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1 – Introduction

Thank you for choosing a PZRacing product. Start is a state-of-the-art GPS chronometer. There are many advantages to this technology: you will no longer need to place a bulky infra-red transmitter at the side of the track, you can even view split times on the display and thanks to specially designed software, you can view all the trajectories covered on a given track. Start is the only chronometer in the world to use a 50Hz receiver and a touch screen pad with "Gloves Sensitive" technology which makes it possible to use the device even when wearing gloves.

Start Next and Start Basic are two chronometers of the same product line and they function in the same way. However, Start Basic does not allow data acquisition and box expansion connection.

Please note: PZRacing products are water resistant but not waterproof; do not wash the product with pressurised water and keep the lateral tab closed at all times; failure to do so could cause permanent damage to the product.

1.1 – GPS Technology

The Global Positioning System (also known as GPS) is a satellite positioning and navigation system which, thanks to a network of artificial satellites in orbit, sends information about geographic coordinates and the time to a GPS receiver, in any weather conditions and on any place on Earth. Its functioning principle is based on a spherical positioning method which measures the time taken by a radio signal to cover the distance from a satellite to a receiver. One of the main features of GPS receivers is the update frequency expressed in Hertz (Hz); this measurement unit indicates how many times per second the satellite receiver is capable of updating its position. Start has a state-of-the-art GPS receiver with an updating frequency of 50Hz (50 times per second), which translates into higher precision in calculating the time and visualising trajectories.

1.2 – Package content

- Start Next / Start Basic
- USB cable type C
- Fixing Velcro strap
- No.4 screws for plastic adaptor
- Plastic adaptor for bolt

- M6x3cm bolt for fixing onto the bracket
- Self-locking M6 nut
- Metal washers
- No.1 anti-vibration PVC plane washers
- No.1 anti-vibration PVC conical washers

1.3 – Technical features

Start Basic - Lap timer without data acquistion	**Start Next -** Lap timer with data acquistion
• Integrated 50Hz GPS receiver • Touch screen with "Gloves Sensitive" technology • 1/100s precision • Management of up to 3 split times • GPS speed visualization • Ideal time • 2 predicted time visualizations • Total time session visualization • Storage of values per lap and absolute best • "Best Lap & Split Time" /Maximum RPM /Temp warning Led • 2 engine meters • 2 odometers • Automatic circuit recognition • Global circuits database • PC set-up of a new circuit • Integrated lithium battery • Automatic shut down • Back light • Anti-impact container • Water resistant • Size: 85,6x70,5x27,6mm	• Integrated 50Hz GPS receiver • Touch screen with "Gloves Sensitive" technology • 1/100s precision • Management of up to 3 split times • GPS speed visualization • Ideal time • 2 predicted time visualizations • Total time session visualization • Internal triaxial accelerometer • 5 visualization screens • Storage of values per lap and absolute best • Storage of the trajectories • "Best Lap & Split Time" /Maximum RPM /Temp warning Led • 2 engine meters • 2 odometers • Retrieval of up to 9 analogue channels and 3 digital channels • 50Hz sampling of the connected channels • Inserted gear indicator (optional) • Data download by USB and Wi-Fi • Automatic circuit recognition • Global circuits database • PC set-up of a new circuit • PC software for data analysis • Integrated lithium battery • Optional external battery connection • Automatic shut down • Back light • Anti-impact container • Water resistant • Size: 85,6x70,5x27,6mm

1.4 – Important information for correct usage

– This device is to be used exclusively in open spaces
– In order to use the device, you must wait for satellite reception to have been completed; the GPS icon in the top left hand corner will appear on a black background when reception is complete (see chap. 4.5)
– After a long period of inactivity, satellite detection may take up to 4/5 minutes
– In normal conditions when used on the track, satellite retrieval will only take a few seconds.

