

## ABOUT US

With our headquarters in Guelph, Canada, HPS operates out of multiple plants located throughout Canada, US, Mexico, Italy and India. HPS has the broadest ranges of standard and special transformers.

Founded: 1917  
 Number of employees: +1,000  
 Ownership: Hammond Power Solutions (HPS) is a public company traded on the Toronto Stock Exchange ("HPS.A")

## Our Capabilities

### COMPETITIVE EDGE

North American leader for the design and manufacture of standard & custom engineered dry-type transformers with a diverse and expanded product range globally.

- Global manufacturing presence
- Diverse channels to market
- Highly regarded for our engineering expertise
- Commitment to Continuous Improvement and Quality Systems (ISO 9001)
- Excellent support for global OEMs and large end-users



### MANUFACTURING

HPS offers a broad range of dry-type and liquid filled transformer capabilities through our standard and custom Affiliated International Companies:

- Hammond Power Solutions S.p.A., Italy
  - Specializing in Dry-type transformers (Cast Coil & VPI)
- HPS, Canada
  - Specializing in Dry-type transformers (Cast Coil & VPI)
- PETE - Hammond Power Solutions Private Limited, India
  - Specializing in Dry-type (Cast Coil & VPI) & Liquid Filled transformers



### CUSTOMER SERVICE

HPS customer service personnel are dedicated to providing the information you need as quickly as possible. Our teams are technically trained and are able to answer most questions over the phone. Stock checks, expediting, quotations or technical information are always readily available. Our commitment to customer service means you will be an informed and satisfied customer.



### QUALITY ASSURANCE

HPS has been regarded for quality since its very inception. With our commitment to 'Excellence' and 'Continuous Improvement', we build value and reliability into every HPS product.



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## HPS Water-Cooled Transformers

WATCO03  
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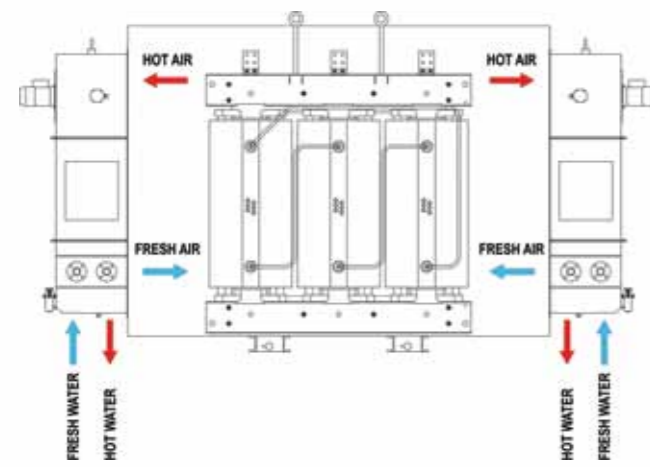
power to perform



## WATER-COOLED TRANSFORMERS

Where the dissipation of heat is an important factor (ie. ship and marine applications), cooling the electrical apparatus with water allows for better thermal management.

HPS offers a wide range of transformers for low and medium voltage systems that can be installed into IP44 metal enclosures with air-water heat exchangers.



**Durable**  
**RELIABLE**



### KEY FEATURES

- The heat generated by the transformer is transferred to the cooling water within the heat exchanger and dissipated externally
- Suitable for Cast Resin or Vacuum Pressure Impregnated (VPI) units
- Reduced space and weight
- Reliable and durable
- Large selection of options
- Design and performance customization available
- Certified by third party for marine and offshore application approvals: ABS, DNV, BV, LR, RMRS, RINA, GL, etc.

### SUPERIOR MANUFACTURING

You benefit from HPS' use of precision coil winding machines, tightly regulated casting technology and rigorous quality testing. The end result is a superior product that will deliver years of reliable service.

## APPLICATIONS

HPS Water-Cooled Transformers are used in many demanding applications:



Marine    Oil & Gas    Drive    Automation

## SPECIFICATIONS

- Power:** Up to 10MVA
- Frequency:** 50 or 60 Hz (others available upon request)
- Technology:** VPI or Cast Resin
- Voltage:** Up to 36kV class
- BIL value:** Class 2 (according to IEC 60076-11)
- Environmental, climatic and fire classes:** E2, C2, F1
- Conductor material:** Copper or Aluminum
- Insulation Class:** F/155°C (VPI: H/180°C on request)
- Temperature Rise Class:** F or B (VPI: H on request)
- Earthed copper screen between windings**
- Protection degree:** IP44 (IP54 on request)
- Cooling system:** AFWF (Air forced / Water forced)
- Type of cooling liquid:** Fresh water or sea water
- Heat exchangers:** 1 or 2 units
- Transformer solutions for:** Standard distribution or for frequency converter (2, 3, 4 or 5 windings transformer for 6/12/18/24-pulse applications)
- Conformance to standards:** IEC 60076-11 (main), others upon request



