DeltaV™ SISNet Fiber Components

DeltaV™ SIS is the world's first Smart SIS to use the power of predictive intelligence for increasing the availability of the entire safety instrumented function.

- Fiber-optic repeater for redundant safety- rated communications

- Dedicated to safety—no possibility of common-cause control and safety communications failures

- 50 mS update time anywhere on the SISNet

- Spans 32 nodes

Introduction

The DeltaV SIS™ system, part of Emerson's smart SIS, ushers in the next generation of Safety Instrumented Systems (SIS). This smart SIS approach uses the power of predictive field intelligence to increase the availability of the entire safety instrumented function.

Benefits

Safety-rated communications across different locations. The SISNet Repeater is used when safety-critical inter-trip signals are needed across a physically spread-out plant.

Dedicated to safety. Some systems use the same networks for both control and safety. DeltaV SIS SISNet is dedicated to safety, carrying only safety-rated signals. It is therefore immune to any failure of the control network.

50 mS update time. All of the data broadcast on the SISNet is available to all of the other nodes within 50 mS. This, combined with the speed of the logic solver, guarantees input-to-output times of less than 225 mS anywhere on the distributed SISNet.

DELTAV™

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Spans 32 nodes. The SISNet spans 32 nodes in a redundant ring architecture. These nodes can be up to 2 km apart, so the whole ring can be up to 64 km around. If even longer distances are required, then the SISNet Extender can be used to achieve distances of greater than 60 km between nodes, going a total distance of 1920 km.

The 50 mS update time is guaranteed even at this size of network.

Product Description

This section provides general information on DeltaV SIS hardware. Refer to the *Installing Your DeltaV Digital Automation System* manual for more information on DeltaV system equipment.

DeltaV SIS Equipment

A DeltaV automation system consists of carriers, one or more I/O subsystems, controllers, power supplies, workstations, and a control network.

DeltaV SIS consists of:

■ Smart Logic Solvers (SLS 1508) and termination blocks (see separate product data sheet)

■ SISNet Repeaters

■ Carrier extender cables

■ Local peer bus extender cables

■ Right 1-wide carrier with termination

■ SISNet Distance Extenders as required

SISNet Repeaters extend communication beyond the local Logic Solvers connected to one DeltaV controller and broadcast global messages to remote Logic Solvers through a fiber-optic ring. Global messages refer to messages that are intended for all Logic Solvers. The SISNet Repeater installs on a 2-wide carrier. There is a primary and secondary SISNet Repeater on each carrier.

Carrier Extender Cables extend LocalBus power and signals between 8-wide carriers. Local peer bus extender cables extend the local peer bus (SISNet) between Logic Solvers on different carriers. 1-wide carriers with terminators terminate the local peer bus at the final carrier.

SISNet Extenders extend the communications between SISNet Repeaters using single-mode fiber.

A redundant pair of SISNet Repeaters.

Communication

Control Network: The DeltaV Control Network provides communication between the nodes in the DeltaV network. Refer to the *Installing Your DeltaV Digital Automation System* manual for complete information on the Control Network.

LocalBus: The LocalBus provides communication between DeltaV controllers and Logic Solvers and between DeltaV controllers and SISNet Repeaters. The controller isolate the LocalBus from the control network.

Local Peer Bus (SISNet): Logic Solvers communicate with other Logic Solvers and with local SISNet Repeaters through the carriers over a 2- channel local peer bus. The same message is broadcast over both channels. The local peer bus must be terminated at both ends. The local peer bus is terminated at the left end through the 2-wide power/controller carrier and at the right end through a terminated 1-wide carrier.

The SISNet Repeaters can be located anywhere on a local peer bus—between the M-series Controller(s) and the terminated 1-wide carrier.

Remote Peer Ring: SISNet Repeaters hosted by one DeltaV controller communicate with SISNet Repeaters hosted by a different DeltaV controller over a fiber-optic remote peer ring. A local SISNet Repeater collects locally generated messages into a single message and sends it to the next SISNet Repeater in the ring. Upon receipt of a message, the receiving SISNet Repeater broadcasts it on its local peer bus (SISNet) and forwards the message to the next SISNet Repeater in the ring. A global message is forwarded around the ring once. The primary SISNet Repeaters form one fiber-optic ring and the secondary form a separate, independent ring. The fiber rings operate at 100 MB. By using the SISNet Extender, the ring can be a combination of multi- mode and single-mode fiber as required to achieve the inter-node distances.

