

Industrial Ethernet CableAnalyzer™ Kit (DSX2-5-IE-K1)

Cabling in Industrial Environments

ISO/IEC 11801-3 and ANSI/TIA-1005-A are telecommunications infrastructure standards for **Industrial Premises**. These standards were created to reduce problems in harsh industrial environments. The standards use the term MICE to explain 4 important factors impacting industrial networks.

- M**echanical; vibration, physical shock, rough handling
- I**ngress; chemicals and water, especially in wash-down environments
- C**limatic; temperature extremes found in industrial processes
- E**lectromagnetic; noise from motors, VFDs, welding processes, etc.

- Standards have 3 MICE levels to help identify the severity of the environment
- Level 1: Control and data rooms. This is usually an office environment
 - Level 2: Factory floor. This is usually between the manufacturing equipment and control rooms
 - Level 3: Manufacturing and automation areas

MICE Environmental Classifications

 Mechanical vibration, shock	M ₁	M ₂	M ₃
 Ingress water, dust	I ₁	I ₂	I ₃
 Climatic/Chemical temperature, humidity	C ₁	C ₂	C ₃
 Electromagnetic EMI, ESD, RFI	E ₁	E ₂	E ₃



Overview

Industrial environments are much harsher and more time sensitive than traditional IT environments. Ethernet packets can be corrupted (CRC, FCS errors) causing packet re-sends which increases latency which can disrupt communications resulting in production delays.

Cables that appear good and pass basic continuity and speed tests can be susceptible to vibration, moisture and contamination, temperature changes, and electromagnetic noise (factors referred to as MICE — see above) in a manner that causes ethernet packets to be intermittently corrupted.

The DSX Industrial Ethernet CableAnalyzer™ (DSX2-5-IE-K1) is based on the Fluke Networks DSX-5000 and supports testing copper Industrial Ethernet networks and has optional modules to support fiber optics.

- Validate that cables conform to international standards.
- Faster Startup: Ensure cable performance at machine builder, commissioning and after making changes.
- Prevent downtime: Find marginal cables susceptible to vibration, moisture, noise and temperature.
- Speed troubleshooting: Avoid wasting time installing bypass cables.
- Identify the exact type and location of cable failure—or prove it's good.
- Pass/Fail indication in 10 seconds
- Supports cabling for EtherNet/IP™, PROFINET™, ModBus TCP™ and other industrial networks
- Supports RJ45 and M12 connectors
- Documentation of test results for commissioning



Find Cables Susceptible to Mechanical Vibration (M), Moisture Ingress (I) & Climatic/Temperature (C) Issues

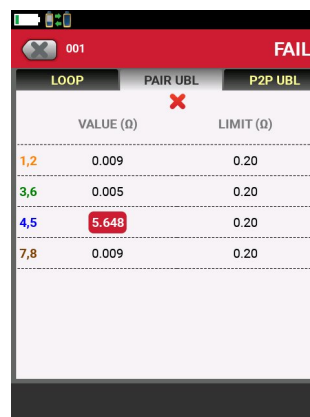
Continuity testers are designed to find open and shorts, but it is possible for a cable to pass a continuity test and have intermittently higher resistance (or even open circuit) on one or more of the wires in the cable that appear with vibration, moisture or temperature changes. This can cause intermittent packet loss

adding excessive latency to time sensitive networks.

The DSX CableAnalyzer features a unique resistance unbalance test that measures resistance on all 4 or 8 wires in the cable. One wire with higher resistance than the other wires is likely to become intermittent.



All 4 pairs have nearly equal resistance

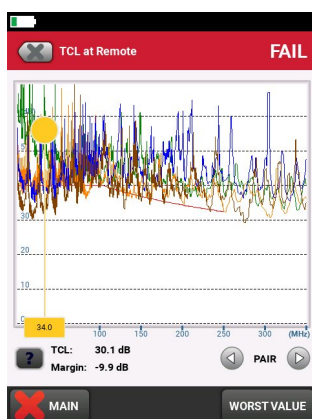


Excessive resistance which could cause an intermittent connection

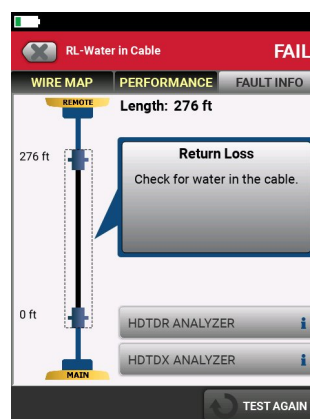
Find Cables Susceptible to Electromagnetic Interference (EMI) with TCL and ELTCTL Tests

EMI corrupts data packets which is why Transverse Conversion Loss (TCL) and Equal Level Transverse Conversion Transfer Loss (ELTCTL) requirements are included in the standards for UTP systems to protect against Electrostatic Discharge (by direct contact and through air) — up to 8kV, radio frequency interference, surges (line to earth) — up to 1kV, and magnetic fields (motors and relays).

Cables (including pre-terminated cables) can pick up EMI (noise) from other data cables, power cables, motors, motor drives, and other sources. This is caused by a lack of balance in the cable due to untwisted wires, excessively tight cable ties, sharp radiuses, excessive bends and other factors.



