



## APPLICATIONS

**ELA 10 DATA LINE ANALYSER** is a flexible and highly functional hand held instrument for analog testing in the range 20 Hz to 20 (85) kHz. Digital signal processing (DSP) technology delivers fast accurate results in a compact battery powered instrument ideal for field use. It is intended for the test of 2/4 W ordinary or special quality leased circuits and dial-up circuits.

ELA 10 provides single sided and end-to-end measurements with two instruments in MASTER-SLAVE arrangement. Just one person, thanks to the communication between the two instruments, can perform such measurements. Operation is made extremely simple by means of pre-defined automatic test sequences.

ELA 10 can be programmed as MASTER and SLAVE as well. Tolerance masks of cable parameters and the principal system parameters are pre-programmed for ITU-T M.1020, M.1025 and M.1040 systems.

When the automatic test sequence is ready ELA 10 provides an immediate PASS/FAIL indication by comparing the test results with the tolerance masks.

Detailed test results are available in graphic and numeric forms. In case of FAIL indication the reason of failure is marked with asterisks.

The test results can be stored in memory and transferred to PC for post processing or creating archive.

## FEATURES

- Comprehensive parametric testing in the frequency range 20 Hz to 20 kHz
- Spectrum analyzer and out of band noise measurement up to 85 kHz
- Measurements from ITU-T M.1020, M.1025, M.1030, M.1040, M.1050 and M.1060
- Analogue-to-analogue measurements on PCM systems
- Quasi analogue graph shows the measured results graphically
- Simultaneous phase hit, gain hit, impulse noise, and interruption event counting
- Interruption measurement with histogram display of results
- Group delay distortion measurement
- A range of accessories for signal balance, return loss, impedance and other measurements
- Integral loudspeaker and microphone
- Service telephone facility
- Loop holding and dialing (pulse and DTMF) for dial-up circuit testing
- Acoustic pair detection facility
- AC-DC Voltage measurement
- Memory for phone numbers
- In-service talk/listen and voice monitoring
- Automatic Master-Slave test sequences with preprogrammed templates and parameter sets
- Immediate PASS/FAIL indication
- USB interface for test results transfer to PC and SW upgrade
- PC program is provided to produce detailed test protocols in Excel format
- Large store-recall memory for test results
- 320 x 240 dot color graphic LCD display
- Internal rechargeable battery with an operating time of approx. 8 hours
- Processor controlled battery manager with three hour fast charging facility
- Selectable English, German or Russian languages
- On line help facility
- Handheld, lightweight (approx 0.8 kg)

**Measurements**

**Standard Manual Measurement Set**

- Receiving
- Spectrum analyzer
- Transmitting
- Insertion loss (NEXT)
- Wide band noise
- Psophometric noise (O.41)
- Noise with tone (O.132)
- Longitudinal balance (LCL)
- Impedance
- Return loss
- Echo test
- AC-DC voltage

**Measuring SW. Options**

- Long time interruption analysis (O62)
- Event counters, simultaneously counting:
  - Amplitude hits (O.95)
  - Phase hits (O.95)
  - Interruptions (O61)
  - Impulsive noises (O.71)
- Group delay distortion (O.81 app. 1)
- Phase jitter (O.91)

**Standard Automatic end- to-end Measurements**

- Loss
- Frequency response
- Background noise
- Noise spectrum
- Total distortion
- Near end cross-talk (NEXT)
- Impedance
- Return loss
- Longitudinal balance (LCL)

**With Measuring SW Options**

- Simultaneous event counting
- Group delay distortion
- Phase jitter

**Preprogrammed Templates and Test Sequences**

**Passive circuits:**

- ITU-T M.1020 2 wire
- ITU-T M.1025 2 wire
- ITU-T M.1040 2 wire
- ITU-T M.1020 4 wire
- ITU-T M.1025 4 wire
- ITU-T M.1040 4 wire

**Active circuits:**

- ITU-T M.1020 2 wire
- ITU-T M.1025 2 wire
- ITU-T M.1040 2 wire
- ITU-T M.1020 4 wire
- ITU-T M.1025 4 wire
- ITU-T M.1040 4 wire

**SPECIFICATIONS**

**Selective Receiver**

Impedances ..... 600, 900 Ohm, >20 kOhm  
 Frequency range..... 20 Hz to 20 kHz  
 Level range ..... +10 to -80 dBm  
 Resolution..... 0.1 dB  
 Accuracy (1020 Hz, 0 dBm, 600 Ohm) ..... ± 0.1 dB  
 Frequency response  
 200 Hz to 20 kHz ..... ± 0.1 dB  
 100 Hz to 200 Hz ..... +0.1 -0.5 dB  
 20 Hz to 100 Hz ..... +0 -1 dB

