

OPERATING INSTRUCTIONS

ELTRIP-45n
ELTRIP-45nc
ELTRIP-45nk



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1. TECHNICAL DATA

COUNTERS:

- * 2 pcs (0 and 1) alternative counters for measuring distance, time (and temperature). It is possible to preset distance into the 0-counter.
- * 3 pcs (2, 3 and 4) optional counters for measuring distance, time (and temperature)
- * S-button for selecting speed on the display and turning the display off.
- * T- button to select time, total distance (and temperature) and to initiate friction measurement.
- * N-button clears the counters

KEYS: 8 snap action push buttons

DISPLAY: six 10 mm high digits, red LED display. Display can be switched off.

INDICATOR LIGHTS:

- * 5 red LEDs above buttons 1...4 and S-buttons, indicating on going operation
- * 1 green LED above T button (friction measurement)
- * 3 red LEDs on the right hand side of the display indicating selected display.

RESOLUTION OF THE DISTANCE ON THE DISPLAY:

- * 1 metre, max. measurable distance 999 kilometres

RESOLUTION OF SPEED: 0.1 km/h

RESOLUTION OF THE TOTAL COUNTER ON THE DISPLAY: 1 km

RESOLUTION OF TEMPERATURE: 0,1 °C

DIMENSIONS: Width 112 mm, height 45 mm, Depth 30 mm

WEIGHT: 150 grams

OPERATING VOLTAGE: 9 - 30 v, automatic control

Voltage connection is polarity protected

POWER AND CURRENT CONSUMPTION:

*12 V	display on	70 mA, 0,85 W
	display off	15 mA, 0,2 W
*24 V	display on	40 mA, 0,96 W
	display off	10 mA, 0,24 W

MEMORY PROTECTION: memory is protected in case of power break.

The tripmeter doesn't have accumulators or batteries which require service.

OPERATING TEMPERATURE: -30 - +60° C

FUSE: max 400 mA

SENSOR: depends on type of vehicle, several alternatives

We congratulate you on your choice of the ELTRIP tripmeter.

Please study these instructions carefully. By practising the calibration and use of your ELTRIP, you can keep your tripmeter exact and get the best benefit from it.

The use of ELTRIP-45n trip- and friction meters is to measure distance, time, speed and temperature. There are several ELTRIP-tripmeters with different properties.

ELTRIP-45n distance, time and speed
ELTRIP-45nc distance, time, speed and data transfer
ELTRIP-45nk distance, time, speed and friction
ELTRIP-45nkl distance, time, speed, friction and temperature

2. THE INSTALLATION OF ELTRIP

Note! The installation varies depending on the version of ELTRIP.

2.1. The installation of ELTRIP-tripmeter

Fit the ELTRIP-tripmeter into a place near you where it will not endanger your driving. Avoid fitting the tripmeter into places which are in direct sunlight and/or near the heating apparatus.

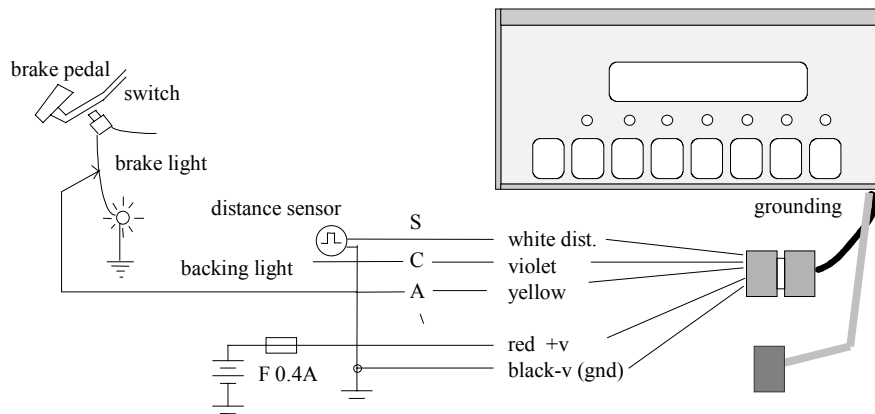
2.2. Connecting the sensor cable, sensor of temperature and electronic conductors

Connect the conductors of the tripmeter and the sensor together. During the power break the contents in the tripmeter's memory will be saved in the data storage. You can connect the tripmeter also to unbroken power.