Cable susceptible to EMI

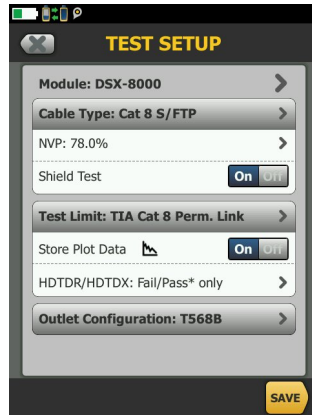


Cable that may contain water

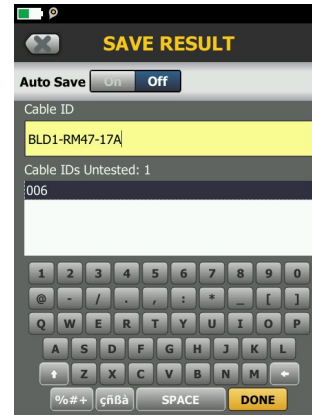
Find 4 Pair Cables with Bad Shield with the Shield Integrity Test

The CableAnalyzer can distinguish between an equipment ground path and the actual shield (or screen) used on some 4 pair cables. The Wire Map display provides a Pass/Fail indication and the distance to the fault.





Simple Setup

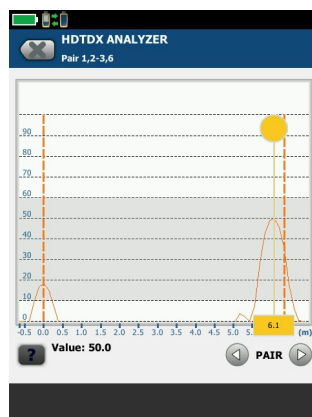


Quickly enter Cable Ids with the capacitive touchscreen

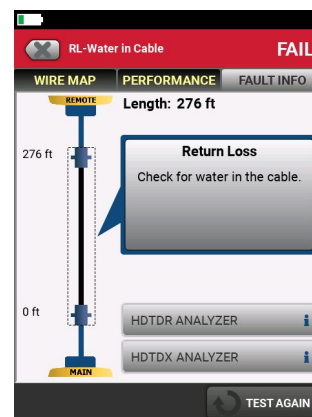
Troubleshoot Like An Expert

Graphically displays the source of failures including crosstalk and distance to shield faults for faster troubleshooting

The DSX reduces the time required to fix cabling faults with dedicated diagnostics, a simple 1 button test runs all tests and saves all data. The graphical results screen allows you to look down the cable to see exactly where any cross talk, return loss or shield faults are located on any given link. This common view is easily interpreted by novice and expert users alike to isolate and act on any failed results quickly and is stored with the test result for remote analysis.



High Definition Domain Cross talk (HDTDX) shows the far end connection is clearly the issue



Features simple diagnostic based on decades of Fluke Networks troubleshooting experience

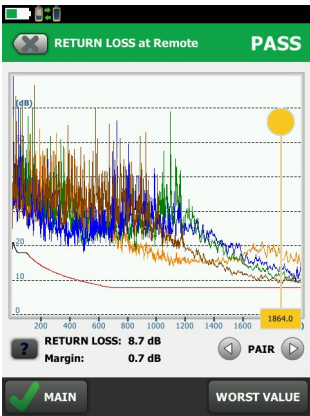
Performs with Unsurpassed Speed

Document cable performance with pass/fail results in as little as 8 seconds.

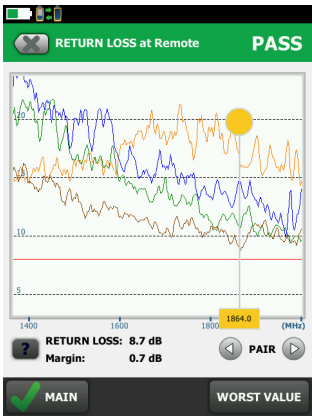
No tester offers so much speed for so many tests. Complete copper certification to Cat 6A in 8 seconds or certify two fibers at two wavelengths in just 3 seconds. Complete copper cable testing to international standards in 8 seconds per link. Test fiber optic links (requires optional fiber optic modules) in under 3 seconds per link.



Passing test result



Return loss graph



Pinch and zoom for more detail

DSX CableAnalyzer Series Specifications

Cable Types

Shielded and unshielded pair LAN cabling

TIA Cat 3, 4, 5, 5e, 6, 6A, 100 Ω ISO/IEC Class C, D, E, EA, F, FA and I/II: 100 Ω and 120 Ω

Adapters and Test Standards

Adapters

RJ45 channel, M12-D (2 pair) and M12-X (4 pair)

TIA

Cat 3, 4, 5, 5e, 6, 6A per TIA 568 Series

ISO/IEC

Class C, D, E, EA, F, FA, certification per ISO/IEC 11801 Series

General Specifications

Supported test parameters
(The selected test standard determines the test parameters and the frequency range of the tests)

