AVE-S

**Digital Odometer
&
Dual Digital Tripmeter**

**by DIGITECH
firmware > 2v00-b07**
English

Warning

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Introduction

AVE-S is an evolution of the previous model *AVE* and has been specifically designed for races where you have to drive stretches of road keeping a prescribed average speed.

The instrument has two operating modes: Trip mode and Average mode.

In Trip mode, the instrument can be used in time races to check the correspondence between the distance you have actually travelled and the distance indicated in the RoadBook.

In Average mode, this instrument can be very useful in races where you have to drive one or more sections - which can also be concatenated – at a constant speed: this user friendly instrument allows you to identify immediately errors and change the average speed during the race – e.g. in case of setting error. The main features are the following:

For both modes:
- Global *START*, *STOP*, *RESET*, *SPLIT* (freeze) functions and *RESTART* function only for the "Partial" counter.
- *BACK* function for both counters to count down. This function is activated using the keyboard.
- Possibility to *RESTART* the "Partial" counter using the external button.
- High visibility display with 12mm high digits.
- Keyboard with number pad to program the instrument parameters easily.
- Display and keyboard backlighting which can be activated for a perfect night vision.
- Backup battery which allows you to use the instrument even if it's disconnected from the car battery.
- Distance display, whose resolution can be selected by the user – the possible options are 0.001, 0.01 and 0.1
- Through the *INTERFACE-S* connection box you can connect four sensors at the same time. The sensors can also be of different types. In case of main sensor fault, this allows you to go automatically to the next sensor in a programmed sequence, without losing any pulse.
- If you are using a sequence of several sensors, you can choose how to calculate the travelled distance, with regard to the first two sensors in the list. You can use the pulses produced by:
  - the main sensor
  - the average between the two sensors
  - the sensor "connected" to the wheel which turns faster
  - the sensor "connected" to the wheel which turns more slowly.

- Storage of six groups of four kilometric constants each (one constant for every single sensor), if you are using the instrument on other cars or on the same car but with different sets of tyres.
- Possibility to change the kilometric constants you have saved, also in the course of the event, by using a correction coefficient: this is determined on a reference route defined by the rally organizer.
- Possibility to use inductive or rotary sensors on the original odometer cable.
- Possibility to modify quickly the partial/total counter in order to align it to the distance indicated in the RoadBook.

Trip mode:
- Double counter: "Total" distance (up to 9999.999) and "Partial" distance (up to 199.999).
- Possibility to program the "Total" and "Partial" counter separately so that the counting starts from a determined value, increasingly as well as decreasingly.
- Display of the car's current speed.

Average mode:
- 100 averages (0..99) which can be programmed in case of consecutive trials.
- Possibility to program the average up to the meter.
- Possibility to set for every average:
  - a "virtual distance" at which the instrument goes automatically to the next average.
  - the counter setting when you go to the next trial:
  RESET: the counting starts again from 0.000,
  CONTINUE: the counters are not reset and so the counting continues.
  - an automatic start time.
  - the race length, to have a countdown of the partial counter
- Display of measured and calculated distance and of error in time or distance.
- Constant graphical view for an immediate error detection.
- Clock programmable to the second with synchronization through external button.

Operating principle of the Average mode

AVE-S measures constantly the travelled distance and the time elapsed from a determined moment (trial start).
The instrument determines the precise time to drive the measured distance by using the prescribed average speed and shows – in textual and graphical view - how early or late you are in comparison with the time you have actually

measured from the start.

For example:
If you set an average speed of 36.0 Km/h and after 500 meters the elapsed time is 40 seconds, you are 10 seconds too late: if the average speed is 36.0 Km/h, that is 10 m/s, you have to drive 500 meters in 50 seconds sharp.
In this case the average calculator shows an error of -10,0 Sec in the textual view, and in the graphical view places the indicator bar to the left by a logarithmic quantity of -10".

Connectors

RESTART/SPLIT input   ←▪▪▪

The instrument has an external input, which allows you to SPLIT the counters or to RESTART only the partial counter - you can select this in the instrument settings - by using a **PB5/JG-A** button.

USB connector   *PC*

> ### CAUTION:
>
> ***This input has the same connector type as the INTERFACE-S input.***
> ***<u>Never connect the cable from the INTERFACE-S box to this input.</u>***
> ***If the INTERFACE-S box is powered by the car battery, this***
> ***connection damages irreparably the PC input of the instrument, and***
> ***this makes it impossible to update the installed firmware.***

You can connect the *AVE-S* to a Personal Computer by using a "mini USB" cable.

Through this connection you can update the instrument firmware or upload / download with a specific program the programming and the results of the trials you have done.

> *The update is necessary - when available – to improve the*
> *instrument performances and correct possible software errors (see*
> *chapter "Firmware update").*

In/Out connector   ↑↓

This connector, a 3.5mm audio jack, it's a RS232 connection which is equivalent to the USB connection.

You can use this if you don't have a USB connector.

> ### CAUTION:
>
> ***The In/Out connector is disabled if the instrument is connected to a***
> ***PC through the USB connector.***

INTERFACE-S connector   ▲ *Car in*

This connector, through a common "mini USB" cable, is used to connect the *AVE-S* to the *INTERFACE-S* box.

To this interface box are connected the sensors installed on the car as well as the power supply of the instrument, through the connection to the car battery.

> *In very noisy cars, where there are interferences on the power*

supply that can disturb the functioning of the instrument, it's possible to use only the internal batteries of the AVE-S to power the sensors.
The autonomy is very reduced and depends on the number of sensors used.

AVE-S keyboard

It's a membrane keyboard with keys in relief, completely waterproof. The keys functions are briefly described below.

⏻	**[*ON*]** Press it for longer than 2 seconds to turn on the instrument. **[SHIFT]** Press it once to enable the *SHIFT* function and the second function of some keys.
MENU	**[*MENU*]** This calls up a list to program kilometric constants and counters.
☀	**[*BACKLIGHT*]** With this you select the display backlighting type. **[*CONTRAST*]** With the *SHIFT* function on, it enables the display contrast adjustment.
VIEW	**[*VIEW*]** With this you change the view on the display, switching from TRIP to AVERAGE mode.
SET AVG	**[*SET AVG*]** This enables setting and/or selection of the average speed to be used in the Average mode.
BACK	**[*BACK*]** This enables the countdown of both counters.
▼	**[*DOWN*]** In a list, it moves the cursor downwards. When setting a time, it decreases the blinking selection.
▲	**[*UP*]** In a list, it moves the cursor upwards. When setting a time, it increases the blinking selection.

	■	**[*STOP*]** This stops both counters. **[*RST*]** If you press this key longer than 2 seconds or by pressing [SHIFT] followed by [STOP], you reset the measured and calculated distance with its error. [*Clear*] In the setting phase, with *SHIFT* function on, it resets the programming.
	▸✕‖	**[*START SPLIT*]** This enables the counting or freezes both counters. Press again this key to remove the SPLIT. *[ESC.]* When setting a parameter, with this you exit without modifying anything.
	↳✓	**[*RESTART*]** It goes to the next programmed average. Depending on the programming of the current average, it resets or doesn't reset the Partial counter without any "freezing". *[ENT.]* When setting a parameter, it confirms the changes you have made.
	▶◀	**[*TRIP SYNC*]**: synchronize Partial/Total counter *In SPLIT status*: It allows you to modify immediately the value in the Partial/Total Counter with previously programmed values of the current average speed *In "non SPLIT" status*: This sets the distance value that it's going to be entered in the Partial/Total Counter by pressing the SPLIT key (input) the next time.
	✚	**[*PART INC*]**: increase Partial distance counter The Partial/Total distance counter is increased by one unit, according to the selected resolution. The value that is added can be programmed by the user, according to the resolution. **[+]** In the setting phase, it changes a value from negative to positive.