Fix frequency mode

Frequency range..... 20 Hz to 20 kHz  
 Frequency step/bandwidth  
 20 Hz to 360 Hz ..... 1/1 Hz  
 360 Hz to 3.6 kHz ..... 5/1 Hz  
 3.6 kHz to 20 kHz ..... 25/50 Hz

Receiving 36 frequencies at the same time

Frequency range..... 200 Hz to 3.6 kHz  
 Frequency raster..... 100 Hz  
 Bandwidth..... 10 Hz

**Transmitter**

Impedances ..... 600, 900 Ohm  
 Frequency range..... 20 Hz to 20 kHz  
 Level range  
 Without current loop..... +10 to -30 dBm  
 With current loop..... +1 to -30 dBm  
 Resolution..... 0.1 dB  
 Accuracy (1020 Hz, 0 dBm, 600 Ω) ..... ± 0.1 dB  
 Frequency response  
 200 Hz to 20 kHz ..... ± 0.1 dB  
 100 Hz to 200 Hz ..... +0.1 -0.5 dB  
 20 Hz to 100 Hz ..... +0 -1 dB

Fix frequency mode

Frequency range..... 20 Hz to 20 kHz  
 Frequency step  
 20 Hz to 360 Hz ..... 1 Hz  
 360 Hz to 3.6 kHz ..... 5 Hz  
 3.6 kHz to 20 kHz ..... 25 Hz

Transmitting 36 frequencies at the same time

Frequency range..... 200 Hz to 3600 Hz  
 Frequency raster..... 100 Hz  
 Output Level ..... -20 dBm/tone (3dBm peak)

**NEXT (Loss)**

Impedances ..... 600, 900 Ohm  
 Frequency range..... 200 Hz to 20 kHz  
 Resolution 200 Hz to 3.6 kHz ..... 5 Hz  
 Resolution 3.6 kHz to 20 kHz ..... 25 Hz  
 Measuring range ..... -10 to 70 dB  
 Accuracy (1000 Hz, 600 Ohm)  
 -10 to 60 dB ..... +0.5 dB  
 60 to 80 dB ..... ±1 dB



**Spectrum Analyzer**

Impedances .....	600, 900 Ohm, >20 k Ohm
Frequency range .....	20 Hz to 85 kHz
Level range .....	0 to -90 dBm
Resolution & bandwidth	
20 Hz to 360 Hz.....	2 Hz
0.2 kHz to 3.6 kHz.....	20 Hz
0.5 kHz to 85 kHz.....	500 Hz

**Background Noise**

Impedances .....	600, 900 Ohm, >20 k Ohm
Frequency range .....	20 Hz to 85 kHz
Measuring range .....	0 to -80 dBm
Weighting filters .....	Psophometric (O.41) 1020 Hz Notch (O.132) 3.1 kHz flat 50 Hz to 250 Hz 4.6 kHz to 85kHz
Conditioning tone .....	1020 Hz
Measurement times .....	1, 5, 10, 15, 30 s 1, 5, 10, 15, 30 min

**LCL Balance Measurement**

Impedances .....	600, 900 Ohm
Frequency range .....	200 Hz to 20 kHz
Measuring range .....	0 to 40 dB
Accuracy	
1kHz to 10 kHz.....	±1 dB
200 Hz to 20 kHz.....	±2.5 dB

**Impedance Measurement**

Frequency range .....	200 Hz to 20 kHz
Measuring range .....	300 to 1600 Ohm
Accuracy	
1 kHz to 10 kHz.....	±5% ±5 Ohm
200 Hz to 20 kHz.....	±10% ±5 Ohm

**Return Loss Measurement**

Frequency range .....	200 Hz to 20 kHz
Impedances (Z) .....	600, 900 Ohm
Measuring range	
Return loss measurement .....	up to 40 dB
Impedance range.....	Z/2 to 2Z
Accuracy at 20 dB	
1kHz to 10 kHz.....	±1 dB
200 Hz to 20 kHz.....	±2.5 dB

**DC voltage**

Measuring range .....	up to 300 V
Resolution.....	0.1 V
Accuracy.....	± 1% ±1 V

**AC Voltage**

Measuring range .....	up to 200 V <sub>rms</sub>
Frequency range .....	up to 200 Hz
Resolution.....	0.1 V
Accuracy.....	± 2% ±1 V

**Optional Measurements**

**Interruption Analysis (O.62) SW. Option**

Test signal.....	1020 Hz +10 to -30 dBm
Threshold.....	3, 6, 10, 20 dB
Evaluation time categories.....	0,6 to 3 ms 3 to 30 ms 30 to 300 ms 300 ms to 1 min > 1 min
Evaulation.....	Relative duration Errored seconds Count/category Time distribution/category
Measurement times .....	5, 15, 30, 60 min 2, 4, 8, 12, 24, 48, 72 hour

