



990DSL CopperPro™

Copper Loop Qualification Tester

16 test sets in one

CopperPro packs all the test, analysis and troubleshooting capabilities an OSP technician needs into one integrated handheld tool for a new view of your local loop:

1. **Digital Multimeter** — AC/DC Voltage, Resistance
2. **Opens Meter** — measure capacitive length of pair
3. **RFL Meter** — locate shorts, crosses or grounds
4. **Noise Meter** — VF & WB, Gaussian & Impulse
5. **Time Domain Reflectometer** — precisely locate and identify faults
6. **Dial Set** — set up or monitor calls
7. **Leakage Tester** — “punch” through resistance faults not detected by other tests
8. **Ammeter** — test DC loop current
9. **Loss Meter** — VF & WB. Measure signal loss over a pair in voice or wideband frequency ranges
10. **VF & WB Precision Signal Generator** — generate precisely controlled signals in single tones, swept sets or composite signals
11. **Tracing Tone Generator** — identify pairs
12. **ANI & CID Tester** — identify telephone numbers and verify proper Caller ID operation
13. **ADSL Connectivity Tester** — verify DSLAM and customer modem functionality
14. **ADSL and Special Services Pair Qualification Set** — prequalify pairs for up to 12 digital services
15. **VF and WB Longitudinal Balance Meter** — identify and prevent noise problems
16. **Power Harmonics Analyzer** — quickly track down tough noise problems

The CopperPro family of loop testers from Fluke Networks provides all technicians working in the outside plant a full complement of testing, fault locating and qualification capabilities in a single, rugged, handheld test set. CopperPro is easy to use. Fast. And it offers more capability than any other single loop test set.

Installation and maintenance

CopperPro makes fast work of installing and maintaining service. The one-button POTS AutoTest helps you quickly document status before and after work is complete. And all the basic tests you expect are there, as well – AC and DC voltage, loop current, circuit noise, balance, leakage and Caller ID/ANI. Verify DSLAM and modem on ADSL lines. Make fast work of loss and slope tests with its automated dial-up tests. Even a dial set with phone number storage is built in.

Cable construction and repair

Use CopperPro’s unique TDR AutoTest to both locate and identify faults. But that’s not all. Find shorted or open pairs fast. Count and locate load coils. Locate high-resistance faults precisely, no matter the cable make up. Step-by-step instructions make set up a breeze.



Pair up with Terminator for fast, easy, one-tech-out terminating testing

With the companion Terminator, qualifying pairs for voice or data services is easy. In fact, it’s the only solution that meets manufacturers’ requirements for HDSL2 and HDSL4 qualification – including loop attenuation – with one technician in less than two minutes. Together, they’re a proven way to reduce failure frequency, wasted dispatches and rebates.





The next generation in subscriber line test sets

The image shows a handheld device with a screen displaying test options: POTS Auto-Test, ADSL Auto-Test, ADSL Verify Test, and TDR Auto-Test. Below the screen are buttons for POTS, ADSL, TDR, and Setup. The device has a keypad with a TEST button, navigation arrows, and a numeric keypad. Callout boxes highlight various features:

- Integrates today's top OSP testing and troubleshooting tasks in one tool; less to buy, maintain and train on** (points to the screen)
- Large graphic interface is fast and easy to read — whether your frontline tech is up a telephone pole or down a manhole** (points to the screen)
- Configurable one-button auto-test "toolboxes" support techs of all skill levels for higher productivity and consistency** (points to the screen)
- Serial interface for downloading software and uploading or printing reports quickly and easily** (points to the side of the device)
- More than 16 hours typical battery life** (points to the side of the device)
- Single test modes support the needs of more expert techs** (points to the screen)
- Power or charge from mains (100-240V) or 12V auto lighter (cable included)** (points to the side of the device)
- On-line help** (points to a button on the right side)
- Built tough for rugged field use and low cost of ownership: sealed to resist moisture, drop tested 1 meter** (points to the bottom of the device)
- Handheld - weighs in at less than 4 lbs. (1.8 kg)** (points to the bottom of the device)

13 Reasons the 990 is the *better* test set

- Test Call Waiting Caller ID, as well as standard CID and ANI
- Longer TDR range thanks to 2,500 and 5,000 nS pulse
- Built-in stress test
- Bridge unobtrusively on to active circuits (ADSL and Specials) and see level and noise at all frequencies
- Find intermittent problems with bargraphs, monitor modes and min/max peak recording
- Shoot TDRs in the presence of up to 250V
- Zero in on the source of tough circuit noise problems with the built-in power harmonics analyzer
- Quickly identify crosstalk source with built-in disturber masks
- Pinpoint noise spikes that knock down specials with wideband impulse noise test
- Verify longitudinal balance at high frequencies. Identify problems that don't show up at lower frequencies
- Verify DSLAM provisioning and presence of customer modem with ADSL Verify Test
- ADSL and xDSL service qualification (with rate prediction for ADSL)
- Identify the type of fault, as well as distance to it with the unique, one-button TDR AutoTest