Extender cables: Carrier extender cables and local peer bus extender cables connecting a DeltaV controller and 8-wide carrier with standard DeltaV I/O and DeltaV SIS to a second 8- wide carrier (hosted by the same controller) are installed with Logic Solvers, SISNet Repeaters, and a terminated 1- wide carrier. Logic Solver messages are communicated to a remote DeltaV SIS (hosted by a separate controller) through fiber-optic cable.
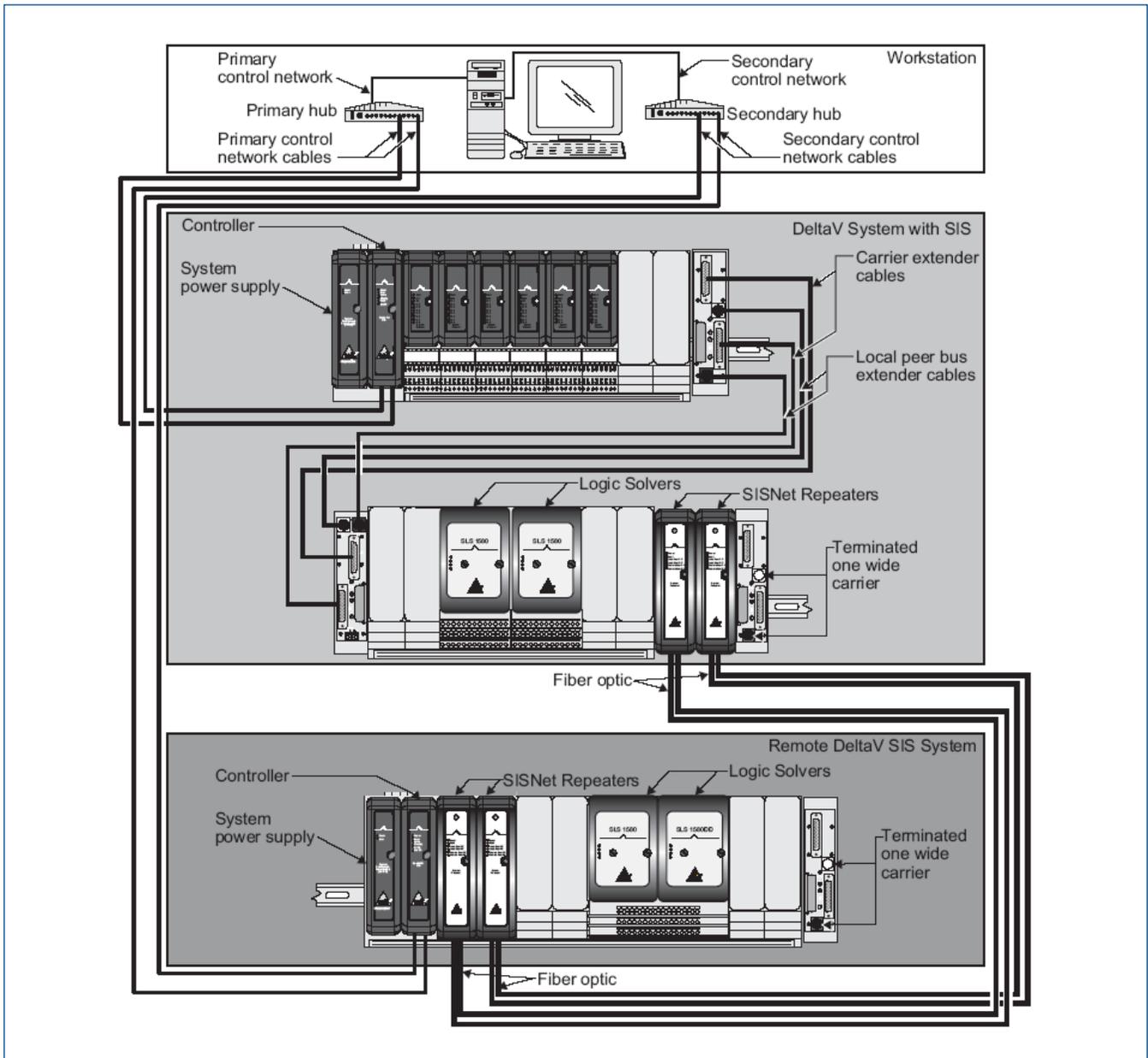

DeltaV SIS overview.

