

First trip measurement with TM1700 and TM1800



Introduction

Test the breaker at first operation after a longer period of static position. Trip the circuit breaker from station control (Local or remote system). During operation coil currents are recorded by current clamps connected to TM1700 control part or TM1800 analog module. 3 phase timing are

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recorded by current clamps in secondary circuit station of current transformers (in the bay). The “timing” current clamps are connected to the analog channels.

Auxiliary contacts and vibration/acoustic measurement can also be done during this kind of measurement.

TM1800 and TM1760 with analog channels is needed for this application. TM1800 needs two analog channels for currents and one digital module or analog channels for motion (and one more analog module for acoustic measurement.) TM1760 needs one or two analog sections.

1. Application: First trip test

A good and time effective way to check the condition of a circuit breaker is to document its behavior at the first open operation after it has been idle for long time. The measurement and connections to the circuit breaker are carried out while it is still in service. All of the connections are made inside the control cabinet.

The biggest benefit of using first trip testing is to test “real world” operating conditions. If the circuit breaker has not operated for years, first trip testing will reveal if the circuit breaker is slower due to problems in the mechanism linkages or coil armatures caused by corrosion or dried grease. With traditional methods, the testing is carried out after the circuit breaker has been taken out of service and has been operated once or even twice. On a gang operated breaker, (breaker with a common operating mechanism), one coil current is measured and on an IPO (Independent Pole Operated) breaker three coil currents are measured. Analyzing the coil current signature gives information of the CB condition. Auxiliary contacts timing can also be measured. Opening times can be measured by monitoring the protection CTs’ secondary current, however, the arcing time will then be included. If there is a parallel current path available the opening times can be more accurately determined since the arcing is minimized.

A more advanced approach to first trip is to also measure vibration. This provides detailed information of the status of the circuit breaker. These measurements during first trip are possible with TM1800, TM1700 and TM1600/MA61. Extra caution must be taken since there are live circuits in the control cabinet and the mechanism is fully charged. The breaker can operate at any time a fault condition occurs.

2. Advantage

Detect first operation makes it possible to detect true status of circuit breaker after long time without operation.

Example : Mechanical parts easy get stuck in position due to corrosion and old grease.

The test is done on line with live phases so test should only be done with experienced personal. Don't connect anything directly on the live phases. Do not disconnect any current circuits in bay.

3. Material

1 or 3 Current clamps for trip(close/open) coil. Max 300A DC/AC ratio 100mV/A

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3 current clamps for timing via reading of secondary circuit in current transformer in breaker bay.
Max 30A DC/AC ratio 100mV/A

1 or 3 XLR to BNC adapter cable, for control current, only used with TM1800

3 XLR to BNC adapter cable for timing read by analog channels

2 connectors for supply voltage reading

2 Sense cables for supply voltage reading

Media with test plans/template

Application note

Case

4. Preparations

Setup on breaker setup from template "First trip". Select common or separate mechanism. Setup current clamps follow Transducer configurations in analyzer User guide

Turn off function Auto power off for all current clamps for this application. Set current clamps into continuous mode. Press autozero button during start of clamp. The red LED will illuminate and current clamp will stay on until turned off.

