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### Commissioning

Flow Technology Inc. (FTI) has been contracted to commission the Fusion Fuel Accountability & Management System, these commissioning services will consist of the following items:

- 1) Review of the wire terminations to insure correct interconnection.
- 2) Review of mechanical installation to verify proper placement of equipment.
- 3) Verify correct input power.
- 4) Initial power up of the system.
- 5) Verification of serial communication with the various sensors.
- 6) Verification of proper communication with the customer supplied GPS.
- 7) The DAU will be configured at the factory per the customer requirements. On site the configuration will be verified and modified as required.
- 8) Fundamental system training/operation will be provided as required.

Note: Installation of the Fusion equipment and interconnection wiring on the vessel is **NOT** included in our standard commission service. If all of the required Fusion equipment is not installed prior to the arrival of the FTI service technician, commissioning of the Fusion system will **NOT** be possible. If commissioning can not take place due to improper installation, the FTI field service trip will still be invoiced at the quoted price and a second field commissioning trip will need to be scheduled.

### Pre-Commission Check List

In order to insure that the FTI commissioning of the Fusion system goes smoothly, please confirm the following items have been properly addressed:

- 1) All flow meters should be installed in the fuel lines per section 2.1 of the Fusion Hardware Manual TM-68101. Please insure the meters are installed in the proper location, i.e. supply meter in the supply line and return meters in the return line.
- 2) The engine room junction box should be installed per section 2.3 of the manual. It should be placed in a location that allow access for inspection of wiring.
- 3) RPM sensors need to be mounted so the flywheel gear teeth of the propulsion engines can be detected. See section 2.2 of the manual for mounting instructions.
- 4) The DAU is a marine grade, sunlight readable, touch screen computer. It can be panel mounted, wall mounted or ceiling mounted depending on customer preference and optional accessories purchased. See section 2.6 for DAU mounting instructions.
- 5) The Fusion system is supplied with a UPS, 24 VDC power supply, and interconnection terminal strip. This equipment should be mounted in a protected area near the DAU. See sections 2.4 and 2.5 of the manual for installation instructions.
- 6) FTI recommends using the supplied interconnection cabling between the sensors and the engine room junction box as well as the cable run from the junction box to the DAU location. If customer supplied interconnection cable is used in place of the FTI wiring it must meet the same specifications. The Fusion communications is via 485 bus. Changes in cable specification or termination has the potential of creating reflections that can disrupt communications. See Appendix C of the manual for wiring instructions.
- 7) If the system was supplied with optionally available analog to 485 converters, please see section 2.8 for installation instructions. These devices would be used to accept an analog output from an existing vessel device such as a generator and place it on the Fusion system as a sensor.
- 8) The Fusion system requires a serial input from an NMEA 0183 GPS for proper operation. Supply of the GPS and the interconnecting cable to the Fusion DAU DB 9 connector is the responsibility of the customer. GPS interface information is located in section 2.9 of the manual.