CopperPro Testing Capabilities

Standard Features (990DSL and 990DSLWT)

- DCV and ACV measurement
- Shorts, grounds and loop resistance with distance conversion
- Resistive fault location (Wheatstone and K-Test)
- Load coil counter with estimated distance to fault and impedance vs. frequency graph
- Leakage stress test
- Loop device counter
- Tracing tone with four modes
- Voice frequency noise – metallic and power influence
- Voice frequency loss
- Voice frequency longitudinal balance
- Voice frequency tone generator
- Automated POTS AutoTest
- Dial set and non-intrusive line monitor
- Voice frequency terminated and dial-up test macros (SmartStrap, MyHelper, FED, SASS, DATU, SmartPro)

Optional Features – Wideband TDR (990DSLWT only)

- Wideband noise and level spectral analysis with interference masks
- Wideband loss
- Wideband longitudinal balance
- Wideband tone generator
- ADSL and XDSL AutoTest for pair qualification
- ADSL verification test for connectivity testing
- Wideband terminated test macros (SmartStrap, MyHelper, FED)
- TDR AutoTest
- TDR pair 1 test
- TDR compare pair 1 and 2
- TDR difference between pair 1 and 2
- TDR pair 1 monitor
- TDR pair 2 to pair 1 crosstalk
- TDR compare pair 1 to stored trace

Specifications

Physical

Size	(H x W x D): approximately 24.9 cm x 13.5 cm x 8.1 cm (9.8" x 5.3" x 3.2")
Weight	1.81 kg (4.0 lb.)
Display	320 x 240 pixel graphic LCD with backlight and adjustable contrast
LED Indicator	Charging status indicator (located on side connector panel)
Communication Port	RS-232 PC/Printer port (DB-9)

Power

AC Operation	Operates from an external AC and 12V vehicle adapter/chargers
Battery Type	Operates from an internal removable NiMH rechargeable battery pack (installed)
Battery Life	A fully charged battery provides approximately 16 hours of normal use
Battery Recharge Time	2 to 3 hours (in the tester) for a fully discharged battery pack

Environmental

Operating Temperature	-20° to 60°C (-4° to 140°F)
Storage Temperature	-40° to 70°C (-40° to 158°F)
Humidity Tolerance	95% (operation without condensation)
Rain Resistance	IEC60529 1P02, international protection water dripping
Vibration	Random, 2 g, 5-500 Hz
Shock	1 Meter Drop Test (3 ft.)
Altitude	4500 m (15,000 ft.)

Standards Compliance

Analog Transmission Parameter Measurement	IEEE 743-1995
ADSL Metallic Interface	ANSI T1.413-1998

Regulatory Compliance

Safety	CSA C22.2 No.1010.1
CE	EN 61326 Emissions and immunity Class A; En 61010-1 + 2nd Amendment

Specifications: Basic 990DSL

Function	Range	Accuracy
AC Voltage	0 to 250V	1% ± 0.5V
DC Voltage	0 to ±150V	1% ± 0.5V
($R_{IN} = 100\text{ k}\Omega, 10\text{ M}\Omega$)	150 to 300V	2%
DC Loop Current	0 to 120 mA	2% ± 0.3 mA
(430Ω)		
Resistance	0 to 100Ω	0.1% ± 0.10Ω
(shorts & grounds)	100Ω to 4 kΩ	0.3% ± 0.10Ω
	4 kΩ to 100 MΩ	3%
Leakage Stress	2 kΩ to 100 MΩ	3%
Opens	0 to 3000 ft. (0 to 9144m)	1% ± 5 ft. (1.5m)
	3 to 50 kf (914.4 to 15240m)	3%
	50 to 80 kf (15240 to 24384m)	5%
Splits	0 to 50 kf (0 to 15240m)	10% of Cable Length
RFL		
Fault Resistance	0 to 30 MΩ	=
Loop Resistance	0 to 4000Ω	=
Resistance to Fault	0 to 100Ω	0.1% RTS ± 0.10Ω
(at rf = 100 kΩ)	100Ω to 4 kΩ	0.3% RTS ± 0.10Ω
K-Test	Same as RFL	± 1% ± 1Ω
(RTS = Res.To Strap)		
Load Coils		
Count	0 to 6	± 1
Distance to first	0 to 12,000 feet (0 to 3,658 meters)	±10% ±500 feet (152 meters)
Tracing Tone		
Frequency	577.5 Hz	0.1%
Level	>3.5 Vpp	10%
VF Noise		
Impedance	600Ω, 900Ω, Bridged	1%
Filters	C, CN, 3k, 15k, Psophometric	=
Metallic Noise	0 to 10 dBm	± 2 dB
	10 to 100 dBm	± 1 dB
Power Influence	40 to 120 dBm	± 2 dB
VF Loss		
Signal Level	-40 to +10 dBm	± 0.5 dB (dryline) ± 1.0 dB (dial up single tone) ± 2.0 dB (dial up Smart Tone)
Frequency	100 Hz to 20 kHz	0.1% ± 2 Hz



