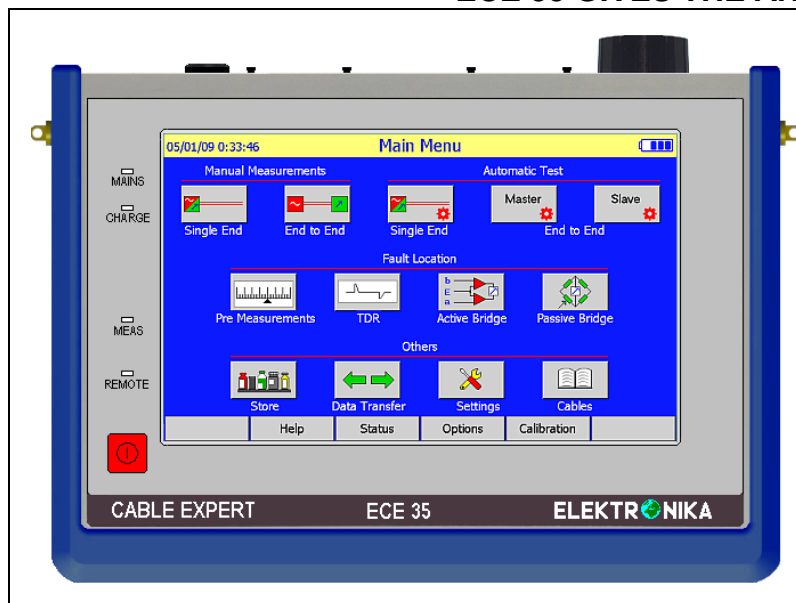


IS THIS PAIR SUITABLE FOR YOUR SYSTEM? IF NOT WHERE IS THE FAULT?



ECE 35 GIVES THE ANSWER!



**ECE 35** is an advanced hand-held instrument providing powerful tools for qualification and fault location of copper pairs used for various xDSL and voice frequency telecommunication services.

#### TWO INSTRUMENTS IN ONE

- Sophisticated Line Qualifier
- Precision Cable Fault Locator

#### TOOLS for LINE QUALIFICATION

- 35 MHz Transmitter
- 35 MHz Receiver
- Spectrum Analyzer
- Z, Return Loss, LCL measurements
- Phone Simulator

#### TOOLS for CABLE FAULT LOCATION

- Active Bridge & DMM
- Passive Wheatstone Bridge
- Graaf Fault Locator
- TDR

### LINE QUALIFICATION

#### MANUAL MEASUREMENTS

For the test of principal characteristics on xDSL and voice frequency lines

##### Single Sided Measurements

Impedance, Return Loss, LCL, NEXT, WB Noise, Impulse Noise, Spectrum Analyzer, Loss estimation for xDSL lines and Echo for VF lines

##### End to End Measurements

Loss, Interruption, Group Delay, Noise with Tone, Jitter and Frequ.-error, Simultaneous Event Counter

#### AUTOMATIC MASTER SLAVE TEST

Tolerance masks of cable parameters as Loss, LCL, Return Loss, Impedance, and the principal system parameters are pre-programmed for VDSL, ADSL, SHDSL, HDSL, ISDN, VF systems. In that mode ECE 35 provides:

**Automatic Data Rate Calculation**  
**Immediate PASS/FAIL indication**

#### SPECIAL ADVANCED SW OPTIONS

##### Spectrogram

In that mode ECE 35 performs repeated spectrum measurements in every second and the obtained results are displayed up to 72 hours in the form of "water-fall" diagram. That method is an excellent tool to discover disturbers appearing in unpredictable times and frequency ranges.

##### Non disturbing test beside vectored groups

The operation of vectored group can be interrupted if the alien noise exceeds a certain limit therefore the traditional test methods are not applicable. ECE 35 provides non disturbing special test methods for the measurement beside vectored lines

### CABLE FAULT LOCATION

#### ACTIVE BRIDGE MEASUREMENTS

For accurate location of faults where the level of disturbing voltages are low.

##### DC Fault Location Methods

Murray, 3 Point, K upfm uller, Repeated K upfm uller and Resistance Difference

##### AC Fault Location Methods

Interruption, Repeated K upfm uller, C Balance

#### PASSIVE BRIDGE MEASUREMENTS

For accurate location of faults where the level of disturbing voltages are high.

