



## **25 HP STATE-OF-THE-ART AMBIENT PRESSURE MOTOR CONTROLS FROM 100 - 550VDC**

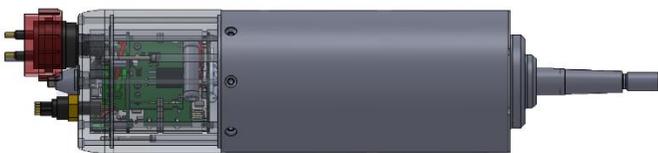
The 1002 series electric thrusters are offered with a matching integrated or stand-alone controller option, oil filled and pressure balanced, eliminating the need for a motor controller housed in a separate one atmosphere bottle.

Where space allows the Integrated Motor Controller (IMC) option is a two-connection solution to the thruster. The separate HV DC power feed and low voltage digital control connection provide a simple interconnect to vehicle systems, and very low radiated emissions.

Where space does not allow, the Stand-alone Motor Controller (SMC) is offered in a separate bottle with resolver and phase power connections to the motor.

Specially designed to match the 1002 Series Electric Thruster range from Innerspace, the IMC integrated controller operates in torque or velocity mode. Torque mode is particularly useful when integration to a vehicle stability control system is anticipated, allowing percentage torque thrust forward and reverse to the RPM limit of the motor. Feedback from the motor to the system controller receipt of the digital commands sent and provides real time RPM and motor current, along with system health and performance monitoring data. Motor acceleration rates and other parameters can be set to suit the motor and application.

Recording of lifetime performance data including total shaft revolutions, hours since overhaul and power cycles provide data points for operation and maintenance purposes are standard.



Integrated Controller (IMC)  
Mounts on rear of motor body

Stand-alone Motor Controller (SMC)  
Bottle w/o connectors  $\phi 4.72'' \times 5.86''$



**SPECIFICATIONS** IMC (Integrated Motor Controller) or SMC (Stand-alone Motor Controller):

Type: Oil filled, Pressure Balanced Three Phase BLDC motor controller.

**Available Configurations:**

Integrated (IMC): Directly attached to motor - includes all control elements within motor housing.

Stand Alone (SMC): Independent control unit with cable connections to motor - phase (power) and sensing (resolver).

Motor Power Rating: Integrated: 1hp (750W) to 25hp (18kW)  
Stand Alone: 1hp (750W) to 25hp (18kW) with options to 55hp (41kW)

**General Characteristics:**

Voltage: DC, 100VDC to 550VDC, Positive, Negative, Isolated from Frame Ground.

Current: Maximum Continuous 50A (in water - limited by connector capability)

Motor Type: Suitable for Three Phase water cooled BLDC Permanent Magnet motors

Integrated Controller: End effect magnetic shaft position sensor and direct commutation

Stand Alone Controller: Sine/CoSine resolver and direct commutation

Operating Parameters: Controller parameter matched to associated motor.

**Connections - Integrated Option**

Power: Three Pin Rated for Applicable Current - Positive, Negative and Frame Safety Ground

Data: Five Pin (e.g. SubConn Micro Circular) - +12V, 0V, CAN+, CAN-, Frame Safety Ground

**Connections - Stand Alone Option**

Power: Three Pin Rated for Applicable Current - Positive, Negative and Frame Safety Ground

Data: Five Pin (e.g. SubConn Micro Circular) - +12V, 0V, CAN+, CAN-, Frame Safety Ground

Motor Phase: Phase A, B, C, Frame Ground/Shield

Motor Sensor: Sensor SIN+/-, COS+/-, EXC+/- Frame Ground/Shield

**Control**

Electrical: CAN bus point to point electrical connection.

A separate 12VDC LV supply used with the CAN bus allows independent powering of the control electronics. This enables the condition of the controller (and for the IMC the controller/motor) to be known without the HV being present. Communication of all of the motor parameters is possible, and RPM is also reported.

Command: MOD bus command set with defined command set including:

Query Commands, Action Commands and Maintenance Commands.

**Command**

Action Commands: RPM setting (velocity mode) - Forward and Reverse, to rated motor RPM  
Power setting (torque mode)- Forward and Reverse, 0% to 100% of maximum rated/programmed torque  
Safety Lockout (Manual)

Status Messages: Status query

Shaft RPM

Motor Current

Throttle/Thrust setting

Temperature

Safety State Action: Condition warnings (temperature, voltage, current)

Control System Connectivity Failure - Automatic shutdown

**Notes:**

- Optional External Control Interfaces: Test interface and development example code (for use in development)
- For safety and security purposes, the CAN communications bus is point to point, not multi-drop.
- DC supply cables must meet minimum length/inductance requirements to eliminate requirement for an external HVDC soft start switch.
- Adequate DC bus capacitance and reverse EMF/Overvoltage protection must be used.