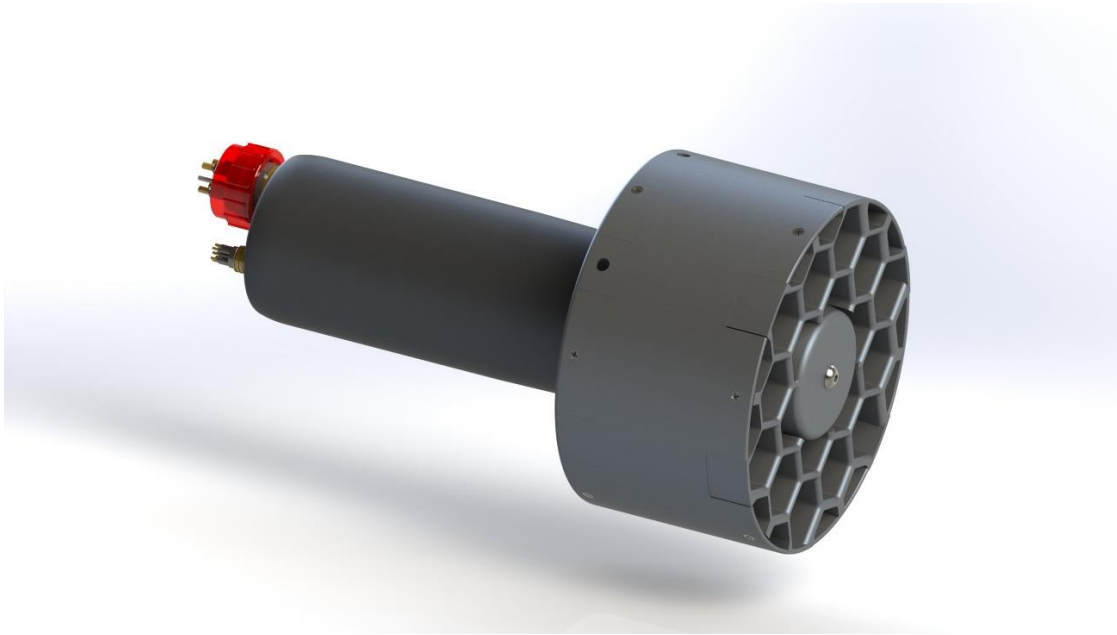




H106-12150RH10-SMC HEXSCREEN ELECTRIC THRUSTER



- No maintenance for 5 years or 5,000 hours other than oil changes.
- No disassembly required for fresh water rinsing.
- Streamlined Brushless DC, oil filled and pressure balanced motors.
- True direct drive electric motors. No gearbox, no magnetic coupling, nor any other device to transmit power, simplifying the design and increasing reliability.
- Proven 3 tier seal system that includes Silicone Carbide Face Shaft Seals.
- 90% Reverse Thrust
- High Efficiency and Much Faster Response Time. Thrusters that will make a difference to any ROV's / Submarines performance
- All USA made materials, manufacturing and assembly.
- Independently Tested Off-The-Shelf Units that have a proven track record.

PRECISION DESIGNED AND BUILT - COMPARE EFFICIENCIES & PROP TIP CLEARANCES.

- Optional Hexscreens of Hydrodynamic Design Protects Divers & the Propeller.
- The Hexscreens Cancels 80% of the Propeller Torque While Reclaiming Thrust by Reducing the Jet Whirl. Makes for a more energy efficient & Steadier Vehicle.

Customized Solutions/Systems for R & D Programs or Prototype Vehicles, small or large. These thrusters can be precision matched to each application.



PERFORMANCE DATA & THRUSTER DIMENSIONS

H106-12150RH10-SMC Motor Specifications				
Input Voltage	Max Thrust	RPM	Input Power	Shaft Power
150 VDC	205 lbf (93 kgf)	1,500	3.2 HP (2.4 kW)	2.2 HP (1.7 kW)
Reverse Thrust				
150 VDC	180 lbf (82 kgf)	1,500	3.2 HP (2.4 kW)	2.2 HP (1.7 kW)

