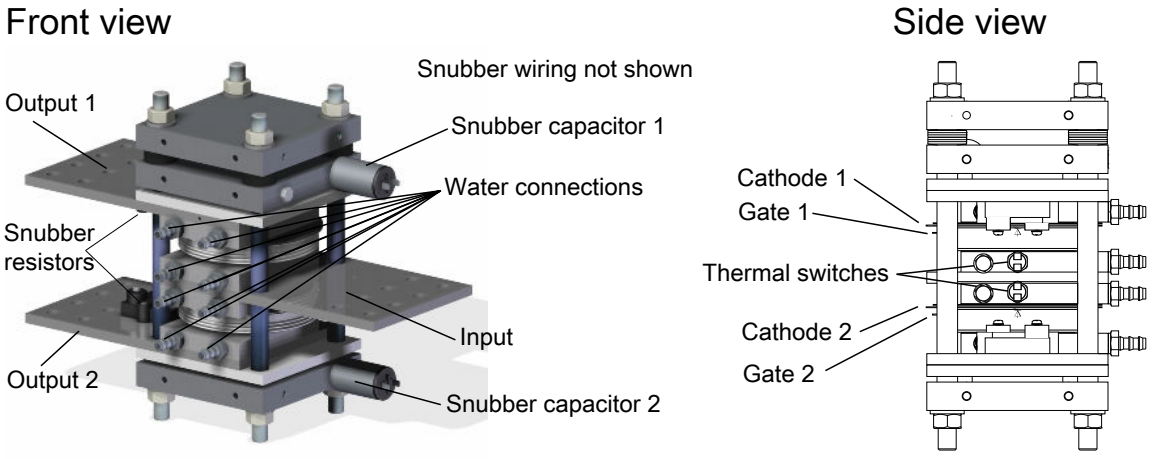


Figure 5. Water-cooled stack elements (snubber wiring not shown)