Connect the temperature connectors together. When fitting the temperature sensor, avoid the place where the rain and wind disturb the function of the sensor. Avoid the place near the motor and lights, too. The place behind the cushion would be just right.

Note the danger of fire

In the case the main switch of the vehicle is connected to the minus (-) wire and you are going to connect the tripmeter to the unbroken power, contact the seller or the manufacturer to get more information about the connection.



Black : Connect the black wire to the ground of vehicle (- voltage)

F red: connect the red wire to the fuse protected (+) voltage (12 ... 24 V). Fuse 400 mA, fast.

S white wire: Connect the plus (+) wire of the sensor to the white wire and connect minus (-) wire of the sensor to the ground of the vehicle. In the case the vehicle has electronic meter, connect only the white wire.

C violet: the violet wire is for counting backwards when backing. Connect the violet wire to the wire between the backing light and the switch of the back up light. If you don't need to count backwards, connect the violet wire to the ground of the vehicle. If it is unconnected, the meter counts backwards.

Note: Change the reversing gear after the vehicle has fully stopped. Otherwise the tripmeter operates to the reverse direction.

A Yellow: *ELTRIP-45n and ELTRIP-45nc*: no connection

Friction meter ELTRIP-45nk: the yellow wire is for measuring friction. Connect it to the cable between the stop light switch and the stop light lamp.

ELTRIP-45nc: 9-pin connector for data transfer

After the installation the display may be turned off. Push any of the buttons 0 ... 4, the display will turn on.

2.3 WARNINGS!

When welding, disconnect the ELTRIP-meter from the power. Although the tripmeter has been protected against the unstabilities in power supply which normally occur in vehicles, welding can cause such high voltages that the sensitive, electronic components can be broken.

Blown fuses are to be replaced only with fuses of the same kind and size (400mA or F400 mA).

3. SETTING UP YOUR ELTRIP-TRIPMETER (CALIBRATION)

After the installation the display may be turned off. Push any of the buttons 0 ... 4, the display will turn on.

When you receive your ELTRIP-tripmeter there is inside the tripmeter the test calibration values, which have been set in in the factory. Before the use of the tripmeter you have to set in right calibration values, which are depending on your vehicle and the tyres. Also follow the precision of the tripmeter because of the wearing of the tyres.

Use the accurate test distance for distance calibration and find out about the friction values used in your area.

3.1. Setting of calibration values

After the installation calibration values must be set into the memory of the ELTRIP-meter. These values are: imp/km-value (reference value) , coefficient to scale friction measuring and value to compensate rolling resistance *You have to set in to the ELTRIP-45n- and Eltrip-45nc meter only the imp/km-value.*

3.1.1.Imp-km value (reference value)

Imp/km value is the amount of pulses the sensor sends to the meter when the vehicle has travelled the distance of 1 km. It is dependent on the type of vehicle and the location of the sensor.

Usually the imp/km value is marked on the recorder of the lorry.

Be careful with the calibration, because the precision of distance measuring depends on this reference value. If the conditions change

e.g. different tyres are changed on the vehicle, check the precision again. Write down the imp/km value for later checking.

3.1.2. Coefficient value to scale friction measuring

This value is valid in the friction meter ELTRIP-45nk.

After setting the imp/km value the coefficient value to scale friction measuring must be set into the memory. This is the value you tune the tripmeter to indicate "standard" friction value which is valid in different vehicles.

The grip of the tyres often varies according to the tread of the tyres. To get the friction value to correspond to the standard coefficient of friction, the value in the meter must be corrected with the ratio of the current tyre grip and the standard grip.

Mostly this value is 400 to 600. If the measured value is too high, the coefficient must decrease. If, again the measured value is too low, the coefficient must increase. First set the value 450 and compare it to the standard friction value and then correct the coefficient if needed.