H106 Hexscreen Electric Thruster with 12150RH10 Motor Performance Table

Speed (RPM)	System Voltage (VDC)	Min Voltage (VDC)	Current (A rms)	Torque		Bollard Thrust		Reverse Thrust		Power Shaft		Power In		Efficiency (Pout/Pin)
				(N-M)	(In-Lbs)	0 (Lbf)	0 (Kgf)	(Lbf)	(Kgf)	(HP)	(Watts)	(Watts)	(HP)	
100	150	8.9	1.1	0.0	0.4	1	0.4	1	0.3	0.00	0	1	0.0	43.5%
200	150	17.4	1.7	0.2	1.5	3	1.5	3	1.3	0.00	4	5	0.0	74.5%
400	150	35.1	3.8	0.7	6.1	13	6.1	12	5.4	0.04	29	35	0.0	82.2%
600	150	53.7	7.3	1.6	14.0	31	14.0	27	12.3	0.13	99	123	0.2	81.0%
800	150	73.1	12.3	2.9	25.4	56	25.3	49	22.4	0.32	240	306	0.4	78.6%
1000	150	93.4	18.6	4.5	40.1	88	40.0	78	35.3	0.64	474	625	0.8	75.9%
1100	150	103.9	22.4	5.5	49.0	108	48.9	95	43.1	0.86	638	854	1.1	74.7%
1150	150	109.2	24.3	6.1	53.6	118	53.4	104	47.2	0.98	729	986	1.3	74.0%
1200	150	114.6	26.4	6.6	58.6	129	58.5	114	51.6	1.12	832	1135	1.5	73.4%
1250	150	120.0	28.6	7.2	63.9	141	63.8	124	56.3	1.27	946	1299	1.7	72.8%
1300	150	125.5	30.8	7.8	69.1	152	69.0	134	60.9	1.43	1064	1476	2.0	72.1%
1350	150	131.0	33.2	8.5	75.3	166	75.1	146	66.3	1.61	1203	1680	2.3	71.6%
1400	150	136.6	35.6	9.2	81.0	178	80.8	157	71.3	1.80	1342	1891	2.5	71.0%
1450	150	142.3	38.1	9.8	86.9	191	86.7	169	76.5	2.00	1491	2120	2.8	70.3%
1500	150	148.0	40.7	10.5	93.0	205	92.8	180	81.9	2.21	1651	2369	3.2	69.7%

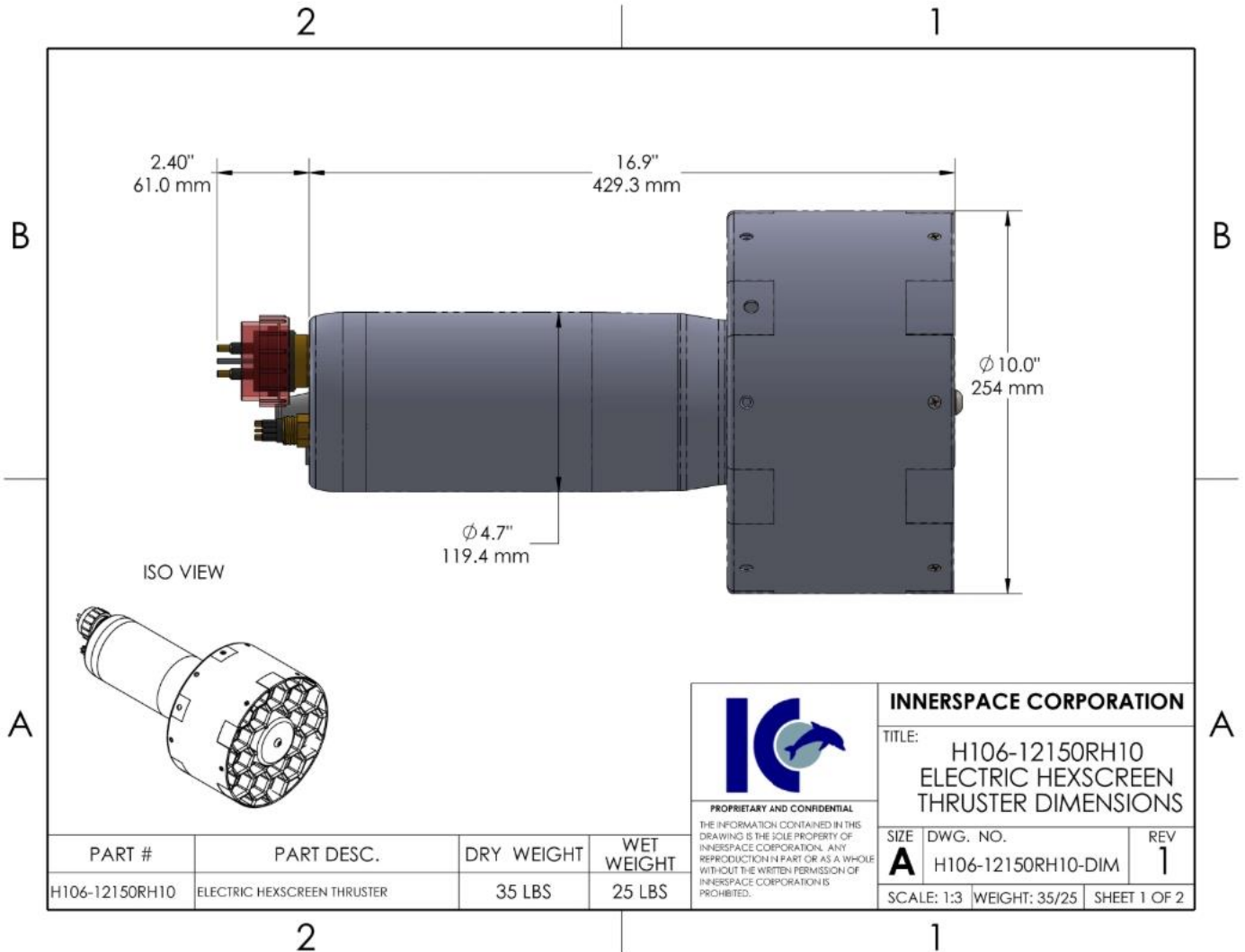
Table Information:

