



### A range of compact, water cooled resistors for low and medium voltage applications, especially severe conditions in automotive, traction or marine systems.

Manufactured from advanced materials the EV2 and EVT use a patented design that encapsulates and totally separates the resistor elements from the coolant providing a modular light weight, low volume, high power solution for water cooled applications. Units can be combined together to handle from 10kW to 1.0MW.

Units can be supplied as individual components or back plate mounted assemblies for inclusion in

customer's systems or completely enclosed multi-banked systems including inlet/outlet manifolds, flow and temperature monitoring.

The EVT, with its lower 10 kW power rating, has been developed specifically for rheostatic braking in smaller vehicles and provides a number of benefits over mechanical braking, including increased control, higher reliability, mechanical simplicity and lower weight.

#### Features:

Continuous operating voltage to 1.5kV per module.

Available in 1, 2, 3 or 4 module assemblies to meet most power and connection requirements.

Low time constant – achieves operating temperature < 5 seconds.

#### Applications:

- Hybrid and all-electric vehicles
- Winches and cranes
- Cable laying vessels
- Propulsion drives on ships and oil rigs
- Dummy loads
- Discharge resistors

# Post Glover EV2 & EVT advanced water cooled modular resistors

"The Resistor Specialists"

## The inside story of this important resistor breakthrough.

The new ceramic material used in the EV2 and EVT has properties that are found individually in many materials but rarely together in the same one.

### These key properties are:

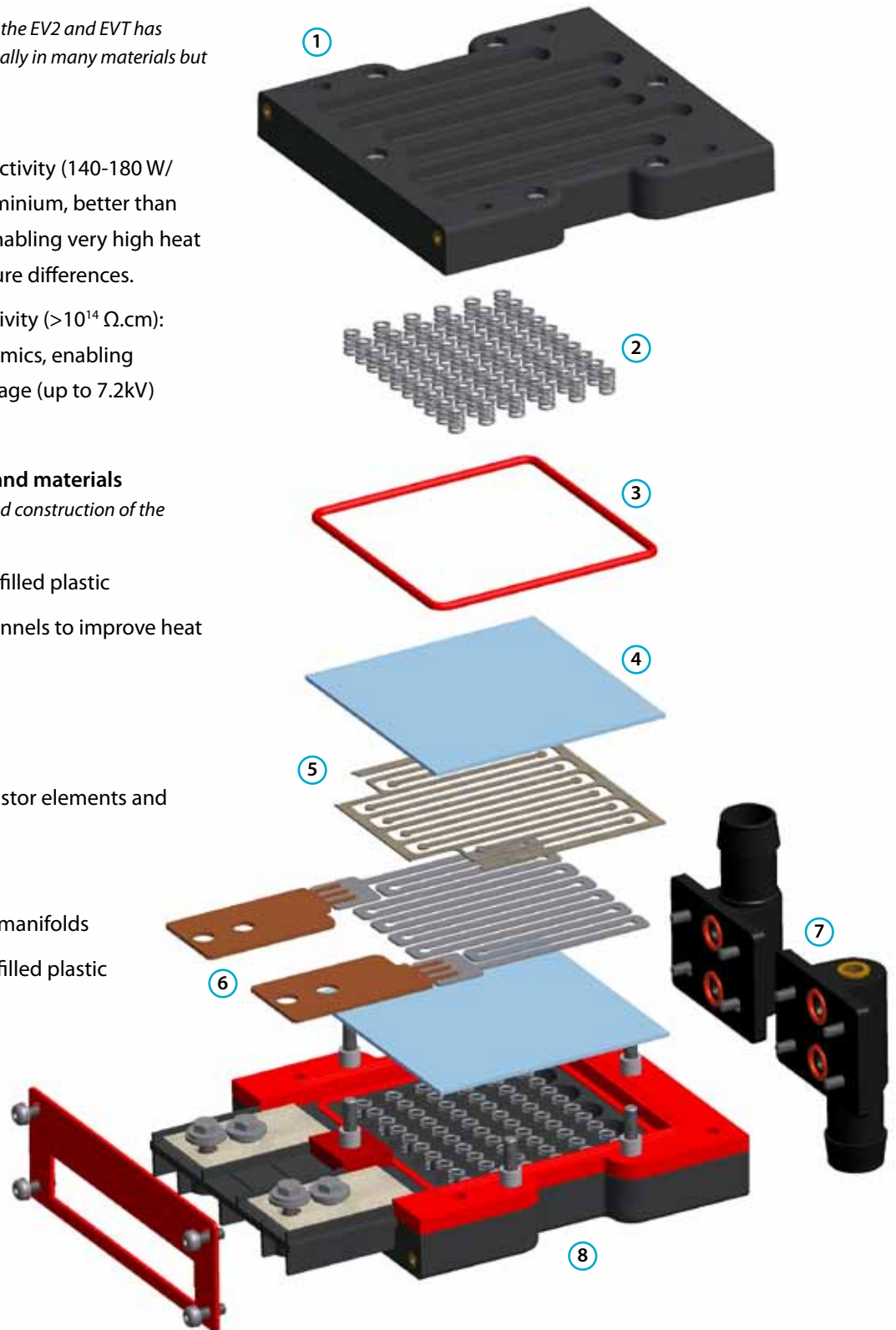
Very high thermal conductivity (140-180 W/m<sup>2</sup>K): comparable to aluminium, better than most common metals, enabling very high heat transfer at low temperature differences.