##### DC Fault Location Methods

Murray, 3 Point, K upfm uller, R Difference

##### AC Fault Location Methods

K upfm uller, C Balance

#### GRAAF FAULT LOCATION

For fault location on totally water-soaked cable if the disturbing voltages are high and intermittent.

#### TDR MEASUREMENTS

To find low impedance faults and splits causing cross talk between the pairs.

##### Single Pair Modes

Short Time L1 or L2, Long Time L1 or L2

##### Double Pair Modes

XTALK, L1 & L2 or L1-L2

##### Memory Modes

Memory & L1 or Memory - L1

##### Automatic Configuration

For L1 and XTALK measurements

#### DMM MEASUREMENTS

Loop and Insulation resistance, Capacitance, AC/DC Voltage, DC Current  
Automatic Cable State Survey

**BASIC MEASURING MODES FOR LINE QUALIFICATION**

<p><b>Manual Measuring Modes</b></p> <ul style="list-style-type: none"> <li>• Transmitting</li> <li>• Selective Receiver</li> <li>• Wideband Receiver</li> <li>• NEXT</li> <li>• LCL Balance</li> <li>• Impedance</li> <li>• Return loss</li> <li>• Wideband Noise</li> <li>• Impulse Noise</li> <li>• Spectrum Analyzer</li> </ul>	<p><b>Automatic Master/Slave xDSL Line Test (DELT)</b></p> <ul style="list-style-type: none"> <li>• Templates for SVDSL, VDSL2, ADSL2+, ADSL2, ADSL, READSL, SHDSL HDSL and ISDN systems</li> <li>• Loss, Noise, Impedance, Return Loss, Balance, NEXT and FEXT measurements</li> <li>• Bit load &amp; Achievable bit rate calculation</li> </ul> <p><b>Automatic Master/Slave VF Line Test (DELT)</b></p> <ul style="list-style-type: none"> <li>• Templates for Active, Passive and Switched voice frequency lines</li> <li>• Loss, Noise, Total Distortion, Impedance, Return Loss, Balance, NEXT and FEXT measurements</li> </ul>
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**SW OPTIONS FOR LINE QUALIFICATION**

<p><b>Spectral Trace as Reference</b></p> <ul style="list-style-type: none"> <li>• Stored spectrum as reference and</li> <li>• System dependent PSD as reference</li> </ul> <p><b>Spectrogram</b></p> <ul style="list-style-type: none"> <li>• Repeated spectrum measurements in every second up to 72 hours</li> </ul> <p><b>Test Beside Vectored Groups</b></p> <ul style="list-style-type: none"> <li>• Non-disturbing test beside VDSL2 groups.</li> <li>• Non-disturbing test beside SVDSL groups</li> </ul> <p><b>Interruption Analysis</b></p>	<p><b>Automatic Single Ended xDSL Line Test (SELT)</b></p> <ul style="list-style-type: none"> <li>• Single End Loss, Noise estimation,</li> <li>• Bit load &amp; Achievable bit rate estimation</li> <li>• Impedance, Return Loss, Balance, NEXT</li> </ul> <p><b>Voice frequency SW package</b></p> <ul style="list-style-type: none"> <li>• Noise with tone measurement</li> <li>• Group delay distortion measurement</li> <li>• Phase jitter and Frequ. error measurement</li> <li>• Simultaneous Event counters</li> <li>• Echo test</li> </ul>
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**ACTIVE BRIDGE FOR CABLE FAULT LOCATION (HW Option)**

