

## WHERE IS THE FAULT ? ECFL 30A GIVES THE ANSWER !



## Three instruments in one

- **Active bridge** for accurate and comfortable AC DC fault location in high sensitivity or noise protected measuring mode.
- **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 30A** 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
- K upfm uller
- Repeated K upfm uller

**AC Fault Location Methods**

- Interruption
- Repeated K upfm uller

**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**

**ECFL 30A** has a graphic display an easy to use menu system and a many-sided help system providing extremely simple operation for the user. 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

**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 30A 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 K upfm uller 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.

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

## SPECIFICATIONS

### TDR

#### Measuring modes

##### Single Pair Measurements

- L1 or L2
- L1 or L2 Long time measurement

##### Double Pair Measurements

- L1 & L2
- L1 - L2
- XTALK

##### Comparison to Memory

- 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/ $\mu$ s  
 VOP ..... 30 to 99 %

##### For loaded cables

$V/2$  ..... 1.2 to 30 m/ $\mu$ s  
 VOP ..... 0.8 to 20 %

#### Pulse characteristics

Widths for non loaded cable ..... 4 ns to 6  $\mu$ s  
 Widths for loaded cable ..... 330  $\mu$ s  
 Amplitude: ..... 3 to 12 Vpp into 120  $\Omega$   
 Automatically changed  
 with gain and width.

#### Line Connection

Impedance ..... 120  $\Omega$  balanced  
 Balance control ..... 50 to 270  $\Omega$

#### Gain Control

Range ..... 0 to 90 dB  
 Steps ..... 6 dB/Step

#### Distance dependent amplitude correction

Number of steps ..... 10

#### Memory Locations

For waveforms ..... 50

### BRIDGE

#### Voltage

DC voltage ..... up to 400 V  
 AC voltage ..... up to 250 V eff  
 Accuracy .....  $\pm 3\% \pm 1$  V  
 Frequency range ..... 15 to 300 Hz  
 Input resistance .....  $> 2$  M $\Omega$

#### Loop Resistance

Measuring range ..... 1  $\Omega$  to 10 k $\Omega$   
 Accuracy .....  $\pm 0.3\% \pm 0.1$   $\Omega$

#### Resistance Difference

Loop resistance range ..... 10  $\Omega$  to 5000  $\Omega$   
 Accuracy .....  $\pm 0.2\%$  of RI  $\pm 0.2$   $\Omega$

#### Insulation Resistance

Measuring range ..... 10 k $\Omega$  to 5 000 M $\Omega$   
 Measuring voltage ..... 100 V  
 Accuracy  
 10 k $\Omega$  to 300 M $\Omega$  .....  $\pm 2$  to 5%  $\pm 1$  k $\Omega$   
 300 M $\Omega$  to 5 000 M $\Omega$  .....  $\pm 20$  %

#### Capacitance

Measuring range ..... 10 nF to 2  $\mu$ F  
 Measuring voltage ..... 11 Hz, 100 V  
 Accuracy .....  $\pm 2\% \pm 0.2$  nF

#### Capacitive Balance

Measuring range ..... 10 nF to 2  $\mu$ F  
 Measuring voltage ..... 11 Hz, 100 V  
 Accuracy of Lx/L value .....  $\pm 0.2$  %

#### DC Fault Location

Test Methods ..... Murray, K pfm ller, 3 Point  
 Loop resistance range ..... 1  $\Omega$  to 10 k $\Omega$   
 Fault resistance range ..... up to 100 M $\Omega$   
 Measuring voltage ..... 100 V  
 Accuracy  
 Fault resistance  $< 5$  M $\Omega$  .....  $\pm 0.3$  %  
 Fault resistance 5 M $\Omega$  to 25 M $\Omega$  .....  $\pm 0.5$  %  
 Fault resistance 25 M $\Omega$  to 100 M $\Omega$  .....  $\pm 2$  %

#### AC Fault Location Interruption

Range ..... up to 20 km (Depends on cable typ)  
 Accuracy .....  $\pm 2\% \pm 0.2$  nF

