GOSSEN METRAWATT

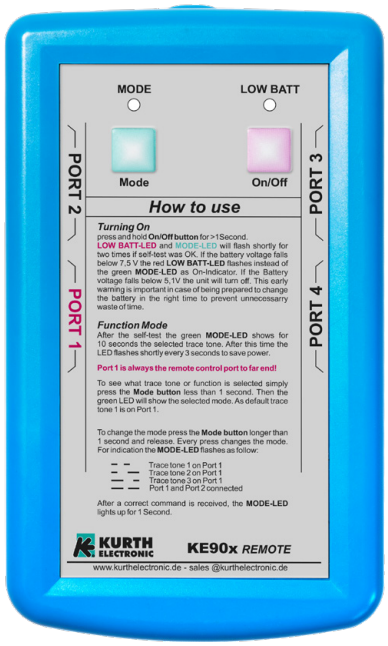
KURTH ELECTRONIC

Coppertests up to 31 MHz

For service technicians for qualification and troubleshooting on the copper wire pair

KE3700 CT Telco line qualifier

KE3700 CT



KE905 Remote

At a glance

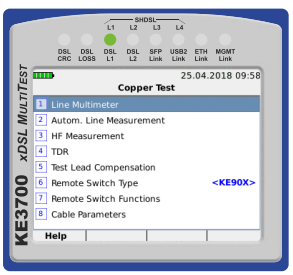
- Spectrum analysis, impedance, return loss, LCL unbalance loss and NEXT, input level (graph.), Signal level transmitter, Broadband and impulse noise
- Resistance and capacitance, symmetry
- Voltage AC/DC incl. AC frequency
- Insulation measurement with 8 V or 100 V
- RFL resistance fault localization according to Murray and Küpfmüller
- TDR identifies and localizes cable faults, with xTalk measurements
- Automated, freely editiable test procedures
- Simplification and acceleration of the measuring application through the KE905 Remote included in the package
- Storage and evaluation of measurement data

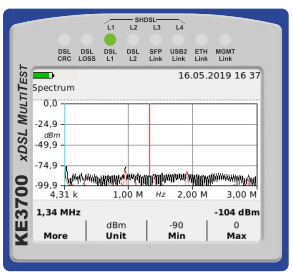
The **KE3700 CT** for fault analysis in the DC and AC range with cable multimeter function incl. resistance fault localisation, TDR function for cable fault location and measurements for line qualification up to 31 MHz.

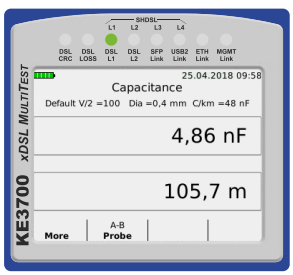
The device allows the qualification of a copper wire pair to the service to be transmitted. Predefined or manually editable filters are available for xDSL or telephony services in the frequency range up to 31 MHz.

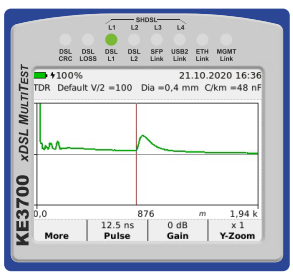
To simplify measurement tasks, manual and automatable test sequences are available to the user in combination with the electronic remote line switch KE905 Remote, which is included in the scope of delivery of the KE3700 CT.

QR code and the supplied KE Manager software allow flexible use with regard to documentation of measurement results or data transfer to electronic order processing systems.









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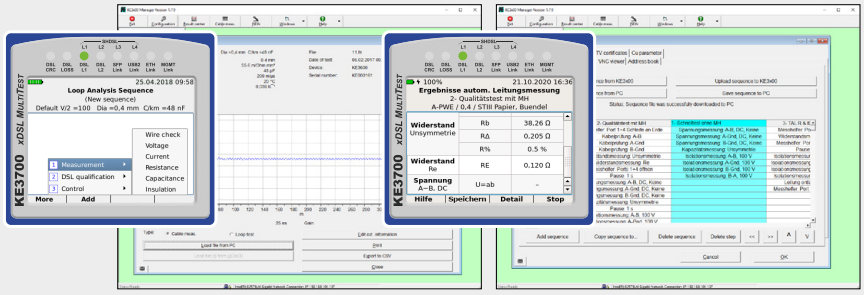
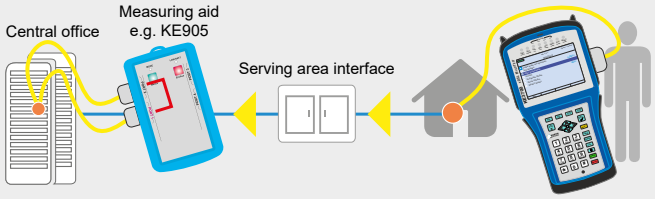
Automated line measurement