<p><b>DC Fault Location</b></p> <ul style="list-style-type: none"> <li>• Loop Resistance</li> <li>• Resistance Difference</li> <li>• Insulation Resistance</li> <li>• Murray,</li> <li>• 3 Point,</li> <li>• Küpfmüller</li> <li>• Repeated Küpfmüller</li> </ul> <p><b>AC Fault Location</b></p> <ul style="list-style-type: none"> <li>• Capacitance</li> <li>• Capacitive Balance</li> <li>• Interruption</li> <li>• Repeated Küpfmüller</li> </ul> <p><b>Telephone Simulator</b></p>	<p><b>TDR</b></p> <ul style="list-style-type: none"> <li>• Single Pair</li> <li>• Double Pair</li> <li>• Comparison to Memory</li> </ul> <p><b>DMM</b></p> <ul style="list-style-type: none"> <li>• AC DC Voltage</li> <li>• DC Current</li> <li>• Resistance</li> <li>• Insulation Resistance</li> <li>• Capacitance</li> </ul> <p><b>Automatic Test Sequences</b></p> <ul style="list-style-type: none"> <li>• Quick Test</li> <li>• Quality Test</li> <li>• Pair Condition Survey</li> </ul>
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**EXTENSIONS FOR ACTIVE BRIDGE**

<p><b>PASSIVE BRIDGE ( HW Option)</b></p> <p>DC Fault Location</p> <ul style="list-style-type: none"> <li>• Loop Resistance</li> <li>• Resistance Difference</li> <li>• Insulation Resistance</li> <li>• Murray, 3 Point, Küpfmüller, Synchronous Graaf Method</li> </ul> <p>AC Fault Location</p> <ul style="list-style-type: none"> <li>• Capacitive Balance, Küpfmüller</li> </ul> <p><b>TEST OF LOADED CABLES (SW Option)</b></p> <p><b>TEST OF MULTI SECTION CABLES (SW Option)</b></p>
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**SPECIFICATIONS OF LINE QUALIFIER FUNCTIONS**

**Transmitter**

Outputs (Balanced)  
 10 kHz to 35 MHz ..... 100, 135, 150 Ω  
 200 Hz to 10 kHz ..... 600 Ω

Frequency  
 Frequency Range ..... 200 Hz to 35 MHz  
 Frequency resolution ..... 1 Hz  
 Frequency accuracy .....  $2 \times 10^{-6} \pm 1$  Hz

Transmitting modes ..... One frequency/MTTS/Sweep

Output level  
 10 kHz to 35 MHz ..... +10 to -40 dBm  
 200 Hz to 10 kHz ..... +4 to -45 dBm  
 Level Resolution ..... 0.1 dB

Accuracy at 0 dBm  
 200 Hz to 10 kHz .....  $\pm 0,5$  dB  
 10 kHz to 6 MHz .....  $\pm 0,3$  dB  
 6 MHz to 35 MHz .....  $\pm 1$  dB

**Receiver**

Inputs (Balanced)  
 10 kHz to 35 MHz ..... 100, 135, 150 Ω or High  
 200 Hz to 10 kHz ..... 600 Ω or High

**Selective Level Measurement**

Frequency  
 Frequency Range ..... 200 Hz to 35 MHz  
 Frequency resolution ..... 1 Hz  
 Frequency accuracy .....  $2 \times 10^{-6} \pm 1$  Hz

Receiving modes ..... One frequency/MTTS/Sweep

Band width  
 200 Hz to 10 kHz ..... 20 Hz  
 10 kHz to 6 MHz .... 20, 200 Hz, 1.74, 1.95, 3.1 kHz  
 6 MHz to 18 MHz ..... 200 Hz, 1.74, 1.95, 3.1 kHz  
 18 MHz to 35 MHz ..... 1.74, 1.95, 3.1 kHz

Measuring Range  
 10 kHz to 35 MHz ..... -120 to +10 dBm  
 200 Hz to 10 kHz ..... -120 to +4 dBm  
 Level Resolution ..... 0.1 dB

Accuracy at 0 dBm  
 200 Hz to 10 kHz .....  $\pm 0,5$  dB  
 10 kHz to 6 MHz .....  $\pm 0,3$  dB  
 6 MHz to 30 MHz .....  $\pm 1,5$  dB

**Wideband Level Measurement**

Frequency Range ..... 200 Hz to 35 MHz

Measuring Range  
 10 kHz to 35 MHz ..... -50 to +10 dBm  
 200 Hz to 10 kHz ..... -50 to +4 dBm  
 Level Resolution ..... 0.1 dB