**Group Delay Distortion (O.81 app. I) SW. Option**

Test signal.....	36MTT, 200 to 3700 Hz
Resolution.....	100 Hz
Output level .....	-20 dBm/tone (3dBm peak)
Input level range .....	-50 to -10 dB/tone
Group delay distortion range .....	0 to 5 ms
Resolution.....	1 µs

**Phase Jitter measurement (O.91) SW. Option**

Test signal.....	1020 Hz, 0 to -30 dBm
Range.....	0.2 to 30.0 degrees p-p
Filter .....	4 to 300 Hz

**Simultaneous Event Counting SW. Option**

Measurement times .....	5, 15, 30, 60 min
Test signal.....	1020 Hz, 0 to -30 dBm
Maximum counts for each counter.....	65000

Amplitude Hit Counter (O.95)

Threshold range .....	2 to 9 dB
Guard interval.....	4 ms
Dead time.....	125 ±25 ms
Dead time after interruption (>10 dB drop).....	1 s

Phase Hit Counter (O.95)

Threshold range .....	5 to 45 °
Guard interval.....	4 ms
Dead time.....	125± 25 ms

Interruption Counter (O.61)

Threshold.....	6, 10 dB
Guard interval.....	2 ms
Dead time.....	3 ±1 ms

Impulsive Noise Counter (O.71)

Filter .....	1020 Hz Notch
Guard interval.....	20 µs
Dead time.....	125 ±25 ms
Threshold range .....	0 to -50 dBm



**Dialing and Loop Holding**

Measurements can be made over a public switched telephone network by using the integral dialing and loop holding features of the ELA 10. Dialing is done from the numeric keys and loop holding is indicated on the screen.

Types of dialing .....DTMF, Pulse  
 Loop holding current ..... 9 to 90 mA

**Memory Locations**

For setups ..... 20  
 For test results..... 30  
 For phone numbers ..... 10

**General Specification**

Power supply

Internal rechargeable NIMH battery pack  
 Operation time..... approx. 8 hours

Automatic power down

Selectable ..... 5, 15, 30 min  
 after the last keystroke

Charging

(Without taking the battery pack out)  
 From 230V mains..... with mains adapter  
 From 12V car battery ..... with car adapter  
 Fast charging time .....less than 3 hours

Connectors

Serial interface .....USB 1.1  
 Line connectors .....2 pieces of RJ 11

Display ..... 320 x 240 dot color graphic LCD

Over voltage protection

For high impedance input..... 250 V DC  
 For terminated input/output..... 100 V DC

Ambient temperature range

Reference ..... 23±5°C  
 Rel. humidity 45% to 75%  
 Normal operation .....0 to +40°C  
 Rel. humidity 30% to 75% \*( $<25\text{g/m}^3$ )  
 Limits of operation..... -5 to +45°C  
 Rel. humidity 5% to 95% \*( $<29\text{g/m}^3$ )  
 Storage and transport .....-40 to +70°C  
 Rel. humidity 5% to 95% \*( $<29\text{g/m}^3$ )

Dimensions..... 200 x 100 x 44 mm  
 Weight (including battery pack)..... approx. 0.8 kg

**Ordering information**

**DATA LINE ANALYSER ELA10**.....404-000-000 E  
 Including:

Operating manual .....OM 404-000-000  
 Short form operation instructions .....ML 404-000-000 E  
 Calibration Certificate ..... CC 404-000-000 E  
 CD (xxx version) .....CD 404-000-000 EE  
 Ground cable (banana to banana) ..... Y 107-332  
 2 balanced measuring cables ..... Y 107-424  
 USB cable for PC connection ..... Y 107-389  
 Cable for car battery connection ..... 367-000-000  
 Mains adapter  
     European version ..... Y 146-001  
     or UK version ..... Y 146-020  
     or US version ..... Y 146-022  
 Battery (built-in).....326-210-000A

**Options**

**PC software**

For result transfer..... SW-404-510-000  
 For parameter set edition ..... SW-404-520-000

**Measuring Software**

Interruption analysis (O.62)..... SW-404-530-000  
 Event counters (O.95,O.61,O.71) ..... SW-404-540-000  
 Group delay distortion (O.81)..... SW-404-550-000  
 Phase jitter and fr. error (O.91)..... SW-404-560-000  
 FM-VFT filters .....SW-404-570-000

**Others**

Calibration Report.....CR-404-000-000E  
 Carrying case..... Y147-007