2 – Chronometer components
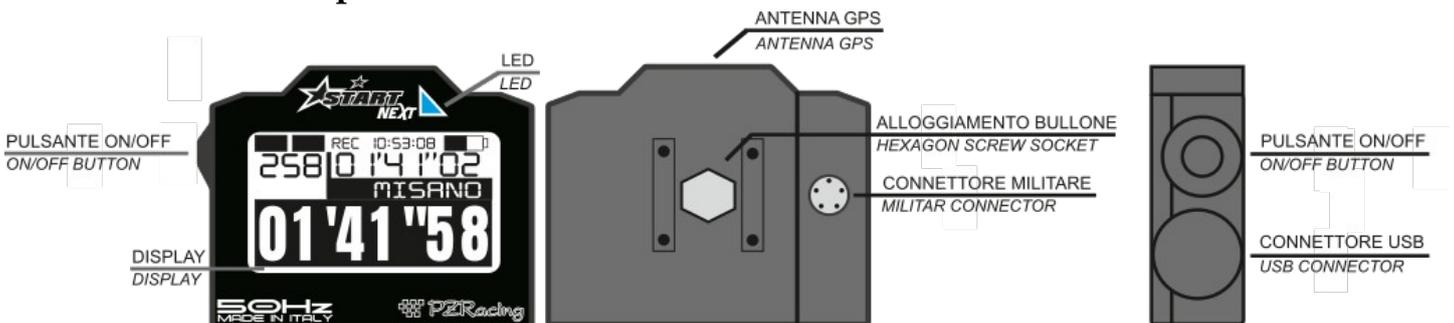
2.1 – Touch screen

Start has eliminated selection buttons which are difficult to press when wearing gloves; with Start, you select and scroll directly on the display thanks to a touch screen pad and "Gloves Sensitive technology" which makes it possible to apply the pressure required even when wearing gloves. In addition, the icons make it even more simple and intuitive to use the device.

3 – Installation

3.1 – Positioning

Start's integrated GPS receiver make installation easy. Place the chronometer in a spot where it has good visibility of the sky and where the pilot can see it well. The GPS receiver is located in the superior part of the device, **this is why it is advisable to install Start in a 45° oblique position,** see lateral picture.

In horizontal position the GPS signal suffers strong degradations as the GPS receiver view only one part of the sky and will also receive an amount of reflected waves from the ground that disturb the signal quality.

N.B: check that nearby and over the upper side of the product, where the gps receiver is located, there's no metal, carbon or electronic items; one of these items could cause the degradation of the satellite signal and the malfunction of the lap timer.

N.B: don't place an onboard camera neraby the lap timer because the internal electronic of the camera cause the degradation of the satellite signal and the malfunction of the lap timer.

Note for R1 2015/18: don't place the lap timer nearby the original dashboard of the motorbike because the internal electronic of the TFT dash causes the degradation of the satellite signal and the malfunction of the lap timer.
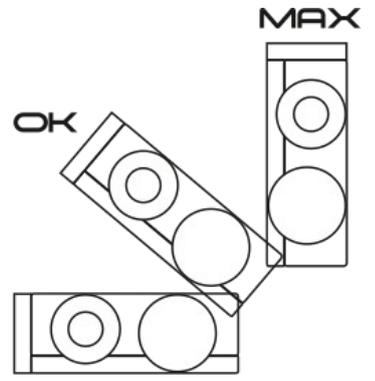
It is possible to fix the device with the plastic Velcro provided or create a bracket following these instructions:

- Prepare a bracket with a 5mm thickness and a 15mm hole (GENERAL SUPPORT)
- Insert the head of the M6 bolt in the designated space on the back of the shell of the Start device
- Fix the bolt with the plastic adaptor making the seat match the head of the bolt.
- Secure the 4 screws to fix the plastic adaptor
- Insert an anti-vibration conical washer in the bolt between the shell and the bracket
- Insert the bolt into the bracket
- Insert the second anti-vibration plane rubber washer
- Insert the plane metal washer
- Place the nut provided on top of the metal washer and screw to hold in place

DADO ESAGONALE
HEXAGON NUT
RONDELLA
WASHER
RONDELLA IN GOMMA PIANA
PLANE PRUBBER WASHER
SUPPORTO GENERICO
GENERIC SUPPORT
RONDELLA IN GOMMA CONICA
CONICAL RUBBER WASHER
VITI X 4
SCREW X 4
ADATTATORE IN PLASTICA
PLASTIC ADAPTER
BULLONE ESAGONALE
HEXAGON SCREW
START
START
RETRO / *REAR*
FRONTE / *RETRO*

Please note: absence of anti-vibration washers or incorrect positioning of these could damage the device due to vibrations of the vehicle. This type of damage is not covered by the guarantee as it is not caused by a product defect but incorrect installation.