Very high electrical resistivity (>10<sup>14</sup> Ω.cm): comparable to most ceramics, enabling construction of high voltage (up to 7.2kV) heaters.

### Construction, components and materials

The illustration shows the patented construction of the 25kW rated EV2 which include:

1. Resistor cover in glass-filled plastic
2. Spring-filled water channels to improve heat transfer
3. O-ring seal
4. Ceramic plate.
5. Fully encapsulated resistor elements and spacers
6. Copper terminals
7. Water inlet and outlet manifolds
8. Resistor body in glass-filled plastic



# Post Glover EV2 & EVT advanced water cooled modular resistors

"The Resistor Specialists"



Multiple EV2 units assembled to provide a single 400kW water cooled load



Parameter	EV2	EVT
Nominal Power Rating (Water coolant at 18l/m)	25kW	10kW
Other Power Ratings / Flow Rate	See Tables	
Overload Ratings Available	Up to 28%	N/A
Resistance (Cold)	1.0Ω to 20Ω	
Storage Temperature	-40°C to +80°C	
Operational Temperature	-30°C to +50°C	
Ingress protection	IP56 to BS EN 60529 (with single EV2 terminal cover fitted)	
Electrical interface	M8 bolted connection	
Insulation Voltage Class	1.5kV	
Test Voltage	4.5kV for 60 seconds	
Insulation Resistance Test	>100MΩ at 1kV	
Terminal to Terminal clearance	35mm	
Terminal to Terminal creepage	35mm	
Shock and vibration	JLR spec TPJLR.00.047: 50 hours random vibrations, 3axis shock, 4000 x 30	N/A
Coolant Types	De-ionised Water, 20% Glycol, 50% Glycol	
Maximum Operating Pressure	3 bar	
Test Pressure	6 bar	
Water Interface	2 x pipe stubs for 25mm hose	
Minimum Coolant Flow Rates	See Tables	
Pre-Filtration Level Required	≤100µm	
Materials:	Body & Terminal Cover: Glass-filled Plastic Terminals: Plated copper • Seals: Silicone Rubber	
Edge Gasket Colour	Red	Black
Registered Patents	UK 2478547; China ZL 2012 0455472.7, UK France Germany Italy Netherlands Spain Sweden 2 592 633, Japan 6351926, USA 8.643.464	
Patents Pending	Brazil 10 2012 029181-9, India 1297/KOL/2012, South Korea 10-2012-0128957	