Specifications: Basic 990DSL (continued)

Function	Range	Accuracy
VF Longitudinal Balance	0 to 70 dB	± 2 dB
Disturbing Frequency	200 to 2500 Hz	0.1%
Impedance	600Ω	1%
Filters	C, Psophometric	
Send VF Tone		
Frequency	100 Hz to 20 kHz	0.1%
Amplitude (Settable)	-20 to 3 dBm (1 dB increments)	± 0.5 dB
Impedance	600Ω, 900Ω	1%

Specifications: 990DSL Wideband Features

Function	Range	Accuracy
WB Noise/Level		
Impedance	100Ω, 135Ω, Bridged	1%
Filters	E, F, G, None	=
Frequency	10 kHz to 1200 kHz	0.1% ± 508 Hz
Amplitude	-50 to 3 dBm	± 1 dB @ 135Ω
	-90 to -50 dBm	± 3 dB @ 135Ω
Weighted WB Noise		
Impedance	100Ω, 135Ω, Bridged	
Filters	E, F, G, None	
Frequency	10 to 1200 kHz	
Amplitude	0 to 30 dBm	± 5 dB
	30 to 120 dBm	± 3 dB
WB Loss		
Impedance	135Ω	1%
Frequency	10 to 1200 kHz	0.1% ± 508 Hz
Magnitude	0 to 50 dB	± 1 dB
	50 to 70 dB	± 2 dB
WB Longitudinal Balance	0 to 70 dB	± 2 dB
Disturbing Frequency	20 kHz to 1104 kHz	0.1%
Impedance	100 Ω, 135Ω	1%
Filters	E, F, G, None	=
Send WB Tone		
Frequency	10 to 1200 kHz	0.1% ± 508 Hz
Amplitude (fixed)	0.0 dBm	± 0.5 dB
Impedance	100Ω, 135Ω	1%

WB Impulse Noise		
Impedance	100Ω, 135Ω, Bridged	1%
Filters	E, F, G, None	=
Test Time	1 to 1440 Minutes	1%
Impulse Counter	0 to 9999	=
Counter Threshold	-40 to 0 dBm	± 1 dB
ADSL Auto-Test		
Impedance	100Ω	=
Noise Filters	E, F, G, None	=
ADSL Standard	ANSI Full, G. Lite	=
Data Rate Prediction		
Resolution	32 kb/s	
Downstream Rate	0 to 8192 kb/s	± 96 kb/s (3 units of resolution)
Upstream Rate	0 to 1024 kb/s	± 64 kb/s (2 units of resolution)

Specifications: 990DSL TDR Feature

Function	Range	Accuracy
Impedance	135Ω	1%
Pulse-width	20, 100, 500, 1000, 2500, 5000 ns	10% ± 5 ns
Vop Selection	0.300 to 0.999	=
Range (Vop = 0.64)	30,000 ft. (9144m)	=
Range Selection (Auto.)	10 ft. to 48 kf (3 to 14630m)	=
Horizontal Resolution	0.5 to 156 ft. (0.1524 to 47.5m)	=
Distance to Reflect.	0 to 30,000 ft. (0 to 9144m)	1% ± Vop uncertainty
Vertical Gain	80 dB	2 dB
Power Filter	5 kHz Highpass	=
Averaging Filter	4x Waveform Avg.	=
Input Protection	± 400 Vp	=

For More Information

For more information or to contact your local Fluke Networks Representative, call (800) 283-5853. Or send email to copperpro@flukenetworks.com.

Each set includes:

- Extensive on-line help
- Internal results storage, both text and graphical
- RS-232 Serial interface for printing, uploading results to a PC, and downloading firmware for the test set
- Rugged weather-resistant handheld design
- High-resolution, backlit LCD display
- Graphical operator prompts and tests results
- Typical 16-hour battery life, with easy-change NiMH battery and user settable power save feature
- Protective bag with shoulder strap and strand hook
- Rubber shock absorbing holster
- AC power supply
- 12 Volt vehicle charger
- Wire gauge
- Users guide

Ordering Information

Model	Description
990DSL	Loop Tester
990DSLWT	Loop Tester with Wideband and TDR
TN2000	Basic Terminator
TN2100	Enhanced Terminator
990TL-N	Test Lead Set (Plain)
990TL-S	Test Lead Set (Spike)
990TL-B	Test Lead Set (Bed of Nails)
990TL-SB	Test Lead Set (Spike and Bed of Nails)
990-Printer	990DSL Serial Graphics Printer (Seiko DPU-414)
990-CASE	Deluxe Transport Bag
GOLD	Extended Warranty and Service Option

NETWORK SUPERVISION

Fluke Corporation
P.O. Box 777, Everett, WA USA 98206-0777

Fluke Networks operates in more than 50 countries worldwide. To find your local office contact details, go to www.flukenetworks.com/contact.

