

Application Note

HIOKI HiCORDER MR8880-20 FOR AUTOMOTIVE CLUTCH EVALUATION TESTING



Hioki Memory HiCorder
MR8880-20

Automotive Clutch & Its Functionality

An automotive clutch is a mechanical device in motor vehicles to engage and disengage the running engine to the wheel during gear shifting [1] without the need to switch off the engine. There are three types of torque transmission clutch– frictional, hydraulic and positive (or dog) clutch [2]. The mechanical friction clutch is the most commonly used in the automotive sector. This clutch type is made up of the spring-loaded pressure plate, single or multiple clutch disk and the flywheel as shown in Figure 1.0. The clutch disk surface functions to grip the rotating flywheel and transfer the power to turn the wheel shaft and mobilize the vehicle.

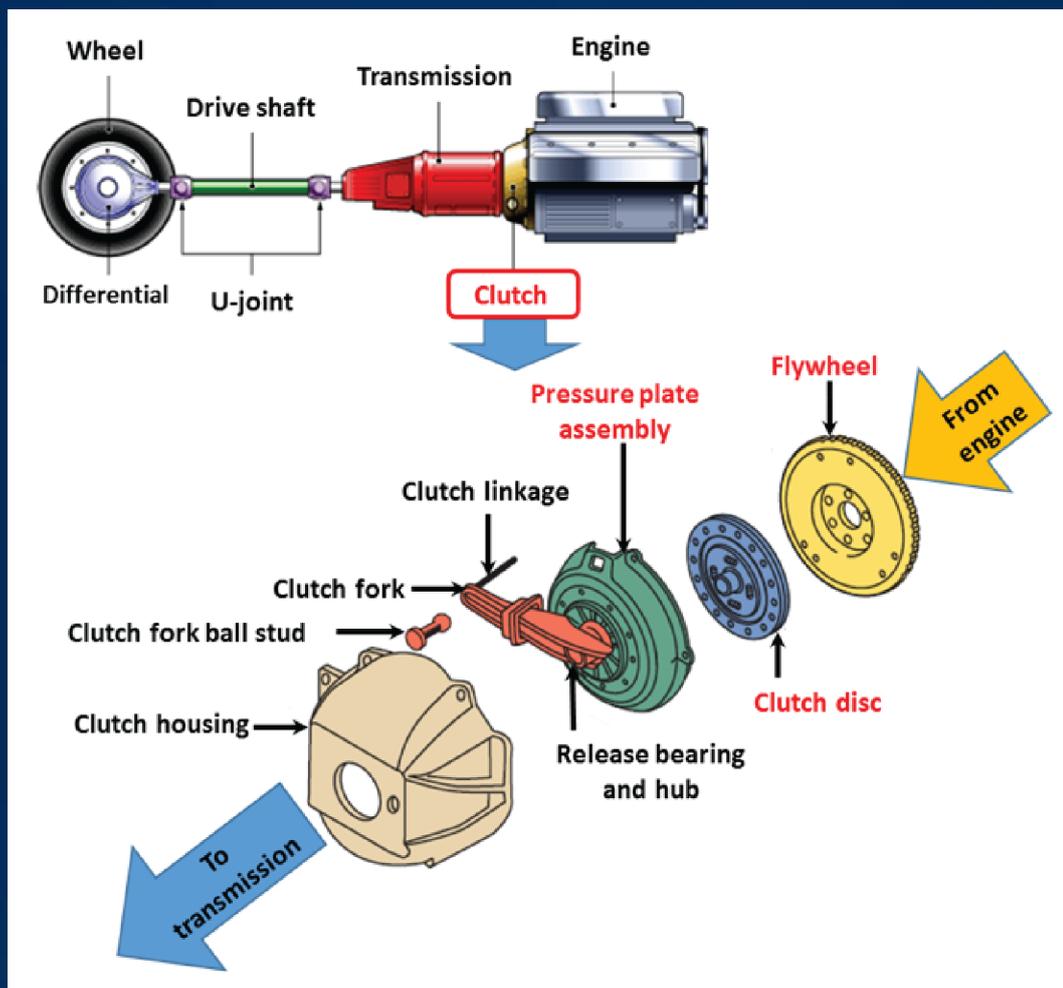


Figure 1.0 Clutch position and its components [3],[4]

Automotive Clutch Evaluation Testing

The friction surface of the clutch disk plays an important role in efficient power transmission from the engine to the wheels. This friction can be translated into the rotational speed response of the clutch when it engages/ disengages. A clutch evaluation test captures the rpm response of the clutch disk when a force is applied to the pressure plate in a set-up similar to a car clutch system. Both measurement output is in the form of electrical signals (voltage).