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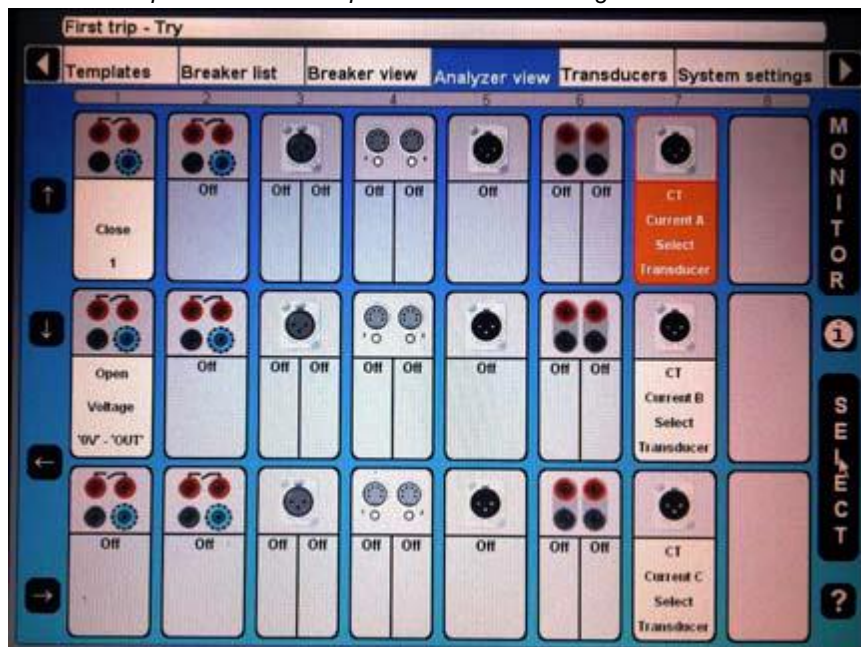
5. Connections

Most common for this test is that the operation is initiated from the control room not from analyser. The connection are described as in this case. Connect the remote trip initiation voltage terminals in the CB control cubicle, parallel to the "Trig-in" input on the Top panel. Connect current clamps for timing according to Analyzer view. For TM1700 control circuit connect current clamp to control outlet CT (BNC) connectors

For this connector the CT ratio must be 100 A/1 V as delivered in set (or result must be converted to right value!) For TM1800 normal analog channels should be used and transducer selected for correct ratio.



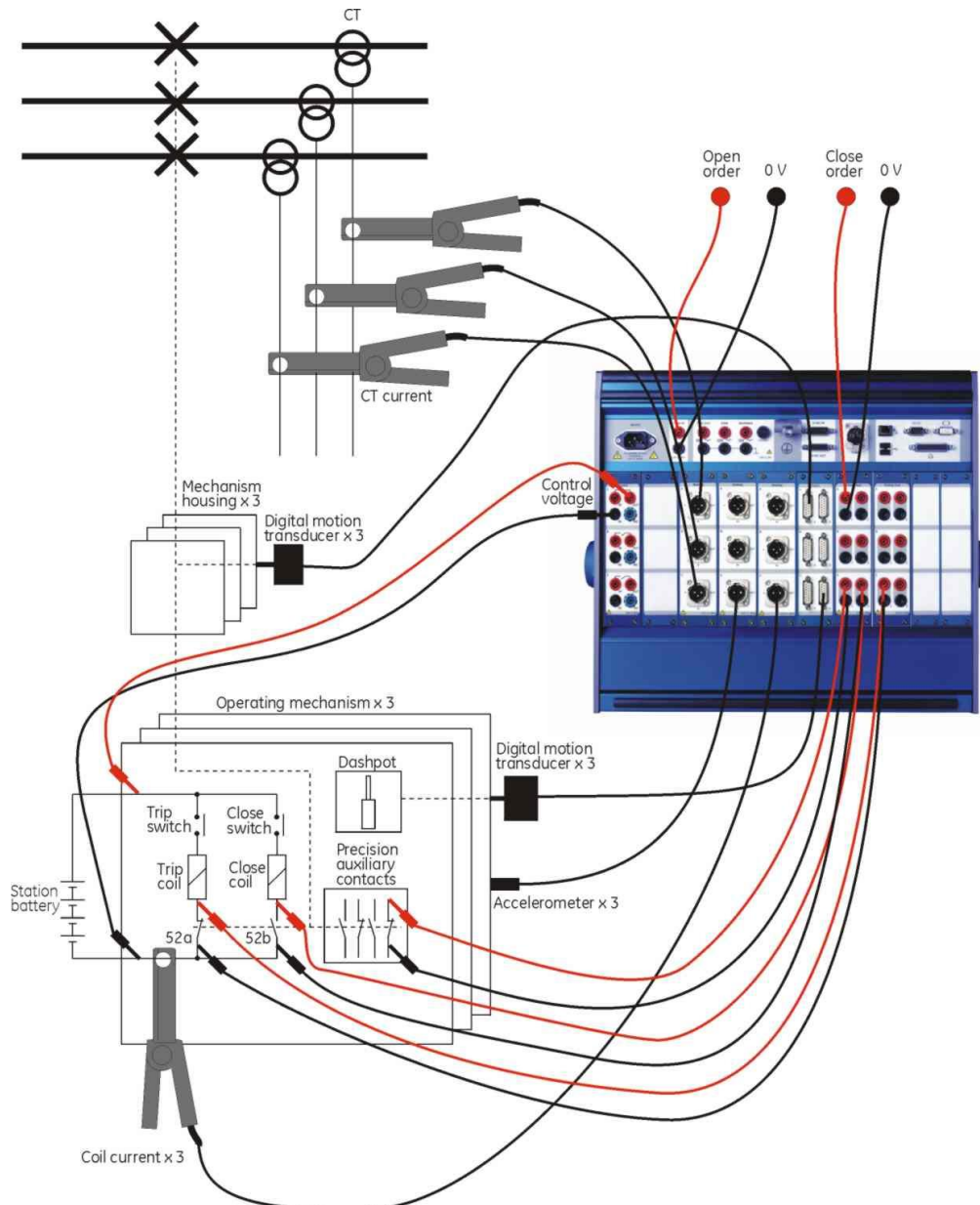
Connection input of current clamp for coil current reading on TM1700.