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CopperPro™ Series II

*The complete test set
for qualifying
your local loop
for ADSL, VDSL
and special services.*



Demand is growing rapidly for next generation broadband services such as video on demand, broadband Internet access, and VoIP. That presents tremendous potential for profitable new business.

But, it also puts pressure on your technicians and outside plant (OSP) to deliver the performance those new services require. To be ready to take advantage of new opportunities, your technicians need a test set that can help them:

- Quickly qualify the facilities for ADSL, VDSL, HDSL, T1, and other special services.
- Easily identify and locate possible problems to ensure reliable performance.
- Install new services efficiently with fewer call-backs.
- Verify connectivity and network performance to ensure that next generation services perform up to your customers' expectations.

In short, your technicians need the new Fluke Networks CopperPro™ Series II copper loop tester.

Make CopperPro™ Series II standard equipment

CopperPro Series II provides a full range of troubleshooting, fault locating, testing and qualification capabilities. That means top performance with fewer tools to carry. Plus, its rugged construction and easy-to-use features give your technicians the vision to build, repair, install, and maintain OSP systems more efficiently with fewer repeats.

Streamline trouble calls

Step-by-step instructions make CopperPro Series II a breeze to set up. Use the unique TDR Auto-Test to:

- Zero in on faults such as short bridge taps and shorted or open pairs.
- Count and locate load coils.
- Locate high resistance faults precisely, no matter the cable makeup.
- Easily identify the source of broadband interference and impulse noise, up to VDSL bandwidth.

Expedite installation and maintenance

CopperPro Series II makes fast work of installing and maintaining service. The one-button POTS Auto-Test quickly documents status before and after work is complete. The CopperPro also gives you a clear view of all the basic tests you need to ensure top performance, including:

- AC and DC voltage
- Loop current
- Circuit noise
- Balance and leakage
- CallerID/ANI

Plus, you can quickly run loss and slope tests with its automated dial-up testing, and use the built-in dial set with phone number storage. You can also verify xDSL connectivity, performance and capacity up to VDSL rates with optional xDSL golden modems



A comprehensive set of copper loop testing functions

The CopperPro Series II packs all the test, analysis, and troubleshooting capabilities an OSP technician needs into one integrated handheld tool that gives a clear vision of your local loop, including:

- DCV and ACV measurement (snapshot and continuous)
- Shorts, grounds, and loop resistance with distance conversion
- Resistive fault location (Wheatstone and K-Test)
- Load coil counter with estimated distance to fault and impedance versus frequency graph to distinguish real results from false positives
- Multimode TDR with Auto-Test: pair 1 test, compare pair 1 and 2, difference between pair 1 and 2, pair 1 monitor, pair 2 to pair 1 crosstalk, compare pair 1 to stored trace
- Broadband noise and level spectral analysis with interference masks (VDSL bandwidth)
- Broadband loss impulse noise reduction (VDSL bandwidth)
- ADSL, ADSL2+, VDSL2 and XDSL Auto-Test for pair qualification (varies by model)
- Optional ADSL1/2/2+ Modem (ATU-R)
- Optional VDSL Modem (ATU-R and ATU-C)
- Broadband terminated test macros (Terminator, SmartStrap, MyHelper, FED)
- Leakage stress test to 200V
- Loop device counter
- Tracing tone with four modes
- Voice frequency noise – metallic and power influence
- Voice frequency loss
- Voice frequency longitudinal balance
- Voice frequency tone generator
- Automated POTS Auto-Test
- Dial set and non-intrusive line monitor
- Voice frequency terminated and dial-up test macros (SmartStrap, MyHelper, FED, SASS, DATU, SmartPro)

for all your technicians

Multiple tools in one device

Building on the popularity of the original CopperPro, the Series II is a complete solution for testing, troubleshooting, and qualifying OSP copper cables and network services. The CopperPro Series II is easy to use and integrates multiple test tools into a single device that provides all the functions your technicians need, including:

- Metallic testing, including voltage, resistance, balance, and noise
- Fault locating using three terminal opens, RFL, or TDR
- Advanced broadband troubleshooting and qualification for next generation services, including ADSL2+ and VDSL
- Identifying voice and broadband noise and interference
- Collecting and reporting comprehensive results
- Integration with backoffice systems to update loop databases and maintain test results

Seamlessly integrate field testing with backoffice systems

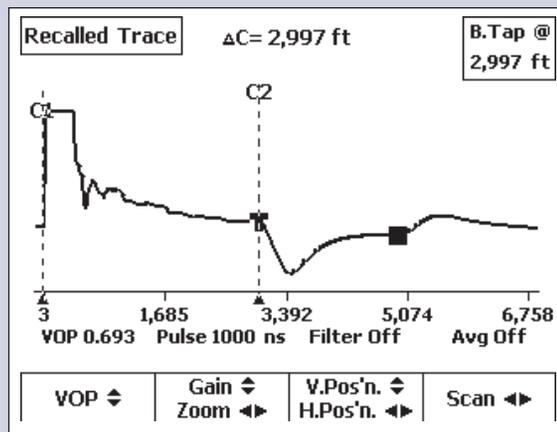
Not only does the CopperPro Series II collect and store comprehensive test data, it also integrates with NetDSL plant conditioning and EXP Technician Productivity solutions to automate job close out and database updates. By integrating with the NetDSL process, the CopperPro Series II eliminates duplicate tasks and paperwork and requires no additional servers, systems, or interfaces.