Accuracy at 0 dBm  
 200 Hz to 10 kHz .....  $\pm 0,5$  dB  
 10 kHz to 6 MHz .....  $\pm 0,3$  dB  
 6 MHz to 35 MHz .....  $\pm 1,5$  dB

**Spectrum Analyzer**

Frequency range ..... 200 Hz to 35 MHz

Line impedances  
 10 kHz to 30 MHz ..... 100, 135, 150 Ω or High  
 200 Hz to 10 kHz ..... 600 Ω or High

Display range ..... down to -140 dBm/Hz

Maximum input level  
 200 Hz to 10 kHz ..... +4 dBm  
 10 kHz to 35 MHz ..... +10 dBm  
 With high impedance active probe ..... +20 dBm

Bandwidth and frequency step

Frequency Range	Bandwidth & Freq. Step
35 MHz	500 Hz to 120 kHz
18 MHz	500 Hz to 60 kHz
12 MHz	500 Hz to 40 kHz
9 MHz	500 Hz to 30 kHz
3 MHz	500 Hz to 10 kHz
1.5 MHz	500 Hz to 5 kHz
600 kHz	500 Hz to 2 kHz
300 kHz	500 Hz to 1 kHz
20 kHz	50 Hz to 100 Hz
4 kHz	10 Hz to 20 Hz
0.3 kHz	1 Hz

Number of displayed frequencies ..... 300  
 Saving of result ..... the actual content of display  
 Evaluation ..... NORM, PEAK, AVG, SAVG  
 Units ..... dBm, dBm/Hz

**LCL Measurement**

Frequency Range ..... 200 Hz to 35 MHz

Display range ..... 0 to 70 dB

Accuracy for all impedances at 35 dB  
 200 Hz to 100 kHz .....  $\pm 2$  dB  
 100 kHz to 5 MHz .....  $\pm 1$  dB

Accuracy for 100 Ohm at 35 dB  
 5 MHz to 30 MHz .....  $\pm 2,5$  dB

**Impedance Measurement**

Measuring range  
 10 kHz to 35 MHz ..... 50 to 400 Ohm  
 200 Hz to 10 kHz ..... 300 to 1600 Ohm

Accuracy  
 200 Hz to 10 kHz .....  $\pm 10\% \pm 5$  Ohm  
 10 kHz to 18 MHz .....  $\pm 5\% \pm 5$  Ohm  
 18 MHz to 30 MHz .....  $\pm 10\% \pm 5$  Ohm

**Return Loss Measurement**

Impedance  
 10 kHz to 35 MHz ..... 100, 135, 150 Ω  
 200 Hz to 10 kHz ..... 600 Ω

Display range ..... 0 to 40 dB

Accuracy at 20 dB  
 200 Hz to 18 MHz .....  $\pm 2$  dB

**Next Measurement**

Frequency range ..... 200 Hz to 35 MHz  
 Impedances  
   10 kHz to 35 MHz ..... 100, 135, 150  $\Omega$  Balanced  
   200 Hz to 10 kHz ..... 600  $\Omega$  Balanced  
 Measuring modes ..... One frequency, Sweep  
 Measuring range ..... up to 80 dB

**Wideband Noise Measurement**

Frequency range ..... 200 Hz to 35 MHz  
 Filters ..... None, Psophometric, 3,1 kHz Flat,  
   ADSL, ADSL 2+, VDSL 1, VDSL 2-8,  
   VDSL 2-12, VDSL 2-17, SVDSL-35  
 Measuring time ..... selectable 1sec to 72 hours  
 Evaluation  
   For 1 sec to 1 min ..... Quasi analogue  
   Over 1 min ..... Histogram with 60 time slots

**Impulse Noise Measurement**

Pulse width ..... >500 ns  
 Interval size ..... >10 ms  
 Threshold range ..... 1 to 500 mV  
 Maximum count ..... 65000  
 Measuring time ..... selectable 1sec to 72 hours  
 Evaluation  
   For 1 sec to 30 s ..... Quasi analogue  
   Over 30 s ..... Histogram with 60 time slots

