WHERE IS THE FAULT? ECFL30 GIVES THE ANSWER!

Four instruments in one
- **Active Bridge** for accurate location of faults where the level of disturbing voltages are low
- **Passive Wheatstone Bridge** for location of faults where the level of disturbing voltages are high
- **Graaf Fault Locator** for accurate fault location on totally water-soaked cable where the disturbing voltages are usually high and intermittent
- **TDR** to find low impedance faults and splits causing cross talk between the pairs

APPLICATIONS

The **CABLE FAULT LOCATOR ECFL 30** hand-held instrument is intended to test the quality of telecom cables and to locate cable faults. That combined instrument provides several tools for the accurate location of DC/AC faults on the line:

**Resistance Measurements**
- Loop resistance
- Resistance difference
- Insulation resistance

**Capacitance Measurements**
- Cable capacitance
- Capacitive balance

**DC Fault Location Methods**
- Murray
- 3 Point
- Küpfmüller
- Repeated Küpfmüller

**AC Fault Location Methods**
- Interruption
- Repeated Küpfmüller

**Graaf Fault Location Method**
- End to end Master-Slave measurement
- Fault location on totally water-soaked cable

**TDR Measurements**
- Single pair
- Double Pair Measurements
- XTALK
- Comparison to Memory

**AC-DC Voltage measurements**
- Cable temperature measurement

FEATURES

Extremely Simple Operation
- Easy to use menu system
- Many-sided topic oriented help system
- Large Graphic Display with Backlight

Operation is made extremely comfortable by means of pre-defined automatic test sequences:

**Automatic Test Sequences**
- Cable State Survey to find the best test method
- Quick Test of main parameters
- Quality Test Sequence

**USB Ports for Result Transfer**
- USB B device-port for direct PC connection
- USB A host-port for USB stick (Indirect transfer)

The indirect transfer is advantageous for the user who does not have administrative right to install a special driver to his PC.

ECFL 30 is suitable for the remote control of loop closing devices on the far end. Utilizing that feature just one person can perform measurements during which the far endings of the tested pair should be opened or closed (e.g. Küpfmüller method).

**Remote Controllable Far end Devices**
- ELC 30 loop closing device to open or close the far end of the tested cable
- ECFL 30S slave unit to perform synchronic end to end Graf measurement and open or close the far end of the tested cable.

**Large Memory**

The obtained test results can be stored in the internal memory of the instrument and transferred to PC.
CABLE FAULT LOCATOR

ECFL 30

FAULT LOCATOR MODES

<table>
<thead>
<tr>
<th>ACTIVE BRIDGE</th>
<th>ELC 30 or ECFL 30S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murray</td>
<td>Graaf</td>
</tr>
<tr>
<td>Kupfmüller</td>
<td>Master</td>
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<tr>
<td>3 Point</td>
<td>TDR</td>
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</tbody>
</table>

SPECIFICATIONS

TDR

Measuring Modes
- Single Pair: L1, L2, L1 long time, L2 long time
- Double Pair: L1 & L2, L1-L2, XTALK
- Memory Modes: L1 & Memory, L1 - Memory

Measuring Ranges
- For non loaded cable (at V/2=100): up to 32 km
- For loaded cable (at V/2=10): 6.4 to 32 km
  The maximum range depends on cable type and condition

Evaluation of Results
- With Cursor and Marker: In meters
- Refreshing of waveform: ~4/sec
- Zoom: Maximum 16

Accuracy
- Fault location: 0.2% of range
- Resolution: 0.01 m

Propagation Velocity
- For non loaded cables: V/2 = 45 to 149 m/μs, VOP = 30 to 99 %
- For loaded cables: V/2 = 1.2 to 30 m/μs, VOP = 0.8 to 20 %

Pulse Characteristics
- Widths for non loaded cable: 4 ns to 6 μs
- Widths for loaded cable: 330 μs
- Amplitude: 1.3 to 12 Vpp into 120 Ω
  Automatically changed with gain and width.

Line Connection
- Impedance: 120 Ω balanced
- Balance control: 50 to 270 Ω

Gain Control
- Range: 0 to 90 dB
- Steps: 6 dB/Step

Distance Dependent Amplitude Correction
- Number of steps: 10

ACTIVE BRIDGE

Voltage
- DC voltage: up to 400 V
- AC voltage: up to 250 V eff

Accuracy
- ±3% ±1 V
- ±0.3% ±0.1 Ω

Frequency range: 15 to 300 Hz

Input resistance

Loop Resistance
- Measuring range: 1 Ω to 10 kΩ
- Accuracy: ±0.2% of RI ±0.2 Ω

Resistance Difference
- Loop resistance range: 10 Ω to 5000 Ω
- Accuracy: ±0.2% of RI ±0.2 Ω

Insulation Resistance
- Measuring range: 10 kΩ to 300 MΩ
- Measuring voltage: 100 V
- Accuracy: ±2% ±0.2 nF

Capacitance
- Measuring range: 1 nF to 2000 nF
- Measuring voltage: 11 Hz, 100 V
- Accuracy of Lx/L value: ±0.2 %