SISNet Distance Extenders: SISNet Distance Extenders convert multimode fiber-optic signals to single mode fiber-optic signals to allow SISNet Repeaters to communicate over greater distances. Depending upon the installation, the remote peer ring can be extended by an additional 60 km between repeaters when single mode fiber-optic cable is used.

The SISNet Distance Extenders are installed directly on the DIN rail. Multimode fiber-optic cables are installed between the SISNet Distance Extenders and SISNet Repeaters. Single mode fiber-optic cables are used to connect the Distance Extenders to each other.
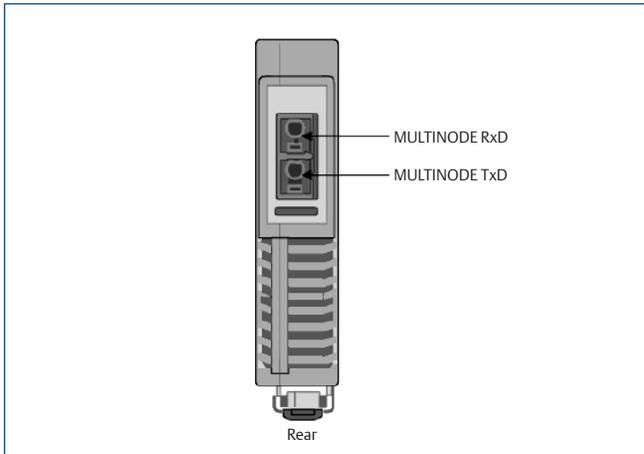

*Multimode Fiber-Optic Connectors on the SISNet Distance Extender (Bottom View).*
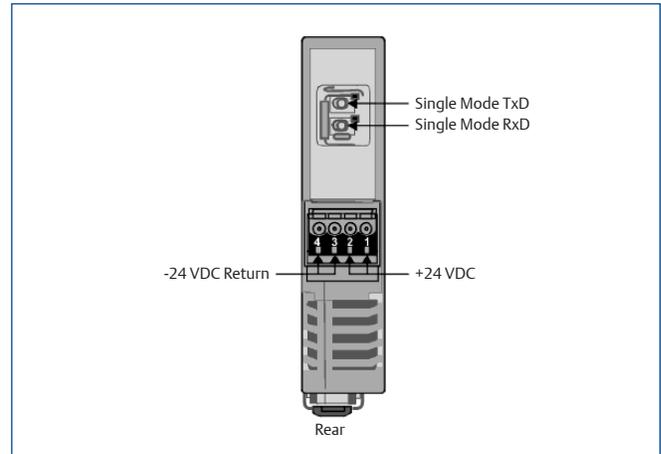
Single Mode Fiber-Optic Connectors on the SISNet Distance Extender (Top View).