As part of the Fluke Networks EXP productivity solution, the CopperPro Series II dramatically improves technician efficiency while significantly reducing repeats. Automated close-out tests assure consistent, complete testing and centralized test results make it easy to track results and monitor technical productivity.

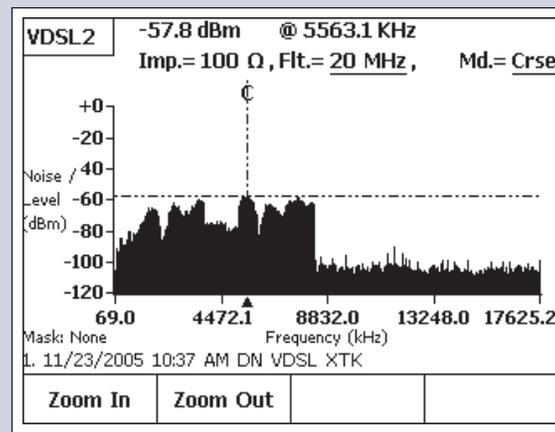
Advanced features to support next generation services

The CopperPro Series II offers several new features focused specifically on helping you install and maintain next generation services. These include:

- Bandwidth to 18 MHz to support ADSL2+ and VDSL technologies
- Identification of broadband noise for VDSL, including crosstalk and impulse noise
- Advanced TDR capabilities for locating short bridge taps and other hard-to-detect impairments to DSL performance
- Golden modem options for ADSL, ADSL2+, and VDSL



Quickly identify and locate a wide range of faults, including short bridge taps and other impairments that other sets have trouble finding.



CopperPro Series II now has the bandwidth to test and troubleshoot the latest broadband technologies.

Modem Results	Modem Status	Test Completed	
	Service Type	G9925a ADSL2+	
Parameter	Upstream	Downstream	
Attainable B/R	1315 Kb/s	20072 Kb/s	
Interleave B/R Ch. 0	1312 Kb/s	20072 Kb/s	
Interleave B/R Ch. 1	n/i	n/i	
Capacity Ch. 0	99%	100%	
Capacity Ch. 1	n/i	n/i	
Noise Margin	6.4 dB	7.0 dB	
Transmit Power	11.9 dBm	19.9 dBm	
Line Attenuation	12.0 dB	26.9 dB	
Interleaver Depth	8 frames	64 frames	
Interleaver Delay	11.00 ms	6.50 ms	
PSD	-39 dBm/hz	-44 dBm/hz	
More	Bits / Bin	Save Results	Setups

Golden modem options permit verification of ADSL1/2/2+ and VDSL connectivity and performance.

Test, troubleshoot, and qualify your copper loop for a profitable triple play with one, easy-to-use tool.

Integrates today's top OSP testing and troubleshooting tasks into one tool; less to buy, maintain and train on

Built tough for rugged field use and low cost of ownership: sealed to resist moisture, drop tested 1 meter

ADSL, ADSL2/2+, VDSL2 Golden Modem modules support a broad range of vendor chip sets and can be updated via software in the field

State-of-the-art TDR can find bridge taps as short as 20 feet (7 meters), even with CPE attached

Large graphic interface is fast and easy to read – whether your frontline tech is up a telephone pole or down a manhole

Serial interface for downloading software and uploading or printing reports quickly and easily

Configurable one-button auto-test "toolboxes" support techs of all skill levels for higher productivity and consistency