This measurement allows automatically running measurement sequences, which can be selected by the user. The configuration is done via selection menus in the tester or in the KE-Manager. This is followed by the execution accompanied by dialog windows – with automatic control commands to the measuring assistant for remote switching. The measurement results can be saved and edited in the KE-Manager.



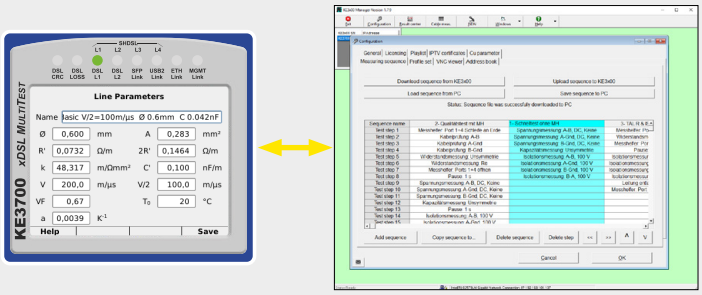
Measuring aid control

Direct control commands can be sent via the KECT interface to the optionally available measuring aids such as the KE905 remote unit – for safe (remote) switching of the copper pair. This means that the customer line to be tested can remain in service until the start of the measurements and time-consuming journeys to the line changeover are reduced.



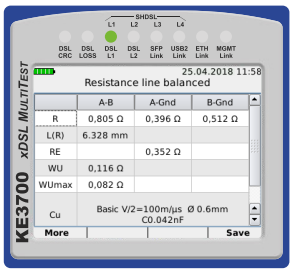
Cable parameters

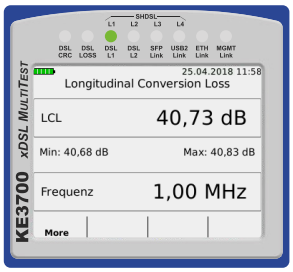
New cable types as basis for the copper measurements – if these are not yet available in the cable database of the device, they can simply be created under the menu item Cable parameters directly in the device. The parameters are more conveniently entered or edited in the KE-Manager and then uploaded to the tester. By entering only two values, e.g. the cable diameter ø and the resistance per meter R, the new cable is automatically calculated by the KECT. Only the cable-specific VF value has to be entered.

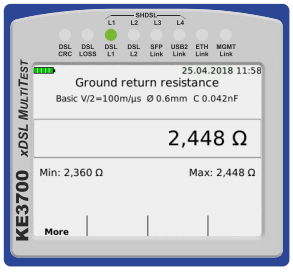


Line multimeter

Measurement	Short description
Voltage AC/DC	AC/DC voltage measurement can be used to detect connected connections such as ISDN or analogue as well as external voltages, e.g. by terminating another line.
Loop resistance	Determination of the loop resistance, e.g. to detect short circuits and to estimate the cable length.
Loop impedance symmetry	Determination of the loop resistances of the a and b wires, a wires to earth and b wires to earth. The cable length depending on the resistance and the resistance difference (WU) are displayed.
Insulation	The measurement of the insulation operating resistances between the two cores of a pair of wires and the individual wires and earth provides information about damage to the cable insulation, moisture penetration or oxidized contact points of the cable.
Capacitance	The purpose of the measurement is to determine the operating capacity of a wire pair. The measurement shows whether the line is open and shows the typical input capacitance of connected devices as well as the asymmetries of the conductor pair.
Capacitance symmetry	Determination of the capacitances of the a and b wires, a wire to earth and b wire to earth. Helps to detect cable faults that lead to signal distortion or transmission errors.
Ground resistance	This measurement helps to detect inoperative current to ground, which may cause triggering of protective devices such as a fuse or circuit breaker.
LCL at 1 MHz	Balance between the a wire to the earth in comparison with the b wire to the earth. A tone at 1 MHz is fed symmetrically to the veins in relation to the earth. If a difference is measured between the cores, there is an asymmetry.
NEXT at 1 MHz	A tone of 1 MHz is transmitted to a pair of lines and the near-end crosstalk on the adjacent line is measured, which is the cause of significant limitations in xDSL performance.
Current AC/DC	Measurement of direct (DC) and alternating currents (AC). The measurements can be used to detect power supplies, emergency power supplies or line faults.
PPA and signature identification	**PPA detection:** Checks whether a Telekom TAE socket is installed correctly on the subscriber side. **Signature:** Checks whether the subscriber has properly connected a Telekom DSL router to the TAE socket using the appropriate cable.