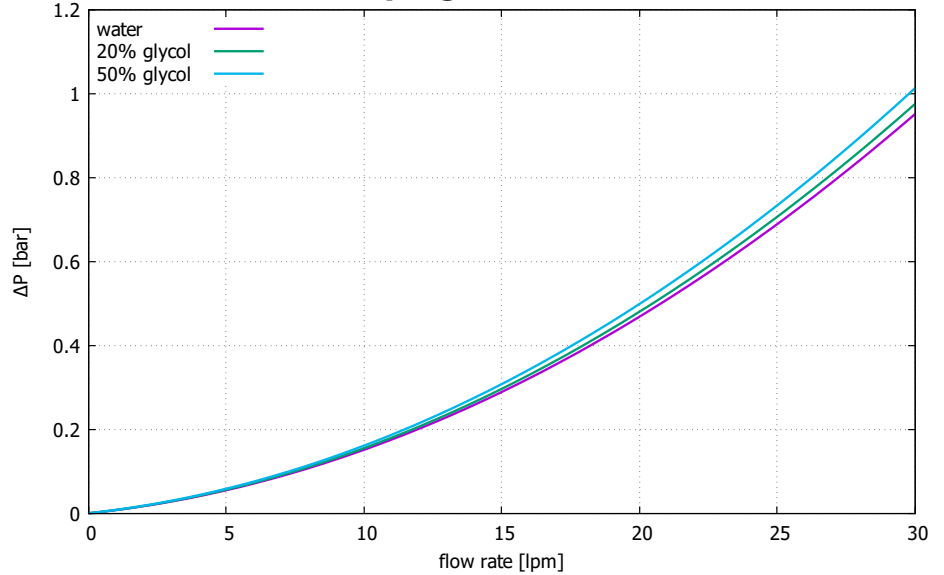
**SHOCK AND VIBRATION TESTING** with simultaneous power cycling was carried out in our own laboratories to current automotive and traction standards (five hours in each axis).



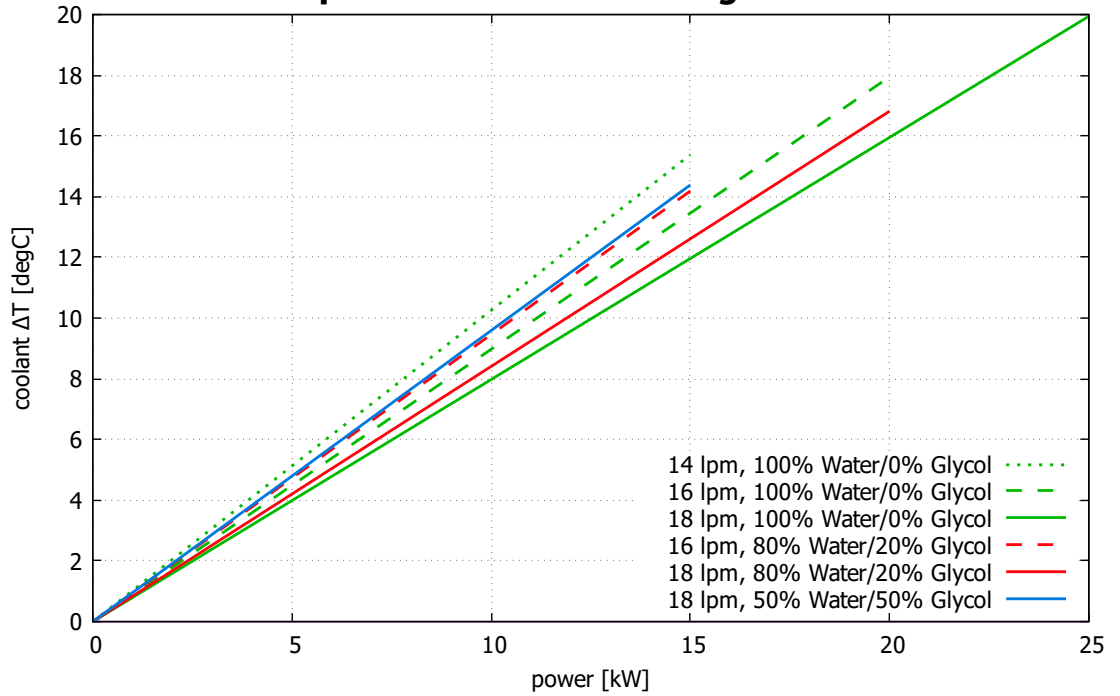
Note! Graphical data is based on a single EV assembly. When supplied as combined modules (2EV, 3EV or 4EV) cooling flows will be in parallel.