The figure below shows a remote peer ring with two local nodes (Nodes 1 and 3) and one remote node (Node 2). Link distances for a local node are less than or equal to 2 km (nominal) one way. Link distances for a remote node are up to 60 km (nominal) one way.
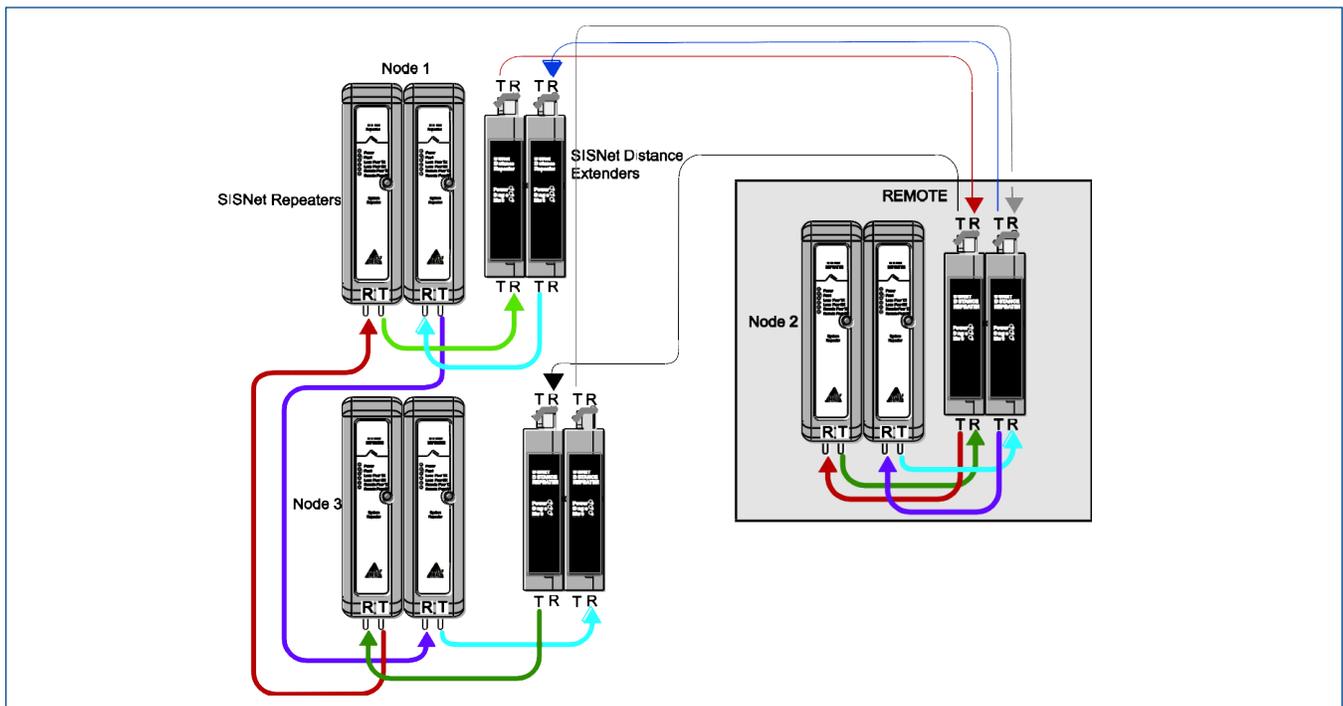
Remote Peer Ring with Local and Remote Nodes.

The figure below shows a remote peer ring in which all nodes are remote. This remote peer ring uses a counter-rotation topology in which the primary SISNet Repeaters are connected clockwise and the secondary counterclockwise.
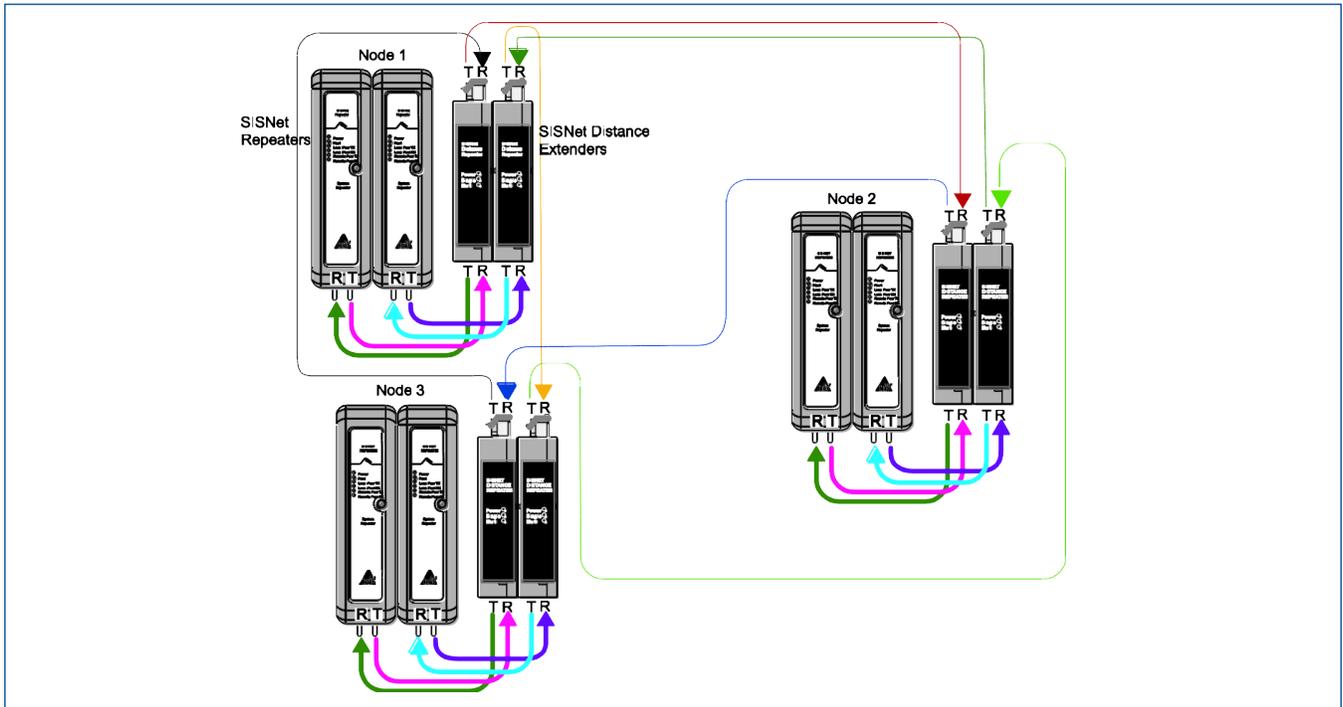
Remote Peer Ring with all Remote Nodes.