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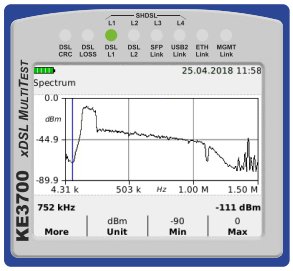
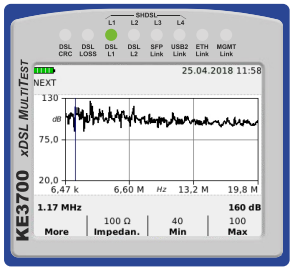
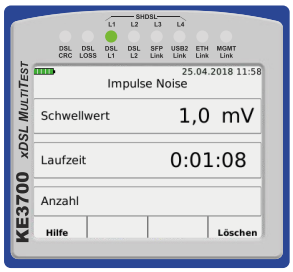
HF measurements up to 31 MHz for line qualification

Extensive high-impedance measurement functions for line qualification and troubleshooting allow the service technician to perform a complete analysis of the wire pair for the suitability of the xDSL system intended for the application.

Measurement	Short description
Spectrum analysis	Examines the spectral conduction density of the individual tones. For example, wideband crosstalk caused by another xDSL system or noise caused by discrete frequencies such as radio stations can be detected.
Impedance	If, for example, the input impedance of a device does not match the impedance of the line, reflections will occur which reduce the power transmission and lead to resonance phenomena and thus to a non-linear frequency response.
Reflection damping	Represents the reduction of the transmitted energy of a signal over the course of a transmission path and is therefore a decisive value for DSL. The longer the line, the lower the data rates that can be achieved with DSL.
Asymmetry damping	Longitudinal currents can cause noise on the line if the symmetry is imperfect. The asymmetry attenuation indicates the wire's ability to suppress the effect of the longitudinal currents.
NEXT	The transmission quality and thus the transmission capacity of a DSL system is strongly affected by near-end crosstalk (NEXT). If the value is outside the limit, the cause may be a split pair.
Receive level	In this operating mode, the KECT can be used as a selective level meter in conjunction with the *Send Signal* function.
Send Signal	Generation of measurement signals which can then be used for DELT measurements in the receive level and reflection loss modes.
Broadband noise	The transmitted signal from the subscriber lines is disturbed by noise and the data transmission capacity is reduced. Causes are asymmetry errors, crosstalk and bad connections.
Impulse noise	Impulse noise is a non-stationary noise caused by electromagnetic disturbances occurring in the vicinity of the line, e.g. switching on or off a refrigerator motor or call voltages from adjacent lines.







TDR for cable fault location and length measurement

A powerful **Time Domain Reflectometer** (TDR) enables fast detection of the line end and accurate location of cable faults. The operating mode works by the pulse-echo method, in which a measuring pulse is sent into the cable. When the pulse reaches the cable end, a fault location or cable anomaly, a certain portion of the pulse energy is reflected to the meter. The reflection curve shown shows all impedance changes along the cable. The amplitude of a reflection is determined by the magnitude of the impedance change.