- 1) The Minimum Voltage column in the above table shows the minimum Voltage needed to achieve the performance at that corresponding propeller RPM/Thrust.
- 2) The Current shown represents the continuous RMS Current to the motor to achieve the Thrust at the corresponding propeller RPM.
- 3) The Shaft HP developed is a function of the propeller and increases with propeller RPM.
- 4) The maximum performance achieved will depend on the limitations of customers system Voltage and driver Current capacity.
- 5) For Thrust at Forward Vehicle Speed (Kts), anything lower than 500 RPM varies greatly with vehicle design.
- 6) The Current/RPM might need to be limited depending on customer connector spec and or system Current limitations.
- 7) Minimum Voltage to achieve full Thrust is 148 VDC.
- 8) Max Voltage should not exceed 10% of rated Voltage.



INNERSPACE CORPORATION
1138 E. EDNA PLACE, COVINA, CA 91724
TEL: (626) 331-0921 FAX: (626) 966-6391
www.innerspacethrusters.com

H106-12150RH10 Dimensions



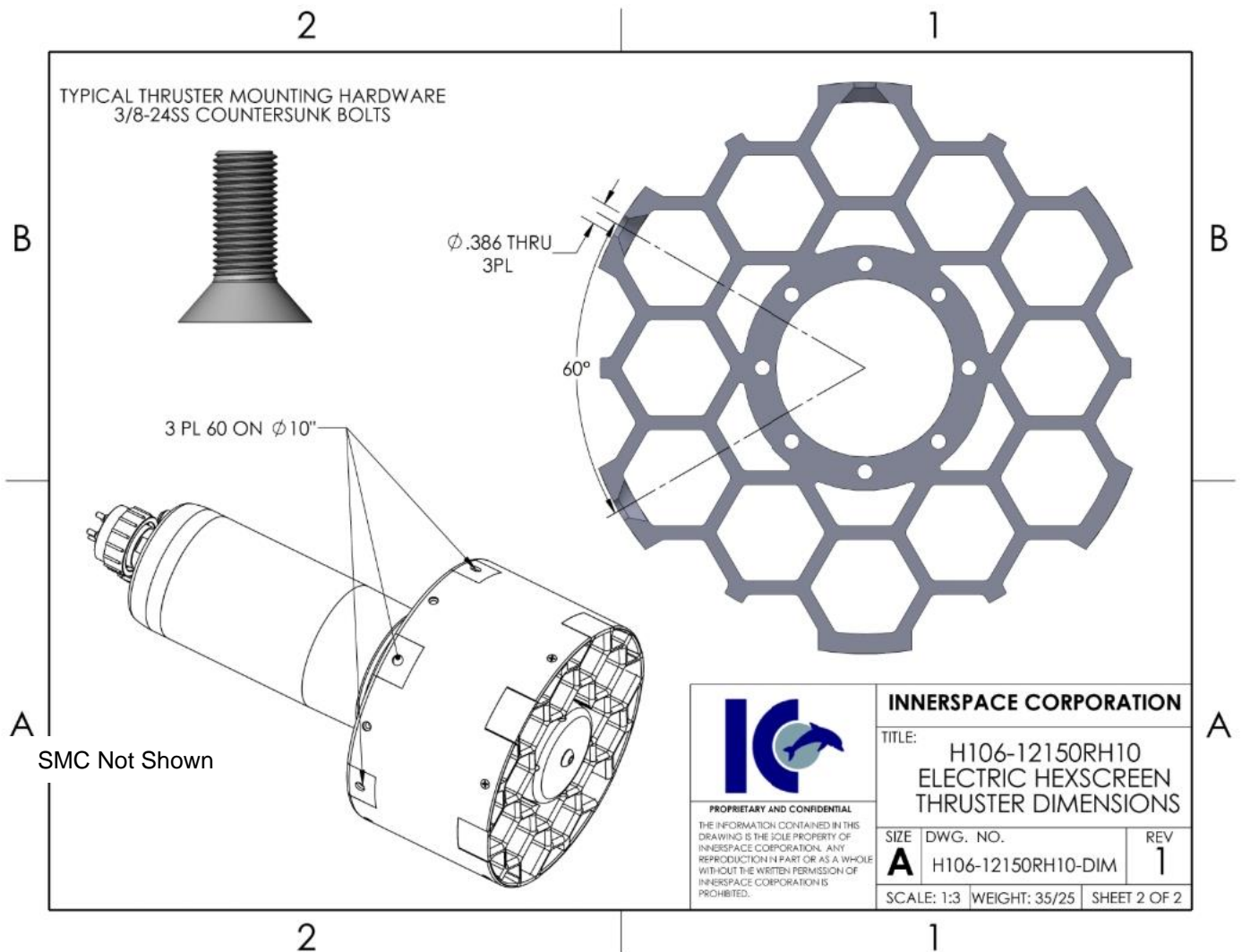


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The Electric Thrusters can be ordered with almost any customer preferred connectors if Current ratings are taken into consideration.

The above Drawing shows the H106-12150RH10 Thruster Dimensions with Vertical Fittings/Bulkheads (1) and Axial fittings/Bulkheads (2).

