OPERATING INSTRUCTIONS

ELTRIP-45nkl
ELTRIP-45nkc
ELTRIP-45nkg

TRIPPI Oy

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Hevossuontie 50
87100 Kajaani, Finland

Tel +358 8 6121 651, Fax +358 8 6130 874
www.trippi.fi

CONTENTS

1. TECHNICAL DATA

KEYS: 8 snap action push buttons

COUNTERS: * 2 alternative counters for measuring distance, time and temperature. It is possible to preset distance into the 0-counter.

* 3 optional counters for measuring distance, time and temperature

* S-button for selecting speed on the display, turning the display off and turning time on the display

* T- button to select time, total distance and temperature, to initiate friction measurement and data savings

* N-button for clearing the counters

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

INDICATOR LIGHTS:

* 6 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

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 1A

SENSOR: depends on type of vehicle, several alternatives

DATA TRANSFER TO THE PC COMPUTER:

ELTRIP-45nkc RS232-connection, 19200bps, 8bit, 1 stop, no paritity, bcc-checking

Connection box ET-45nkc, connection with GPS

ELTRIP-45nkg: GSM mobile phone with modem connection (AT-commands)

2. THE INSTALLATION OF THE ELTRIP

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.

ELTRIP-45nkc and ELTRIP-45nkg are the tripmeter, which you can count distances, time, friction and temperature. You have possibility to save friction values and road conditons to the memory oF ELTRIP. After that you can transfer data to the computer disk and have different reports.
ELTRIP-45nkl has no data transfer.

2.1. The installation of the tripmeter

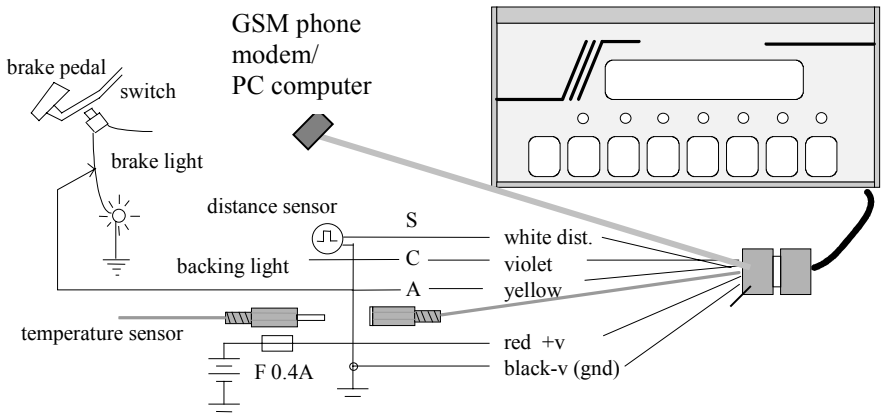
Fit the ELTRIP-tripmeter into a place near you where it will not endanger your driving. Avoid fitting the tripmeter into places which are in direct sunlight and/or near the heating apparatus.

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 max 1A, 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: the yellow wire is for measuring friction. Connect it to the cable between the stop light switch and the stop light lamp.

Connect the temperature conductors together.

ELTRIP-45nkc: Connect the 9-pin connector to RS232 port of the laptop computer
If you have ELTRIP-45nkc with the connection box, there is the separate instructions about the connection. In that case there is the different connection cable.

ELTRIP-45nkg: When transferring the data, connect 9-pin connestor to the modem cable of the gsm-phone.

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 (max 1A or F1A).

3. SETTING UP YOUR ELTRIP-TRIPMETER (CALIBRATION)

After the installation the display may be black. Turn out the display by pushing any of the counters 0 ... 4.

When you receive your ELTRIP, it has inside the test calibration values. That´s way before you take ELTRIP to use you have to set the values according to your vehicle and tyres.

4 (5) calibration values are: a) the reference value, b) the coefficient to scale friction measuring and c) the value to compensate rolling resistance d) offset value of temperature e) car number (only ELTRIP-45nkg)

3.1. Calibration values

3.1.1. Reference value (imp/km)

Reference 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, location of the sensor and the tyres.
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 reference value for later checking.