For EV modules connected in parallel the pressure drop is the same, the flow rate is the sum of the flows in each module.

### Pressure Drop Against Flow Rate for EV2



### Coolant Temperature Rise Increase Against Power for EV2



EV2 Power Ratings			
Max. Power (kW) for coolant types:	Min. Flow Rate (l/m)		
	14	16	18
Water	15kW	20kW	25kW
20% Glycol	X	15kW	20kW
50% Glycol	X	X	15kW

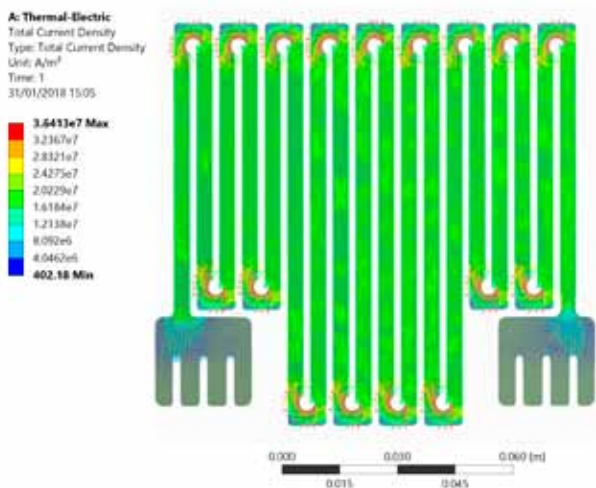
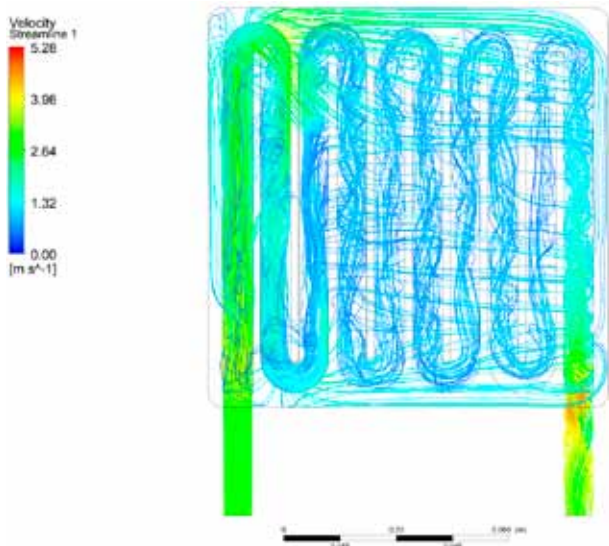
EVT Power Ratings			
Max. Power (kW) for coolant types:	Min. Flow Rate (l/m)		
	14	16	18
Water	6kW	8kW	10kW
20% Glycol	X	6kW	8kW
50% Glycol	X	X	6kW

EV2 Overload Ratings			
Max. Power (kW) for coolant types	On Time (s)		
	Cont.	10	1
100% Water/0% Glycol	25kW	28kW	38kW
80% Water/20% Glycol	20kW	23kW	32kW
50% Glycol/ 50% Glycol	15kW	21kW	28kW

