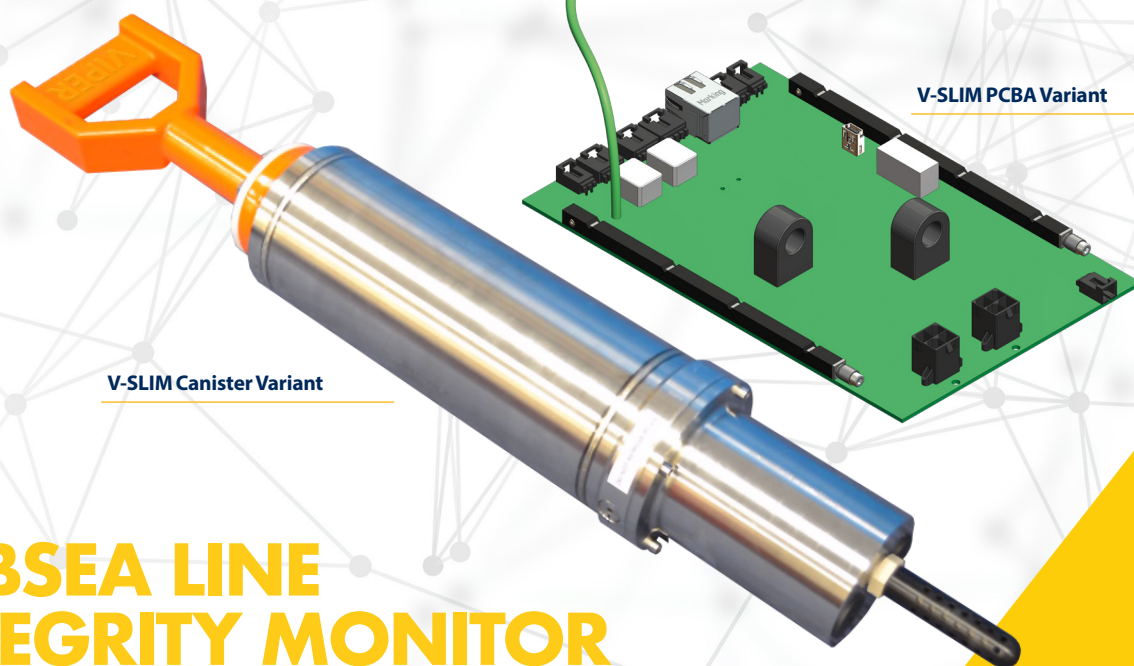


V-SLIM

TECHNICAL DATA SHEET

www.viperinnovations.com



V-SLIM Canister Variant

V-SLIM PCBA Variant

SUBSEA LINE INTEGRITY MONITOR

 **V-SLIM**[®]
A VIPER INNOVATION

THE V-SLIM IS SUBSEA DEPLOYABLE ELECTRONICS WITH UNIQUE TECHNOLOGIES TO MONITOR AND IMPROVE THE INTEGRITY OF SUBSEA ELECTRICAL CABLES AND DISTRIBUTION EQUIPMENT

The Problem

Water ingress to subsea electrical cables is the dominant cause of electrical faults. This results in an increase in leakage current and a low insulation resistance (Low IR) alarm. Continual insulation degradation eventually leads to failure of the circuit.

Existing topside located line insulation monitors only display a single IR result for the complete subsea system. When the IR drops, the topsides monitor provides no information on the number of faults or their location. A costly subsea fault finding campaign and possibly a production disruption is required which also carries the risk of introducing new faults in previously good connections. Even if a fault can be found and fixed, the entire process must be repeated each time a new fault occurs providing no long term added value.

Distribution systems that include subsea deployed transformer modules pose an additional integrity management challenge. In these systems a topside located line insulation monitor can typically only monitor up to the primary winding of the transformer, effectively monitoring the main umbilical only. Integrity monitoring of the electrical distribution equipment attached to the secondary side of the transformer, as is now commonly specified by field operators, must be addressed by other means.

In addition to being unable to monitor the integrity of anything on the secondary side of a transformer, it is also not possible to utilise V-LIFE to recover low IR faults on the secondary side from a topside located V-LIM.

The Solution

When deployed as part of the V-IR® system, the V-SLIM's unique capability to measure the total system insulation resistance and the insulation resistance downstream of the unit enables a complete picture of the electrical integrity of the subsea distribution system to be presented to the field operator. The V-SLIM electronics can be installed at strategic subsea locations, either through retrofit or embedded within OEM equipment, and any associated degradation of the subsea electrical distribution network can be measured and located with analytics.

