

# Operating Instructions

**Eltrip-7km**

**Eltrip-7kmb**

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## 1. Getting started

We congratulate You for choosing reliable and dependable Eltrip-friction meter.

The purpose of this operating instruction manual is to guide You with calibration and use the meter, so we recommend that you read these instructions carefully before starting to use the meter.

### 1.1. *Placement in vehicle*

When selecting placement of meter in vehicle you should make sure that it will not obscure your vision and you can easily reach the meter.

Attach the meter sturdily to the vehicle, preferably with at least two attachment points, for example at top and bottom of the meter. The meter should not shake or vibrate when driving on normal even road, as vibration may cause wrong measurement results during friction measurement.

## 2. General about measuring friction

The slipperiness between road surface and vehicle tires is expressed with *friction coefficient*. It depends on road condition, place of measurement, vehicle, vehicle load, tires and to a degree even speed of travel during measurement.

Thus, *absolute friction* cannot be measured – even similar two vehicles can experience different friction when travelling on a road.

The friction coefficient is thus usually defined as subjective friction. In this case all used measurement instruments are *calibrated* to measure same friction coefficient in similar conditions. This makes the readings from the different meters in different vehicles comparable and usable when determining for example the needs of wintertime road maintenance.

Eltrip-7k uses subjective measurements. This means that it must be calibrated when taken in use in a new vehicle or vehicle has experienced changes, such as wear of tires or different load.

## 3. Use in multiple vehicles

It is possible to alternate the meter between multiple vehicles without new calibration as long as the meter is first calibrated to all the required vehicles.

When connecting the meter to a vehicle, display shows text 'C 1'. It is then possible to choose identifier of current vehicle (number 1 through 6) with right button and select vehicle with a left button.

If text 'EEC' is shown after vehicle selection, the calibration information of vehicle is missing and the meter must be calibrated first. The EEC message is cleared by pressing both keys at same time.

Calibration for single vehicle does not erase calibration of other vehicles from meter memory, so meter can be calibrated to new vehicle whenever needed without having to do calibration for all other vehicles at same time.

## 4. Measuring friction

The meter must be calibrated before the measurements are reliable. Make sure that the meter is calibrated for your vehicle before starting measurements. The calibration instructions can be found from chapter 5.

The measurement is best made on flat and straight part of the road.

Measurement is made as follows:

1. Hold the speed at approximately 40km/h.
2. Press and hold the clutch, or in case of automatic, lift your foot from the gas pedal.
3. Meter display is dark; press OK button.
4. Meter display shows single line (-), and second later another line (display shows '--')
5. Important: Make sure that you can brake safely and there is no one behind you that could hit you during braking!
6. Apply brakes at full power for one second. The brake must be pressed fully down very quickly, held down for one second and let go also very quickly. When the meter detects braking third line is shown on display and meter measures the braking effect.
7. Let the car roll freely (without braking or accelerating) until the result is shown on meter display.
8. By pressing OK button the result is send to data collection device via Bluetooth link (only Eltrip-7kmb model).
9. The display is automatically turned off after one minute, or by pressing C key.

If the third line is shown on display too quickly, before braking, the sensitivity of meter is too fine and must be adjusted. Note that very rough (bumpy) road surface can also cause premature measurement.

## 5. Calibration

In order to measure friction in all vehicles the same way, the friction meter must be calibrated for the vehicle it will be used in. For the measurements to be reliable, the calibration should be done often enough, at least whenever vehicle condition changes (for example tires are worn or have been changed).

Calibration is done in a place with known friction, for example on airport runway with the aid of accurate friction meter. The Eltrip-7k meter will remember the calibration even if it is not connected to vehicle.

For calibration two values are set to meter, A and B.

- A) Friction value, the known friction of surface.
- B) Sensitivity, which specifies how easily meter will detect braking. Small value makes meter more sensitive to braking, but in that case also uneven (or rough) road surface can cause erroneous measurements. High value makes meter less sensitive to incorrect measurements, but it may also prevent meter from noticing braking on very slippery conditions. The suitable value for a vehicle can be found by trying. Usually this value is between 50 and 70.

The calibration is done as follows:

1. Measure friction normally (see chapter Measuring friction)
2. When friction result is shown (the shown result does not need to be correct), hold OK key down until "CAL" text is shown on display. Release OK key.
3. Basic value "A.20" is shown on display (that is, 0.20, with first zero being replaced with indication A). Change number by pressing C-key shortly, or by holding C-key down in which case number increases quickly. After .79 the reading changes back to .10.
4. When desired reading (the actual friction of current road) is reached, press OK button shortly.

5. Reading changes to B.50 is , where number indicates the selected sensitivity value (see chapter B on previous page). The reading is set between 20 to 80 the same way as friction in step 3, and accepted by pressing OK.
6. The display changes between values A and B and text “SET”
  - If you want to accept the calibration, press and hold OK-button for about a second to accept. “S.E.T.” will show on display for a moment, and meter saves the calibration and returns to off mode.
  - If you want to reject calibration, press C and meter returns to off mode. For new calibration friction measurement must be started over again.
7. Verify new calibration with a few more friction measurements. If needed, repeat calibration.

## 6. Bluetooth functionality

If the meter has been equipped with Bluetooth-connectivity, the address of meter is in format xx:xx:xx:xx:xx:xx (six pairs of numbers and letters, for example 00:02:24:1A:83:D9) and can be found underneath a panel in back of the meter. The connection is formed to meters serial port service. After connection has been established, the meter sends requested friction measurements to remote device by pressing OK key when the result is shown.

The measurement result message of meter is formatted similarly to messages sent by Eltrip-45nkc, except the temperature and road condition fields are empty. The message format is as follows:

**\$PTRPF , , , 0 . 32 \* 73 <lf><cr>**

\$PTRPF is message identifier, followed by two comma-separated fields (in Eltrip-45nkc these fields include temperature and road condition). Third field is measured friction value, followed by \*-character and 2-character checksum that is calculated by calculating exclusive OR (XOR) operation for all characters between \$ and \*, these excluded.

# 7. Problems

## 7.1. *“EEx” on display*

In error conditions at text EEx is shown on display, where x specifies the error in detail. Error can be cleared by pressing both buttons at same time.

EEC – Meter calibration is invalid and the meter must be calibrated before it can be used.

EEA – Meter has detected an error in self test and must be repaired.

## 7.2. *Meter does not turn on*

If meter stays dark and does not react to keys, unplug it for a several seconds and reconnect it. If this does not help, check the fuse in the plug connector.

## --- Other products ---

### **Eltrip-45nk / -nkl / -nkc**

Precision trip meter with friction and temperature measurement and with computer connectivity for demanding professional use.

### **Eltrip-50**

Easy-to-use driving log for enterprenours.

### **Eltrip-R10 / -R20**

Meters with features especially for rally use.



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