

CRESSALL**DYNAMIC BRAKING****for marine electric drive systems****Applications**

Electrical drive systems are being used more and more on ships, oil rigs, crane barges and vessels of all types, for every type of powered application: main propellers and bow thrusters, driving winches and windlasses, cranes, lifts, conveyors and jacks, cable laying and tensioning.

Advantages of electric braking

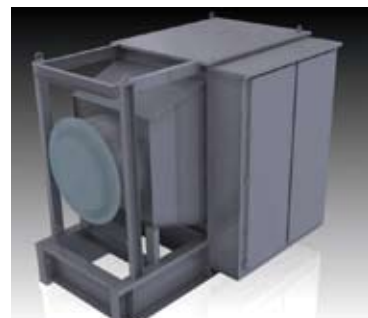
An important benefit from using an electric drive is that reliable systems of regenerative and dynamic braking are available to complement or replace traditional mechanical braking systems. The advantages of electric braking include control, reliability, mechanical simplicity, weight saving and in some cases the opportunity to make use of the regenerated braking energy.

Range

Cressall Resistors' wide range of resistor technologies and long experience in this field means that we have suitable brake resistor designs for all of the above applications, with braking powers from a few kW up to many MW (needed, for example, for some crane and main propulsion brakes) and cooling methods which include liquid, forced air and natural convection. We have standard products of all types.

Design considerations

The majority of our designs make use of suitably rated Incoloy-sheathed mineral insulated elements. These are less vulnerable to physical damage, prevent accidental contact with live, possibly high, voltages, and are thus considered much safer to use in these environments. Applications in areas of heavy pollution, exposed to flammable liquids or gases, or severely corrosive environments would also justify the use of a sheathed element. Use of marine-grade stainless steels for all metalwork including fasteners and fittings is standard.



For brake resistors operating at more than 2kV, sheathed elements are unsuitable and we employ live elements. Normally, cooling is by simple natural convection, but if the heat losses after braking would impose unacceptable loads on the ship's air conditioning system we add an air-to-water heat exchanger to transfer the brake energy to the ship's chilled water system.

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CRESSALL**DYNAMIC BRAKING****for marine electric drive systems****Water cooled:
Fresh water**

Most ships have a chilled water system, which circulates cool water throughout the vessel, used for both air conditioning and equipment cooling. It is usually straightforward to incorporate resistors of the type shown into these circuits.

Our standard range has the following features, using vessels, cable box and fittings constructed from 316 grade stainless steel:

Continuous power: 100kW – 1800kW

Vessel size: 1700–3700mm long

Vessel bore: 200–500mm dia.

Voltage rating: 800V DC

Elements: Mineral insulated with Incoloy sheath, test voltage 2.5kV.

Operating pressure: 3 bar, test pressure 10 bar.

Cable box: IP56 complete with automatic anti-condensation heater and terminals for one capillary thermostat and one PT100 temperature sensor

**Water cooled:
Sea water**

Construction and ratings as our fresh water designs but with titanium-sheathed elements in higher-grade stainless steel vessels, suitable for continuous duty in hot sea water.

**Air cooled:
Fan cooled**

These units are suitable for deck mounting on their included anti-vibration mounts, with enclosures and all fittings and fan in 316 grade stainless steel:

Total continuous power: 200kW – 1500kW

Maximum number of electrically separate sections: 14

Voltage rating: 800V DC or 690V 3 phase AC

Elements: Mineral insulated with Incoloy sheath, test voltage 2.5kV.

Cable box: IP56 complete with automatic anti-condensation heater and terminals for one capillary thermostat per section, one PT100 temperature sensor and an airflow sensing switch.

Fan cooled brake resistors, power ratings and dimensions						
Power (kw, max)	length mm	base width mm	total width mm	height mm	fan motor kW	fan dia. mm
300	1888	722	1098	1181	3.6	710
600	2203	1016	1341	1840	7.5	710
1000	2950	1016	1341	1840	9	800
1500	3656	1216	1541	1840	18	900

**Air cooled:
Natural convection**

For small inverter drives we offer our standard ES range, intended for indoor use and usually incorporated within or on the roof of the drive system control panels. Standard enclosures are in galvanized sheet steel but optionally 304 or 316 grade stainless. For higher powers we have custom-built designs, optionally with air-to-water heat exchangers to dissipate the brake energy via the ship's chilled water system.

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