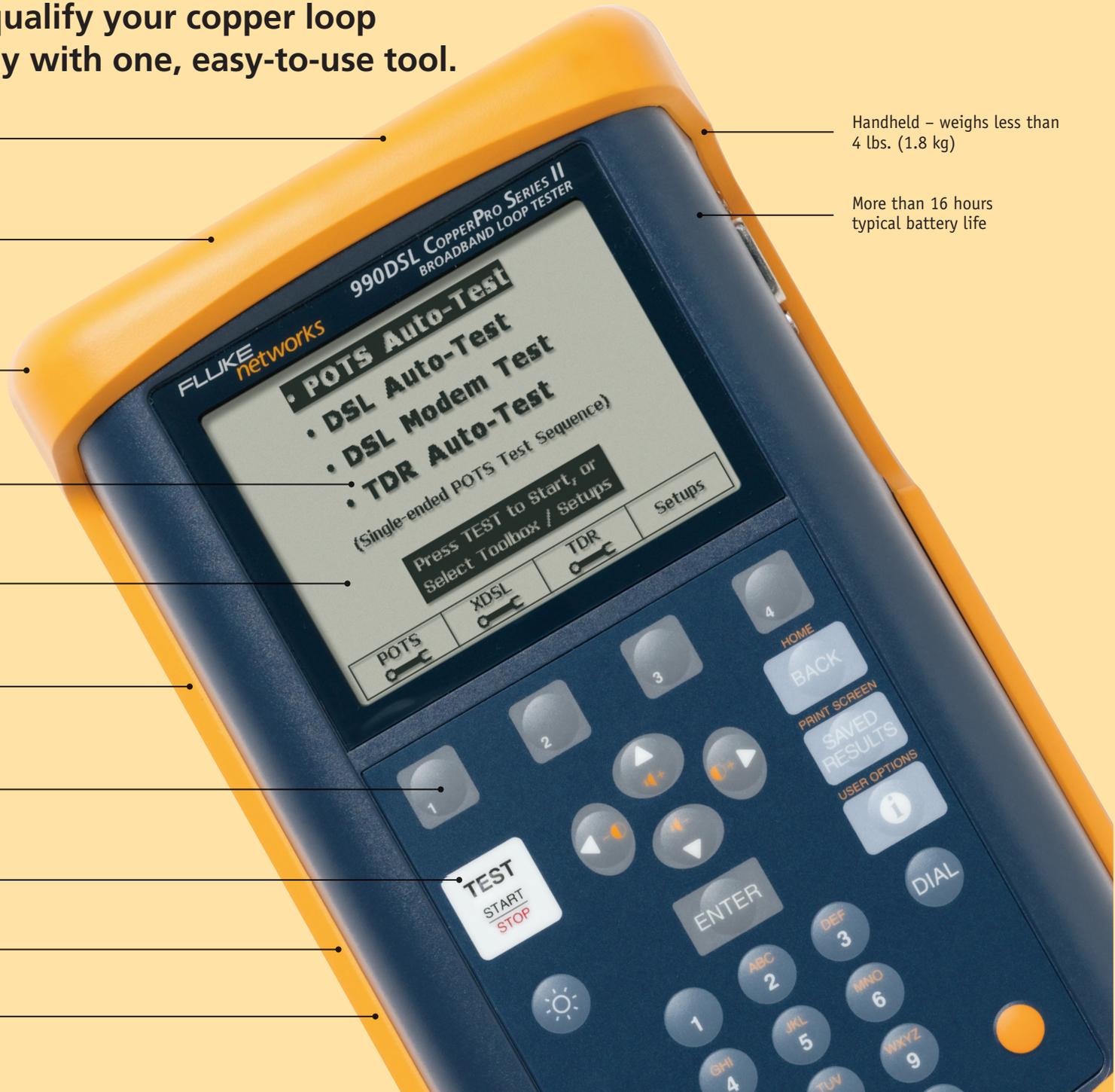
Single test modes support the needs of more expert technicians

On-line help

Power or charge from mains (100-240V) or 12V auto lighter (cable included)

Handheld – weighs less than 4 lbs. (1.8 kg)

More than 16 hours typical battery life



CopperPro Series II

Physical	
Size (H x W x D)	approximately 9.8" x 5.3" x 3.2" (25 cm x 13.5 cm x 8.1 cm) (does not include the softcase and test leads)
Weight	4.0 lbs. (1.8 kg) (does not include the softcase and test leads)
Display	320 x 240 pixel graphic LCD with backlight and adjustable contrast
LED Indicator	charging status indicator (located on the side connector panel)
Communication Port	RS-232 PC and printer port (DB-9)
Power	
AC Operation	operates from an external AC adapter/charger
Battery Type	operates from an internal removable NiMH rechargeable battery pack (installed)
Battery Life	a fully charged battery provides approximately 16 hours of normal testing usage and approximately 4 hours of continuous TDR or broadband testing usage
Battery Recharge Time	2 to 3 hours (in the tester) for a fully discharged battery pack
Environmental	
Operating Temperature	-4° F to +140° F (unless otherwise specified) (-20° C to +60° C)
Storage Temperature	-40° F to +158° F (-40° C to +70° C)
Battery Charging Temperature	50° F to 104° F (10° C to 40° C)
Humidity Tolerance (operation without condensation)	95%
Rain Resistance	IEC60529 IP02, Ingress Protection: water dripping
Vibration	Random, 2 g, 5 Hz to 500 Hz
Shock	1 Meter Drop Test
Altitude	4500 m (15,000 ft)
Standards Compliance	
Analog Transmission Parameter Measurement	IEEE 743-1995
ADSLx / VDSLx Metallic Interface	ANSI T1.413 Issue 2; ITU G.992.1a,b; G.992.2ab; G.992.3a,b,l,m; G.992.5a,b; G.993.1; G.993.2
Regulatory Compliance	
Safety	CAN / CSA-C22.2 No 61010-1
CE	EN 61326 Class A Emissions and Immunity EN 61010-1

990-GM2 ADSL2+ Golden Modem (optional)