Connections instruction for First trip with TM1700.

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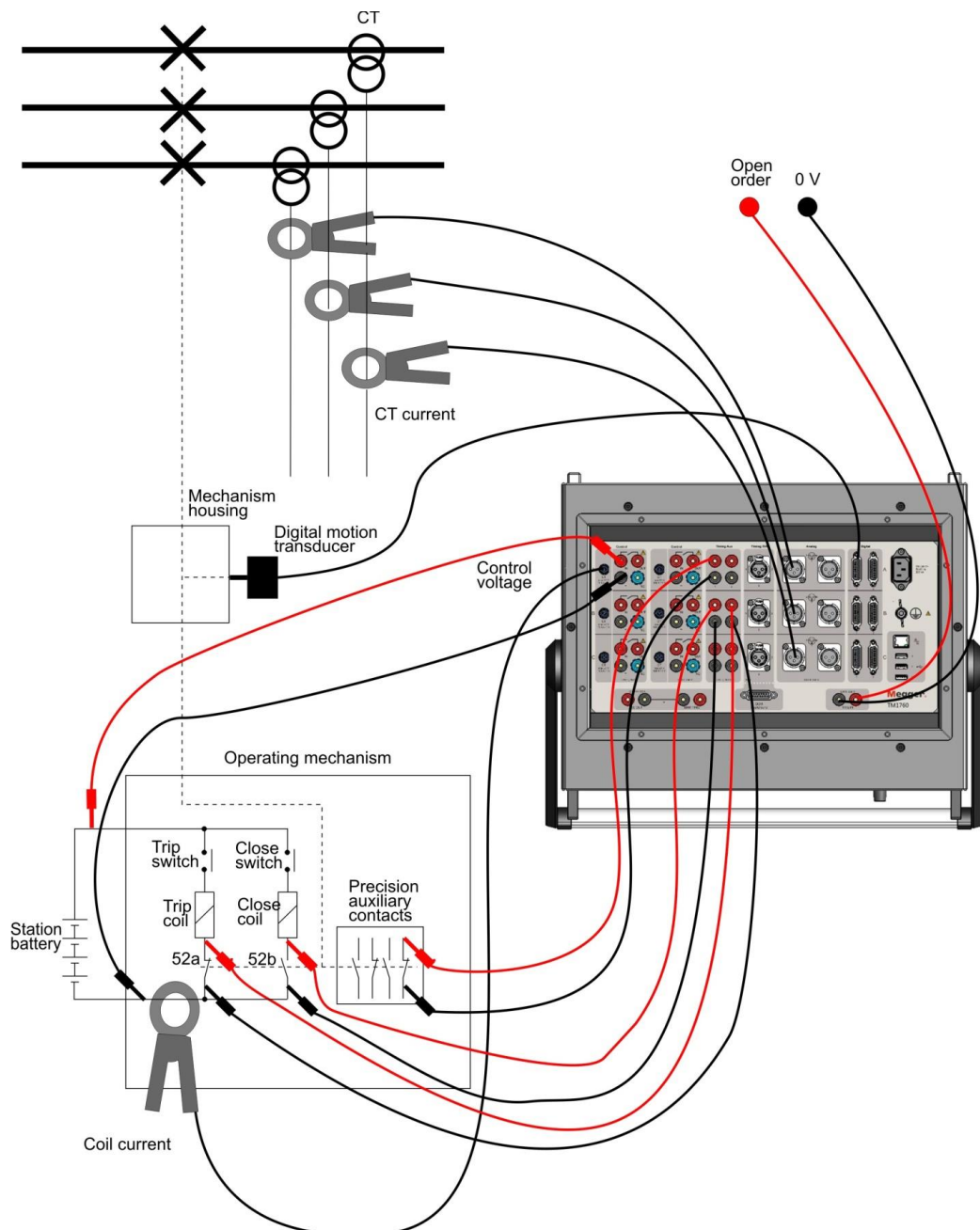