### REPEATED PRE MEASUREMENTS

#### Disturbing Voltage

Measuring range  
 DC voltage ..... up to 400 V  
 AC voltage ..... up to 250 V eff  
 Accuracy .....  $\pm 3$  %  $\pm 1$  V  
 Frequency range ..... 15 to 300 Hz  
 Input resistance ..... 2 M $\Omega$

#### Loop Resistance

Measuring range ..... 1 to 10 k $\Omega$   
 Accuracy .....  $\pm 0.5$  %  $\pm 0.2$   $\Omega$

#### Insulation Resistance

Measuring range ..... 10 k $\Omega$  to 300 M $\Omega$   
 Measuring time ..... ~ 3 sec  
 Measuring voltage ..... 100 V  
 Accuracy (without disturbing voltages)  
 in % of test result ..... 2 to 20 %

## 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

## 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°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 95% at +45°C \*( $<35\text{g/m}^3$ )

### Memory Locations

For test results ..... 50  
For cable parameter ..... 50

### Mechanical Data

Dimensions ..... 224 x 160 x 60 mm  
Weight (Including battery pack) ..... ca. 1.5 kg

\* Without condensation

## AUTOMATIC QUALITY TEST

### Insulation

Measuring range ..... 10 kΩ to 5000 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 ..... 1 Ω to 5 kΩ  
Resolution ..... 1/1000

## ORDERING INFORMATION

### CABLE FAULT LOCATOR

ECFL 30A ..... 429 000-000

### Including:

Operating manual ..... OM 429 000-000  
Short form operation instruction ... ML 429 000 000  
Calibration Certificate ..... CC 429 000 000  
CD, containing ..... CD 429 000 000  
Instrument software (Firmware)  
Demo program  
PC- data transfer program  
Operating manual in pdf  
Ground cable ..... Y 107-425  
2-wire test lead (red/black) ..... Y 107-426  
2-wire test lead (blue/yellow) ..... Y 107-427  
AC 90 to 260V Mains adapter  
European version ..... Y 146-017  
UK version ..... Y 146-021  
US version ..... Y 146-024  
USB cable ..... Y 107-389  
Battery pack (built-in) ..... Y 355-140 000B  
Carrying case ..... Y 147-014

### Options

Loop closing device ELC 30 ..... 421-000-000  
Intelligent Slave ECFL30S ..... 425-000-000  
Data transfer ..... SW 429-510-000  
Car battery adapter ..... Y 367-000

## REMOTE CONTROLLABLE OPTIONAL DEVICES FOR ECFL 30 and ECFL 30A

### INTELLIGENT SLAVE ECFL 30S

#### 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. Küpfmüller method).
- Current measurement at the far end of the tested pair when Graaf method is applied. In case of Graaf method the master instrument (ECFL 30 or ECFL 30A) 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

#### ORDERING INFORMATION

**INTELLIGENT SLAVE ECFL 30S** ..... 425-000-000

##### Including:

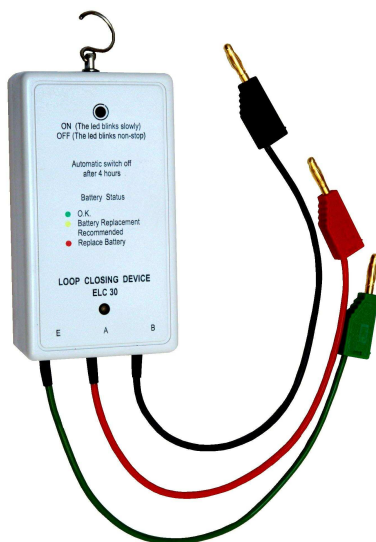
AA size alkaline battery cells .....	4 pieces
Measuring cables .....	4 pieces

### LOOP CLOSING DEVICE ELC 30

#### 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. Küpfmüller method).

The device is remote controlled by (ECFL 30 or ECFL 30A) over the tested pair



#### SPECIFICATIONS

##### Power Supply

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

##### Connectors

A, B line connectors .....	4 mm banana plugs
Ground connector .....	4 mm banana plug

##### Mechanical Data

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

#### ORDERING INFORMATION

**LOOP CLOSING DEVICE ELC 30** ..... 421-000-000

##### Including:

AA size alkaline battery cells .....	3 pieces
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