3.1.2. Coefficient value to scale friction measuring

After setting the reference value the coefficient value to scale friction measuring must be set into the memory.

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 500 and compare it to the standard grip and then correct the coefficient if needed.

3.1.3. Rolling resistance

The third value is set to compensate rolling resistance**.** This value corrects the error caused by air resistance.
In case you set the value 0, ELTRIP makes automatic compensation. When measuring the friction ELTRIP compensaters automatically the rolling resistance in the case the road is varying up and down or the speed is slowing.
In case you set the value >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 lies usually 30 … 50

3.1.4. Offset value of temperature

Set the offset value of temperature**.** This means, the measurement of temperature will justified to the right value in the certain temperature, usually 0 °C. The setting value is about **1650.** In case the temperature is different, value can be changed. If you decrease the value by 10 units, the temperature changes + 1°C. Eg If the temperature on the display is - 1°C and the real temperature is 0 °C, set the offset value 1640. If the temperature on the display is + 1°C and the real temperature is 0 °C, set the offset value 1660.

3.1.5 Car number (only ELTRIP-45nkg)

Car number will be saved to the memory when measuring friction value. The cars must have different numbers, if you later need to know the measuring car.

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 simultaneusly, you'll get 1000 onto the display.

1. Start calibration mode (Note! k=calibration): push down 1- and T-buttons simultaneusly (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 over 255 pulses.

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.

The known distance	Reference value
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. Thus you go into the mode for setting in the coefficient to scale friction measuring. 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 **A**ccept it by pressing the N-button.

4.a Now you are in the mode for setting the offset value for temperature. Time and tot lights are on. Set the offset value in the same way described above
4.b **A**ccept it by pressing the N-button. (ELTRIP-45nkc: This will move you from the calibration mode to the normal measuring mode).

5.a. (**Only ELTRIP-45nkg)** Now you are in the mode for setting car number. Set the number
5.b Accept it by pressing 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.

3.3. Setting time and date (only in ELTRIP-45nkg)

ELTRIP gets the time information to its memory every time when you transfer the data to the computer in office. That´s why be careful your computer time is correct. The time is saved to the ELTRIP-memory when you make friction measuring and it is in view in the reports.

You can set time information using the buttons, too.

In the setting mode the values can be altered as previous described.

push button 0 clears display
push button 2 increases the value with 10.00 units
push button 3 increases the value with 1.00 units
push button 4 increases the value with 10 units
push button S increases the value with 1 unit

Eltrip has an internal clock calendar. So that Eltrip can count the leap years correctly the year reading is set by calculating the years to the previous leap year. E.g. year 2004 was a leap = 0, 2005=1, 2006=2, 2007=3, 2008=0

1.a Setting time starts from keys 1 and S. They are pressed down simultaneously. The time will show on the display and the dist led will illuminate

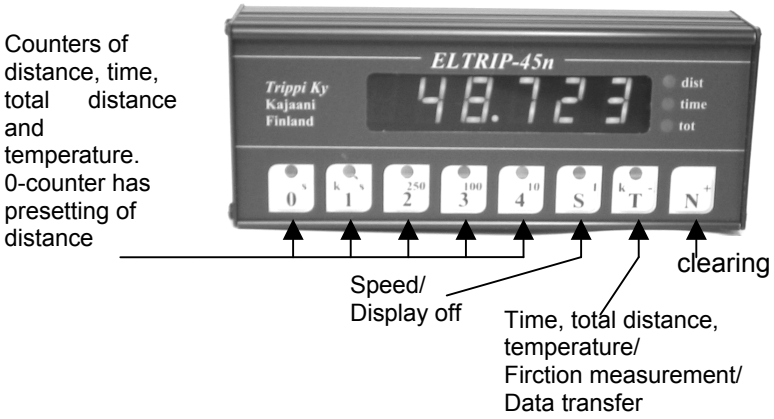
1.b Time: TT.MM (e.g. 13.25 = clock 13.25). Set hours and minutes, press N.