Hioki HiCorder MR8880-20 For Automotive Clutch Evaluation Testing

Hioki HiCorder MR8880-20 is capable of recording the real-time waveform of the force applied and the rotational speed response during clutch evaluation testing. In this application note, the measured force is in torque value and the rotational speed in revolutions per minute (RPM). Two connecting cords (L9197) connects the torque and speed signal source to two different channels on the memory logger (Figure 2.0)

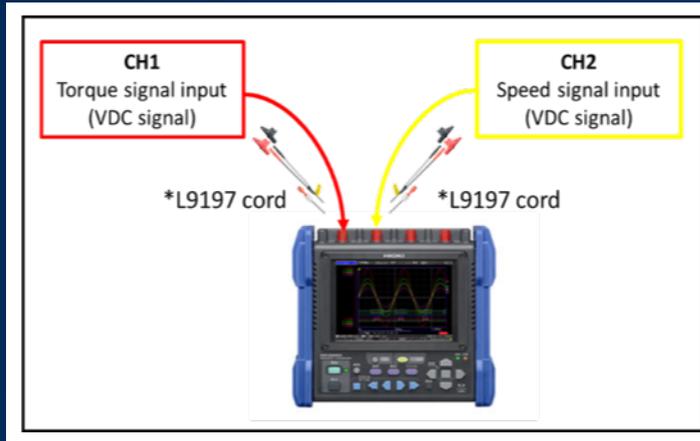


Figure 2.0 Hioki MR8880-20 set-up for clutch evaluation

Set the recording configuration before the start of the test. Use the ‘Setting’ tab to set the recording interval, time/division, and the recording method. Choose the ‘Realtime’ recording method and set a recording interval of 5ms for each data point and time display axis interval of 500 ms/ division. Figure 3.0 below illustrates these settings.

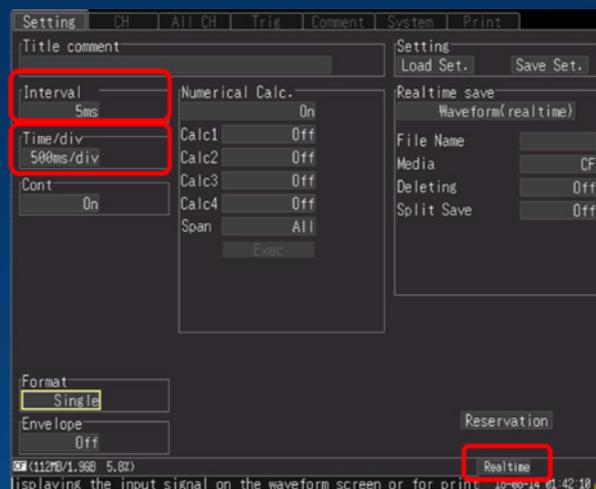


Figure 3.0 MR8880-20 recording setting

Next, configure the measurement voltage range and the upper limit of measurement for both channels using the [Wave+Set] screen (Figure 4.0).

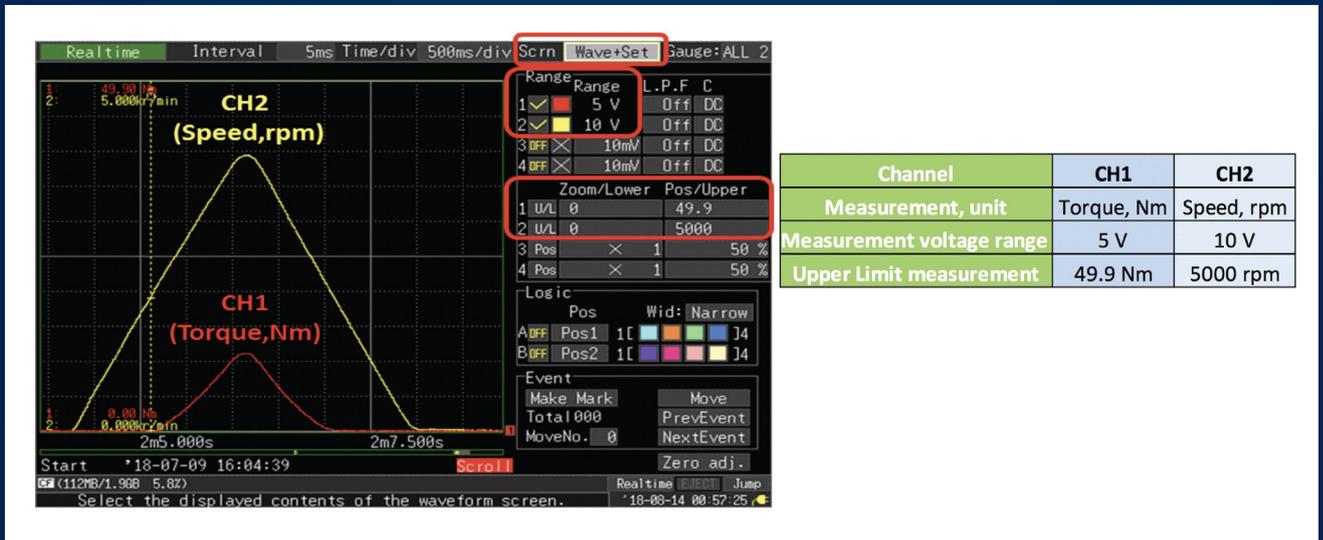


Figure 4.0 MR8880-20 Range & Upper Limit For Measurement

Use the cursor mode at [Wave+Crsr] screen to determine the RPM at specific torque value. Figure 5.0 list the step-by-step to enter the cursor mode.