TM1800 setup for 3 mechanisms and 3 motion with digital transducers, 3 dashpot dampings and 3 acoustic measurements.

Note CT clamp delivered are of other kind as those in this picture! In this picture also motion, damping and acoustic accelerometers are connected to circuit breaker. Motion should not be performed if not a laser transducer or preinstalled transducer can be used.

First trip measurement with TM1700 and TM1800

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TM1760 setup for 1 mechanisms and 1 motion with digital transducers (3 mechanism and 3 timing can also be done with TM1760, in similar way as with TM1800. Note max 6 channels free auxiliary contacts.) TM1700 configuration with one section of analog channels needed for this application.

First trip measurement with TM1700 and TM1800

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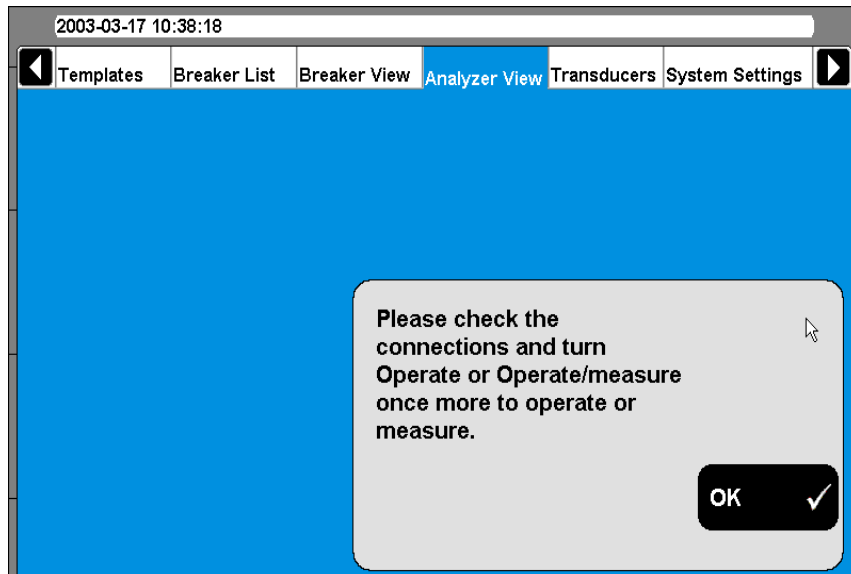
Note CT clamp delivered are of other kind as those in this picture! Both types are possible to use!