1.c Date KK.PP (e.g. 06.16 = 16th June). Set month and day, press N.
Tot-led will illuminate.
1.d Year Y (0,1,2 or 3). Set year and press N.

Now you are out of clock setting mode and the trip meter is on the display.
You can have time the on the display by pushing first S-counter and then N.

4. HOW TO USE THE ELTRIP

4.1. Measuring the distance, time, temperature and total 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
* temperature (tot): resolution on the display 0,1 °C

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/F button

once - time on the display - "time" light is illuminated
again - total counter on the display - "tot" light is illuminated
and again - temperature on the display - ”tot” light is illuminated

The indicator LEDS above the buttons indicate which counters are in operation (O-counter has no LED).
* 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 (O...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/F-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

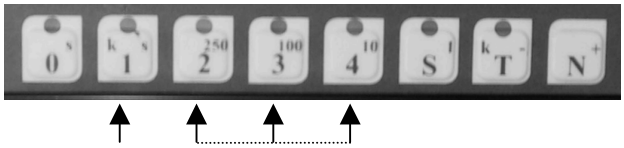
When using the ELTRIP-tripmeter, you will notice that all the functions of the tripmeter (distance, time, total distance and temperature) are operating simultaneously. The counters always count forwards even when backing the vehicle, except in the case that a violet wire is connected to the backing light (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.

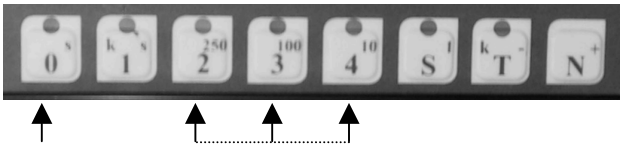
4.3.2. Taking counters 2, 3 and 4 into use



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 press 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, total counter, temperature and saving to the memory, data transfer, 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.

Step 3. Push the T-button again and the temperature reading will come on the display. The precision of temperature is 0,1 °C.

By T button you can save friction value and road conditions to the ELTRIP memory . You can save them after you have made the friction measure. See chapter 4.5

4.3.5. Speed, Display off, Clock, S-button

1)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.

2) 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 automaticully 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.

3) You can have time the on the display by pushing first S-counter and then N (only ELTRIP-45nkg).

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.

4.4. 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 preseting mode in the following way:

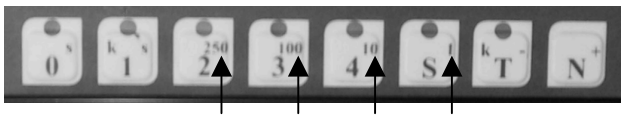
push button 2 increases the numbers with 250 units
push button 3 increases the numbers with 100 units
push button 4 increases the numbers with 10 units
push button S increases the numbers with 1 unit.

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 simultaneosly, 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.

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.**

4.5. Friction and data saving, S and T buttons

Eltrip-45nkc and –45nkg have a possibility to save friction and road conditions data to the ELTRIP memory. You can transfer data to the PC-computer, where is the separate program. With the program you can edit data and print reports. Report includes e.g. date, time, road number, measuring place, area, friction value, temperature, weather conditions.
Eltrip-45nkc: You can transfer the data on-line to the laptop computer

To start friction measuring push down S-button and then T-button. Now there is L xxxx on the display. This is the previous measured road number. Set the new road number and push T-button. Display is flashing once which is the sign the data has to be saved to the memory. At the same time 0-counters distance is cleared. **The place of the friction measuring will be measured to 0-counter**. To specify the measuring place, it is wise to start from the beginning of the road. Eltrip-45nkc gets the place data from the GPS

If you don´t want to save the data , quit by pushing N-button. None data will be saved to the memory during this measuring period.

The period of friction measuring ends when you push on the display any of the distance counter 0 . . . 4.

The value of the road conditions will be set to the tripmeter after you have made the friction measurement. If you want to save the data, push down T-button. ELTRIP asks road condition value by giving the earlier value. E.g. on the display = 1 1 1 1, where 1 1 1 1 is the earlier value. You can give new value according to the road condition or accept the data and save it to the memory by T-button. Display is black about one second time. The data will be saved .

