

LTC135

Load Tap Changer Testing Power Supply



- **Winding Resistance Measurement**
- **Dynamic Resistance Measurement**
- **Switch sequence timing**
- **Transition/resistor measurement**

Description

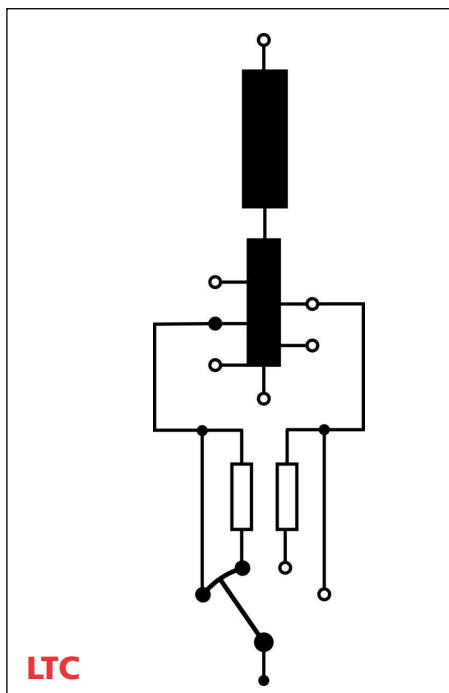
LTC135 is an accessory for circuit breaker analyzers to test Load Tap Changers where it delivers test currents for the measurements.

The load tap changer is the only moving part connected to the transformer windings. Taking a transformer off the system to investigate an internal problem with a tap changer is an expensive exercise; therefore it is in every utility's interest to carry out condition assessments of their tap changers to help detect developing faults at an early stage.

LTC135 is designed to be used together with the following Megger instruments:

- EGIL
- TM1600/MA61
- TM1700 series
- TM1800

Together with the circuit-breaker analyzer (CBA) it becomes a test setup for performing dynamic measurements on load tap-changers. The unit can also be used for winding resistance measurements and other applications where a constant DC current test signal is requested. It is a power supply designed for DC current testing of inductive loads with provisions for discharging the transformer winding when the test is finalized.



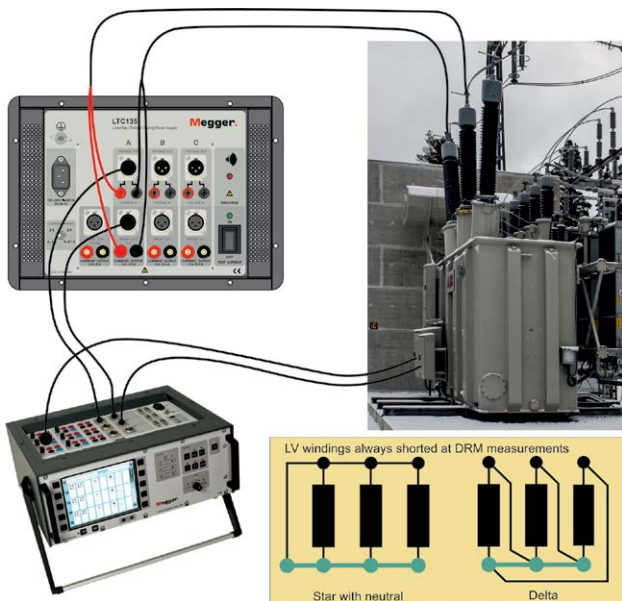
Supported measurements	EGIL (with analog measurement)	TM1600/ MA61	TM1700 series	TM1800
Single-phase				
Continuity test	X	X	X	X
Dynamic current/ timing	X	X	X	X
Dynamic voltage/ timing	X	X	X	X
Dynamic resistance and timing	X ¹⁾	X	X	X
Motor current (external clamp-on)				
Three-phase				
Continuity test		X	X	X
Dynamic voltage/ timing		X	X	X
Dynamic resistance and timing		X	X	X
Motor current (external clamp-on)			X	X
LTC control	X	X	X	X

1) Resistance can be indicated/estimated by combining measured dynamic voltage and assumed/set test current

Application example

Dynamic resistance measurement (DRM) technique has been used extensively on high voltage circuit breakers to determine the condition and deterioration of arcing contacts inside the breaker. DRM is also an advanced diagnostic tool for LTCs to detect problems like coking (creation of pyrolytic carbon and thick organic film on the contacts), long term degradation of tap selector contacts and reversing switch contacts, deviation in switching times, damaged transition resistors or reactors and excessive resistance increase of arcing and main contacts of LTC. DRM is measurement of resistance (or voltage from a constant current source) trace while the tap changer is switched from one extreme tap to the other and back. Since the resistance changes dynamically as the LTC taps are changed, it is recorded with a high sampling rate and plotted as a function of time. Dynamic change in resistance (or voltage) plot gives valuable information about the contact condition which cannot be determined by traditional static winding resistance measurements (WRM).

Magnitude of test current for DRM test is very important. DRM response obtained at different test currents on same LTCs should not be compared as DRM trace would vary depending upon the magnitude of test current selected. One of the major differences between DRM and WRM setup, other than selection of test current, is shorting the corresponding secondary winding. The reason for shorting the secondary windings is twofold. First, by reducing the inductance it minimizes the L/R time constant of the circuit that allows to measure and track fast variations in voltage/resistance as the taps are changed. The WRM test should use 1 and 5 A per tap and the DRM test preferably a constant current source of 100 mA.



General hook-up overview, in this case together with TM1760.

Specifications LTC135

Specifications are valid at an ambient temperature of +25°C, (77°F). Specifications are subject to change without notice.

Environment

Application field For use in high-voltage substations and industrial environments.

Temperature

Operation -20°C to +65°C (-4°F to +149°F)

Storage -40°C to +85°C (-40°F to +185°F)

Relative humidity %RH 5%-95%, non condensing

CE-marking

EMC 2004/108/EC

LVD 2006/95/EC

General

Mains voltage 100-250 V AC, 50 / 60 Hz

Power consumption 300 W (max)

Dimensions 360 x 195 x 300 mm

14.2 x 7.7 x 11.8 in.

Weight

6.5 kg (14.3 lbs) instrument only

10.9 kg (24 lbs) with accessories and carrying case

Outputs

Output current	3 x 0.1 A	3 x 1 A	1 x 5 A
Open circuit voltage	48 V	48 V	48 V
Output impedance	480 Ω	48 Ω	9.6 Ω
Shunt output	1 V/0.1 A	1 V/1 A	1 V/5 A
Shunt inaccuracy	0.1%	0.1%	0.1%
Measurement range			
EGIL and TM1600 (4 V)	0 - 44 Ω	0 - 4.4 Ω	0 - 850 mΩ
TM1700/1800 (15 V)	0 - 200 Ω	0 - 20 Ω	0 - 4 Ω

Included accessories



Carrying bag



Sets of test leads (x3) 20 m (65 ft)

Ordering information

Item	Art. No.
LTC135	
Including carrying bag and cables	CG-92100

Postal address

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Visiting address

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Registered to ISO 9001 and 14001

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