**Interruption Analysis**

Test signal ..... 1020 Hz, 0 to -30 dBm  
 Impedance ..... 600  $\Omega$   
 Threshold below the normal level .... 3, 6, 10, 20 dB  
 Accuracy of Threshold  
   For 3, 6, 10 dB .....  $\pm 1$  dB  
   For 20 dB .....  $\pm 2$  dB  
 Measuring time ..... selectable 4min to 72 hours  
 Interruption Categories ..... 0.6 ms to >1 min  
 Evaluation ..... Relative duration, Errored sec  
   Count & time distribution / category

**Single-End Insertion Loss Measurement**

Frequency ranges ..... 1.5, 3, 9, 12, 18, 35 MHz  
 Line length range ..... 100 m to 6 km  
 Direct measurement ..... 100 kHz to 6 MHz or  
   up to 45 dB cable loss  
 Extrapolation ..... Over 6 MHz or  
   Over 45 dB cable loss  
 Vertical scale ..... 0 to 80 dB  
 Accuracy ..... 2 to 4 dB  
 (The accuracy and the maximum length depends  
 on the cable conditions)

**Echo Test**

Measuring range ..... up to 2500 ms  
 Resolution ..... 5 ms  
 Display range ..... 0 to -90 dB

**Telephone Simulator**

Dialing ..... Pulse & Tone  
 Storage of phone numbers ..... Provided  
Indications  
 Line voltage ..... up to 100V  
 Line current ..... up to 100 mA  
 Ringing voltage ..... up to 100V p-p

**Simultaneous Event Counting**

Transmitter  
 Test signal ..... 1020 Hz  
 Test signal level ..... 0 dBm  
 Receiver  
 Level range ..... 0 to -30 dBm  
 Measurement times ..... 5, 15, 30, 60 min  
 Maximum counts for each counter ..... 65000  
Amplitude Hit Counter (O.95)  
 Threshold range ..... 2 to 9 dB  
 Guard interval ..... 4 ms  
 Dead time .....  $125 \pm 25$  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 .....  $125 \pm 25$  ms  
Interruption Counter (O.61)  
 Threshold ..... 6, 10 dB  
 Guard interval ..... 2 ms  
 Dead time .....  $3 \pm 1$  ms  
Impulsive Noise Counter (O.71)  
 Filter ..... 1020 Hz Notch  
 Guard interval ..... 20  $\mu$ s  
 Dead time .....  $125 \pm 25$  ms  
 Threshold range ..... 0 to -50 dBm

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

Transmitter  
 Test signal ..... 36MTT, 200 to 3700 Hz  
 Resolution ..... 100 Hz  
 Output level ..... -20 dBm/tone (3dBm peak)  
 Receiver  
 Input level range ..... -50 to -10 dB/tone  
 Group delay distortion range ..... 0 to 5 ms  
 Resolution ..... 1  $\mu$ s  
 Reference .... smallest, 800 Hz, 1000 Hz, 1800 Hz

**Phase Jitter & Frequ. Error Measurement**

Transmitter  
 Test signal ..... 1020 Hz  
 Test signal level ..... 0 dBm  
 Receiver  
 Test signal level ..... 0 to -30 dBm  
Phase Jitter measurement (O.91)  
 Measuring Range ..... 0.2 to 30.0 degrees p-p  
 Filter ..... 4 to 300 Hz  
Frequ. Error Measurement (O.91)  
 Measuring Range .....  $\pm 30$  Hz  
 Resolution ..... 0.1 Hz

**Noise with Tone Measurement**

Transmitter  
 Test signal ..... 1020 Hz  
 Test signal level ..... 0 dBm  
 Receiver  
 Measuring range ..... 0 to -80 dBm  
 Filters ..... Psophometric (O.41)  
   1020 Hz Notch (O.132)