3.1.3. Rolling resistance

This value is valid in the friction meter ELTRIP-45nk.

The third value to set is the compensation of rolling resistance. This value corrects the error caused by air resistance.

In case this value is 0, ELTRIP makes automatic compensation. When measuring the friction ELTRIP compensates automatically the rolling resistance in the case the road is varying up and down and the speed is slowing.

In case this value is >0, you have to estimate the rolling resistance value. This value is depending on the vehicle. It lies between 10...100, the greater value – the greater compensation. In cars the value is usually 30 ... 50.

3.2. Setting the calibration values

Set these calibration values successively into the meter

In the calibration mode the value on the display can be changed in the following way:

- push button 2 increases the value with 250 units
- push button 3 increases the value with 100 units
- push button 4 increases the value with 10 units
- push button S increases the value with 1 unit

The values on the display decrease with the same number of units mentioned above when 0-button is held down together with buttons

2...S. If you push down 1-button and any of the buttons 2 ... S simultaneously, you'll get 1000 onto the display.

1. Start calibration mode (Note! k=calibration): push down 1- and T-buttons simultaneously (first 1). Dist light is on.



Now in display will be the value of pulses the sensor gives. At the start it is 0

If you want you can drive the distance of 1 kilometre for initiate the value of calibration.

While driving you will see on the display the impulses the sensor sends. After 1 kilometre stop the value into the display by pushing down N-button. You have to drive so that on the display is over 255 pulses. Proceed to the point 2a (next page)

If you want to get old calibration value into the display, push down 0-button.

Now you can change the calibration value in display

The travelled distance can be shorter than 1 km. In this case the reading on the display must be multiplied by the corresponding coefficient (10, 5, 2, 1) to find the exact reference value of the vehicle.

<u>The known distance</u>	<u>Reference value</u>
100 m	10 x value on the display
500 m	2 x value on the display
2000 m	0,5 x value on the display

Example: 200 m gives the value 632 (value on the display after the vehicle has travelled 200m). The reference value will be 5 x 632.

Set this reference value into the memory of the ELTRIP-tripmeter according to the following instructions

1.a Set the calibration value, imp /km, by using the buttons according to the list previous page.



1.b Accept the **imp/km value** by pushing down the N-button.
If your meter is ELTRIP-45n or ELTRIP-45nc this will move you from the calibration mode to the normal measuring mode.



- - - If your ELTRIP includes the friction measurement (ELTRIP-45nk), you are now in the mode for setting the coefficient value. In other case this will move you to the normal measuring mode.
The 'time' light is on.

2.a Key **the coefficient value** onto the display with the same buttons used to set in the imp/km value

2.b Accept value by pressing the N-button.

3.a. Now you are in the mode for setting the value to compensate rolling. The 'tot' light is on. Set the value in the same way described above

3.b Accept it by pressing the N-button.

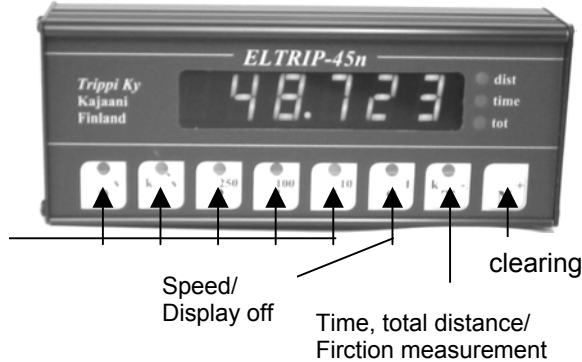
This will move you from the calibration mode to the normal measuring mode.

When calibrating first time it will be wise to clear all the counters (0 ... 4). Check the precision of the tripmeter. If necessary change reference values.