⊟	**[PART DEC]**: decrease Partial distance counter The Partial/Total distance counter is decreased by one unit, according to the selected resolution. The value that is subtracted can be programmed by the user, according to the resolution. **[-]** In the setting phase, it changes a value from positive to negative.
⊡	**[PTS]**: point If in the average in use you have set a stretch, with this you choose to display/not to display the countdown of the Partial distance counter.

SHIFT function

Some keys have a second function which corresponds to the second symbol and/or writing under the main function.

You can activate this function by pressing shortly the [*ON*/] key.

The "*Status Bar*" will appear at the bottom of the display (last two rows at the bottom) and this indicates that the function is activated.

Press [*ON*] again or a key that doesn't have a second function to deactivate this function and restore the previous view.

Display

The instrument has a high contrast, 240 x 64 pixel graphical display of trans-flective type, visible in direct sunlight and also in poorly lit environments by turning on the backlighting.

Backlighting

You can turn on the display backlighting to use the instrument in poorly lit environments or at night. Press the [*BACKLIGHT*] key to choose between three possible backlighting conditions (see "Backlighting").

Contrast
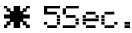
Press [*SHIFT*] followed by [*BACKLIGHT*] to adjust the display contrast: the status bar will be replaced by the contrast level indicator.

With [*UP*] and [*DOWN*] you change the level. With [*ENT.*] you confirm and exit, with [*ESC.*] you exit without modifying anything.

Status bar

Press [*SHIFT*] to enable the instrument status bar at the bottom of the display.

The status bar shows some information about the instrument.
Press [**SHIFT**] again to disable the status bar.

☀ 5Sec.	(❋)†	▥	KG1 SENS A. AVG	✳12:24:55
▲	▲	▲ ▲	▲	▲
A	B	C D	E	F

(A) Backlight Status		
☀ ON	**ON**	Backlighting always on
☀ OFF	**OFF**	Backlighting always off

(B) Remote Connection Status		
(❋)	**Waiting connection**	Device ready for remote connection
(❋)†	**Active connection**	Connection to another device is active

(C) Battery Status		
▥	Batt. OK	Battery energy level is OK
▢	Batt. LOW	Battery energy level is low

With INTERFACE-S connected	
(D) Group of constants	
`KG1`	Group of kilometric constants (from 1 to 6) currently used. This blinks if the correction coefficient is active.
(E) Sensor in use	
`SENS A.`	It indicates which sensor input of the INTERFACE-S box is active. In the event of main sensor fault, it blinks and shows the new input used.
AVG	It indicates the operating mode of the sensors (*FIRST; AVG; SLOW; FAST*)
With INTERFACE-S not connected	
"**NOT CONNECT**"	It signals that there is a problem with the connection to the INTERFACE-S.

(F) Internal clock	
`✳12:24:55`	Internal clock

Contrast adjustment

While setting the display contrast, the status bar is replaced by the level indicator of the value you are setting.

Connections

Installation and connections on the instrument must be done by a professional installer in order to prevent damages to the electrical equipment of the car and/or to the **AVE** itself.

> ***After the installation on your car, remember that the instrument must be "calibrated" as described below ("Menu-Constant Setup")***

If you have to remove the instrument from your car, before you unplug it from the connector, check that the power supply from the battery is disconnected (through specific switch or ignition key turned off): doing so you will prevent damages to the instrument and/or sensor.

Introduction

In order to count pulses generated by a sensor, the instrument is provided with a quadruple input **INTERFACE-S** box for the connections to the car (power supply and sensors).

The box must be positioned in a stationary manner into your car, protected from water infiltration. It must be connected to the instrument through the provided **mini USB** cable.

Example of connection to the INTERFACE-S box

Using this kind of connection you can remove the instrument from the dashboard easily, so that you can use it on different cars.

> ***CAUTION:***

The INTERFACE-S (CAR IN) input and the Personal Computer (PC) input have the same type of connector.
Never connect the cable from the INTERFACE-S box to the PC input.
If the INTERFACE-S box is powered by the car battery, this connection damages irreparably the PC input of the instrument, and this makes it impossible to update the installed firmware.
To reduce to a minimum this problem, we put a protection plug on the PC input, in order to prevent it to be connected to the INTERFACE-S box.
If you need to update the instrument, you only need to remove this plug with your nail or a small screwdriver.
We advise you to put the plug again on the PC input when the update has finished.

In the event of connection failure or fault of the INTERFACE-S box, the instrument signals the problem with a message.
Press a key to go on with the normal operation: in this way, you can program averages without being connected to the car.

CAUTION:
In the event of connection failure of the INTERFACE-S box, it's not possible to check and/or modify the kilometric constants to calibrate sensors and their operation sequence because these data are saved only in the interface box and not in the instrument.

Power supply

External power supply

The instrument is usually powered by the car battery through the interface box. The sensor is powered directly by the instrument: when the instrument is turned off, there is no power supply.

Internal power supply

The instrument can work also without being connected to the car battery by using four AA batteries: also in this case the power supply of the sensor is produced directly by the instrument.

The internal power supply is enabled when there is no external power supply: in this way, the instrument keeps counting the distance also in case of major voltage drops or lack of power caused by electrical connection problems (disconnected wire or burnt fuse).

See "Technical Specifications" for operating time with internal batteries only.

> **CAUTION:**
>
> **The instrument doesn't signal in any way that it's using the internal batteries: therefore, in the event of burnt fuse or disconnected wire, the instrument could turn off because it has reached the maximum autonomy of internal batteries.**
> **Pay attention when the "Battery low" symbol turns on.**

> **If the instrument is installed on very old cars, in which the ignition system of spark-plugs/battery coil ignition causes interferences, it can occur that these interferences on the instrument power supply alter its operation: you can solve this problem by using the internal batteries only.**

Type of sensors

Through the interface box you can connect different sensor types:

Rotary sensor: this sensor must be connected in series to the existing odometer cable by removing a piece of protective sheath of the cable itself. There are three wires: negative power supply, positive power supply and signal to be connected to *-Vcc*, *+Vcc* and *IN*.

2-wire inductive sensor: this sensor requires a metal plate connected to the hub of a non-driving wheel. It must be positioned at 3-4 millimeters from the plate to "see" the plate passing every time the wheels turns. There are two wires: negative power supply and signal to be connected to *-Vcc* and *IN*. In this case you don't have to use the pin *+Vcc*.

3-wire inductive sensor: like the previous one but with three wires: negative power supply, positive power supply and signal to be connected to *-Vcc, +Vcc* and *IN*.

Inductive sensors: size of the plate

In order to measure the distance properly, if you are using inductive sensors, you have to position a plate whose size is such that the sensor is activated for at least 50 microseconds.

The size determination depends on the maximum speed you suppose to reach. The minimum size of the plate is calculated through the following formula:

Plate size(*Cm*) = (**max_speed**(*Km/h*) * **1000** / **3600**) * **0.05**

Example: Maximum speed = 144 Km/h

Size = ((144 *1000) / 3600) * 0,05 = 2 centimeters.

INTERFACE-S

Through this interface box you can connect up to four sensors, also of different types: you have a main sensor used for normal operation, and, in the event of main sensor fault, you go automatically to the second or the third one, without modifying the measured distance.

This is made possible because the *INTERFACE-S* box samples constantly the inputs of the enabled sensors: when the main sensor input doesn't receive pulses anymore or a much smaller quantity of pulses than the other inputs, it signals the problem to the instrument. The instrument decides then to use pulses produced by another input and signals the problem to the user.

> *The indication of the sensor currently used will blink in the status bar to indicate the main sensor fault.*

At any time you can set the operation sequence to decide which one is the main sensor to be used for counting pulses and, in the event of main sensor fault, which one must be considered the second and third sensor to "replace" it.

> *If you are using 2 sensors connected to the car wheels, you can enable a function to have the average between pulses or the number of pulses generated by the wheel turning faster / by the wheel turning more slowly.*

The four sensor inputs are the same and can be used with no difference to connect the various sensor types.