**PASSIVE BRIDGE**

**PRE MEASUREMENTS**

<b>Loop Resistance</b>	
Measuring range .....	1 Ω to 10 kΩ
Accuracy .....	±0.3% ±0.3 Ω
<b>Insulation Resistance</b>	
Measuring ranges	
Measuring ranges .....	10 kΩ to 300 MΩ 10 kΩ to 10 GΩ
Measuring voltage..... 100 V	
Accuracy	
100 kΩ to 50 MΩ .....	5 %
50 MΩ to 100 MΩ .....	10 %
100 MΩ to 5 000 MΩ .....	20 %
5 000 MΩ to 10 000 MΩ .....	30 %
<b>Resistance Difference</b>	
Loop resistance range .....	1 Ω to 5000 Ω
Accuracy .....	±0.2% of RI ±0.2 Ω
Resolution of Lx/L (Mk)-value	
In range ΔR <10% .....	1/10000
In range ΔR >10% .....	1/1000
<b>DC Fault Location</b>	
Test methods ..... Murray, Küpfmüller, 3 Point	
Loop resistance range .....	1 Ω to 10 kΩ
Fault resistance range .....	up to 100 MΩ
Measuring voltage.....	100 V
Accuracy (RI=2 kΩ, Lx/L=0,1 to 1)	
Fault resistance < 1 MΩ.....	0.2 %
Fault resistance 1 MΩ to 5 MΩ .....	0.3 %
Fault resistance 5 MΩ to 25 MΩ.....	0.5 %
Fault resistance 25 MΩ to 100 MΩ.....	2 %
Resolution of Lx/L (Mk) value .....	1/1000
<b>AC Fault Location Küpfmüller Method</b>	
Loop resistance range .....	1 Ω to 10 kΩ
Fault resistance range. ....	up to 25 MΩ
Measuring voltage.....	11 Hz, 100 Vp
Accuracy (RI=2 kΩ, Lx/L=0,1 to 1)	
Fault resistance < 1 MΩ.....	±0.3%
Fault resistance 1 MΩ to 5 MΩ .....	±0.5%
Fault resistance 5 MΩ to 25 MΩ.....	±1.0%
Resolution of M value .....	1/1000
<b>AC Capacitive Balance</b>	
Measuring range. ....	10 nF to 2 μF
Accuracy of Lx/L value .....	±0.2%
Measuring voltage.....	11 Hz, 100 Vp
Resolution of Lx/L value	
In range Lx/L=0.9 to 1.1.....	1/10000
In range Lx/L<0.9 or Lx/L>1.1 .....	1/1000
<b>Fault Location Graaf Method</b>	
Loop resistance range .....	10 Ω to 10 kΩ
DC current range. ....	10 μA to 0.1A
Accuracy of current measurement.....	±0.3% ±2μA
Accuracy of Lx/L value (current >0.1mA) .....	±3%
Accuracy of Lx/L value (current >1mA) .....	±0.3%

<b>Disturbing Voltage</b>	
DC voltage. ....	up to 400 V
AC voltage.....	up to 250 V eff
Accuracy .....	±3 % ±.1 V
Frequency range .....	15 to 300 Hz
Input resistance .....	2 MΩ
<b>Loop Resistance</b>	
Measuring range .....	1 Ω to 10 kΩ
Accuracy .....	±0.5 % ±0.2 Ω
<b>Insulation Resistance</b>	
Measuring range.....	10 kΩ to 1 GΩ
Measuring voltage .....	100 V
Accuracy (without disturbing DC voltage)	
Up to 300 MΩ .....	20 %
<b>DC Current</b>	
Measuring range.....	10μA to 0.1A
Accuracy .....	±0.3 % 2 μA
<b>Capacitance</b>	
Measuring range .....	10 nF to 2 μF
Measuring voltage .....	11 Hz, 100 Vp
Accuracy .....	±3% ±0.3 nF

**AUTOMATIC QUICK TEST**

<b>Disturbing Voltage</b>	
Measuring range. ....	up to 400 V DC, 250 V AC
Test results .....	Vab, VaE and VbE
<b>Insulation</b>	
Measuring range .....	10 kΩ to 300 MΩ
Measuring voltage.....	100 V
<b>Capacitance</b>	
Measuring range .....	10 nF to 2 μF
<b>Capacitive Balance</b>	
Test result .....	Unbalance %
Measuring voltage .....	11 Hz, 100 Vp

**AUTOMATIC QUALITY TEST**

<b>Insulation</b>	
Measuring range .....	10 kΩ to 10 GΩ
<b>Capacitance</b>	
Measuring range .....	10 nF to 2 μF
<b>Capacitive Balance</b>	
Test result .....	Unbalance %
Resolution .....	1/1000
<b>Loop Resistance</b>	
Measuring range .....	1 Ω to 10kΩ
Accuracy .....	±0.3% ±0.1 Ω
<b>Resistance Difference</b>	
Loop resistance range .....	1 Ω to 5 kΩ
Resolution .....	1/1000