General Specification	990-GM/2+	990-GM/V-2
Size	4.2 x 6.6 x 1.3 in. (11 x 17 x 3.3 cm)	
Weight	12.8 oz. (364 g)	
Operating Temperature	+12° F to +122° F (-10° C to +50° C)	
Storage Temperature	-40° F to +158° F (-40° C to +70° C)	
990 II Battery Oper. Time (modem in "Showtime")	Typical, 4 Hrs. Continuous	Typical, 3 Hrs. Continuous
Standards compliance		
ADSL ANSI	ANSI T1.413 Issue 2	ANSI T1.413 Issue 2
ADSL G.DMT	ITU G.992.1a, b	ITU G.992.1a, b
ADSL G.Lite	ITU G.992.2ab	ITU G.992.2ab
ADSL2	ITU G.992.3a, b, l, m	ITU G.992.3a, b, l, m
ADSL2+	ITU G.992.5a, b	ITU G.992.5a, b
VDSL1		ITU G.993.1
VDSL2		ITU G.993.2



990-GM2 ADSL+ Golden Modem

Operational Specifications

Function	Range	Accuracy
AC Voltage	0 V to 220 V, 60Hz	1% ±0.5 V
DC Voltage (RIN = 100 kV default; VMV or 10 MV optional)	0 V to 150 V 150 V to 240 V 240 to 300 V	1% ±0.5 V 2% 3%
DC Loop Current (430 W)	0 mA to 120 ma	2% ±0.3 mA
Resistance (Shorts and Grounds)	0 Ω to 100 Ω 100 Ω to 4 kΩ 4 kΩto ΩM	0.1% ±0.10 0.3% ±0.10 3%
Leakage Stress	2 kΩ to 999 MΩ	3%
Opens	0 ft to 3000 ft 3 kft to 50 k ft 50 kft to 80 k ft	1% ±5 ft 3% 5%
Splits	0 kft to 50 k ft	10% DTE ±50 ft1
RFL Fault Resistance (Rf) Loop resistance Resistance to Fault (@ Rf = 100 kΩ) K-Test Resistance to Fault	0 M Ω to 30 M Ω 0 Ω to 4000 Ω 0 Ω to 100 Ω 100 Ω to 4 k Ω 0 Ω to 4 k Ω	- - 0.1 % RTS2 ±0.10 Ω 0.3 % RTS2 ±0.10 Ω 1 % RTS2 ± 1 Ω
Load Coils Count Distance to First	0 to 6 0 to 12,000 ft	±1 10 % ± 500 ft
Tracing Tone Frequency Level	577.5 Hz >3.5 V peak-to-peak	0.1 % 10 %
VF Noise Impedance Filters Metallic Noise Power Influence Power Harmonics	600 Ω, 900 Ω, Bridged ³ C, C-Notched, 3 k Flat, 15 k Flat, Psopho 0 dBrn to 10 dBrn 10 dBrn to 100 dBrn 40 dBrn to 120 dBrn -60 dBm to +20 dBm (50 Hz to 3 kHz)	1 % - ±2 dB ±1 dB ±2 dB ±2 dB ±2 dB
VF Loss Signal Level Frequency	-40 dBm to +10 dBm 100 Hz to 20 kHz	Single Tone: ± 1 dB SmartTone: ± 2 dB 0.1 % ±2 Hz

Function	Range	Accuracy
VF Longitudinal Balance Disturbing Frequency Impedance	0 dB to 70 dB 200 Hz to 2000 Hz 600 Ω, 900 Ω	±2 dB 0.1 % 1 %
Send VF Tone Frequency Amplitude (settable) Impedance	100 Hz to 20 kHz -20 dBm to +3 dBm 600 Ω, 900 Ω	0.1 % ±0.5 dB (1 dB steps) 1 %
WB/BB Noise/Level Impedance Filters Frequency	100 Ω, 135 Ω, Bridged ⁴ E, F, G, 1.3 MHz, 20 MHz 10 kHz to 1.2 MHz ⁵ 25 kHz to 18 MHz ⁴	1 % - 0.1%, 508.63 Hz multiples 0.1%, 4312.5 Hz multiples
Amplitude	+3 dBm to -50 dBm -50 dBm to -90 dBm -90 dBm to -105 dBm	±1 dB7 (Bridged = ±3 dB typical) ±3 dB7 (Bridged = ±3 dB typical) ±3 dB typical ⁷
Noise Floor	-140 dBm/Hz typical	-
WB/BB Loss Impedance Frequency Magnitude HDSL2/4 Loop Attenuation WB/BB Longitudinal Balance Disturbing Frequency (Single Tone) (70 Tone Multi-Tone) Impedance Filter	100 Ω, 135 Ω 10 kHz to 1.2 MHz ⁵ 25 kHz to 18 MHz ⁴ 0 dB to 50 dB 50 dB to 90 dB 0 dB to 70 dB 0 dB to 20 dB 20 dB to 40 dB 40 dB to 50 dB 50 dB to 55 dB 25 kHz to 18 MHz 0.25 MHz to 18 MHz 135 Ω, < 1.2 MHz 100 Ω, > 1.2 MHz 1.3 MHz, < 1.2 MHz 20 MHz, > 1.2 MHz	1 % 0.1%, 508.63 Hz multiples 0.1%, 4312.5 Hz multiples ±1 dB ⁷ ±3 dB ⁷ ±2 dB ±3 dB ^{7,9} ±2 dB ^{7,9} ±3 dB ^{7,9} ±3 dB typical ^{7,9} 0.1%, 4312.5 Hz multiples 0.1%, 4312.5 Hz multiples 1 % -