Prepare setup from First trip template. Give circuit breaker setup a ID and create a new test. Select transducers for channels.

Rotate the OPERATE/MEASURE knob as shown in the figure below to initiate the measurement.



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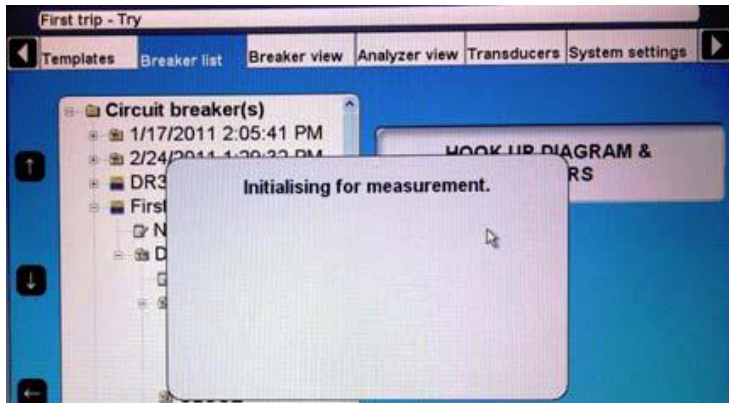


The unit will display the following warning, to check the connection. Accept by clicking OK icon after checking the site and connections. Be ready to walk out from the test site.

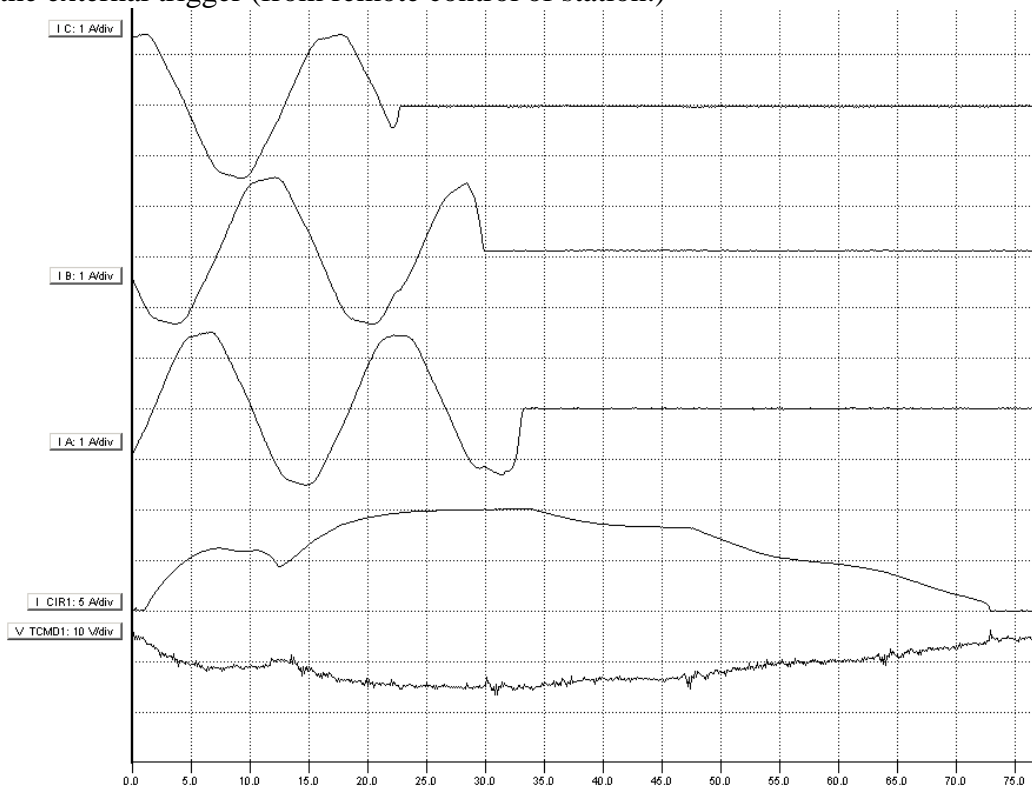
Rotate the OPERATE/MEASURE knob as shown in the figure below to initiate the measurement once again.