4. HOW TO USE THE ELTRIP

4.1. Measuring the distance, time, and total distance

Counters of distance, time and total distance
0-counter has presetting of distance



Counters 0...4 are all independent distance and time counters. They are to be cleared one at a time. The functions of the counters are:

- * distance counter (dist): resolution on the display 1 metre
- * time counter (time) : resolution on the display 1 minute
- * total counter (tot): resolution on the display 1 kilometre

These functions are simultaneous in every counter. The leds on the right hand side of the panel indicate which function is on the display.

The distance counter will come onto the display by pushing buttons 0...4 once. The reading can be locked onto the display by keeping the button pressed down. Counting will continue normally.

By pushing the T-button

once - time on the display - "time" light is illuminated

again - total counter on the display - "tot" light is illuminated

The indicator LEDS above the buttons indicate which counters are in operation.

* the LED is lit -> the counter is operating, but the contents of this counter are not on the display.

* the LED flashes on at shorter intervals -> the counter is in operation and the contents of this counter are on the display.

* the LED flashes on at long intervals -> the counter is not in operation but the contents of this counter are on the display.

Try these in practice and you'll notice the difference.

4.2. Clearing the counters

4.2.1. Clearing the distance counters

All the counters are to be cleared separately one at a time. The reading on the display will be cleared.



Step 1 Push down the button of the counter (0...4). The reading of the counter 0 ... 4 is on the display

Step 2 Push down N-button.

Step 3 The reading 0.000 will appear on the display.

NOTE! THE TIME COUNTER WILL BE CLEARED AT THE SAME TIME.

4.2.2. Clearing the total counters

All the counters are to be cleared one at a time. The reading on the display will be cleared.

Step 1 Take the reading of the total counter 0 ... 4 onto the display. (Push twice T-button down)

Step 2 Push down N-button.

Step 3 Check by keying the contents of the total counter onto the display (display 0).

4.3. How to use counters

When using the ELTRIP-tripmeter, you will notice that all the functions of the tripmeter (distance, time, total distance and temperature) are operating simultaneously. The counters always count forwards even when backing the vehicle, except in the case that a violet wire is connected to the backing light (Section 2.2). The numbers can be locked on the display by keeping the push button down. Measuring continues normally regardless of number locking.

4.3.1. 0- and 1-counters

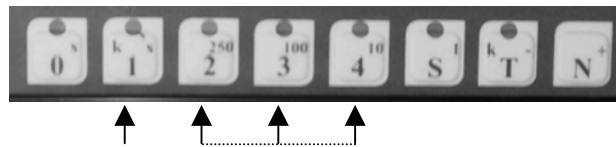
Either one of these counters is always in operation. If you want 0-counter into operation, push 0-button once. The principle is the same with the 1-counter. By pushing 1-button the counter begins to operate.



4.3.2. Taking counters 2, 3 and 4 into use

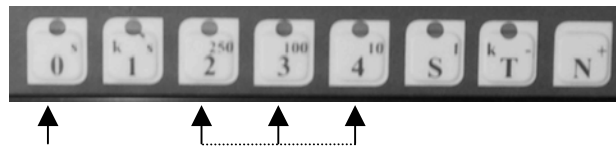
You can take any or all of these counters into use together with counter 1 or 0. The LEDs indicate which counter/counters are operating.

Push down the button of the counter you want to use, keep it down and push down button 1. Release in reverse order. The indicator LED will come on.



4.3.3. Taking counters 2, 3 and 4 out of operation

Push down the button of the counter you want to take out of use, keep it down and push button 0. Release in reverse order. The indicator LED will go out, but flash brightly because the contents of this counter are still on the display.



4.3.4. Time and total counter, T-button

Time, total and temperature can be selected onto the display by pushing down the T-button.



Step 1. Push down the T-button once if you want to select the reading of the time counter onto the display. The "time" LED on the right hand side of the display will illuminate. Time is in the form of hours and minutes.

Step 2. Push the T-button again and the total travelled distance reading will come onto the display. The bottom LED (tot) on the right hand side of the display will come on. The total distance is in the form of whole kilometres.

4.3.5. Speed and turning the display off, S-button

The S-button for speed. If speed is wanted on the display, push the S-button down. Two of the upper LEDs on the right hand side of the display will illuminate. The green LED above the T-button and the LED above the S-button will turn on (*ELTRIP-45nk*).