Cable faults such as short-circuits, contact, interruption, branching, bad splices, water penetration and other problems such as lightning strikes, bruising etc. can be detected. A sample-and-hold function allows the detection of unstable or temporary cable faults. Some typical reflection curves and the associated cable faults are, for example:


Open cable end


Short circuit


Splice

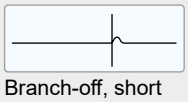

Branch-off

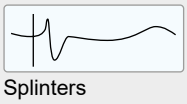

Split / Resplit


Water within cable


Bad contact

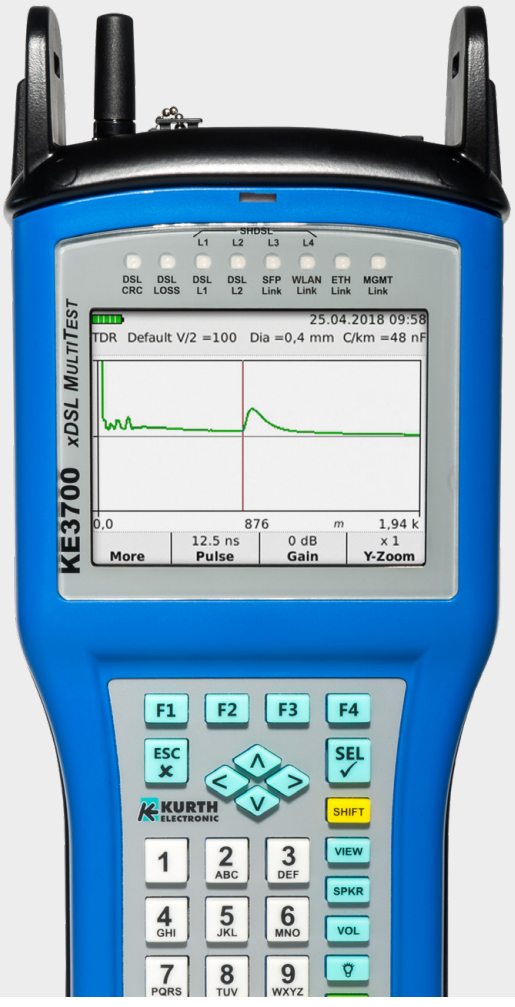

Intruding water


Branch-off, short


Splinters

The maximum checkable cable length for telecommunication cables is up to 6,000 meters, depending on wire diameter and measuring pulse length. The extremely low dead zone of less than 4 meters and the versatile setting options for precise fault location are particularly noteworthy.

NEW xTalk Measurements: A measuring pulse is transmitted via L1 and every reflection on L2 is detected, only L2 is displayed.



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Specifications KECT and KE3700 CT

Line multimeter

General	■ Overvoltage protection with switchover to voltage measurement ■ Measuring points selectable between A-B, A-GND and B-GND		■ Test line compensation ■ Display of min / max values
Conformance	Measurement range Resolution / Accuracy to 6 V to 60 V to 280 V Overvoltage protection	0 to 280 V DC 1 mV DC / ± 0,5 % + 2 Digits 10 mV DC / ± 0,5 % + 1 Digit 100 mV DC / ± 0,5 % + 1 Digit 300 V DC	0 to 200 V AC sinusodial 1 mV DC / ± 1,5 % + 3 Digits[1] 10 mV DC / ± 1,5 % + 3 Digits[1] 100 mV DC / ± 1,5 % + 3 Digits[1] 300 V AC sinusförmig
Frequency	Measurement range Resolution / Accuracy to 600 Hz to 6 kHz to 60 kHz	– – – –	15 Hz to 60 kHz 0,01 Hz / ± 0,5 % + 1 Digit 0,1 Hz / ± 0,5 % + 1 Digit 1 Hz / ± 0,5 % + 1 Digit
Current	Measurement range Resolution / Accuracy Overvoltage protection	0 to 700 mA DC 0,1 mA DC / ± 0,5 % + 3 Digits 950 mA	0 to 500 mA AC 0,1 mA DC / ± 1,5 % + 5 Digits[2] 950 mA
Insulation / Resistance Leakage	Measurement range Resolution / Accuracy to 30 MΩ to 300 MΩ to 3 GΩ	1 kΩ to 50 MΩ at 8 V test voltage 60 kΩ to 2 (5) GΩ at 100 V test voltage 10 kΩ / ± 2 % + 50 kΩ 100 kΩ / ± 2 % + 500 kΩ 1 MΩ / ± 2 % + 5 MΩ	
Loop resistance	Measurement range Resolution / Accuracy Loop length (short circuit) calculation Loop length resolution / accuracy	0 to 3 kΩ with DC mains voltage suppression 100 mΩ / ± 0,5 % + 0,5 Ω 0,1 m to > 20 km depending on cable parameters 0,1 m / ± 1 %	
Resistance	Measurement range Resolution / Accuracy	0 to 2 MΩ 4 Digits / ± 1 %	
Capacitance	Measurement range Resolution / Accuracy to 30 nF to 300 nF to 3 µF Line length (open) calculation Resolution / Accuracy to 100 m to 1 km > 1 km	0 to 3 µF (10 µF) 10 pF / ± 1 % + 100 pF 100 pF / ± 1 % + 500 pF 1 nF / ± 1,5 % + 5 nF 0,1 m to > 20 km depending on cable parameters 1 mm / ± 1 % 0,1 m / ± 1 % 1 m / ± 2 %	
Ground resistance Station ground	Measurement range Resolution / Accuracy	0 to 2 MΩ 4 Digits / ± 1 %	
LCL @ 1 MHz Symmetry damping	Measurement range Resolution / Accuracy	0,01 to 90 dB 0,01 dB / ± 0,5 dB	
NEXT @ 1 MHz	Measurement range Resolution / Accuracy	0,01 to 125 dB 0,01 und 0,1dB / ± 0,5 dB	
RFL Resistance fault localization	Measurement range Resolution / Accuracy Line length (short circuit) calculation Resolution / Accuracy	0 to 3 kΩ via 2- and 3-wire method 100 mΩ / ± 0,5 % + 0,5 Ω 0,1 m to > 20 km depending on cable parameters 0,1 m / ± 1 %	
Note	Measurements via current clamp not possible [1] Sinusodial voltage > 5 % of end value 45 Hz .. 65 Hz, > 15 Hz or > 65 Hz .. 10 kHz additional error of ± 3 % + 5 digits. [2] The TRMS converter causes a zero point deviation in the AC measurements of up to 30 digits.		