If you don´t want to save road condition value, quit by pushing N-button.

Road conditon value will be set by the value, which numbers mean the data of weather, slush, snow, road surface. Numbers will be 0 . . . 9. Every number means one data item and it is printed to the report. On the report data is formed with numbers 0 . . . 9. That's way you have to agree locally the meaning of the numbers

1000 - weather e.g snowfall
100 - slush amount
10 - snow
1 - road surface

Error code ' Err 1 ' means Eltrip can´t save the data.

When starting to measure use 0-counter, because Eltrip takes the distance value from this counter. Push down 0-button.

1. Push down S-button to get speed on the display.

2.Push down T-button. The meter is ready to measure the friction.
There is earlier road number on the display (L 1234).

Eltrip-45nkg: Set the new road number and push down **T-button - saving** or **N-button** , if you do´t want to save data. There is temperature on the display
NOTE! In this mode you must decide, if you want to save the friction value.

Eltrip-45nkc: You can bypass the road number, because you get it from GPS. push down **T-button - saving** or **N-button** , if you don´t want to save data. There is temperature on the display
NOTE! In this mode you must decide, if you want to save the friction value

3. Drive on the speed of 40 .. 60 km/t, it is same as when calibrating.

4. Check the breaking don´t cause danger to the other traffic.
Press clutch down. Let the car go on free 1 .. 2 sekonds

5. Step on the brakes heavily for approx. 2 seconds. Don´t pump the brakes during the measuring cycle. On the display ´- - - - ´

6.Let the car go on free until the friction value will be shown on the display. It is in the mode of 0.314. Value lies usually 0.100 . . . 0.500 .
The principle is: the lower the reading, the weaker the friction/grip.
If speed increases during measuring (braking) or the car is sliding the value is meaningless.

If you don´t want to save the friction value, push down N-button. If you don´t want to save friction value, tripmeter waits your next breaking (measuring).

7. If you choose the saving (point 2), tripmeter asks for the code of road condition. (See the previous page). Set the value and push down T-button
The measuring place, date, time and temperature will be saved at the same time. Now ELTRIP is ready for the next measurement.
If you don´t want to save data, push N-button.

If you have Eltrip-45nkc with the connection box, which is connected to the computer, interrupt Eltrip temporarily the communications from GPS and sends friction data to the computer. Data $PTRPF,0000,-13.2,0.234,*55(cr)(lf)
Communication 8bit, no-parity, 1 stop, 19200 b/s

5. DATA TRANSFER TO THE PC-COMPUTER

ELTRIP-45nkg: You can transfer the measured data to the PC-computer in office via GSM phone modem which has connected to ELTRIP.

Push down **S-button** to get speed on the display.
Push down **N-button** and **at the same time S-button**
ELTRIP asks SEnd
Push down 1-button. ELTRIP starts the transfer. You can follow sending on the display.

SEnd 1	checks modem connection
SEnd 2	initialises modem
SEnd 3	
SEnd 4	chooses phonenumber
SEnd 6	sends code information
SEnd 7	sends measured information
SEnd 8	receives quittance and time and data, turns off connection

NOTE When the line is open, don´t start the car, because voltage in the car reduces and it may interrupt the sending

If the sending don´t proceed normally, Eltrip gives error kodes

Err1	no connection to the modem; cable is unfastened, modem closed
Err 4	computer does't answer to the call, wrong number, receiving program not running, or hanged
Err 6,7,8	too much errors in the transmission, weak gsm field.

6. 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 trom 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 (via backing light) (voltage lower than 3 V). Check also the back lights and grounding of back lights of the car

Measured distance or speed is not correct
Check that the reference value (imp/km) is correct. Check the sensor and connections of sensor.

Malfunctions in transferring information onto the memory
If transferring the information onto the memory doesn´t succeed, ELTRIP informs this with Err 1 - code. Contact the seller or manufacturer
Delete Err –code by pushing 0-button 2 sekonds

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