There is a BACK input to enable the countdown of distance counters. To enable the BACK function, you have to connect the *IN* input to the respective *-V* input or to the car's ground, if the *INTERFACE-S* is powered by the car.

> *The AUX input is not used at the moment.*
> *You don't have to connect it to anything.*

Connection description

SUPPLY	Power supply from the car
+ V	Positive power supply of the instrument. You have to connect it to the battery positive terminal, in series to a switch and a 1 Amp fuse.
- V	Negative power supply. You have to connect it to the battery or to the car bodywork.
A	*Group of connections - sensor A*
- V	Negative power supply for sensor A, supplied by the instrument.
+ V	Positive power supply for sensor A, supplied by the instrument.

IN	Input for pulses generated by sensor A.
B	*Group of connections - sensor B*
C	*Group of connections - sensor C*
D	*Group of connections - sensor D*
BACK	*Group of connections to enable the countdown of counters.*
IN	BACK input, which must be connected to -V to enable the function
-V	Common BACK
AUX	Not used
IN	AUX input, not used
-V	Common AUX input
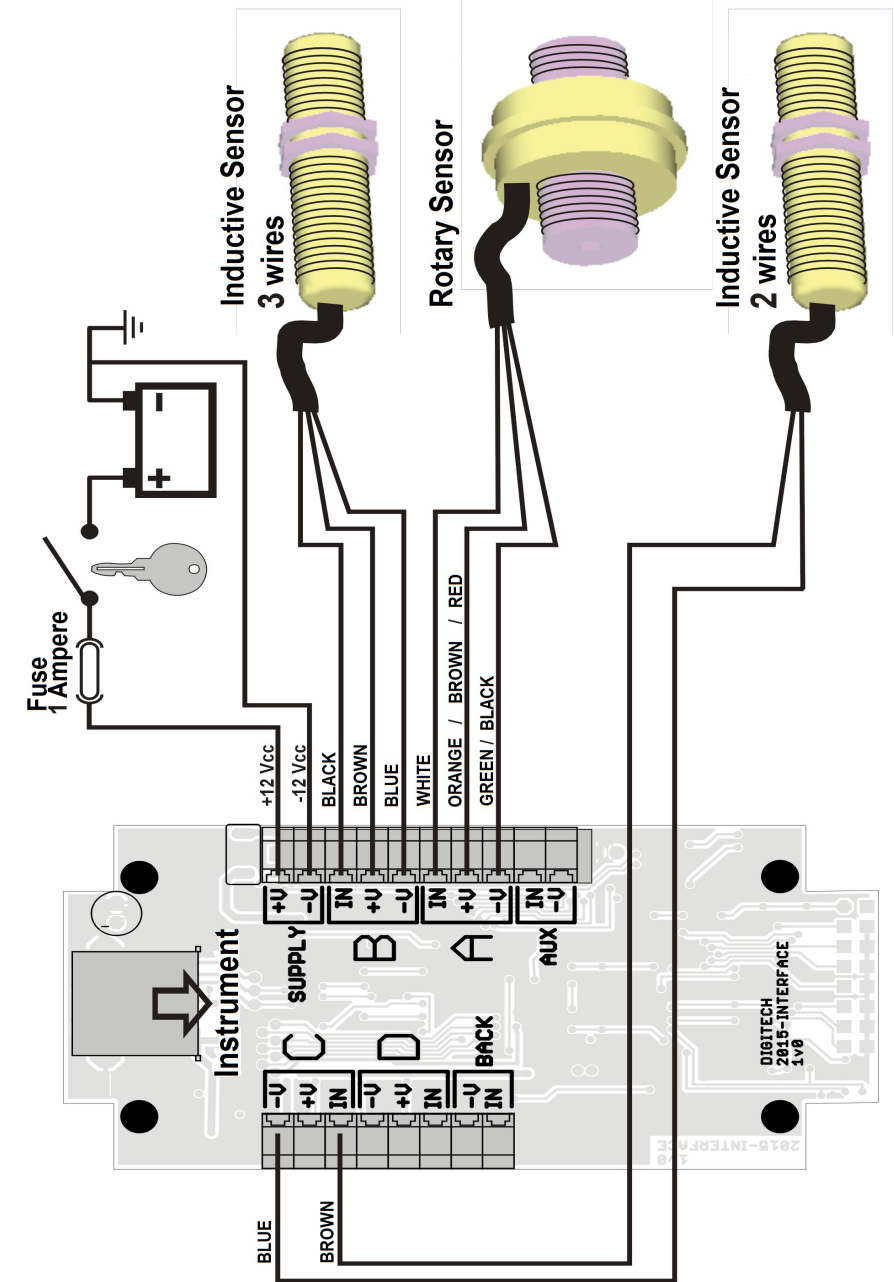
Starting off

Batteries

To insert batteries, remove the battery compartment cover on the back of the instrument by pushing the small lever.
Insert four AA batteries, make sure that the positive and negative ends are facing the correct direction.
Check that the batteries are well positioned, close the compartment cover and make sure that the lever fits correctly.

Turning on

To turn on the instrument, press and hold the [*ON*] key until the name of the instrument and the firmware version appear.

By releasing the key, the instrument loads the average speed records saved in the permanent memory or displays the *INFO* card, which contains some information about the operative parameters currently set.

By pressing any key, the instrument displays the Total and Partial distance counters.

The instrument shows the values measured before it was switched off.

> *In the event of connection failure to the INTERFACE-S box or of a INTERFACE-S box fault, the instrument signals the problem with an error message.*
> *If you press a key, the instrument displays the INFO card with the operative parameters.*

Turning off

To turn off the instrument, select "*Instrument Off*" in the menu.
The instrument saves the settings you have done and turns off.

Emergency shutdown

If the instrument blocks due to some firmware error, you can switch it off without removing batteries. You only need to press and hold the [*ON*] key until the instrument turns off (approximately 6-7 seconds).

The last settings will not be saved.

Backlighting

You can activate the display backlighting to use the instrument in poorly lit environments or at night.

Press repeatedly the *[BACKLIGHT]* key to choose between three possible backlighting conditions:

Always Backlighting always on.

When needed Backlighting is activated by pressing any key, stays on for 5 seconds and then turns off automatically.

Off Backlighting always off.

The backlighting status is shown in the status bar.

View selection

AVE-S has two main view modes, in which you will find two submodes:

TRIP mode:
> *TRIP partial*:
> this shows total and partial distance measured
> *TRIP speed*:
> this shows total distance and current speed.

AVG mode:
> *AVG text*:
> this shows measured partial distance and distance calculated in relation to set average speed with its error
> *AVG graph*:
> graphic and textual view of measured partial distance and error compared to calculated distance.

To switch from TRIP to AVG mode and vice versa, press and hold for longer than one second [*VIEW*] or press [*SHIFT*] followed by [*VIEW*].

Press [*VIEW*] briefly to switch alternately between the two submodes.

TRIP mode

In the TRIP mode, the TOTAL distance is shown in the upper part of the display and the PARTIAL distance or the current speed are shown in the lower part.
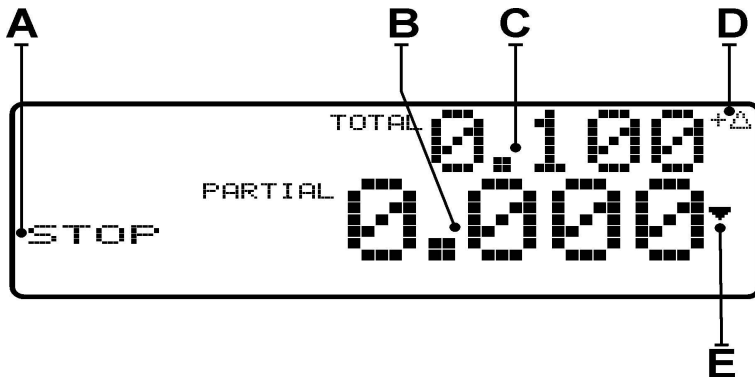
A: Trip status indicator:
- *STOP*: counting of measured and virtual distance is stopped
- *RUN trip*: counting of (total and partial) distance measured is enabled but not of virtual distance.
- *RUN*: counting of measured and virtual distance is enabled
- *SPLIT*: temporary freezing of counters

B: Partial distance counter or current speed
C: Total distance counter
D: Delta activated on Total Distance
E: Indicator of "enabled CountDown of Partial counter"

The available commands, which can be selected using your keyboard, are listed below.