3.2 – Power

Start is fitted with a 2000mA lithium battery; you can see the status of the battery on the icon in the top right hand corner of the main screen.

Battery charge	Low battery
GPS REC 14:29:41 ■■	GPS REC 14:29:41 ☐

To charge the battery, attach the USB connector of Start to a power source or USB port on your PC using the USB cable provided; the image of a battery being charged will appear on the display.
Once the battery is fully charged, "Charging complete" will appear on your display; you can now disconnect the USB cable.
(only Start Next) You can also charge the product directly on the vehicle by purchasing the optional SS12V100 cable or the SS12CAR cigar lighter cable; when using these devices, the battery will be charged only when the product is switched on.

Please note: in order to use some of the sensors to apply to the Expansion modules, you need to use the optional SS12V100 cable; read the technical description of the sensors you wish to install carefully.

3.3 – Internal memory

The memory contains sessions and data saved by the device; it also contains system configuration folders and the coordinates of the finish lines of the tracks. The memory card contains the following folders:

Folder: SYSTEM   File: CONFIG.CFG (file for all product configurations)
Folder: TRACKS   File: *.TRK (file for the finish line and split time coordinates)
Folder: SESSIONS   File: *.SES (saved sessions file)
Folder: MANUALS   File: *.pdf (instructions manuals in several languages)
Folder: IMAGE   File: *.bmp (startup image, monochrome bitmap 128x64px)

Please note: All the names and contents of the folders and files have been appropriately formatted; DO NOT change them manually; only use Race Pro software to read/write the file.

4 – How to use Start

4.1 – Switch on/off

To switch on the device, keep the ON/OFF button pressed until the Start logo appears on the display. To switch off, keep the ON/OFF button pressed until the device switches off.
Start also has an automatic shut down feature which switches the device off after 20 minutes of inactivity.

4.2 – Registering sessions

Start will begin to register a new session every time the three following conditions are met:
- the GPS signal has picked up the satellite signal
- the chronometer has been activated (we remind you that the chronometer starts when the internal accelerometer retrieves the departure of the vehicle)

4.3 – Screens

The following information is always displayed on the top line of the main screen: GPS (GPS receiver connected to satellites), REC (recording ongoing); time, battery level; the bottom line always display the time per lap.

The remaining area of the screen displays the following information: lap time (**01'41"58**), best lap (**01'41"02**), speed (**265**) and the circuit/acceleration type (**MISANO**):

SCREEN 1	
DURING LAP	UNDER FINISH LINE

Crossing the finish line, the difference from the best lap of the session will be displayed instead of the "Best Lap".

(Only Next version)
By inserting at least one Box Expander, you activate new visualisation screens which can be selected by pressing the lateral "switch on" button for one second; the screens available are the following and it will also be possible to view RPMs (**15500**), temperature (**113**), analogue 1 (**580**), inserted gear (**6**), best lap (**01'41"58**) and the circuit/acceleration type (**MISANO**):
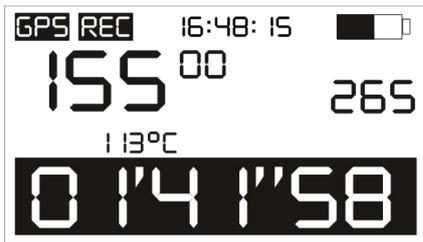
SCREEN 1