When deployed as a standalone subsea integrity monitor on the secondary side of a subsea transformer the V-SLIM fills the gap in the integrity monitoring information of the complete subsea electrical system required by many field operator specifications which cannot be provided by a topsides line insulation monitor. The V-SLIM can also be V-LIFE enabled which allows low insulation faults to be rejuvenated even on systems with subsea transformers. This is particularly advantageous on systems with transformers and infield umbilicals on the secondary side which are difficult to fault find and costly to replace.

Key features:

- Measure the total system insulation resistance and insulation resistance downstream of the unit
- Additional measurement parameters include voltage, current, frequency and insulation capacitance
- Compatible with single phase AC or DC
- Patented measurement technology allows wires to be routed directly through the V-SLIM with no in-line electronics or switches in-line
- Compatible with existing topside IR verification testing activities (use of Megger)
- V-LIFE ready

Key benefits:

- Provides information to locate electrical faults without the need for an intervention
- Compatible with existing subsea control systems
- Minimises subsea intervention costs
- Mitigates unplanned production loss

Product Variants

- V-SLIM PCBA (Printed Circuit Board Assembly)
- V-SLIM Canister

Product Accessories

- Mounting receptacle for canister variant

Production Specification

Total Insulation Resistance Measurement Range

1k Ω to 1G Ω

Downstream Insulation Resistance Measurement Range

1k Ω to 1M Ω

Total Insulation Capacitance Measurement Range

0.1 μ F to 150 μ F

Downstream Insulation Capacitance Measurement Range

0.1 μ F to 20 μ F

Line Frequency Measurement Range

47Hz to 63Hz @1% \pm 0.5Hz (True Rms)

Line Voltage (True Rms) Measurement

Up to 1000V \pm 3% \pm 5V

Line Current (True Rms) Measurement

Up to 15A \pm 1%

Qualifications

API STD 17F
ISO 13628-6

Temperature Rating (in accordance with API 17F)

Design: -18 $^{\circ}$ C to +70 $^{\circ}$ C
Test: -18 $^{\circ}$ C to +40 $^{\circ}$ C
Operational: -5 $^{\circ}$ C to +40 $^{\circ}$ C
Storage: -18 $^{\circ}$ C to +50 $^{\circ}$ C

Line Rating

1000V
Up to 10A continuous (canister variant)
Up to 15A continuous (PCBA variant)

Standalone Communications

Ethernet:

- 10/100 Base TX
- Auto-Negotiation & Auto-MDIX
- IPv4 addressing
- DHCP / Static (Configurable)
- Modbus TCP/IP & HTTP Webserver
- V-LIFE only via HTTP Webserver

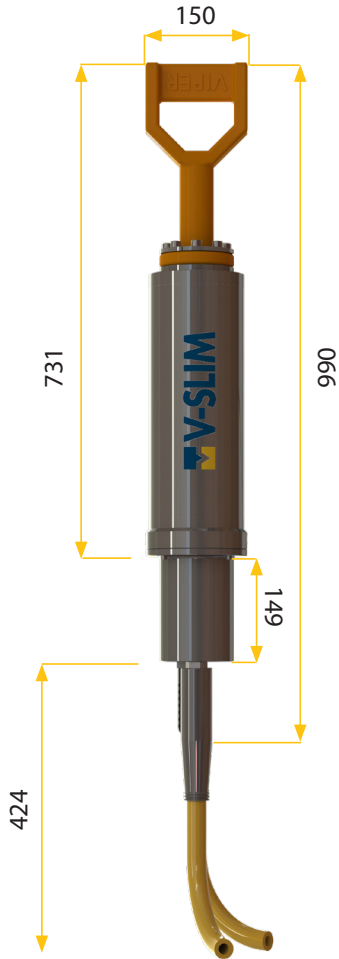
Design Life

25 years

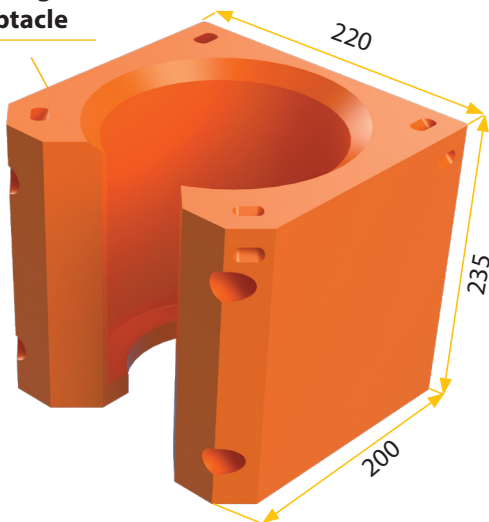
Product Marks



Canister Variant



Mounting Receptacle



Power Input

24V DC nominal, 5W(max)
Line powered option available on request

Welding

Electron Beam Welding of Super-Duplex

V-SLIM Weight (Including Handle)