> *"Global" means that both counters – Total as well as Partial counter – are concerned.*

Enabling Global counting (START)

You can enable the counting of travelled distance by pressing *[START SPLIT]*, *[RESTART]* or by using the external button.
On the display the word *STOP* disappears and is *replaced* by *Run trip*. The two counters are increased according to the travelled distance.

Stopping Global counting (STOP)

Press **[STOP]** to stop the "Total" as well as the "Partial" counting.
On the display the word **STOP** appears and pulses, which come from the sensor afterwards, are ignored.

Freezing Global counting (SPLIT)

Once you have enabled the Global counting, using **[START SPLIT]** you can freeze on both counters the distance travelled until that moment.

This "freezing" is indicated by the word **SPLIT** on the display.

The "freezing" stays activated for the time programmed in "*Split Delay*" in the menu "*Setup / Inputs*" and can vary from 3 to 20 seconds.
The counting of distance will start again at the end of this time or by pressing again [**START SPLIT**].

> **During the "freezing" time, the global "Stop" as well as the "Partial counter Restart" are active.**

You can enable the "freezing" also using the external button if this input is enabled for the *SPLIT* function in the menu "*Setup / Inputs*".

Decreasing Global counting (BACK)

Counting direction can be reversed anytime in order to decrease distance.
Press the **[BACK]** key to switch from count up to count down, which is indicated by the word **BACK**, and vice versa.

Resetting Global counting (RESET)

If you press and hold **[STOP RST]** for longer than 2 seconds, or by pressing [**SHIFT**] followed by **[STOP RST]**, you reset both counters, remove the **BACK** function – if active – and enable again the counting, switching to the function **RUN trip**.

> **CAUTION: both counters are set to 0.000 even if they were previously programmed to start from a determined value.**

Partial counter Restart (RESTART)

Once you have enabled the Global counting, the Partial counter is reset and starts again anytime you press **[RESTART]** or operate the external button – if this input is enabled for the *RESTART* function in the menu "*Setup / Inputs*".

Synchronization of Partial/Total distance counter

Sometimes you need to "synchronize" the Partial or Total distance counter.

You can synchronize quickly one of the two counters.
In "*Menu / Setting / Trip / Sync Trip*" you can choose which counter (*Partial / Total*) has to be modified.

For how to synchronize the counter, please see paragraph below "AVERAGE *mode / Real distance synchronization*".

Modifying Partial distance (Increasing/Decreasing)

Sometimes you need to modify "a little bit" the Partial distance counter.

To do this, press [**PART INC**] to increase or [**PART DEC**] to decrease the distance.

The counter is increased or decreased by one unit, according to the selected resolution. This value can be programmed by the user according to the resolution (see menu "Setup / Trip Setup / Inc/Dec Delta"").

Factory-set values are:

with resolution 0.1	distance modified by +/- 100
with resolution 0.01	distance modified by +/- 10
with resolution 0.001	distance modified by +/- 5

Displaying partial counter CountDown [PTS]

If in the average speed actually used you have programmed a stretch, press [**PTS**] to display the countdown of the partial counter only: an upside-down triangle turned on, on the right side of the partial counter, will signal that this view is enabled.

Press again [**PTS**] to revert to the normal count-up view.

If you don't have programmed any stretch, the view doesn't change.

> **NOTE:**
> **If you are using the instrument as a simple trip and not as an "average calculator", you can program average speeds AVG only with stretches.**
> **If you enable the function"Show CountDown", anytime you change the average speed with [RESTART], the instrument displays the partial distance counter, starting again with the value programmed and decreasing the counting.**
> **If the programmed value is 0, the distance starts again with 0.000,**

and the counting is increased.

Displaying speed (VIEW)

You only need to press **[VIEW]** to see your current speed.

The lower row on the screen switches from "Partial" distance to speed view, which is expressed in kilometers/miles per hour, with resolution to the hundredth.

The word *SPEED* indicates that the speed is shown.

Press again **[VIEW]** to switch to the Partial distance view.

| *While the speed is displayed, all normal functions of AVE-S are active, except the synchronization and modification of the Partial distance counter.* |
| --- |

AVERAGE mode

In the AVERAGE mode there are two view modes:

Textual view
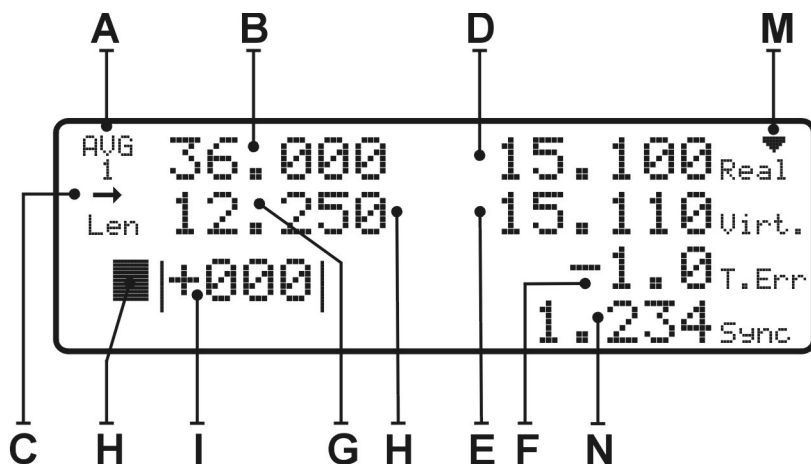
Graphical view
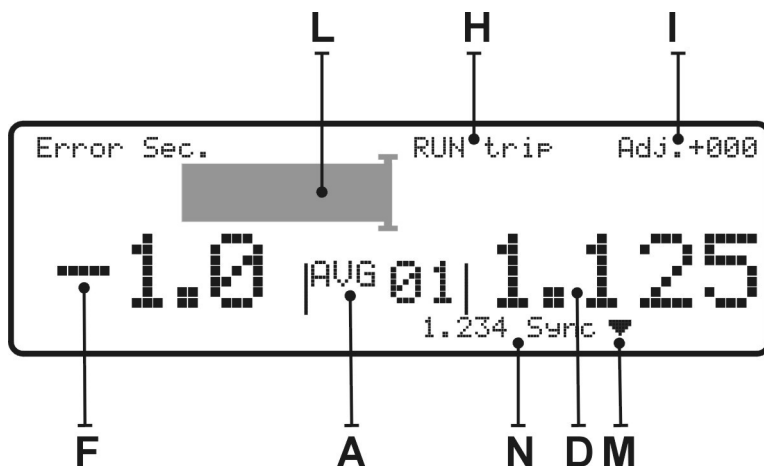
A: Selected average number

B: Selected average value

C: Operating mode of the selected average at the next RESTART

"→ " *RESET* mode

"↔ " *CONTINUE* mode

D: Measured partial distance

E: Calculated virtual distance in relation to programmed average

F: Error between measured and calculated distance

"*T.Err*": delay or advance in seconds and tenths

"*D.Err.*": extra or less distance compared to theoretical distance →

G: Programmed virtual distance at which you have to start the average counter

H: Instrument status

■ *STOP*: Counters of measured partial distance and calculated virtual distance are stopped

▶ *RUN*: Counters of measured partial distance and calculated virtual distance are running

❯ *RUN trip*: Counter of measured partial distance is running and counter of calculated virtual distance is stopped

❚❚ *SPLIT*: Counters of measured partial distance and calculated virtual distance are frozen

I: Correction value of partial counter (Real), which is set using [**PART +**] and [**PART -**].