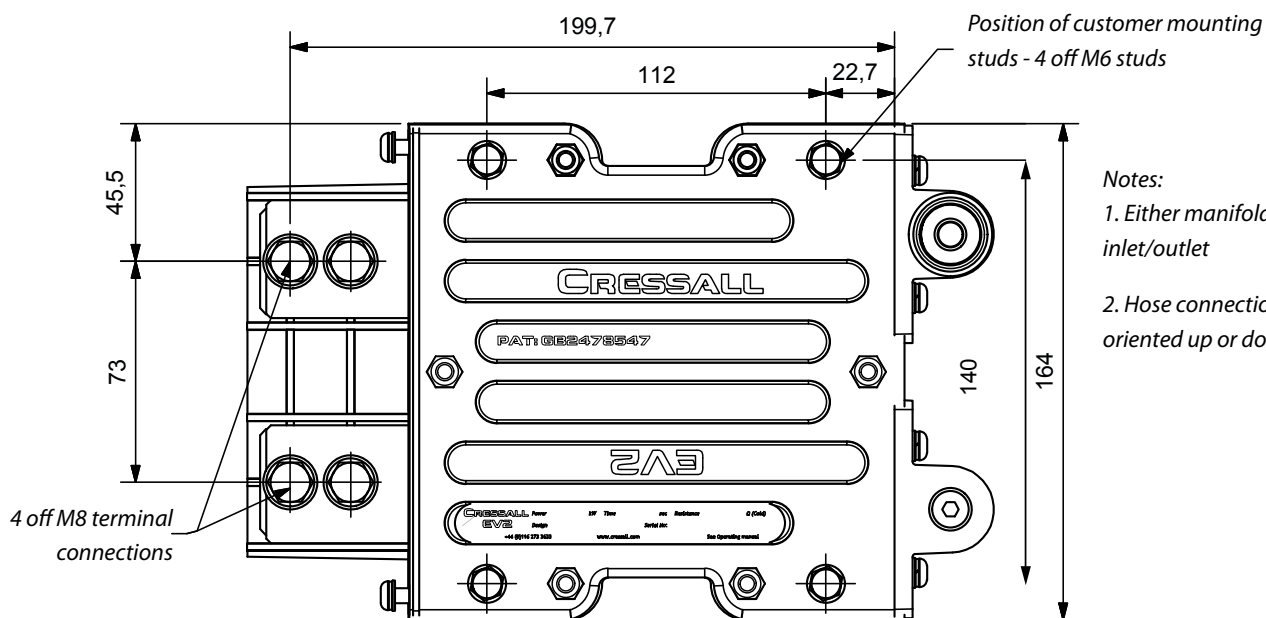
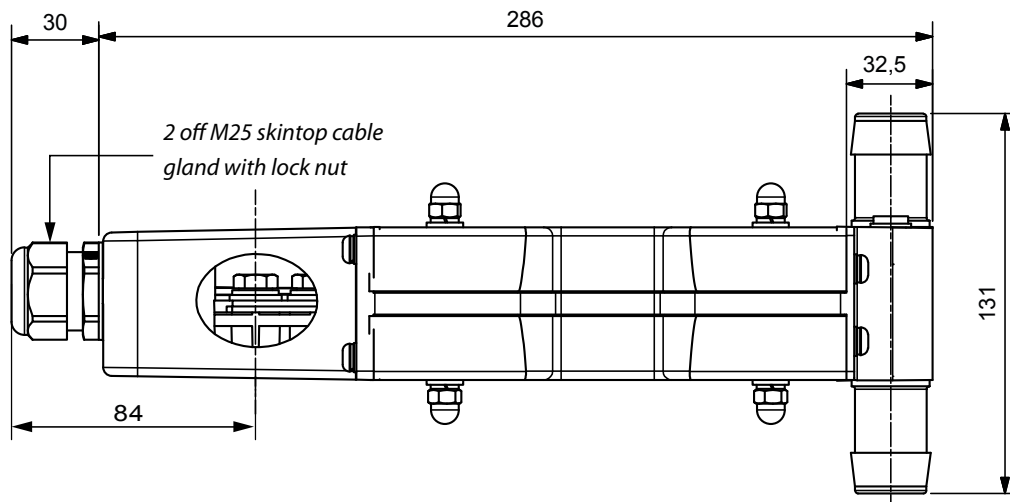
Recovery time after overload should be  $\geq$  to the on time used.