In air: 24.6 kg
Subsea: 19.9 kg

Environmental Data

Operating Depth rating: 3000m

Canister Materials

Exposed Metal:

- Super Duplex UNS S32750

Non metals:

- PEEK 450G (Probe Insulator)
- Acetal Co-Polymer (Probe cover)
- Polyurethane 90 ShoreA (handle)

Receptacle Weight

In air: 5.9 kg
Subsea: 0.25kg

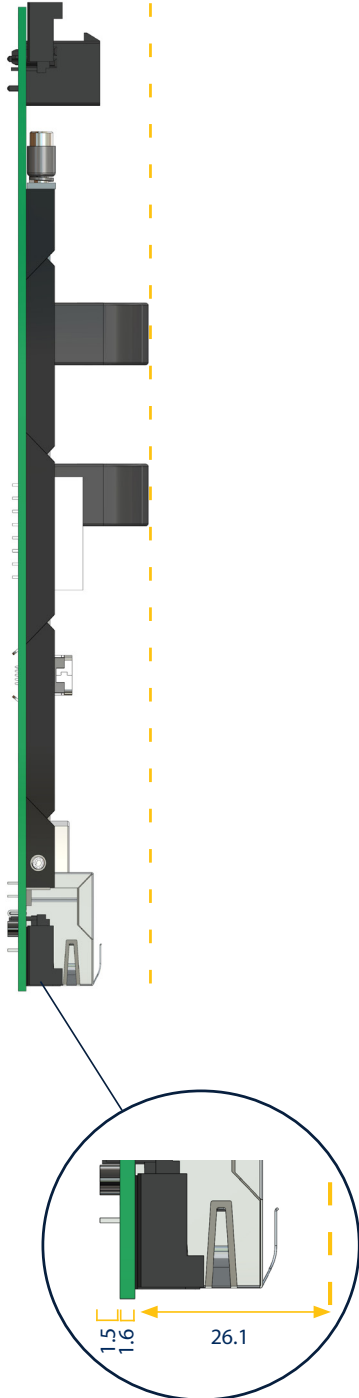
Receptacle Material

Nylon

Note:

Dimensions in mm
Accessories available on request

PCBA Option

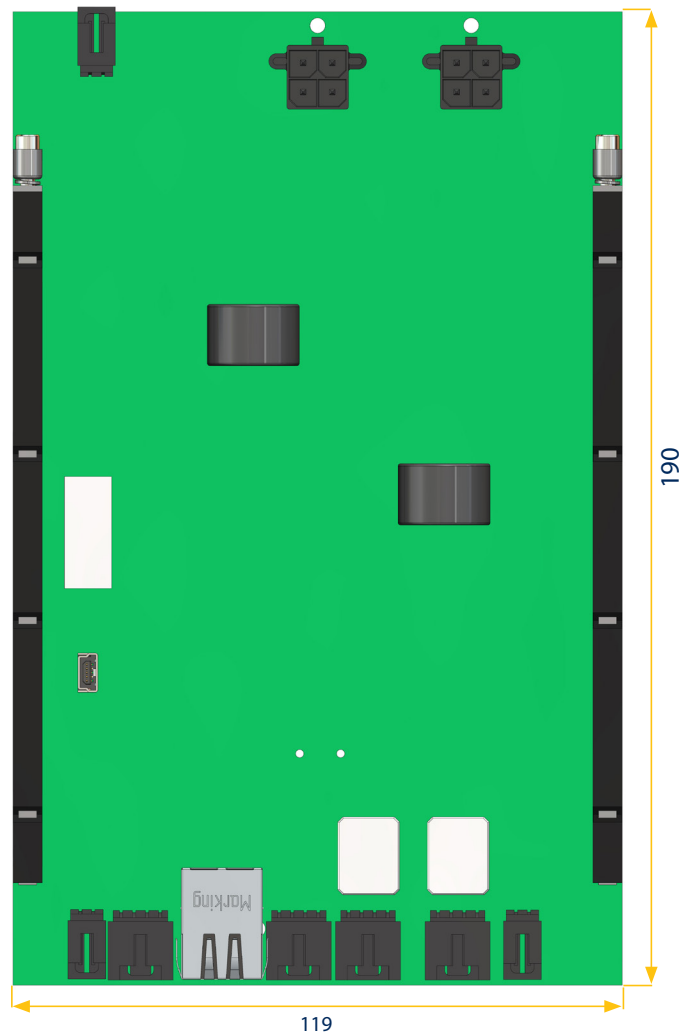


Operating Environment

Use in a 1 atmosphere Inert Gas
Conformal coating applied in accordance with
IPC-CC-830

Power I/P

24 V DC Nominal , 5W (max)
20V AC Nominal, 7VA (max)



Note:
Dimensions in mm



For more information visit:

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