System Compatibility

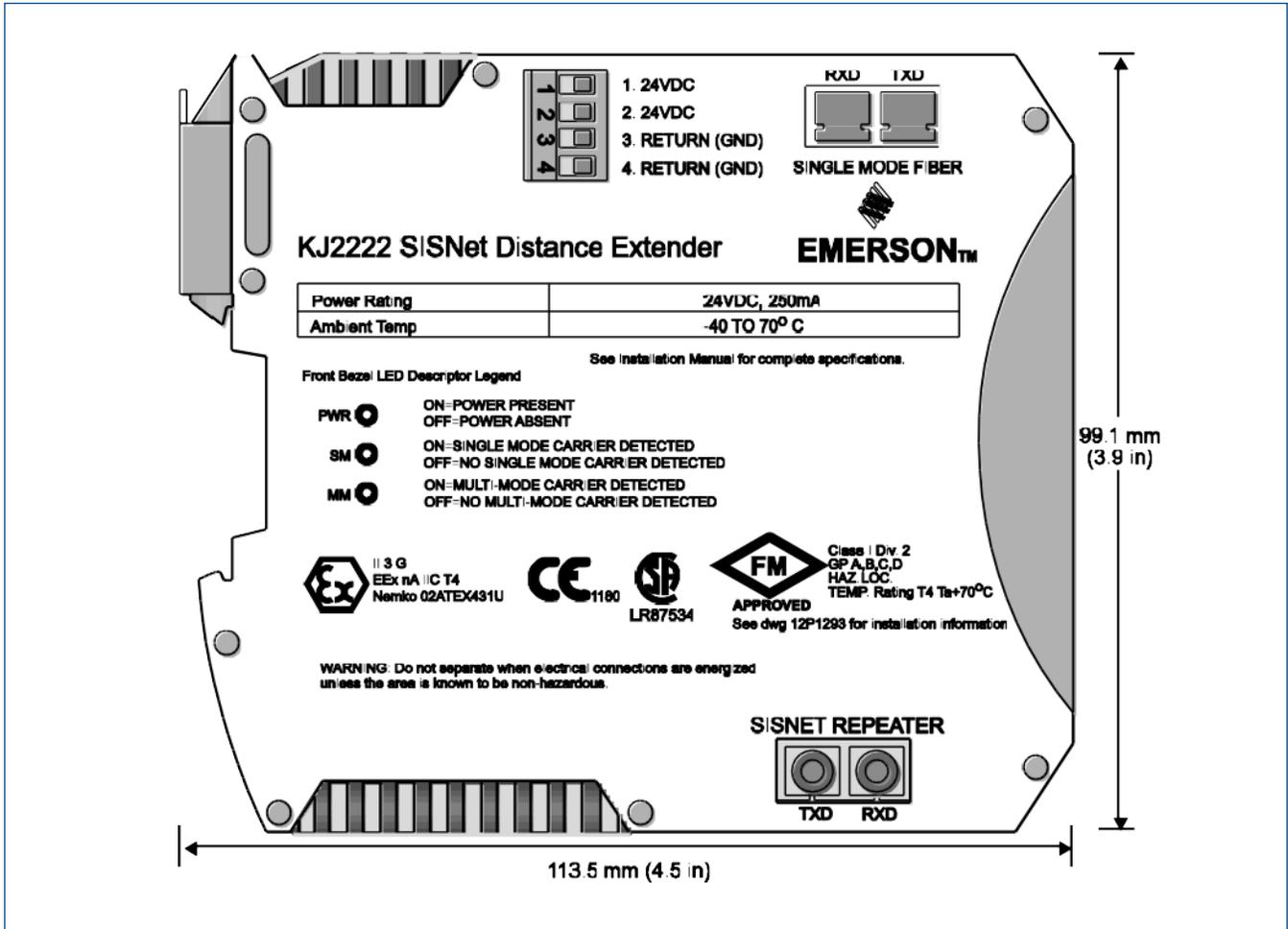| SISNet Distance Extender Specifications	
Item	**Specification**
Port types	
Multimode fiber port Single mode fiber port	Duplex SC Duplex LC
Cable types	
Multimode Single mode	62.5/125 μm ST type or 50/125 μm ST type 9/125 μm
Output power	
Multimode Single mode	14 dBm 0 dBm
Link budget	
Multimode Single mode	62.5/125 μm – max attenuation 11 dB 50/125 μm – max attenuation 8 dB Wavelength 1300 nm 9/125 μm – max attenuation 30 dB Wavelength 1310 nm
Link distance (nominal)	
Multimode Single mode	2 km one way TxD to RxD 60 km one way TxD to RxD *Note: Actual lengths depend upon the quality of the fiber-optic cable and the connections.*
Topology	Multimode (between SISNet Repeaters and SISNet Distance Extenders): SISNet Repeater RxD to SISNet Distance Extender TxD and SISNet Repeater TxD to SISNet Distance Extender RxD. Single mode (between SISNet Distance Extenders): RxD of successor SISNet Distance Extender to TxD of predecessor SISNet Distance Extender.
Mounting	*DIN rail*