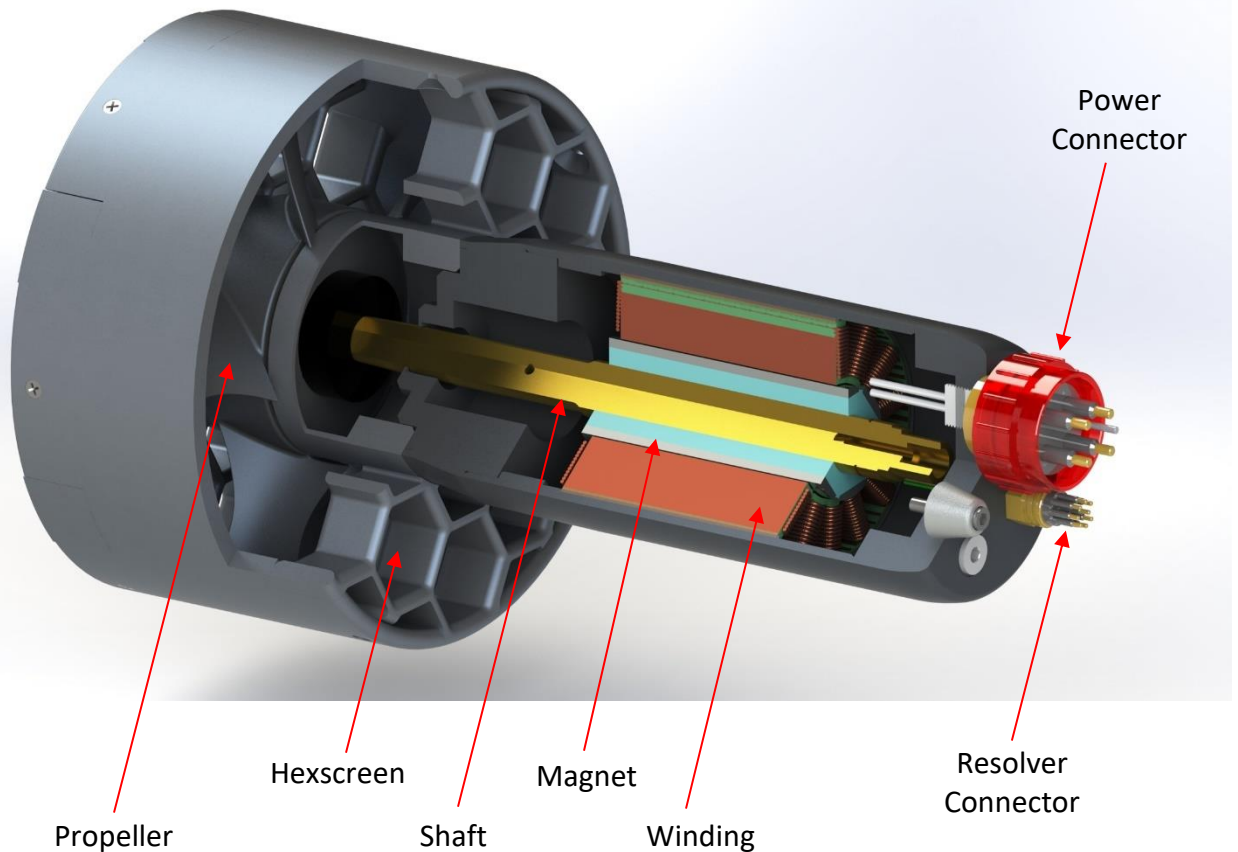


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GENERAL ARRANGEMENT

12150RH10 BDC MOTOR

DIRECT DRIVE – Propeller Attached on the same shaft that the Magnets are on without any other device to transmit power to the Propeller.





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STATE-OF-THE-ART AMBIENT PRESSURE MOTOR CONTROLLER FROM 50 – 780 VDC

The H106 Series Electric Thrusters are offered with a matching SMC (Stand-alone Motor Controller) housed in a separate one atmosphere bottle. Specially designed to match the H106 Series Electric Thruster range from Innerspace, the SMC 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.



Stand-alone Motor Controller (SMC)
Sizes will vary depending on depth.



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SPECIFICATIONS

SMC (Stand-alone Motor Controller):

Type: Atmospheric Pressure Housed Three Phase BLDC motor controller.

Available Configurations:

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

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

General Characteristics:

Voltage: DC, 50VDC to 780VDC, Positive, Negative, Isolated from Frame Ground.

Current: Maximum Continuous 50A (in water)

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

Operating Parameters: Stand Alone Controller: Sine/CoSine resolver and direct commutation
Controller parameter matched to associated motor.

Connections

Power: Subconn HPBH4M - Positive, Negative and Frame Safety Ground

Data: SubConn DBH13M – 1. 24V+, 2. SHD, 3. 0V-, 4-7 RESERVED, 8. ECAT TX+, 9. ECAT TX-, 10. ECAT RX+, 11. ECAT RX-, 12 & 13 RESERVED

Motor Phase: Subconn HPBH4F - Phase A, B, C, Frame Ground/Shield

Motor Sensor: Subconn DBH8F Sensor SIN+/-, COS+/-, EXC+/- Frame Ground/Shield

Control

Electrical: Ethercat point to point connection.

A separate 24VDC LV supply used with the Ethercat connection. This enables the condition of the controller to be known without the HV being present. Communication of all the motor parameters is possible.

Command: Over 300 commands available please contact for requirements

Ethercat SDO and PDO:

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 query

Status Messages: 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 code
- 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.
- All Data cable must be shielded for noise prevention
- Data cable should not exceed 6 meters between SMC and electric motors.