**PAIR CONDITION SURVEY**

The Survey of Pair Condition is extremely useful test sequence to find the best fault location method.  
 The consists of the following measurements:

- **Disturbing voltage**
- **Capacitance**
- **Loop and wire resistances**
- **Insulation resistances**



**DATA TRANSFER**

**Data transfer via USB port**

The USB port provides:

- bidirectional transfer of test results
- bidirectional transfer of test setups
- transfer of print screen images to USB stick
- transfer of upgrade files to ECE 35

**Data transfer via WiFi**

The WiFi connection provides two ways of transferring test results, test setups and images to LAN network:

- ECE 35 initiates a connection to a FTP server
- ECE 35 acts as a HTTP server

**LOOP CLOSING DEVICE ELC 30 (Accessory)**

**Functions**

Opening or closing the far end of tested pair when just one person wants to perform a measurement during which the far endings should be opened or closed (e.g. K pfm ller method).

The device is remote controlled over the tested pair by ECE 35



**Specifications**

**Power supply**

AA size alkaline battery cells ..... 3 pieces  
 Operation time ..... ca. 1000 hours  
 Auto power off ..... 4 hours

**Connectors** ..... 4 mm banana plugs

**Mechanical Data**

Dimensions ..... 110 x 60 x 25 mm  
 Weight (Including battery pack) ..... ca. 0,2 kg

**INTELLIGENT SLAVE ECFL 30S (Accessory)**

**Functions**

Opening or closing the far end of tested pair when just one person wants to perform a measurement during which the far endings should be opened or closed (e.g. K pfm ller method).

Current measurement at the far end of the tested pair when Graaf method is applied. In case of Graaf method the master ECE 35 and the remote controllable intelligent slave ECFL 30S measure the current at the two cable ends at the same time and communicate over the tested pair. The Master calculates the location of fault out of the rate of currents



**Specifications**

**Power Supply**

AA size alkaline battery cells .....4 pieces  
 Operation time ..... ca. 500 hours  
 Auto power off ..... 4 hours

**Connectors**

A, B, C line connectors ..4 mm banana sockets  
 Ground connector ..... 4 mm banana socket

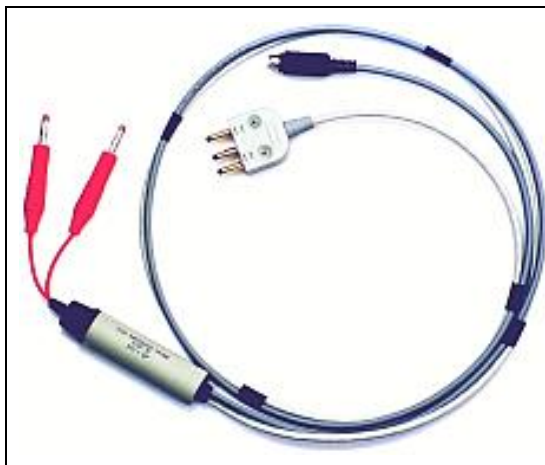
**Mechanical Data**

Dimensions ..... 210 x 100 x 40 mm  
 Weight (Including battery pack) ..... ca. 0,4 kg

**Control**

The device is remote controlled over the test- ed pair by ECE 35

**HIGH IMPEDANCE PROBE ELQP 30 (Accessory)**



**Purpose**

The ELQP 30 active probe is intended for PSD spectrum measurement on working lines when test instrument should be connected parallel with the operating modems and the regular measuring cables can not be used because the digital systems are extremely sensitive for the capacitive load

**Specifications**

Frequency range .....5 kHz to 30 MHz  
 Attenuation ..... 15 dB  
 Input Impedance ..... 5 kOhm || 5pF  
 Accuracy  
 5 kHz to 25 kHz ..... ±1dB  
 25 kHz to 5 MHz ..... ±0.3 dB  
 5 MHz to 30 MHz ..... ±1dB  
 Powered ..... from ECE 35