Overload ratings are offered on EV2 only and are not available on the EVT.

# & EVT advanced water cooled modular resistors

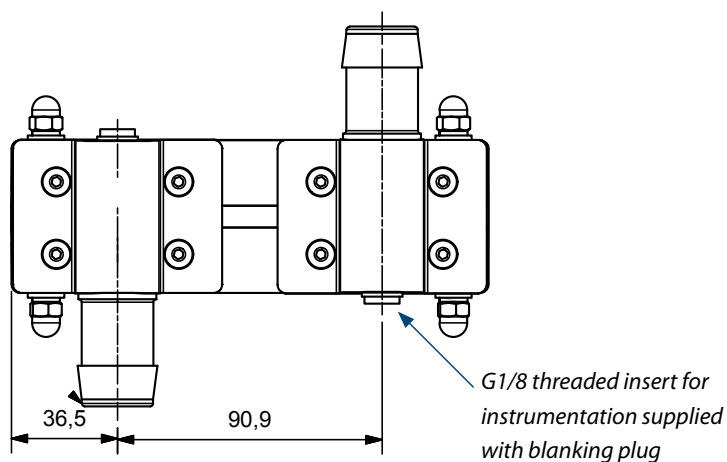
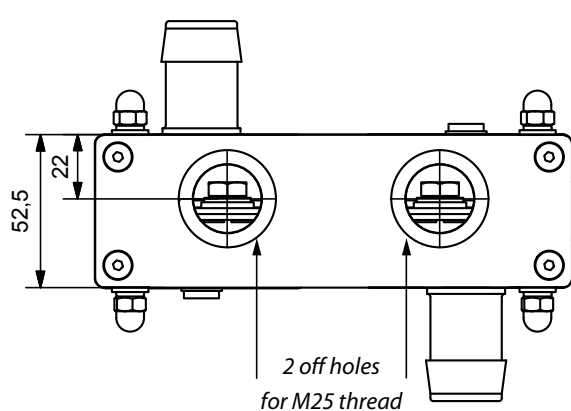