If you want to turn the display off, keep S-button down for approx. 2 sekonds. The display and all the leds turn off simultaneously. The counters operate normally.

If you want the display on, push down any of the buttons 0 ... 4.

NOTE! The display of ELTRIP-tripmeter turns off automatically after the vehicle has been stopped approx. 5 minutes. Display turns on you start driving = ELTRIP gets the first pulse from the sensor. You can have the display on by pushing down any of the buttons 0 ... 4.

4.3.6. Locking the display

The readings on the display can be locked by pushing the corresponding button and keeping it down. This does not stop the distance and time counting. Release the button and the display returns to normal mode.

4.3.7. Presetting the distance into the memory of 0-counter

A certain kilometre and metre reading can be preset into the 0-counter. The distance will decrease or increase depending on how you have set the distance. The numbers on the display can be changed in the presetting mode in the following way:

push button 2 increases the numbers with 250 units
push button 3 increases the numbers with 100 units
push button 4 increases the numbers with 10 units
push button S increases the numbers with 1 unit.

The numbers on the display will decrease with the same units mentioned above when the 0-button is held down together with the 2... S buttons. If you push down the 1-button and any of the buttons 2 ... S simultaneously, you'll get 1000 into the display.

Presetting the distance

1. Start presetting: Push 0-button, hold it down, push 1-button. Release buttons in the reverse order. Note the s-letters on the buttons = presetting.



2. Set in kilometres according to the list above. Note the small numbers on the buttons.



3. Accept kilometres by pushing T-button, if you want the measuring to run backwards. If you want the measuring to run forwards accept kilometres using N-button.



↑ ↑
backwards forwards

4. You are now in the mode to set metres. Set and accept metres in the same manner as presetting kilometres. Now the meter is in the normal measuring mode and ready to use. See 0-button is on.

4.3.8. Friction, S and T buttons

This chapter is valid in ELTRIP-45nk

When starting to measure:

1. Push down S-button to get speed on the display. Be careful with the other traffic.



2. Push down T-button. The meter is ready to measure the friction. There is four lines on the display.



3. Keep driving reasonable speed (40 ... 60 km/h)

4. **Check your braking don't cause danger for other vehicles and passangers in the traffic.** Push the clutch in. Let the car run free for 1 ... 2 seconds.

5. Step on the brakes heavily for approx. 1 second. Don't pump the brakes during the measuring cycle. On the display '-----'

6. Release the brakes. Let the car run free until the friction value is on the display (e.g. 0.314). The range of the friction value is 0.100 ... 0.500. The principle is the lower value the weaker friction/grip. If speed increases during measuring (braking) the value is meaningless

7. If you want to measure friction value again push T-button.

4.4. The data transfer to the computer (ELTRIP-45nc)

If your tripmeter is named 'ELTRIP-45nc' (look at the label at the bottom of the tripmeter), you have the possibility to transfer the data from the tripmeter to the portable computer. You can transfer the data using the ELTRIP keys or sending a command from the computer to ELTRIP.

Data transfer operates using RS-232 method. Any handshaking is not used but computer must wait until ELTRIP sends answer to the computer before sending any other request. Response time will be about 50 ms.

If data you are using data transferred by the the ELTRIP keys, computer does not send anything to ELTRIP - it only listen the line and receives the data from line.

Transfer protocol:

Transfer rate: 9600 b/s

Data length 8 bit

Parity no

stop bits 1

connector 9 pin female (normal delivery)

Hand shaking lines is not connected (if needed it must be connected by user)

4.4.1 The data transfer using the keys of ELTRIP

While transfer the data ELTRIP operates in the sending. The numbers of the buttons are turned to the code numbers and will be send to the computer with the measured distance. Only counter-0 value will be send to the For this reason, before you go into the mode of the data transfer choose onto the display the counter-0, which is operating (e.g. 0-counter, because it is possible to preset the distance into the 0-counter).

