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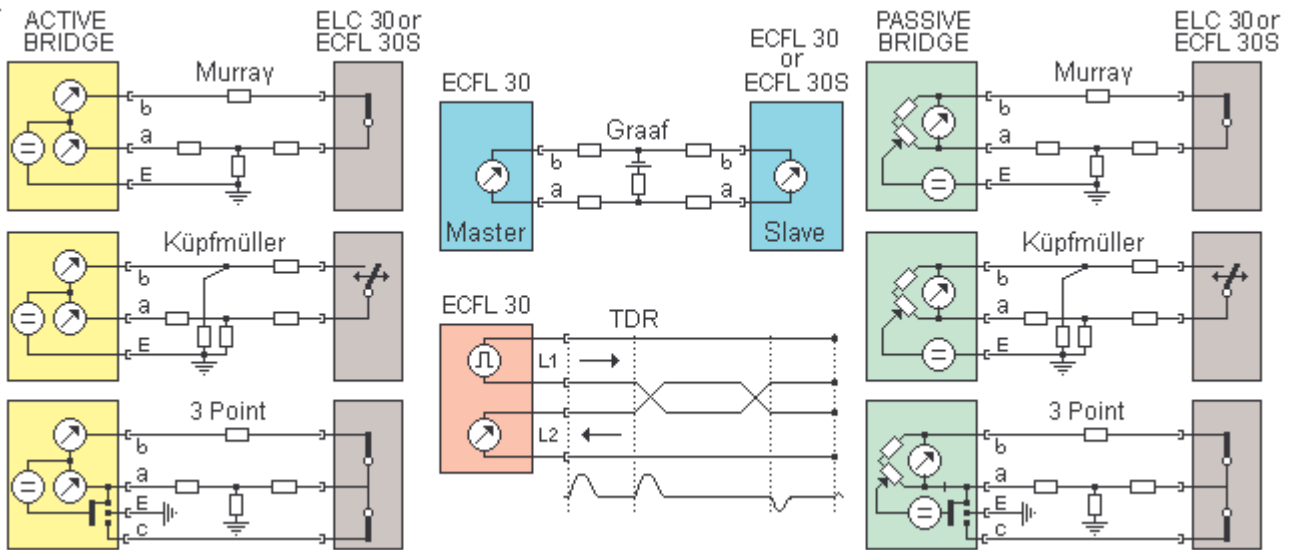
Remote Controllable Far end Devices
- ELC 30 loop closing device to open or close the far end of the tested cable
- ECFL 30S slave unit to perform synchronic end to end Graaf measurement and open or close the far end of the tested cable.

Large Memory
The obtained test results can be stored in the internal memory of the instrument and transferred to PC.

FAULT LOCATOR MODES

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
Frequency range ....15 to 300 Hz
Input resistance .... 2 M Ω

Loop Resistance
Measuring range...............................1 Ω to 10 kΩ
Accuracy..±0.3% ±0.1 Ω

Resistance Difference
Loop resistance range ....10 Ω to 5000 Ω
Accuracy...................................±0.2% of Rl ±0.2 Ω

Insulation Resistance
Measuring range......................10 kΩ to 300 MΩ
Measuring voltage ....100 V
Accuracy .... 2 to 5% ±1 kΩ

Capacitance
Measuring range........................ 1 nF to 2 (10) µF
Measuring voltage .... 11 Hz, 100 V
Accuracy.......................................±2% ±0.2 nF

Capacitive Balance
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 (Rl=2 kΩ, Lx/L=0,1 to 1)
Fault resistance < 1MΩ ....± 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 typ)
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%...............................1/1 0000
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. ....5µA 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. ....5µA 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
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℃
Rel. humidity 45% to 75%*
Normal operation.................................... 0 to +40℃
Rel. humidity 30% to 75% *(<25g/m^3)
Limits of operation ....-5 to +45℃
Rel. humidity 5% to 95% *(< 29 g/m^3)
Storage and transport........................–40 to +70℃
Rel. humidity 95% at +45℃ *(<35g/m^3)

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

* Without condensation

ORDERING INFORMATIONS

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