Special Monitoring of Applied Response Technologies (SMART) is a cooperatively designed monitoring program for dispersant use. The SMART program is designed to determine if dispersants are effective in dispersing the oil and how quickly dispersants are working. SMART recommends three options, or Tiers.

**Tier I**
A trained observer, flying over the oil slick and using photographic job aids or advanced remote sensing instruments, assesses dispersant efficacy and reports back to the Unified Command.

**Tier II**
Provides real-time data from the treated slick. A sampling team on a boat tows a C3 fluorometer in a C-ray tow body configured with SMART software to continuously monitor for dispersed oil one meter under the dispersant-treated oil slick. The team records and conveys fluorometer data to the scientific support team which forwards it with recommendations to the Unified Command. In addition, water samples are collected for later analysis at a laboratory.

**Tier III**
Expands the monitoring effort and provides information on where the dispersed oil goes and what happens to it: (1) two C3 fluorometers in C-ray tow bodies are used on the same vessel to monitor at two water depths; (2) monitoring is conducted in the center of the treated slick at several water depths, from one to ten meters; and (3) a portable water laboratory provides data on water temperature, pH, conductivity, dissolved oxygen, and turbidity.

**Optical Sensors**
Crude Oil optics are required for SMART. Up to 2 additional optical sensors can be installed in the C3 to expand its capabilities.

**Available Optical Sensors**
- Blue Green Algae
  - Phycoerythrin (marine)
  - Phycocyanin (freshwater)
- CDOM/FDOM
- Chlorophyll *in vivo*
  - Blue excitation
  - Red excitation
- Fluorescent Dye Tracing
  - Fluorescein
  - PTSA
  - Rhodamine
- Hydrocarbons
  - Crude Oil
  - Refined Fuels
- Turbidity
- Wastewater Monitoring
  - Optical Brighteners
  - Tryptophan

*Contact us for Custom Optics*
### Required SMART Package Components

- C3 Submersible Fluorometer with Crude Oil optics
- C3 Pressure Sensor (factory-installed)
- Oil Spill Firmware (factory-installed)
- SMART Toughbook Computer with associated Hardware & Software
- C-ray Towed Deployment Body
- C-ray Shade Cap
- 25 meter Extender Cable
- Boosters
- 12 VDC Power Supply Adapter
- Continuous Data Cable

### Physical Specifications

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Weight in Air</td>
<td>9 kg; 20 lbs</td>
</tr>
<tr>
<td>Total Length</td>
<td>37.8 cm; 14.9 in</td>
</tr>
<tr>
<td>Total Width</td>
<td>49.8 cm; 19.6 in</td>
</tr>
<tr>
<td>C-ray Inside Diameter</td>
<td>10.4 cm; 4.1 in</td>
</tr>
<tr>
<td>C-ray Housing Material</td>
<td>Powder Coated Low Carbon Steel</td>
</tr>
<tr>
<td>C-ray Wings Material</td>
<td>High Strength Plastic</td>
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<tr>
<td>Operating Temperature</td>
<td>-2 to 50 degrees C</td>
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</table>

### Electrical Specifications

<table>
<thead>
<tr>
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<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Minimum Power Supply</td>
<td>8 - 30 volts; 5 watts</td>
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<tr>
<td>Output</td>
<td>Digital (ASCII string)</td>
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<tr>
<td>Interface</td>
<td>RS232</td>
</tr>
<tr>
<td>Minimum Sample Interval</td>
<td>1 Second</td>
</tr>
<tr>
<td>C-ray Towing Speed</td>
<td>1 to 5 knots*</td>
</tr>
<tr>
<td>Maximum Current Draw @ 12 volts</td>
<td></td>
</tr>
<tr>
<td>- operational</td>
<td>200 mA (C3)</td>
</tr>
<tr>
<td>- sleep mode</td>
<td>3 mA</td>
</tr>
</tbody>
</table>

*Recommended deployment speed depending on water conditions

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**Application** | **Minimum Detection Limit** | **Linear Range**
---|---|---
CDOM/FEOM | 0.1 ppb** | 0-1,500 ppb**
C3 Submersible Fluorometer with Crude Oil optics | 0.5 ppb*** | 0-3,000 ppb***
Chlorophyll *in vivo* | 0.03 µg/L | 0-500 µg/L
Blue excitation | 0.3 µg/L | 0-500 µg/L
Red excitation | 0.01 ppb | 0-500 ppb
Fluorescein Dye | 0.2 ppb*** | 0-1,500 ppb***
Oil - Crude | 3 ppb* | 0-3,500 ppb*
Oil - Fine | 10 ppm**** | 0-30 ppm****
Optical Brighteners | 0.6 ppb*** | 0-2,500 ppb***
Phycocyanin | 2 ppb* | 0-4,500 ppb*
Phycoerythrin | 0.1 ppb* | 0-750 ppb*
PTSA Dye | 0.1 ppb*** | 0-650 ppb***
Rhodamine Dye | 0.01 ppb | 0-1,000 ppb
Tryptophan | 3 ppb | 0-5,000 ppb
Turbidity | 0.05 NTU | 0-1,500 NTU

*1,3-Naphthalene Disulfonic Disodium Salt
**Quinine Sulfate
***PTSA (1,3, 6, 8 - Pyrenetetrasulfonic Acid Tetrasodium Salt)
****BTEX (Benzene, Toluene, Ethylbenzene, Xylenes)
PE Phycocyanin pigment from Prozyme diluted in Deionized water
PF Phycoerythrin pigment from Prozyme diluted in Deionized water

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**Contact Us**

<table>
<thead>
<tr>
<th>Toll-Free</th>
<th>Email</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.877.316.8049</td>
<td><a href="mailto:sales@turnerdesigns.com">sales@turnerdesigns.com</a></td>
<td>1995 N. 1st Street</td>
</tr>
<tr>
<td>Phone : 408.749.0994</td>
<td>Web : <a href="http://www.turnerdesigns.com">www.turnerdesigns.com</a></td>
<td>San Jose, CA  95112</td>
</tr>
<tr>
<td>Fax : 408.749.0998</td>
<td></td>
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**Smart Designs**

Reliable Instruments for an Unreliable World

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S-0224 Rev. B