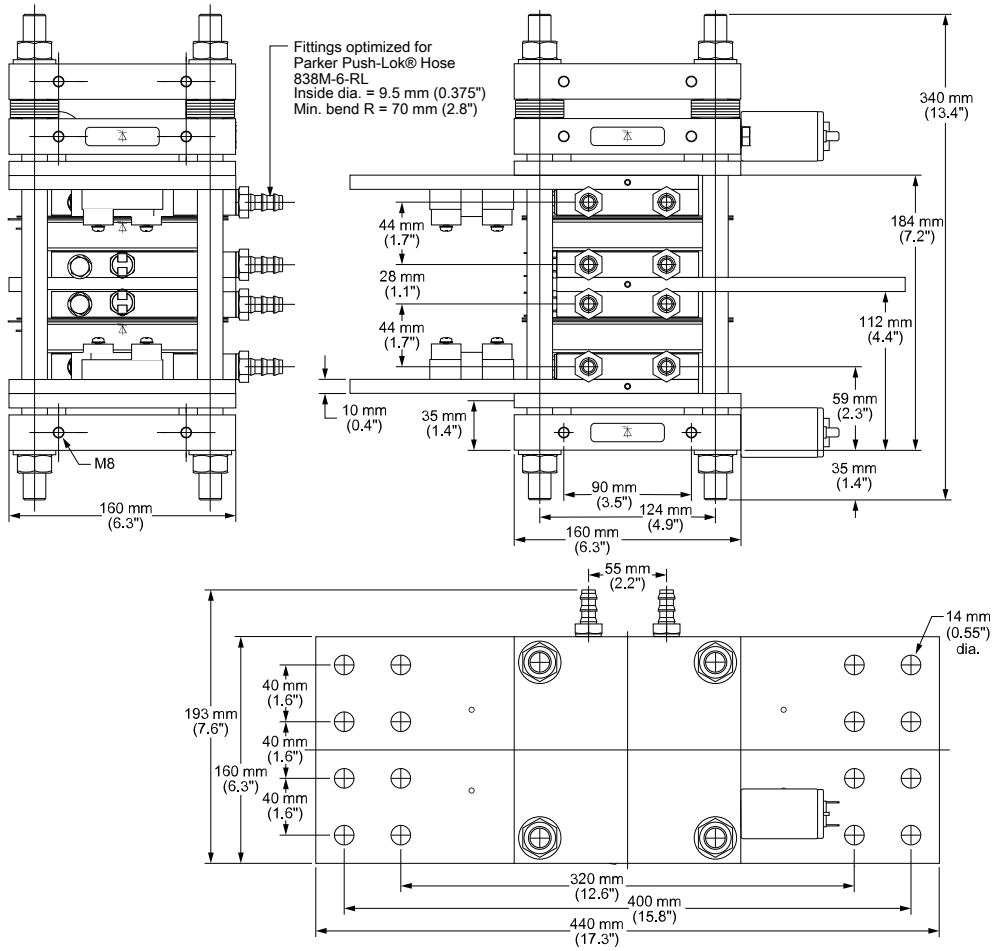


Figure 6. Dimensional drawing

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.

CAUTION:

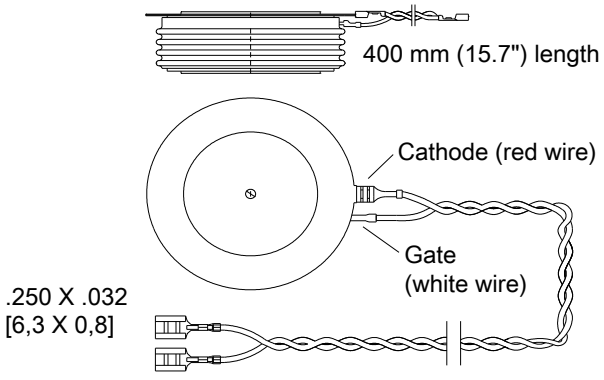
These units are heavy, and many jurisdictions require that you use at least two people to lift the unit or that you employ a mechanical lifting aid. Follow local and/or company regulations when lifting these units.

ATTENTION:

Ces appareils sont lourds; par conséquent, plusieurs organismes de réglementation exigent qu'ils soient soulevés par au moins deux personnes ou à l'aide d'un dispositif mécanique de levage. Ils doivent être soulevés conformément aux règlements locaux et/ou aux règlements de l'entreprise.

1. Lift the unit from the crate and into position. The unit weighs 35 kg (77.2 lb). AE recommends using a hoist and appropriate rigging.
2. Mount the Water-Cooled Stack accessory to the input and output bus bars. Tighten each fastener to the torque specified in Table 1.
3. Connect the cooling-water lines.

   The fittings are optimized for Parker Push-Lok Hose 838M-6-RL. The minimum bend radius is 70 mm (2.8")
4. Connect Gate 1 and Cathode 1 of the upper (positive) thyristor to the controller interface board.



   If you are using an AE controller and interface card, see the user guides for those products for additional information.
5. Connect Gate 2 and Cathode 2 of the lower (negative) thyristor to the controller interface board.

6. Connect the normally-closed temperature switches on each heat sink in series with the interlock circuit. The switch contacts are rated at 250 V, 10 A, and open at 85°C (185°F).

   For installations operating at greater than 250 V AC, use the heat-shrink tubing supplied with the unit to double insulate the temperature switch wires.

   If the temperature switches on the unit must be galvanically isolated from the control circuit, use a relay. The normally-closed temperature switches are wired in series with the relay coil, the normally-open relay contact connects to the interlock circuit. The relay and relay power supply are customer provided.

Table 1. Terminal screw torque

Screw	Torque		
	Minimum NM (Pound-Inches)	Rated NM (Pound-Inches)	Maximum NM (Pound-Inches)
M10	22.0 (194.7)	33.0 (292.1)	44.0 (389.4)
M12	38.0 (336.3)	56.0 (495.6)	75.0 (663.8)

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