L: Error bar. This allows you to determine immediately direction and quantity of error compared to prescribed average speed.

M: This indicates that the display of real and virtual distance countdown is enabled.

N: Value of synchronization distance for the partial counter (Real) which is going to be changed at the next *SPLIT*.

In the graphical view, the instrument shows the error between measured and calculated distance using a horizontal bar, which increases and reduces its size to the left and to the right, depending on the value and sign.

> *In this view mode, the (positive and negative) full-scale of the error expressed in time is 59.9 Sec.*

Setting averages [SET AVG]

Before you use the instrument as an average calculator, you need to set the average speed currently selected.
In the event of races with concatenated sections but different average speeds, the instrument allows you to program up to 100 averages (0..99), to which you go automatically any time you press [*RESTART*].

Press [*SET AVG*] to display the Averages List.
Press [*ESC.*] to exit from the list.

Averages list

In Averages List you can see the list of the programmed averages.

The black arrow, positioned on the left side of the list, indicates the average that can be set and/or modified.

Press [*UP*] and [*DOWN*] to position the cursor on the desired average.
Press [*SHIFT*] followed by [*UP*] to position the cursor on the first average.
Press [*SHIFT*] followed by [*DOWN*] to position the cursor on the last average.

The average speed currently used is highlighted by the blinking row.

Enabling selected average

With [*ENT.*] you make operative the average pointed by the black arrow, in order to calculate the virtual distance.

You cannot do this if the average is not programmed (error notification).

You can enable the selected average also in the menu (see paragraph below).

Modifying selected average

Press again *[SET AVG.]* to go to "*Change settings*" of the selected average parameters.

Press [*UP*] and [*DOWN*] to select the item you want to modify / set.

The current value will blink to highlight the selected item.

Press [*ENT*.] to go to the item settings.
Press [*ESC*.] to exit from "Change settings", you save the changes you have made and go back to the averages list.

> **You can use the number keys to modify directly a parameter. Next to every item you will find the corresponding number.**
>
> **If you press [SHIFT] followed by [UP] or [SHIFT] followed by [DOWN], you go to the previous or next average, with the item still selected.**

1 Val.(Value)

With this you can set the average value.
The setting method is the same used for the other settings.

Press [**ENT.**] to confirm the changes you have made.
Press [**ESC.**] to exit without modifying this parameter.

> *If you change the current average speed, the instrument calculates*
> *again virtual distance and error in time, starting from the last*
> *Restart.*

2 Typ. (Average type)

The instrument has two operating modes for the counters when you operate the
RESTART:

- • "*type RESET*":
  at the RESTART counters are reset, you go to the next average and the
  counting starts with 0.000.

- • "*type CONTINUE*":
  at the RESTART counters are not reset, you go to the next average
  keeping the measured / calculated values.

Press [**UP**] and [**DOWN**] to choose the desired mode.
With [**ENT.**] you select the operating mode.
With [**ESC.**] you exit without modifying anything.

3 Time (Automatic start time)

By selecting this entry you can enable / disable and set the time at which the
average must start the virtual distance calculation.

The first entry allows you to enable / disable the automatism.

The second entry allows you to program to the second the time at which the
automatism starts.

> *CAUTION: the automatic start automatism works only if the average*
> *"in use" is the same as the average that must start and the*
> *instrument is in the STOP mode.*

4 Dist.Split (Virtual distance)

With this entry you can set the partial distance value at which the instrument will
go automatically to the next average – if this average is programmed.

> *You remove this automatism by setting the value 0.000.*

5 Length Race

This allows you to set the length of the trial related to the average which has
been selected to be modified. If this option is enabled, you can display the

partial distance CountDown.

8 Part.Sync (0/10) (Synchronization distances of the partial counter)

This allows you to set up to 10 distances to synchronize the partial counter while driving your car.

All 10 values are displayed.
A non-programmed value is highlighted by the symbol "**-- --**".

Press [*UP*] and [*DOWN*] to select the distance you want to change. Otherwise, you can use the number keypad by pressing the number which appears next to every distance.
The value will blink to highlight the selection.

Press [*ENT*.] to change settings.
Press [*ESC*.] to delete what you have set.
If you press [*MENU*], you will find two more functions for deleting a single item or all 10 distances.

To exit from the setting phase of synchronization distances, select "*Exit*" with [*UP*] and [*DOWN*] or directly with the [*PTS*] key, and then press [*ENT*.].

> *If you are setting a value which is the same or included in the range of an already existing value, the instrument signals the problem without setting the value.*

Menu averages list

In Averages List, by pressing the [*MENU*] key you will see the following options:

1 Set >In Use<

The selected average is made operative.

Similar to the *[ENT.]* key operation.

2 Clear Selected AVG

You remove the setting only to the selected average.

3 Clear All AVG

The setting of all averages is deleted and you set the value of 36,000 for the first average in the list (*AVG 0*).

4 GoTo Last programmed

The cursor is positioned to the last programmed average in the list.

5 GoTo >In Use<

The cursor is positioned to the average currently used.

Clear Event of all AVG

This resets all averages changes you have made and makes operative the first average (AVG 0).

Start

Commands are the same as in the TRIP mode.

If you press [**START SPLIT**] or [**RESTART**], **AVE-S** starts calculating the "Virtual" distance and measuring the "Real" distance, and it displays the error.

In the graphical view, the bar moves indicating how early or late the "current speed" is, compared to the prescribed average speed.

Now you have to step on the gas pedal and try to take the pointer back to the "0". The closer you are to this zero, the closer you are to the prescribed average speed.

Restart

If you press the [**RESTART**] key or the external button, depending on the current "*average type*", the instrument resets counters and starts a new counting from 0.000 (average type *RESET*) or continues the counting (average type *CONTINUE*).

If the following average is programmed, **AVE-S** sets it as operative.

If the following average is not programmed, the instrument keeps operative the same average.

The recalculation is done and shown immediately.

Reset

The instrument can be reset anytime while measuring.

You only need to press and hold [**STOP RST**] until the counters are reset, or, without waiting, press [**SHIFT**] followed by {**STOP RST**].

The instrument goes into *RUN trip* mode, the partial counter is enabled and the virtual counter is stopped, ready to start.

Freezing real distance counter

If you press *[START SPLIT]*, you "freeze" only the real distance counter. The view of virtual distance and error compared to real distance stays active.

The "freezing" stays active for the time you have set in "*Delay Split*" in the menu "*Setup   Inputs*". After this time or by pressing again *[START SPLIT]*, the real

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distance counter starts again.

Real distance synchronization

You have three options to align the measured real distance to the distance indicated in the RoadBook in a determined point. These options are described below.

Increasing / decreasing distance

The most direct method to change the partial distance (Real) is using the [**PART INC**] or [**PART DEC**] keys (see previous paragraph "*Increasing/Decreasing Partial distance*").

You can use this system anytime, with frozen counters (SPLIT state) and also with running counters (RUN state).

While operating the keys, the added or subtracted value will blink on the display.

After 5 seconds from last key stroke the value will stop blinking.
At this point, if you press the keys again, depending on the parameter settings "*Setup / Trip / Adj.Partial*", the displayed counting starts again from 0.000 (*Reset mode*) or from the value you reached previously (*CONTINUE mode*).

Synchronization by SPLIT operating

If the instrument is in the *RUN mode*, by pressing [**SYNC TRIP**] you can set the distance that will be entered in the real counter the next time you operate the [**SPLIT**] key. This distance will replace the current one.

To disable the distance update, you have to set the value 0.

If the update is active, the programmed value will be shown on the display.

While operating the *SPLIT*, the value is replaced in the real counter and the programming is set at 0: in this way the update is disabled.

Using this system you can do an infinite number of "synchronizations".

> **In the SPEED mode the synchronization doesn't work.**

Pre-programmed synchronization

If you have pre-programmed the synchronization distances for the average currently used, using the SPLIT command the instrument searches for the distance which, compared to the "frozen" one, falls within the programmed range (see Menu / Setup / / Trip Setup / Range Part.Sycn).