1) To start the data transfer: Select onto the display the counter-0 If necessary clear the counter. If you are going to start the measuring from the desired distance preset the distance (more information in section 4.4)

2) Go into the mode of the data transfer: Push down T- and N-buttons simultaneously (first T). The three (3) leds on the right side of the display will illuminate during the data transfer. Start the data collection program in PC.

3) The buttons are turned to the code numbers and the distance operates on the display. There are 6 code numbers. The code number of the 0-button is 0, the code number of the 1-button is 1 etc., except the code number of the S-button is 5.

To transfer the distance data to the computer push down the button 0 ... S. On the display of the computer is the code number 0 ... 5, the comma (,) and the distance. The period (.) divides the kilometres and metres. The leds flash, this means the data is transferring.

e.g. 2,001.237 CR
 2 = code number of the 2-button
 001.237 = 1 kilometre 237 metres

Every push of the button sends the same kind of line

4) Move from the mode of the data transfer to the normal measuring mode: Push down the N-button. Push down any of the buttons 0 ... 4. The leds of the data transfer will turn off.

4.4.2 Data transfer using the commands from the computer

The computer can read or reset the counter values of ELTRIP. Needed operation is sent from the computer using the command string. It consists of commands and parameter and (cr)-character. When the command is received ELTRIP sends its answer to the command by sending the answer or the error code. Responce time will be under 50 ms.

Reading the counters

Any counter can be read by sending a command and parameter to ELTRIP

Commands are

An(cr) read trip counter n, where n is the number of counter 0..4

answer will be **NNN.NNN(cr)** ELTRIP-45nc
or **NNNN.NN(cr)** ELTRIP-45nc10

Bn(cr) read the time counter n, where n is the number of counter 0..4

the answer will be **HHH.MM(cr)** , H hours and M=minutes

Dn(cr) read the total counter n, where n is the number of counter 0..4

the answer will be **NNNNN(cr)**

S0(cr) read the speed of vehicle

the answer will be **NNN.N(cr)**

I0 (cr) read calibration factor

answer will be **NNNNN(cr)**

Reset the counter:

Cn(cr) reset the trip - and timecounter n, n=0..4

En(cr) reset the total counter n, n=0..4

Answer to the reset commands will be **+(cr)** if command was accepted.

Control of the counters. Any counter can be start or stop by the command of the computer.

On(cr) start counter n (0..4)

Fn(cr) stop counter n (0..4)

Attn starting counter 0 stops counter 1 and vice versa.

Set the calibration value

K0nnnnn(cr) set calibration value to nnnnn

Error codes:

If ELTRIP does not accept the command received it signals it

I(cr) index (n) was not in the accepted range (the value of the counter is something else but 0 ... 4)

C(cr) command code not accepted

5. TROUBLESHOOTING

In case the ELTRIP-tripmeter should not operate correctly, we have made a list of instructions to help you solve the situation.

If you, however, fail to find the fault, contact the seller or manufacturer immediately.

Display is off

Push down any of the buttons 0 ... 4 to turn the display on. If nothing happens, check the fuse and the connection of the power conductors. You have to check both, minus and plus power as near the ELTRIP it's possible. Minus must be 0 V against the ground.

Tripmeter measures time but not distance

The white wire is for the pulse from the sensor. You can measure the pulse with the volt-meter. The voltage levels have to vary from under 3 V to over 3,5 V.

Check the connectors. If the sensor is fastened to the wheel or the cardan, check that the sensor is not too far from the counter plate or magnet.

Tripmeter measures distance but not time

Contact the seller or manufacturer.

Tripmeter measures distance forward/backward wrong

Check the violet wire. It must be connected to the back up light switch of the vehicle. While counting forward it must be grounded (voltage lower than 3 V). Check also the back lights of the car.

Measured distance or speed is not correct

Check that the reference value is correct. Check the sensor.

Other problems

If you have other problems in installing or using the tripmeter, contact the seller or the manufacturer. Take time to read the instructions and practise the calibration of the ELTRIP-meter. In this way you can easily keep your tripmeter accurate and it will give years of trouble-free service.