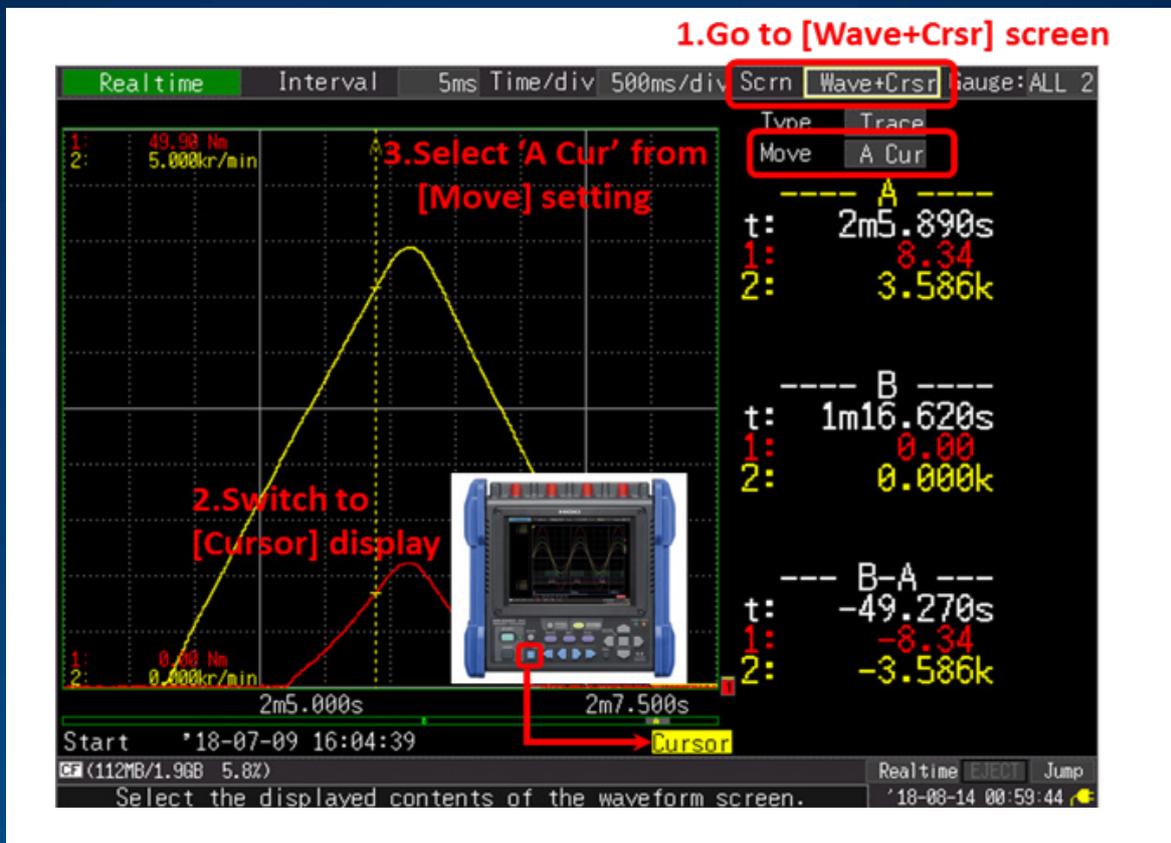


Figure 5.0 Step-by-step to enter cursor

Move the cursor to the desired torque value to obtain the corresponding speed value (Figure 6.0). The obtained value can be used to determine the clutch evaluation result. In the example below, the required speed is 3400 ± 200 rpm @ 8.3 Nm torque. The evaluated sample gives a rotational speed of 3586 rpm @ 8.34 Nm torque and therefore passed the requirement.



Figure 6.0 Cursor function to obtain corresponding RPM to specific RPM to specific torque

Hioki HiCorder MR8880-20 offers a versatile yet easy to use solution for clutch evaluation testing on real-time basis. The simple set-up interface and result retrieval enables speedy testing time.

Find out more about Hioki Memory HiCorder MR8880-20 at www.hioki.com.sg now!

References

1. [http://www.npl.co.uk/reference/faqs/what-is-the-general-principle-of-a-force-transducer-\(faq-force\)](http://www.npl.co.uk/reference/faqs/what-is-the-general-principle-of-a-force-transducer-(faq-force))
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