

BENEFITS:

- Reduces thermal stress
- Increases dive duration and diver comfort
- Easily integrated into existing dive systems

APPLICATIONS:

- Cold Water Diving (Heating System)
- Warm Water Diving (Cooling System)
- Contaminated Water Diving

SPECIFICATIONS:

Physical

- - 10 lbs buoyant

Performance

- Up to 400W of heat in 34° F ambient
- Up to 250W of heat in 100° F ambient

Power

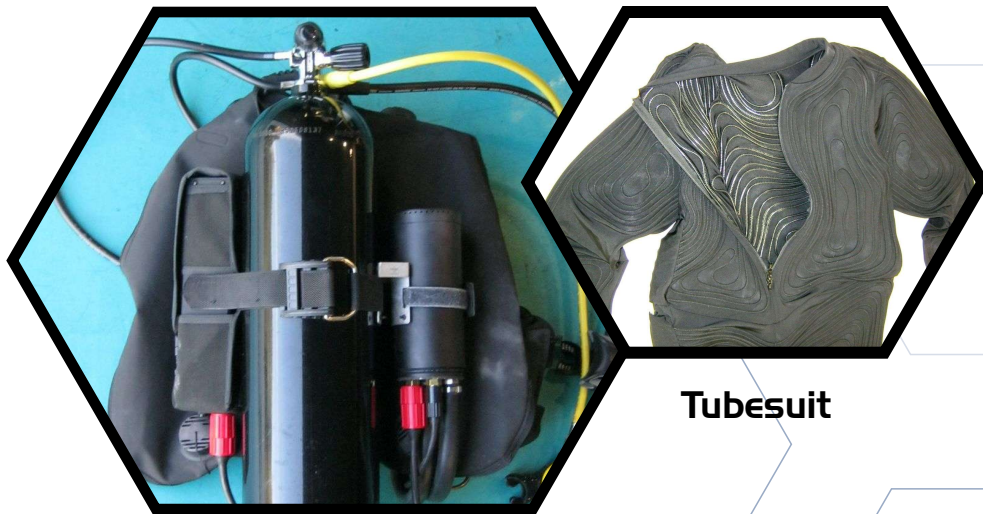
- 12 VDC, 85W-130W
- Lithium polymer battery provides greater than 3.5 hours of run time
- Can also be operated from boat or surface power

COMPONENTS:

- Diver Heating Unit & mounting bracket
- Control pendant
- 14.4V Li-Polymer battery & pouch
- Drysuit quick-disconnect & penetrator
- Tubesuit

Free-Swimming Diver Heating Systems (FDHS) & Free-Swimming Diver Cooling System (FDCS)

Operations performed by free-swimming divers often expose them to extreme thermal conditions. These conditions can induce cold or heat stress which in turn impairs diver performance, shortens dive duration and creates unnecessary health risk to divers. For cold water diving, a heating method is needed to mitigate cold stress, maintain core body temperatures, and improve diver dexterity and endurance. In addition to heating in cold water, cooling of the diver is needed in warm water dives to prevent heat stress and to increase diver capability. This need is magnified for contaminated water dives because the diver must don a dry suit as personal protective equipment (PPE). RINI Technologies has developed the FDHS and FDCS which utilize an efficient miniature heat pump technology as an active body heating or cooling system that will keep a diver thermally comfortable in water temperatures as cold as 34°F and as warm as 100°F.



**Diver Heating Unit (right)
and Battery (left)**

Tubesuit





Handheld Controls



Quick disconnect & drysuit penetrator

How the Diver Heating Systems Work:

RINI's miniature heat pump technology utilizes a miniature heat pump and circulates in a closed loop heated or chilled water through a tubesuit worn against the diver's skin; thereby relieving cold or heat stress. The miniature heat pump uses proven thermodynamic technology used in residential HVAC with an orientation independent compressor developed by RINI. The heat pump can extract heat from very cold sea water and provide that heat via closed loop water to the tubesuit. In the cooling system the heat pump extracts the heat from the closed loop water circulated to the tubesuit and rejects the heat to the ambient water, thereby providing a cooling effect to the diver. The heat pump is sized for the individual and is extremely energy efficient, requiring only 1 Watt of electrical power for every 2-3 Watts of heat delivered or removed from the diver allowing for un-tethered diving with a portable battery. RINI's miniature heat pump technology can operate continuously if supplied electrical power, has no consumables, no gas venting, and no system recovery during or after operation and is designed to operate in contaminated, debris filled water.



About RINI Technologies:

RINI Technologies provides innovative solutions to the toughest thermal-management challenges. RINI specializes in advanced Evaporative Spray Cooling (ESC), Thermal Energy Storage (TES) solutions and miniature refrigeration systems. Applications include high and low power lasers, power electronics, and personal cooling. Contact RINI Technologies today to discuss how its engineers can address your cooling concerns with a complete system solution.