Wire Map, Length, Propagation Delay, Delay Skew, DC Loop Resistance, Pair-to-Pair Resistance Unbalance, Pair Resistance Unbalance, Insertion Loss (Attenuation), Return Loss (RL), Common Mode Return loss (CMRL), Near End Crosstalk (NEXT), Far End Crosstalk (FEXT), Attenuation-to-crosstalk Ratio (ACR-N), ACR-F (ELFEXT), Power Sum ACR-F (ELFEXT), Power Sum NEXT, Power Sum ACR-N, Power Sum Alien NEXT (PS ANEXT), Power Sum Alien Attenuation NEXT Ratio Far End (PS AACR-F), Common Mode to Differential Mode NEXT (CDNEXT), Transverse Conversion Loss (TCL), Equal Level Transverse Conversion Transfer Loss (ELTCTL)

Input protection

Protected against continuous telco voltages and 100 mA over-current. Occasional ISDN over-voltages will not cause damage

Display

5.7 in LCD display with a projected capacitance touchscreen

Case

High impact plastic with shock absorbing overmold

Dimensions	Main Versiv unit with DSX module and battery installed: 2.625 in x 5.25 in x 11.0 in (6.67 cm x 13.33 cm x 27.94 cm)
Weight	Main Versiv unit with DSX module and battery installed: 3 lbs, 5oz (1.28 kg)
Main unit and remote	Lithium ion battery pack, 7.2 V
Typical battery life	8 hours
Charge time*	Tester off: 4 hours to charge from 10 % capacity to 90 % capacity
Languages supported	English, French, German, Italian, Japanese, Portuguese, Spanish, Chinese, Korean, Russian, Trad Chinese, Czech, Polish, Swedish, Hungarian
Calibration	Service center calibration period is 1 year
Integrated Wi-Fi	Meets IEEE 802.11 a/b/g/n; dual band (2.4 GHz and 5 GHz)
Software Support	LinkWare Live cloud-based service lets you manage certification jobs. LinkWare PC Management Software allows you to easily generate certification reports and upgrade software in your tester.

Environmental Specifications

Operating Temperature	32° F to 113° F (0° C to 45° C)
Storage Temperature	-22° F to +140° F (-30° C to +60° C)
Operating relative humidity (% RH without condensation)	0% to 90%, 32° F to 95° F (0° C to 35° C) 0% to 70%, 95° F to 113° F (35° C to 45° C)
Vibration	Random, 2 g, 5 Hz-500 Hz
Shock	1 m drop test with and without module and adapter
Safety	CSA 22.2 No. 61010, IEC 61010-1 3rd Edition
Operating altitude	13,123 ft (4,000 m) 10,500 ft (3,200 m) with ac adapter
EMC	EN 61326-1

Ordering Information

DSX Industrial Ethernet Models and Accessories

Model	Description
DSX2-5-IE-K1	DSX Industrial Ethernet Kit (includes tester, RJ45, M12-X and M12-D cable adapters)
GLD-DSX2-5-IE-K1	1 YR Gold Support Package for DSX2-5-IE-K1
GLD3-DSX2-5-IE-K1	3 YR Gold Support Package for DSX2-5-IE-K1

DSX-OPF-Q-ADD	DSX-5000 with Quad OTDR Add-on Kit
DSX-PLA004S	DSX Cat 6A/Class EA Permanent Link Adapter Set
DSX-PLA004-RKIT	Cat 6A/Class EA PLA Adapter – Plug Replacement Kit
DSX-CHA004S	DSXcCat 6A/Class EA Channel Adapter Set
DSX-COAX	DSX Coax Adapter Set
DSX-CHA021S	DSX M12 4-Position Adapter Set
DSX-CHA-M12-X-S	DSX M12X 8-Position Adapter Set
DSX-PC5ES	DSX Patch Cord Test Adapter Set for Cat 5e patch cords
DSX-PC6S	DSX Patch Cord Test Adapter Set for Cat 6 patch cords
DSX-PC6AS	DSX Patch Cord Test Adapter Set for Cat 6A patch cords
DSX-PC5E	Single Patch Cord Adapter for Testing Cat 5e MPTL
DSX-PC6	Single Patch Cord Adapter for Testing Cat 6 MPTL
DSX-PC6A	Single Patch Cord Adapter for Testing Cat 6A MPTL
Versiv-TSET	VERSIV Headphones
VERSIV-BATTERY	VERSIV Battery
VERSIV-ACUN	VERSIV Charger
VERSIV-STRP	VERSIV Hand Strap
VERSIV-STND	VERSIV Demo Stand

About Fluke Networks

Fluke Networks is the worldwide leader in certification, troubleshooting, and installation tools for professionals who install and maintain critical network cabling infrastructure. From installing the most advanced data centers to restoring service in the worst weather, our combination of legendary reliability and unmatched performance ensure jobs are done efficiently. The company's flagship products include the innovative LinkWare™ Live, the world's leading cloud-connected cable certification solution with over fourteen million results uploaded to date.

1-800-283-5853 (US & Canada)

1-425-446-5500 (International)

<http://www.flukenetworks.com>

Descriptions, information, and viability of the information contained in this document are subject to change without notice.

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