31 MHz line qualification

General	■ Frequency range 4.312 kHz to 31 MHz, manual input or xDSL bandwith ■ Cable shortening factor 0.33 to 3.33 10 mV DC		■ Input impedance 100 Ω, 120 Ω ■ Cable diameter 0.1 mm to 1.6 mm
Impedance	Display Resolution / Accuracy	0 .. 1000 Ω, graphical 0.1 Ω / ± 5 % or ± 5 Ω	
Reflection	Display Resolution / Accuracy	0 .. 100 dB, graphical 0.01 dB / ± 1 dB	
LCL (Balance)	Display Resolution / Accuracy 2 MHz / 10 MHz / 30 MHz	0 .. 110 dB, graphical 0.01 dB / ± 0,5 dB / ± 2 dB / ± 5 dB	
NEXT	Display Resolution / Accuracy	0 .. 130 dB, graphical 0.01 dBm / ± 1 dBm	
Recieve level measurement High impedance	Display Resolution / Accuracy	-100 .. 10 dB, graphical 0.01 dBm / ± 1 dBm	
Spectrum High impedance	Display Resolution / Accuracy	-100 .. 10 dB or -150 .. 10 dBm/Hz, graphical 0.01 dBm / 0.01 dBm/Hz / ± 1 dBm	Freeze function Comparison of two measurements
Wide band noise	Filter Display Resolution / Accuracy	ADSL 1.2 to 1,5 MHz / ADSL 2+ 3,0 MHz / VDSL2 8abcd to 9,0 MHz / VDSL2 12ab to 13.0 MHz / VDSL2 17a to 19.0 MHz / VDSL2 30a to 31.0 MHz dBm, numerical 0,01 dBm / ± 1 dBm	
Impulse noise	Impulse length Threshold Resolution Further output values Recording period	> 500 µs 0.1 mV to 25.4 mV / -20 to -59.9 dB 0.1 mV / 0.1 dB Runtime in seconds / Number of noise pulses Unlimited	

TDR function

Time domain reflectometer	Measurement range Resolution of measurement / output Pulse Analogue gain Magnification	4 m to 6,000 m 6.26 ns or 0.1 m 12.5 ns to 2500 ns 0 dB to 56 dB in 10 dB steps Max. 10x	Freeze function Comparison of two measurements

Additional information

	Interfaces	2x 4 mm banana plugs (Line1 and Line2) touch protected for 3-pin TF connectors RJ45 1000 MB management port, RJ45 10 / 100 / 1000 MB test port
	Operating temperature	0 °C to +50 °C
	Storing temperature	-10 °C to +60 °C
	Humidity	Up to 93 %, non-condensing

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