If the result is positive, the instrument shows the value on the display.
By pressing [**TRIP SYNC**] the value is entered in the real distance counter, the instrument goes back into *RUN mode* and the counting starts again from the

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new value.

If the result is negative (no value found in the programmed range), by pressing [*TRIP SYNC*] the instrument asks for the value to be set in the real distance counter.
If you set the value and confirm with [*ENT.*], the instrument goes back into *RUN mode* and starts again the real distance counting from the new value.
Press [*ESC.*] to exit without modifying the real distance.

> *In the SPEED mode the synchronization doesn't work.*

Example: the Range is +/- 50 and the programmed synchronization distance is 1000.

If you "freeze" the real distance at a value between 950 and 1050, the instrument shows the synchronization distance of 1000.
By pressing [*TRIP SYNC*] you set the real distance at 1000 and the instrument goes back into *RUN mode*.

If you "freeze" the real distance at a value lower than 950 or higher than 1050, the instrument asks again for the new distance.

MENU

Press the [*MENU*] key to go to the *Main Menu*: here you can program the operative parameters of the instrument, select the sensor inputs and calibrate the kilometric constants.

The following options will be displayed:
1 Setup
   to set all instrument parameters
2 Set Clock:
   to open the window to check and/or modify the internal clock.
3 Instrument Off
   to switch off the instrument
4 Info
   to display the main operative parameters of the instrument.

Select the desired item using *[UP]* and *[DOWN]*. Press *[ENT.]* to confirm. You can use the number keypad too: in this case, press the number corresponding the item you want to select.

Press *[ESC.]* to go back to the main view.

1) Setup

This is the menu to program all operative parameters of the instrument.

You will find the following options, and every option has its submenus.

1) Constant Setup

> *Since the parameters for kilometric constants are saved in the INTERFACE-S box, this option is active only if the box is connected to the instrument.*

To determine the travelled distance, the instrument needs to know the "kilometric constant" of the car, that is the pulses number for a kilometer generated by the installed sensors.

This menu allows to generate, modify and adjust the kilometric constants for every single sensor.

> *The "determination" of the kilometric constant must be done every time you have a measured "reference route", used by the organizer to write the RoadBook.*

1) Constant Adj.

In some cases, also during the race, you have to align the values of kilometric constants, which are currently saved in the **INTERFACE-S** box, to the "standard" used to write the RoadBook.

Setting correction coefficient

To determine and apply the correction coefficient, you only need to drive the reference route indicated by the organizer by starting the instrument using the [**RESTART**] key or the external button.

When you have driven the reference route and stopped the car, you have to stop the counting using the [**STOP**] key.

> *If the instrument isn't in the STOP mode, it doesn't go to the setting mode of the coefficient and signals the problem.*

If the measured distance corresponds to the distance in the RoadBook, you don't need a correction coefficient for the memorized constants.
If there is a difference, you have to set the correction coefficient by choosing the option "*Constant Adj.*" in the menu.

The instrument displays the current partial distance and the pulses number measured from the last **RESTART**.
If you confirm with *[ENT.]*, you set the distance indicated in the RoadBook.

Press [*UP*] and [*DOWN*] to modify the blinking digit, press [*LEFT*] and [*RIGHT*] to change digit.
If you confirm with *[ENT.]*, the instrument calculates the correction coefficient that will be applied to the programmed constants and goes back to the normal operation.

> *The writing indicating the selected constant and the modified value will blink in the status bar to signal that the correction coefficient is activated.*

By switching off the instrument, the correction coefficient is saved so that it is already set and active the next time you switch on the instrument.

Disabling correction coefficient

To remove the correction coefficient, you have to select "*Constant Adj.*" in the menu and then choose "*Disable*".

> *CAUTION:*
> *The ratio between "measured distance" and "prescribed distance" not always gives a whole number.*
> *As a consequence, the modification of programmed constants can generate a "measured distance" which is slightly different than the one you wanted (usually +/- one meter), and this is due to the decimals that are not displayed.*
> *This fact is accentuated if you use two sensors in "AVERAGE" mode: in this case, the difference is bigger because calculation errors add up.*

2) K Group Select (GRP x)

With the *INTERFACE-S* box you can connect four sensors of different types, with different calibration constants. The *instrument* allows you to memorize six groups of four constants (one for each sensor). By selecting this option, you can choose the group you want to use.

The blinking row indicates the enabled group.

With [*UP*] and [*DOWN*] you change selection.
Press [*ENT*.] to confirm and exit.

> *CAUTION*:
> *To modify manually a programmed constant, you have to enable the corresponding group first.*

3) Manual Change

This allows you to modify the constants values for each input of the selected group.

With [*UP*] and [*DOWN*] you select the constant to be changed.
Press [*ENT.*] to change the value.
Press [*ESC.*] to exit and save any modifications you have made.

CAUTION:
It's not possible to set constants values lower than 1000.

To modify the other constants, you have to enable their respective group first.

4) Calculated Set

Before you proceed with this step, you need to find a road stretch of which you know the length (e.g. a section between two kilometric references or a previously measured section). The calculation is made in three phases:

Counting of pulses:
The pulses, which are produced by the sensor while driving the reference route, are counted.

Setting the base length:
The length of the reference route is entered.

Checking and saving the kilometric constant:
It is checked whether there are enough pulses to calculate a correct kilometric constant. The constant is then saved in the instrument memory.

To use the instrument with averages expressed in Mph, you only need to have a reference route measured in miles.

By selecting this procedure, the instrument will count pulses produced by the sensor installed on the car.

Counting of pulses

The counters of enabled sensors are displayed. These counters will be increased every time a pulse is generated.

Press *[RESTART]* to enable the counting.
The word *RUN* will appear to indicate that the counting is enabled.

At the end of the reference route, press *[RESTART]* to finish the learning phase.

Press *[MENU]* to go to the option for setting the base length.

CAUTION:
The instrument doesn't go to the next step if no counter has been increased.

If you need to repeat the measurement, you can reset the number of pulses which have been measured until now with the keys sequence [**SHIFT**] [**STOP**].

Setting base length

When the counting of pulses has finished, the next step is setting the base length. The default length of 1.000 will appear on the display.

This value can be modified and must correspond to the previously measured distance, which was travelled while counting pulses.

Press *[ENT.]* to confirm the base length you have set.

Calculating, checking and saving kilometric constant

After setting the base length, the instrument calculates the correct kilometric constant by doing the ratio between the number of measured pulses and the base you have set.

If the ratio between number of pulses and set base is a value between 1000 and 9999, this is assigned to the kilometric constant and saved in the permanent memory of the instrument.

If the result is a value lower than 1000 or higher than 9999, an error message will appear.

By pressing a key, the instrument goes back to the step for setting the base length and proposes again the default value of 1000.

> *It is not possible to calculate and save constants if a sensor doesn't generate an adequate number of pulses – because it's damaged or disconnected.*
> *In this case you have to disable the faulty sensor.*

2) Sensors

Since parameters about sensors are memorized in the **INTERFACE-S** box, this option is active only if the box is connected to the instrument.

1) Test

This allows you to check the operation of enabled and connected sensors.

The input status and a pulses counter are displayed for every enabled sensor.

The letter "**H**" indicates that the sensor input it's at a **HIGH** level (voltage higher than 10 volt). This means that the sensor is disconnected or inactive.

The letter "**L**" indicates that the sensor input it's at a **LOW** level (voltage lower than 3 volt). This means a short circuit to ground or an active sensor.

To check if sensors are working properly, you have to switch from **HIGH** to **LOW** and vice versa while the car is moving.

The pulses counter will increase in contemporary with the switchover from **HIGH** to **LOW**.

You only need to press **[ESC.]** to exit from the test function.

2) Sequence Set (A B C D)

This allows you to enable and set the main input and the second, third and fourth input in the sequence.