First trip measurement with TM1700 and TM1800



The unit will display as shown below to initiate for few seconds and will wait for the external trigger (from remote control of station.)



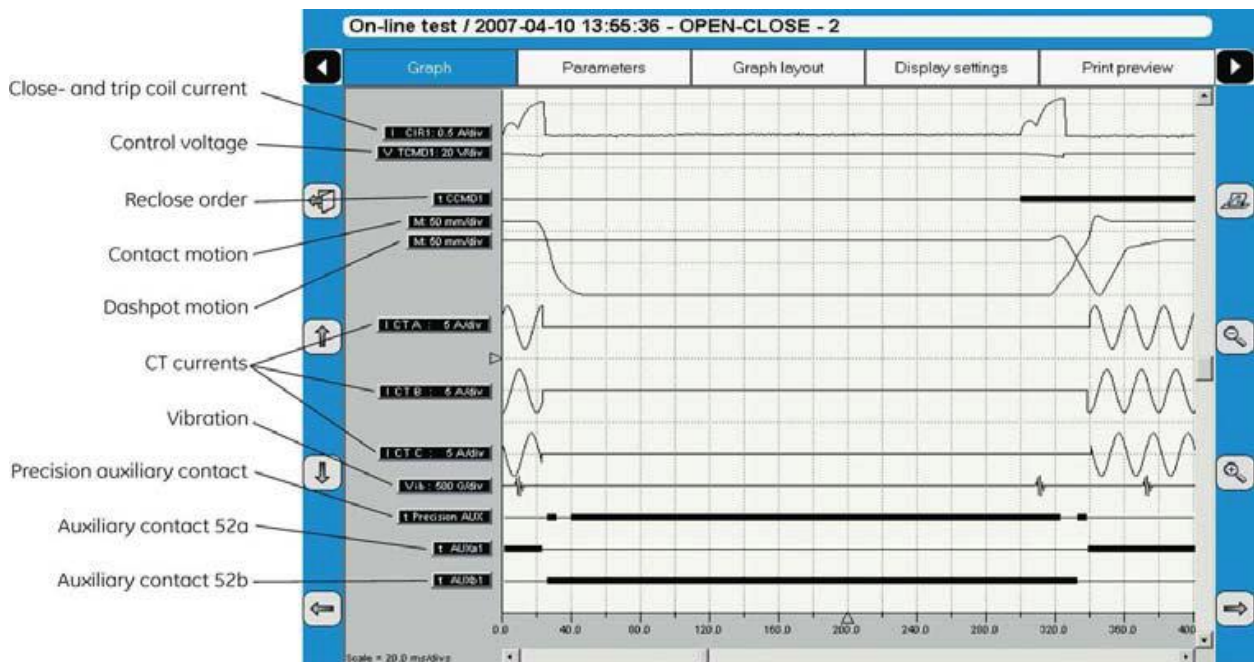
Example of timing trace result(monochrome view):

(Graphs and values presented in standard/normal way.)

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During first trip you measure a trip not an open. Take this into consideration during analyse of results.



Comment:

Kit can also be used for First trip test with TM1600/MA61. With any instrument the tests has to be limited to fit the max amount of analog channels. Max analog channels for TM1600/MA61 are 6!