Specifications for the SISNet Distance Extender

Common Environmental Specifications for SISNet Distance Extender	
Category	**Specification**
Storage temperature	-40 to 85°C (-40° to 185°F)
Operating temperature*	-40 to 70°C (-40° to 158°F)
Relative humidity	5 to 95%, non-condensing
Airborne contaminants	ISA-S71.04-1985 Airborne Contaminants Class G3 Conformal coating
Protection rating	IP 20
Hazardous area/location	European EMC Directive per EN61326-1, Criterion A NAMUR NE21 EMC Requirements Low Voltage Directive IEC 61010-1 Factory Mutual, Non-Arcing Class 1, Div 2, Groups A, B, C, D, T4 hazardous locations ATEX 3 G EEx IIC-nA T4 EN60079-15 CSA 1010
Shock	10 g ½-sine wave for 11 ms
Vibration	1 mm peak-to-peak from 5 to 16 Hz; 0.5 g from 16 to 150 Hz

*Operating any electronics at the higher end of its temperature range for long periods of time will shorten its expected lifetime, see **Effects of Heat and Airflow Inside an Enclosure White Paper** for more information.*

The table below shows the power specifications for the SISNet Distance Extender.

| SISNet Distance Extender Power Specifications	
Item	**Specification**
Input power	19.2 VDC to 28.8 VDC @250 mA max
Connector type	4-position screw terminal
Wire type	Solid or stranded
Wire gauge	12 AWG maximum

SISNet Distance Extender Dimensions.

SISNet Repeater Specifications

Common Environmental Specifications for SISNet Repeater	
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Operating temperature*	-40 to 70 C (-40° to 158°F)
Relative humidity	5 to 95%, non-condensing
Airborne contaminants	ISA-S71.04-1985 Airborne Contaminants Class G3 Conformal coating
Protection rating	IP 20
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SISNet Repeater Specifications	
Item	**Specification**
Port Type	ST Female
Cables Type	Multimode 62.5 / 125 μm; ST type or Multimode 50 / 125 μm; ST type
Output power	< -12 dB
Link budget	Multimode 62.5 / 125 μm – max attenuation 11 dB Multimode 50 / 125 μm – max attenuation 8 dB
Link distance (max)	2 km one way TxD to RxD
Topology	Physical ring: RxD connects to TxD of predecessor and TxD connects to RxD of successor
Test port type	For factory use only
Mounting	2-wide SISNet Repeater carrier Left carrier position is secondary SISNet Repeater; right carrier position is primary SISNet Repeater