With [**UP**] and [**DOWN**] you choose the position within the sequence.
Press [**ENT**] to display the sensors that are still available and the option "**-- --**" (input not enabled). With [**UP**] and [**DOWN**] you choose the desired sensor, and with [**ENT**] you confirm.

If the sensor is not available, you have to select the option "**-- --**" (input not enabled), in order to inform the system not to check the operation of that input.

The first element of the sequence cannot be disabled, it must always be an input.

Press [**MENU**] to save the modifications you have made.

Press [**ESC.**] to exit without modifying anything.

3) Clear Fault

This enables again sensors which were previously disconnected because no pulses were received.

4) Mode Set (Only First)

If two sensors are used, the instrument allows you to choose between four ways for calculating distance. The options are the following:
- "**Only First**": In this mode, the instrument uses only pulses generated by the first sensor of the programmed sequence.
- "**Average":** *In this mode, the instrument takes into consideration the average between signals of both wheels.*
- "**Fast Wheel":** *In this mode, the instrument works with both sensors but takes into consideration the signal of the wheel that turns faster (this is very useful for cars which tend to lift the inner wheel when rounding a curve because you take into consideration the signal of the wheel which stays on the ground).*
- "**Slow Wheel**": In this mode, the instrument works with both sensors but takes into consideration the signal of the wheel that turns more slowly (this is very useful for cars with sensors installed on driving wheels because, in the event of wheel slip while accelerating, you take into consideration the signal of the wheel which turns more slowly, i.e. the wheel that doesn't skid).

CAUTION
In the "AVERAGE" mode, if one of the two sensors doesn't receive

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> **pulses because it's damaged or disconnected, at the beginning of the measurement the instrument shows a distance equal to half of the real distance. This is due to the average calculation, which is done by adding the number of pulses of the two sensors and dividing the result by 2.**
>
> **This wrong display stays until AVE-S disconnects the damaged sensor and goes to the "Only First" mode, using the pulses of the sensor that is still active.**

3) Trip Setup

1) Total

With this you can set the Total distance counter.

2) Partial

With this you can set the Partial distance counter.

By selecting "*Total*" or "*Partial*", you can set the total or partial counter, so that the distance measurement can start not from 0.000 but from a pre-determined value.

In this function, you can set and/or change the value of the total counter by using the number keys.
Press the [**+**] key to set a positive value, press the [**-**] key to set a negative value.

If you set a positive value, this is added to the currently measured distance. If you set a negative value, it is subtracted.

If the measured distance is 0.000 and you set a negative value, you get a countdown.

Press *[SHIFT]* followed by *[RESET]* to reset the programming (CLEAR).

Press *[ENT.]* to confirm the set value and go back to normal operation.

Press *[ESC.]* to exit without modifying anything, without changing the value in the total counter.

> *CAUTION:*
>
> **In the normal operation, if you reset the instrument using RESET, you disable but don't reset the settings of the total and partial counter.**
> **To enable them again you have to go to the respective option in the Menu and press [ENT.], in order to confirm again the set value.**

3) Inc/Dec Delta (0.001)

For every resolution, with this you can set the step you have to add or subtract to the partial distance while operating the [*UP*] or [*DOWN*] keys:

By selecting the resolution option you can program the value for every single step.

You can set a value in the range of 1 – 999 meters.

4) Adj.Partial (Continue)

This allows you to select if you want to reset or not the counter of the correction which has been applied to the partial distance, every time you make a new adjustment using the [*UP*] and [*DOWN*] keys.

The option "*Continue*" indicates that the counter is not reset. In this way, the total modification of the partial distance is displayed.

The option "*Reset*" indicates that, every time you make a new adjustment, the counter is reset in order to display only the last modification you have made.

5) Range Part.Sync (0.100)

With regard to the programming of synchronization distances of the partial counter, this allows you to set the range in which the real distance measured must fall in order to enable the set value.

You can set a value between +/-10 - +/-999.

6) Sync. Trip

Only in the TRIP mode, this option allows you to choose which counter is synchronized using [*TRIP SYNC*] (see previous paragraphs).

By choosing "*Total*" you synchronize the Total distance counter.
By choosing "*Partial*" you synchronize the Partial distance counter.

In the AVG mode this option is not used because the synchronization modifications are made on the Real distance counter, which corresponds to the Partial counter.

4) Display

1) Key Light (50%)

This enables / disables the keyboard backlighting when the display backlighting turns on.

You can choose between four backlighting levels, depending on your needs.

2) Swap Row

The instrument displays in a different way the two rows of the distance

counters.

Depending on your needs, you can make more visible the total distance or the partial distance (or the speed) by using a different size for digits. With this function you switch from

Total distance "big" / Partial distance "small" to
Total distance "small" / Partial distance "big"

and vice versa.

3) Set Decimal (0,,001)

This allows you to choose the resolution for displaying distance counters.

There are three possible resolutions:

0.001	Resolution to three decimal places
0.01	Resolution to two decimal places
0.1	Resolution to one decimal place

With [*UP*] and [*DOWN*] you choose the resolution, with [*ENT.*] you confirm it.

4) Error in (Distance)

If you select *Seconds*, the instrument shows in seconds and tenths of a second the error acquired with reference to elapsed time and distance actually travelled from the last *RESTART*, according to the programmed average.

If you select *Distance*, the instrument shows the error in "distance" between distance actually travelled and theoretical distance related to the programmed average.

5) Inputs

1) Split Delay (15 Sec.)

With this option you can set the time in which the display stays "frozen" when the instrument goes into SPLIT mode by pressing *[START SPLIT]*.
At the end of this time, the display resumes the normal view.
The value can be programmed from a minimum of 3 seconds up to 20 seconds.
The factory-set value is 15 seconds.

2) Ext. Input (SPLIT / RESTART)

With this option you can choose the instrument operating mode when you operate the external button.

You can choose between two options:
Split: by operating the external button you freeze the real counting of the distance on the display for the time you have programmed in "*Split Delay*".

Restart. by operating the external button, depending on the current "average type", you reset the counters and a new counting starts from 0.000 (average type RESET -->) or the counting continues (average type CONTINUE <-->).

The factory-set value is *SPLIT*.

3) Key Tone

Sometimes the key tone when typing can be annoying, especially in the programming phase. By selecting this option, you can enable or disable this tone.

If you set "Disable", the tone generated when typing or by any programming error is suppressed.

If you set "Enable", the tone is restored.

6) Wireless

This allows you to enable or not to enable the Wireless connection to the screen repeater **ECHO-S**.

The option "*Enable" indicates that you can connect to the remote display.
The option "Disable" indicates that the system is not active.*

> **We advise you to deactivate the radio system ("Disable") if you are not using the remote display: in this way, you can reduce the instrument consumption, which is necessary if it's powered by internal batteries only.**

2) Set Clock

This allows you to check, set and synchronize the internal clock if you are using averages with automatic start.

Synchronization check

After you selected "Set Clock", you will see the option "*Clock Check*".

If you operate repeatedly the external button, you will see its operating hours.

You can also use [*ENT*.] to take the time, but this is not as precise as the external button because of the internal delays of the keyboard.

Setting

In "*Clock Check*", press [*SET AVG*] and the menu to select the setting mode will appear.

By selecting the option "*Manual*", the instrument will ask for the new time.

You have to set the current time plus one or two minutes: the actual start will happen later.

After you set the time, press [*ENT*.] to confirm the setting and go to the step "*Ready to Start*".

At the exact time you have to start the clock by operating the external button, which is connected to the input line.

When the clock has started, the instrument goes back into "*Clock Check*".

Correction

With this option you can adjust the time by adding or subtracting a certain quantity of time.

To set a value, follow the same procedure you used to set hours.

To add the programmed value to the clock, you have to set the sign + with [*PART INC*].

To subtract the value, you have to set the sign - with [*PART DEC*].

Press [*ENT.*] to exit and confirm the correction.

Press [*ESC*.] to exit without modifying anything.

