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

# STATE-OF-THE-ART AMBIENT PRESSURE

## MOTOR CONTROLS FROM 50-780VDC

The 1002 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 1002 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 |
| | Stand Alone Controller: Sine/CoSine resolver and direct commutation |
| Operating Parameters: | Controller parameter matched to associated motor. |

**Connections**

| | |
|---|---|
| Power: | Subconn HPBH4M - Positive, Negative and Frame Safety Ground |
| Data: | SubConn DBH8M) - +24V, 0V, ECAT_IN_TX+, ECAT_IN_TX-, ECAT_IN_RX+, ECAT_IN_RX-, Shield. |
| 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.<br>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<br>Ethercat SDO and PDO: |
| Action Commands: | RPM setting (velocity mode) - Forward and Reverse, to rated motor RPM<br>Power setting (torque mode)- Forward and Reverse, 0% to 100% of maximum rated/programmed torque<br>Safety Lockout (Manual)<br>Status query |
| Status Messages: | Shaft RPM<br>Motor Current<br>Throttle/Thrust setting<br>Temperature |
| Safety State Action: | Condition warnings (Temperature, Voltage, Current)<br>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.

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# UNG-01

## Universal Gateway for Rapid Development of SMC Control Systems

The UNG-01 is a top-of-the-line Motor Control System that can take in multiple different communication protocols and rapidly develop an underwater control environment. It's ease of configuration and versatility makes it an excellent addition to the SMC Motor Controller.

Equipped with numerous interfaces, no matter what your current control system can output, our UNG-01 is designed to communicate with your higher control system with ease. (Ethernet/IP, Modbus, TCP/IP)

The UNG-01 provides:

- Self-Sufficient Machine motion control
- Time Deterministic control over motion, IO, and Processes
- Complete compatibility with recognized networking and communication protocols
- Unified Development platform that streamlines motion control solutions
- Various programming capabilities, such as the IEC-61131-3 standard languages, as well as native C and C++ programming support, dramatically accelerate user-level program execution.

### SPECIFICATIONS of the UNG-01:

#### Processor System:

Processor: Computational core system based on Dual Core (2x1.5 GHz)

On Board Flash: 4 GByte

RAM: DDR-3, 4 GByte, 64 bit bus width, (Operational at Full Core Rate)

SD Card: MicroSD Memory Card (Push-push Type) SCHA

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## Communications:

Ethernet for Host: 1 Ethernet port 1000 base-T (UDP, Telnet, TCP)

EtherCAT Master: 2 Ethernet port 100 base for EtherCAT master.

CAN for device: CANopen master port

Baud Rate of 1Mbits/sec

USB - Type A Device USB: High-Speed (HS 480 Mbps) USB 2.0

USB - Type B Device USB: High-speed (HS 480 Mbps) USB 2.0

## Power Supply:

Supply Input Voltage: Single Power Supply, 12V to 31V

Current: Typically, 7.5W (Without Video Support)

## Operating System:

Linux Operating System: With RT extension for real-time motion control support

Motion Programming: Native C Programming, running on target CPU. Compiling and debugging via

the Eclipse IDE using GCC under Cygwin.

IEC 61131-3 with PLCopen Motion Library extension, using Elmo IDE.

Structured Text (ST), textual

Function Block Diagram (FBD), graphical

Ladder Diagram (LD), graphical

Sequential function chart (SFC)

## Notes:

- Visualization interface built with CoDeSys
- Can be Supplied with or without IO points