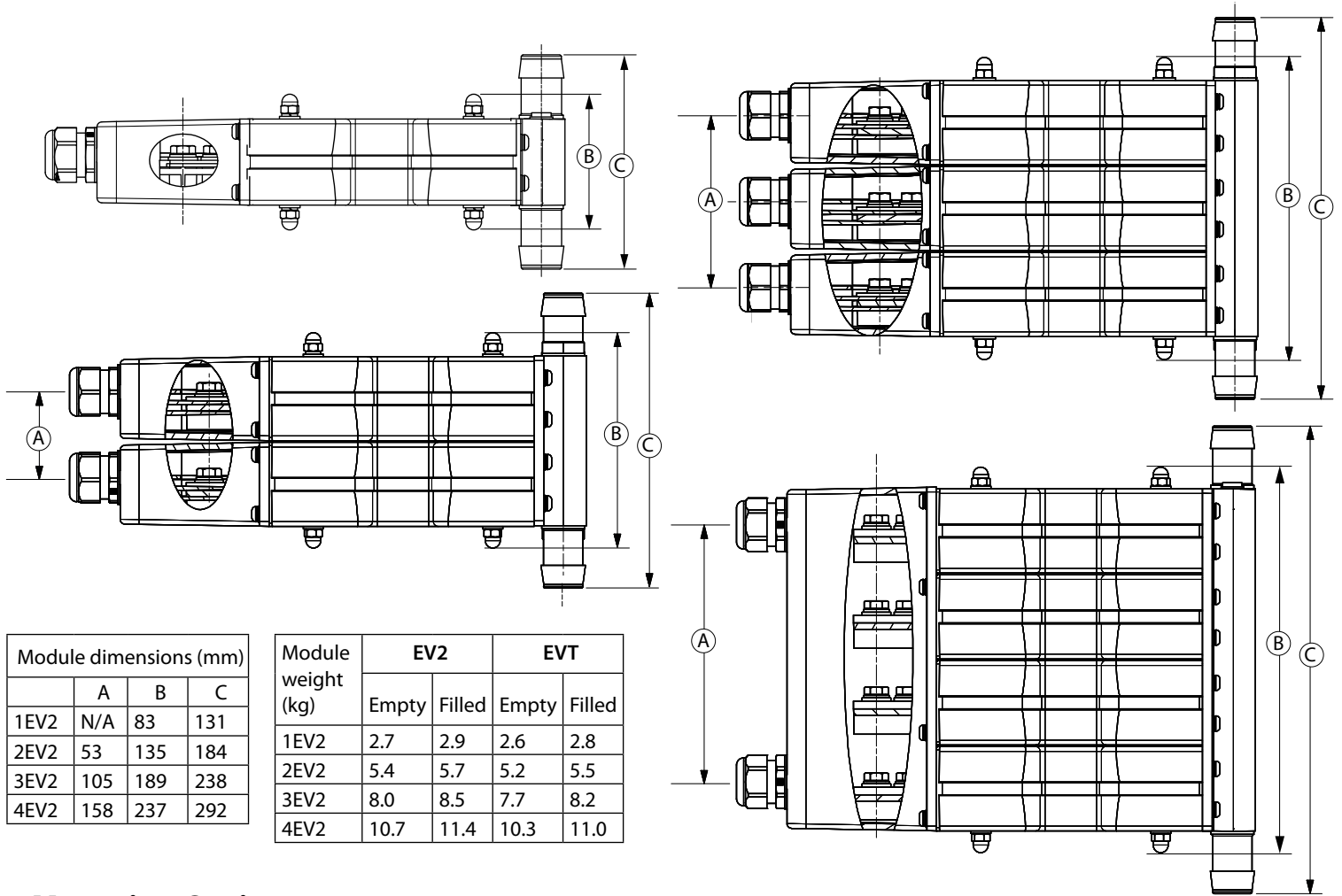
**COMPUTER MODELING** has included extensive modeling and full-scale testing of the fluid flows, heat transfer and stresses within the component materials. The design has been through numerous iterations before reaching its present standard.



- Notes:
1. Either manifold can be used as inlet/outlet
  2. Hose connection can be oriented up or down

1" (25mm) hose connection





## Mounting Options

All EV2 and EVT mounting assemblies are available pre-fitted with filters as well as flow, pressure and temperature sensors and monitoring.



EV2 resistors used to control hoists on board ship. The open back plate assembly holds 2 x 4EV2 assemblies to give a maximum continuous power of 200kW.

Supplied as either open bracket mounted assemblies for installation into existing cabinets or as complete enclosures.