Operational Specifications (continued)

Function	Range	Accuracy
Send WB/BB Tone		
Frequency	10 kHz to 1.2 MHz ⁵ 25 kHz to 18 MHz ⁶	0.1%, 508.63 Hz multiples 0.1%, 4312.5 Hz multiples
Amplitude	0.0 dBm (fixed)	±1 dB
Impedance	100 Ω, 135 Ω	1%
WB/BB Impulse Noise		
Impedance	100 Ω, 135 Ω, Bridged ⁴	1%
Filters	E, F, G, 1.3 MHz, 20 MHz	-
Test Time	1 to 1440 minutes (24 hrs.)	1%
Impulse Counter	0 to 9999	-
Counter Threshold	0 dBm to -40 dBm -40 dBm to -50 dBm	±1 dB ⁸ ±3 dB ⁸ (Typical)
Count Interval	8 / second	-
DSL Auto-Test		
Data Rate estimation		
ADSL/2 (1.104 MHz)	0 – 8 Mb/s	±0.1 Mb/s (typical)
ADSL2+ (2.208 MHz)	0 - 16 Mb/s	±0.2 Mb/s (typical)
VDSL (17.664 MHz)	0 - 55 Mb/s	± 2 Mb/s (typical)
TDR Specifications		
Launch Pulse		
Impedance	100 Ω	1%
Pulse-width	20 ns, 100 ns, 500 ns, 1000 ns, 2500 ns, 5000 ns	10 % ±5 ns
VOP Selection	0.300 to 0.999	-
Range (VOP = 0.64, 19 Ga.)	30,000 ft	-
Range Selection	10 ft to 48 kft (Auto.)	-
Horizontal Resolution	0.5 ft to 156 ft	-
Distance to Reflection	0 ft to 30,000 ft	1% ±VOP uncertainty
Vertical Gain	80 dB	2 dB
Power Filter	5 kHz Highpass	-
Averaging Filter	4 waveform average	-
Input Protection	±400 V peak	-

Notes

- ¹ Dist. to End; Dist. to Split >50 ft; Split pairs must be same length ±5 %.
- ² RTS = Resistance to Strap
- ³ Bridged = >100 k Ω
- ⁴ Bridged = >5 k Ω
- ⁵ Nyquist (Fine) resolution
- ⁶ DMT (Coarse) resolution
- ⁷ @ 25° C ± 25° C; battery-powered
- ⁸ Accuracies specified with E, F, G, and 1.3 MHz filters @ center frequencies, with 100 Ω or 135 Ω terminations.
Additional +/- 2 dB (typ.) tolerance required for 20MHz filter
- ⁹ 0.25 MHz to 12 MHz. Additional ±1 dB tolerance required from 12 MHz to 17.5 MHz.

Ordering Information

Model	Description
990DSL2+	CopperPro Next Gen Copper Loop Analyzer with TDR and wideband spectral analysis for ADSL2+
990VDSL	CopperPro Next Gen Copper Loop Analyzer with TDR and wideband spectral analysis for VDSL
990-GM/2	ADSL/ADSL2/2+ Golden Modem Option for CopperPro Series II Loop Testers/Analyzers
990-GM/V-2	ADSL and VDSL Golden Modem Option for CopperPro Series II Loop Testers/Analyzers with CPE and CO emulation



Network SuperVision Solutions

Fluke Networks, a Danaher company, provides innovative solutions for testing, monitoring and analyzing telecommunications and enterprise networks and for installing and certifying the fiber and copper foundation of those networks. Our comprehensive line of Network SuperVision Solutions™ provides network installers, owners, and maintenance professionals with superior vision into their network, combining speed, accuracy and ease of use to optimize network performance.

Headquartered in Everett, Washington, Fluke Networks has more than 500 employees worldwide and distributes our products in more than 50 countries.

Worldwide support

Like our products, our support is focused on your evolving needs, with an eye on keeping you on top of the latest technology advances.

- Global support in 22 countries
- Award-winning product performance reliability
- Support programs tailored to your needs
- Solutions that continually anticipate and evolve with your network, your business and your market opportunities



Contact Fluke Networks: Phone **800-283-5853** (US/Canada) or **425-446-4519** (other locations). Email: info@flukenetworks.com.

NETWORKSUPERVISION

Fluke Networks
P.O. Box 777, Everett, WA USA 98206-0777

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