### EXAMPLE WATER-COOLED DISTRIBUTION TRANSFORMER

- Power:** 3,5MVA
- Primary Voltage:** 15kV
- Secondary Voltage:** 400V
- Technology:** Cast Resin
- Protection:** IP44
- Cooling:** AFWF (sea water) with two heat exchangers
- Dimensions:** 4000mm(W)x1800mm(D)x2500mm(H)
- Weight:** 7500kg

## FEATURES

- Protection and Accessories (standard):**
- Enclosure construction: Removable sheet steel with bolted side panels and lifting lugs on top
  - Enclosure colors: RAL 7035 powder painted (other colours or finishes available upon request)
  - Temperature sensors for windings
  - Temperature measurement device with local display and alarm/trip/sensor fault
  - Water leakage detector
  - Air locks for fan motors
  - Motors and overload protection (fuses and/or relays)

**Protection and Accessories (custom/options):**

- Temperature sensors for core
- Air and water temperature sensors
- Air flow detector
- Anti-vibration dampers
- Thermostats and anti-condensation heaters
- Surge arrestors
- Earthing balls
- Integrated fuses, current transformers
- Integrated pre-magnetizing transformer
- Starter unit for fan motors
- Thermal inspection windows (IR windows)
- Terminal material: Tinned copper

**Cable entry position:**

- Primary and secondary: Top or bottom entry or through power terminal box

**Cable entry type:**

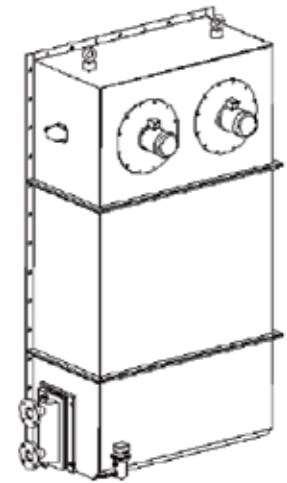
- Cable glands on removable plates
- Bolted MCT-frames
- Cable combing

## HEAT EXCHANGER

- Cooling capacity:** from 25 up to 65kW each
- Fluid:** Sea or fresh water
- Typical water inlet/outlet temperature:** 35°C/45°C
- Water flow rate:** from 5 to 11m<sup>3</sup>/h (for each heat exchanger)
- Water pressure drop:** <50kPa
- Max operating pressure:** 0,9MPa
- Fan motor power:** 1,5kW each
- Power supply:** 440V, 50Hz (others available upon request)
- Motor protection degree:** IP55

**Exchanger technology:**

- Double tube; inner tube CU/Ni10;
- outer tube CU provided with longitudinal grooves
- Primary tube plate material (water side): naval brass
- Secondary tube plate material (air side): anti-corrosive
- Bolted removable water headers
- Carbon steel painted cooler side frame material



## EXAMPLE OF TYPICAL DIMENSIONS & WEIGHTS

Cast Resin, Aluminum, 50Hz

kVA	Ratings		Overall dimensions				Electrical characteristics		Cooling System
	kV Class	kV BIL	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)	Typical losses to water (kW)	Max losses to environment (kW)	Required flow rate (m <sup>3</sup> /hour)
2000	7.2	60	2900	1500	2300	4200	25	5	6
	12	75	3000	1500	2400	4600	24	5	6
4000	7.2	60	3200	1700	2700	7000	45	8	8
	12	75	3300	1700	2900	7700	43	8	8
6000	7.2	60	3700	2000	3000	11000	50	9	10
	12	75	3800	2000	3100	12000	45	8	8
8000	7.2	60	4500	2200	3200	13000	70	12	2x7 (double exchanger)
	12	75	4000	2200	3300	13000	65	11	10
10000	7.2	60	5000	2400	3300	16000	80	15	2x7 (double exchanger)
	12	75	5000	2400	3400	17000	78	14	2x7 (double exchanger)

Values listed are typical and should not be used for construction purposes

## TESTING

All water-cooled transformers produced by HPS can be certified by ship and naval certification bodies directly in HPS' testing department. The three images below show our water testing equipment:



Fan motors



Removable enclosure panels



Lifting lugs



Water connection flanges



Heat exchanger



IP55 auxiliary box