For installation into existing cabinets we can offer:

### Open Bank – up to 4xEV modules

- Can accommodate 1 to 4 EV's, 100kW maximum continuous power
- Monitoring: Flow, Pressure and Temperature
- IP56 Rated terminal compartment
- Coolant Inlet/Outlet: 1" flexible hose

### Open Bank – up to 8xEV modules

- Can accommodate 2 to 8 EV's, 200kW maximum continuous power
- Other features as above

### Complete Enclosure

- Can accommodate up to 24 EV's (6 x 4EV modules), 600kW maximum continuous power.
- Status monitoring relay status displayed on door panel.
- Lockable hinged access doors front and back
- Coolant Inlet/Outlet pipe flange: DN80

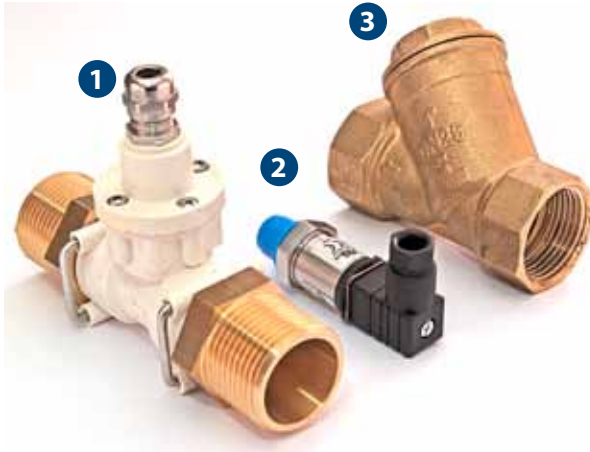
Alternatively we can offer complete stand-alone assemblies.



# Post Glover EV2 & EVT advanced water cooled modular resistors

*"The Resistor Specialists"*

## Recommended accessories for EV resistors



### 1 Flow Meter

- Low pressure drop flow meter
- 0 to 100 l/m input
- Pulsed NPN transistor output
- Supply Voltage: 4.5-24Vdc
- 2 x 1" BSP Male pipe connections

### 2 Temperature Sensor

- -40°C to 275°C temperature input
- PT100 type
- M14 x 1.5mm mounting thread

### 3 Filter

- In-line Y-strainer Filter
- Filtration to 100µm
- 2 x 1" BSP Female pipe connections

### Flow & Temperature Monitor

- 8 x flow sensor inputs
- 8 x temperature sensor inputs
- 8 x per channel status output contact
- 1 x overall flow status output contact
- 1 x overall temperature status output contact
- Supply Voltage: 24Vdc
- Programmable trip points based on EV2 module size(s)

### Pressure Sensor

- 0 to 5 Bar input
- 4-20mA output
- G1/4 Male threaded connection
- Supply Voltage: 9-32Vdcβ

## Post Glover - over 120 years of power resistor experience

Post Glover is the OEM supplier of choice for drive manufacturers the world over. Founded in 1892, we have the industrial and utility experience in power resistors to deliver proven solutions for your critical applications. We bring the broadest line of neutral grounding resistor products and the most engineering experience in the industry. We can design resistors to suit your application or draw from our extensive archive of products to provide you with the exact replacement resistor.

We provide high and low resistance grounding solutions for equipment and personnel protection, dynamic braking and motor/crane control resistors for stopping and motion control for generator and battery testing, and harmonic filter resistors for electrical noise dampening.

The industry's most experienced sales and engineering team and largest independent sales representative network insure a timely and accurate, same day response to your typical and complex applications. With 16 engineers on staff, we are poised to answer your product and application questions.

We pride ourselves on designing and manufacturing in accordance with all applicable standards, be they IEEE, ANSI, NEMA or IEC. Taking safety one step further, we offer the only digital high resistance grounding unit in the industry, as well as UL and CSA offerings in low resistance grounding resistors and dynamic braking resistors.

**For a chance to examine the EV resistor, to receive a no cost proposal or for engineering assistance, call 1-800-537-6144**

**Post Glover**  
*"The Resistor Specialists"*

1369 Cox Avenue • Erlanger, KY 41018 • USA  
Phone: 800-537-6144 / 859-283-0778 • Fax: 859-283-2978  
www.postglover.com  
Quality System Certified to ISO 9001-2015  
Serving the Electrical Industry Since 1892