An asterisk will blink in front of the clock, which appears in the status bar at the bottom right, to indicate that the correction is active.
To remove the correction you have to set a time of 0.00.

3) Instrument Off

To switch off the instrument you only need to choose "*Instruments Off*" in the Main Menu.

The instrument saves the data in the permanent memory and then turns off.

> ### CAUTION:
> **The programming of kilometric constants and averages is saved in the permanent memory of the instrument only when you turn it off. Pay attention therefore not to disconnect the power supply of the instrument before you have turned it off properly.**

4) Information

Here you will find some information about the instrument.

The following elements are displayed:

The serial number and the firmware version of the connected *INTERFACE-S* box.

The sequence of active inputs and the selected group.

The values of calibration constants.

The (possible) enabling of the adjustment of calibration constants.

The resolution of displayed distances.

The number of programmed averages.

The number of past averages.

The average currently used.

Technical specifications

Technology:	ARM CortexM3 32 bit microprocessor.
Display:	240x64 pixel graphical LCD display, monochromatic, transflective, with backlighting
Power supply:	external: from 10 to 15 volt. internal: through four 1.5V AA batteries.
Consumption:	40 mA typical. 80 mA with display backlighting. 110 mA with display and keyboard backlighting
Operating time with internal batteries:	with alkaline batteries: 70 hrs with backlighting off. 55 hrs with backlighting on for 12 hrs. 25 hrs with backlighting always on.
Remaining operating time when "low battery" warning turns on:	with alkaline batteries: 10 hrs with backlighting off. 2 hrs with backlighting always on.
Number of pulses per Km/Miles:	Minimum: 1000 Maximum: 9999
Maximum speed:	250 Km/h - 155 mph
Minimum pulse duration of sensor:	50uSec active. 50uSec not active.
Programmable averages:	100 averages, from 3,000 to 199,999
Size:	(205x100x30)mm
Weight:	400 grams, with 4 AA batteries inside
Operating temperature:	from 0 °C to +50°C
External button input:	normally open contact minimum pulse duration 5 mSec
Connectable accessories:	**PB5/JG-A** external button to control remotely the *[RESTART]* or *[SPLIT]* key
Available sensors:	**SW-ROTAN**: Sensor for cars equipped with tachometer wire. **SW-INDUT**: Sensor for cars without tachometer.

Warranty and assistance

Warranty

The instrument *AVE-S* is guaranteed by Digitech S.r.l. to be free from defects in materials and workmanship for a period of 24 months from the date of delivery to the buyer.

During the warranty validity period, faulty components will be repaired or replaced free of charge. All forwarding charges are at the customer's expense.

This warranty is not valid when the instrument has been damaged due to accident, misuse, neglect or tampering by any person not authorized by Digitech.

No other warranty is expressed or implied.

In no event shall Digitech S.r.l. be liable for damages not covered by this warranty.

Batteries and damages caused by batteries are not covered by the Digitech warranty. Please contact the battery manufacturer for the battery warranty.

If the instrument needs to be repaired

If your instrument needs to be repaired, please contact our assistance service on +39 040/280 990 (from 9:30 to 12:30 and from 15:30 to 17:30, Mondays to Fridays).

Please include the following in the package you send to us:
- The address where to send the item back.
- A brief description of the problem and the procedure to reproduce it, if possible.
- If the warranty is still valid, please include a copy of the sales receipt or other document which proves the date of purchase.

The instrument and accompanying information must be sent in the original package or other equivalent packaging to prevent damages during shipment. These damages are not covered by the warranty.
We advise you to send the item by insured mail.

Digitech will send back the repaired instrument by similar means.
Forwarding charges to Digitech are at the owner's expense.
Any packages with forwarding charges to be paid by us will be rejected.

Repair warranty

Repairs out of warranty are guaranteed to be free from defects in materials and workmanship for a period of 90 days from the date of repair.

Repairs performed under warranty do not extend the original warranty period in any manner.

Functional problem notification

If you find functional problems using *AVE-S* or if you have any doubts concerning the use of the instrument, please do not hesitate to contact us:

per mail:
DIGITECH - Via Stazione di Prosecco, 29/d - 34010 Sgonico (TS) - Italy

per fax:
+39 040 833 0561

per e-mail:
info@digitechtiming.com

This will help us check and solve any problems as soon as possible.

Firmware update

To update the instrument firmware you need following elements:

- a *mini USB* cable.
- a PC with Windows XP operating system or higher.
- the "*Multi-Update_1v4.exe*" updating program or higher.
- the "AVE-*S-XvX.hex*" file, where "XvX" is the updating version.

Connect the instrument to the PC using the mini USB cable.
Wait for the computer to recognize the new hardware.
If required, install the drivers that you find in the website.

> *Hold the [7] key pressed while turning the instrument on.*

The instrument will turn on with the backlighting set on a mid-brightness level, nothing will appear on the display and the keyboard is disabled.

Launch the "*Multi-Update_1v4.exe*" program and open the "AVE-*S-XvX.hex*" file with the button "Open File".
The program will show the updating version.

Click on the button "Connect" if the version is the right one.

The program will search for the instrument among the PC peripheral devices. When the instrument is found, the current firmware version will appear.

Press "Start" if everything is ok.

The update will start.

When the update is completed, if the procedure has been successful, the instrument will turn on normally and will be ready for use.

> *CAUTION: Do not disconnect the instrument or remove the batteries once the update has started.*
> *If the update process is interrupted, the instrument will not work anymore.*
>
> *In this case, you have to send the instrument to us for complete reprogramming.*

If the update stops, follow the emergency shutdown procedure – press and hold the [*ON*] key for longer than 6-7 seconds – and repeat the procedure.

DECLARATION OF CONFORMITY

in accordance with EN45014 and ISO / IEC Guide 22

Manufacturer's name: DIGITECH S.r.l.

Manufacturer's address: Via Stazione di Prosecco, 29/d
34010 Sgonico (TS) - Italy

declares that the product

Product type: Programmable odometer

Product name: *AVE-S*

complies with the following Directives

Directive 73/23/EEC Safety: IEC950 : 1991 / EN60950 : 1993

Directive 89/336/EEC EMC: EN55022 : Class B
EN50082-1 : 1992
IEC801-2 : 1984 - 4kV CD - 8kV AD
IEC801-3 : 1984 - 3V/m

Additional notes:
The programmable odometer *AVE-S* was tested in a typical configuration with
the **INTERFACE-S** box and the **PB5/JG-A** button by DIGITECH.

Trieste, 15 October 2012

**Gustin Diego
QA Manager**

Appendix

Enabling / Modifying sensor sequence

Select the option "Menu / Sensors / *Sequence Set*(*A B C D*)" to enable the inputs to which sensors installed on the car are connected and set their operation sequence.

Once you are in this mode, the first thing you have to do is making the previously programmed inputs available.
Position the cursor on the last item of the list which contains one of the four letters A, B, C, D, corresponding to the four available inputs.

Press [*ENT*.] and select the item "-- --" (input not enabled).

Repeat this procedure till you get a list where only the first row contains a letter. If the remaining letter does not correspond to the input we want to use as main input, select this item with [*ENT.*] and a list will appear. Select the letter corresponding to the desired input from this list.

If you are not using other sensors, exit with [*MENU*] to save what you have set.

If you are using a second sensor, position the cursor on the second row, press [*ENT.*] and select the letter corresponding to the used input.

> *You can use the number keypad to select the desired input by pressing the corresponding number.*

Repeat this procedure if you are using other sensors.

> *Remember to exit using always [MENU] to save the modifications you have made.*

How to invert sensors

Sometimes it could be useful to invert the main sensor installed on the right wheel with the sensor installed on the left wheel.
In such a case, follow this procedure:

Position the cursor on the second row, press [*ENT.*] and select the item "-- --"(input not enabled).

Go back to the first row of the list and select the input you have just disabled.

Go back to the second row and select the input that you have just made "free".

Exit using [*MENU*] to save the modifications you have made.