DC Fault Location
- 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 %

AC Fault Location Interruption
- Range: up to 20 km (Depends on cable type)
- Accuracy: ±2% ±0.2 nF
PASSIVE BRIDGE
Loop Resistance
Measuring range..................................1 Ω to 10 kΩ
Accuracy........................................+0.3% ±0.3 Ω
Insulation Resistance
Measuring modes..................Quick measurement, Quality measurement
Measuring ranges
Quick measurement ..........10 kΩ to 300 MΩ
Quality measurement .......... up to 10 GΩ
Measuring voltage .....................100 V
Accuracy
10 kΩ to 50 MΩ ................................5 % ±1 kΩ
50 MΩ to 100 MΩ ..............................10 %
100 MΩ to 5 000 MΩ ..........................20 %
5 000 MΩ to 10 000 MΩ .......................30 %
Resistance Difference
Loop resistance range ..............1 Ω to 5000 Ω
Accuracy ........................................±0.2% of RL ±0.2 Ω
Resolution of Lx/L (Mk)-value
In range ∆R <10% ................................1/10000
In range ∆R ≥10% ................................1/1000
DC Fault Location
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 (RL=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
AC Fault Location Küpfmüller Method
Loop resistance range ..........1 Ω to 10 kΩ
Fault resistance range .......... up to 25 MΩ
Measuring voltage ...............11 Hz, 100 V
Accuracy (RL=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
AC Capacitive Balance
Measuring range..................10 nF to 2000 nF
Accuracy of Lx/L value ..............±0.2%
Measuring voltage ...............11 Hz, 100 V
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
Fault Location Graaf Method
Loop resistance range ..........10 Ω to 10 kΩ
DC current range ....................5 μA to 1A
Accuracy (I>10 μA) .................±0.3%
PRE MEASUREMENTS
Disturbing Voltage
Measuring mode ............Repeated measurement
Measuring range
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
Loop Resistance
Measuring mode...........Repeated measurement
Measuring range ..........1 Ω to 10 kΩ
Accuracy ..................±0.5 % ±0.2 Ω
Insulation Resistance
Measuring mode ............Repeated measurement
Measuring range ..........10 kΩ to 300 MΩ
Measuring time ..............~3 sec
Measuring voltage ..........100 V
Accuracy (without disturbing voltages) in % of test result ..............20 %
DC Current
Measuring range ...............5 μA to 1A
Accuracy ..................±0.5 % 0.1 μA
Temperature (with Pt 1000 temperature probe)
Temperature range ...........−20 to +60°C
Resolution ..................0.1°C
Accuracy ..................±0.4°C
AUTOMATIC QUICK TEST
Disturbing Voltage
Measuring range .......... up to 400 V DC, 250 V AC
Test results .................Vab, VaE and VbE
Insulation
Measuring range ..........10 kΩ to 300 MΩ
Measuring time ..............~3 x 20 sec
Capacitance
Measuring range ..........10 to 2000 nF
Capacitive Balance
Test result .................Unbalance %
Measuring voltage ..........11 Hz, 100 V
AUTOMATIC QUALITY TEST
Insulation
Measuring range ..........10 kΩ to 10 000 MΩ
Measuring time ..............~3 x 35 sec
Capacitance
Measuring range ..........10 to 2000 nF
Capacitive Balance
Test result .................Unbalance %
Resolution ..................1/1000
Loop Resistance
Measuring range ..........1 Ω to 10kΩ
Accuracy .................±0.3% ±0.1 Ω
Resistance Difference
Loop resistance range ..........10 Ω to 5 kΩ
Resolution ..................1/1000
GENERAL SPECIFICATIONS

Power Supply
- Internal rechargeable NiMH battery pack
- Operation time: approx. 8 hours
  (Without backlight)
- Charging (without taking the battery pack out)
  From 90 to 260 V mains with mains adapter
  From 12 V car battery with car adapter
- Charging time: less than 3 hours
  (Fast charging mode)
- Display: 320 x 240 dot graphic LCD with backlight

Connectors
- Connector for mains adapter: 2.1/5.5mm coax L1 and L2 line
- L1 and L2 line connectors: 4 mm banana sockets
- Ground connector: 4 mm banana socket
- USB A: USB 1.1 host port for USB-Stick (FAT 16 file system supported)
- USB B: USB 1.1 device port to connect PC (Device driver provided)

Over Voltage Protection
- Between a and b or ground: 500 V DC, 350 V AC
- Longitudinal voltage: 60 V AC

Ambient temperature ranges
- Reference: 23±5°C
- Rel. humidity 45% to 75%*
- Normal operation: 0 to +40°C
  - Rel. humidity 30% to 75% *(<25 g/m³)
- Limits of operation: -5 to +45°C
  - Rel. humidity 5% to 95% *(<29 g/m³)
- Storage and transport: -40 to +70°C
  - Rel. humidity 95% at +45°C *(<35 g/m³)

Memory Locations
- For test results: 50
- For cable parameter: 50

Mechanical Data
- Dimensions: 224 x 160 x 75 mm
- Weight (including battery pack): ca. 1.8 kg

ORDERING INFORMATION

CABLE FAULT LOCATOR
ECFL30 ................................................. 419 000-000

Including:
- Operating manual ............ OM 419 000-000
- Short form operation instruction .. ML 419 000 000
- Calibration Certificate .......... CC 419 000 000
- CD .............................................. CD 419 000 000
- Ground cable .................. Y 107-425
- 2-wire test lead (red/black) .......... Y 107-426
- 2-wire test lead (blue/yellow) ........... Y 107-427
- AC Mains adapter (90 to 260V)
  - European version: Y 146-017
  - or UK version: Y 146-021
  - or US version: Y 146-024
- USB cable: Y 107-389
- USB stick: Y 146-019
- Battery pack (built-in): Y 355-140 000B
- Carrying case: Y 147-018

Options
- Loop closing device ELC 30 ............ 421-000-000
- Intelligent Slave ECFL 30S ............ 425-000-000
- Result transfer PC SW: SW 419-510-000
- Car battery adapter: Y 367-000
- Temperature probe PT 1000 ............ Y-146-014

* Without condensation

ELEKTRONIKA reserved the right to change specifications without prior notice! 30.07.2010