SISNet Repeater Power Specifications	
Item	**Specification**
Input	24 V DC, 300 mA (max)
Connector type	4-position screw terminal
Wire type	Solid or Stranded
Wire gauge	12 AWG maximum
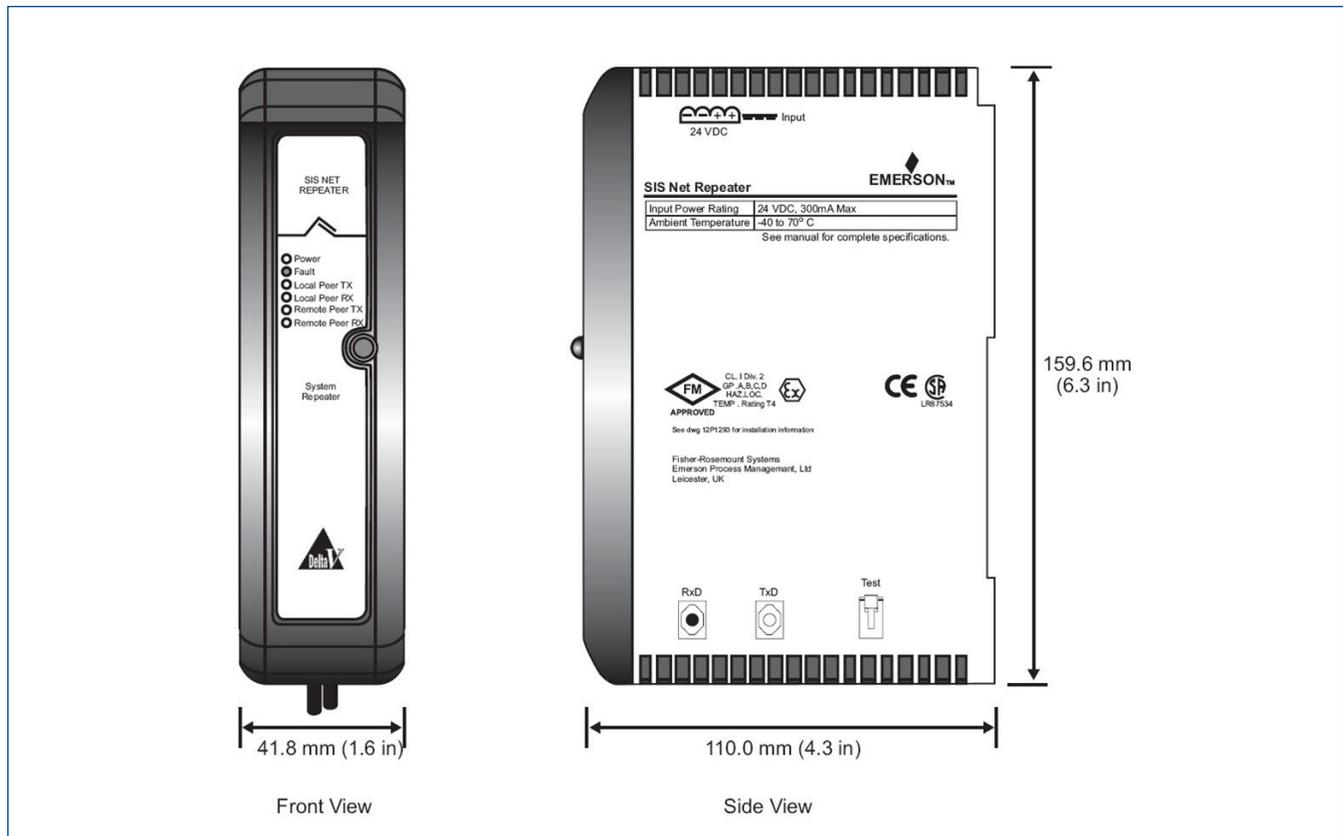
SISNet Repeater Dimensions.

SISNet Repeater Weight, Heat Generation and Power Consumption	
Item	**Specification**
SISNet Repeater	Weight – 0.795 kg Heat Dissipation – 8 W Power – 0.3 A @ 24 V DC
1-wide SISNet Terminator Assembly	Weight – 0.20 kg Heat – N/A Power – N/A

Ordering Information

Description	Model Number
Redundant SISNet Repeater (Two Repeater modules and a two-wide carrier)	VS6002
SISNet Terminator Assembly	VS6051
8-Wide Carrier with Extend Cable Assembly (Cable Assembly consists of left & right extender cards, 2 coax cables for Logic) (Solver communications bus and one cable for carrier backplane communications)	VE4050E1C2
1-wide SISNet Terminator Assembly (right-hand extender card and two termination resistors)	VS6051
Redundant SISNet Distance Extenders	VS6003

Prerequisites

DeltaV v8.3 software of later.