SCREEN 2
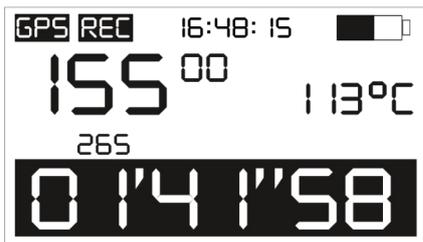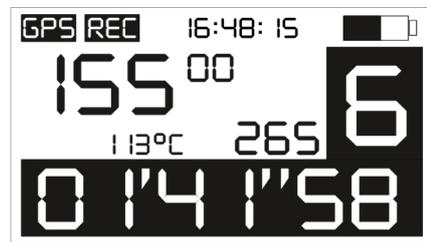
SCREEN 3

SCREEN 4
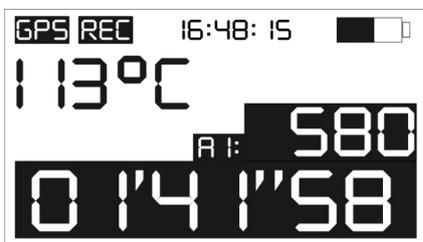
SCREEN 5

On screens 2 and 3, visualization of the gear can be deactivated (image on the left) or activated (image on the right); follow the instructions in Chap. 11 for gear settings.

4.4 – Menu and icons

To access the menu, touch any part of the display. As previously described, all actions and menu entries are represented by descriptive icons which can be divided into 3 categories:

MENU ICONS

EXIT	LAPS	DATA	TRACK	SETUP	GEAR	SUSPENSIONS	INFO
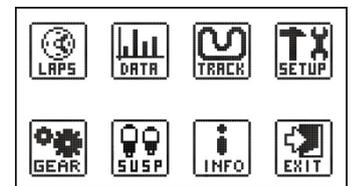
LAPS: to view the sessions and lap times stored on the memory card
DATA: to view the meters, speedometers and highest values stored
TRACK: circuit and conditions of use settings
SETUP: general device settings
GEAR (only Start Next): gear settings
SUSPENSIONS (only Start Next): setting the minimum suspensions travel ("ZERO setting")
INFO: general information about the product and system

SUBMENU ICONS

VALUE	SAT	TEST	EXIT

VALUE: real time visualisation of values
SAT: visualisation of used and queued satellite signals
TEST: self-diagnosis to verify the features of the product
EXIT: to go back to main menu

EXIT: to go back to the main screen

ICON SELECTION

UP	DOWN	NEXT	SHIFT	ERASE	NEW	YES	NO

UP: scrolls upwards
DOWN: scrolls downwards
NEXT: scrolls to next entry
SHIFT: changes the selected entry
ERASE: deletes the selected entry
NEW: button to create a new file with the coordinates of a new finish line
YES: to confirm the selected command
NO: to reject the selected command

4.5 – GPS Signal

GPS signal acquisition can take from a matter of seconds to a couple of minutes. If the device has been switched off for days or the circuit has changed, the time required for the first satellite retrieval can take 4/5 minutes; when used regularly, detection takes very little time. Acquisition of the GPS signal is indicated on the display by the GPS icon:

GPS receiver has detected the satellites	GPS receiver has not yet detected the satellites
GPS REC 14:29:41 ◼️◻️◻️	GPS REC 14:29:41 ◼️◻️◻️

It is also possible to check the signal received by the satellites by accessing the menu, selecting the INFO icon and subsequently the SAT icon; the ID numbers of the satellites will appear together with the dB power signal received; if the signal bar is full the satellite is being used, if not, it isn't.

5 – Configuration, SETUP menu

Below you find all the SETUP menu entries and their descriptions

Language
It is possible to select the language of the device:
- EN: English (default)
- IT: Italiano
- DE: Deutsch
- FR: Francais

Recording
Recording mode can be set according to two configurations:
ALWAYS: recording always activated, every time the chronometer starts to count; a new file will be created and a new session will be recorded (default)
MANUAL: recording is manual, every time you go back to the main screen, you will be asked to save the new session

Time format
Time format setting: 12h o 24h.

Data format
Data format setting: day/month/year or month/day/year.

Time zone
Time zone setting, set the time difference from Greenwich Mean Time (GMT).

Freeze time
Sets the seconds per visualisation of the time per lap upon reaching the finish line 10 – 60 seconds (30 second default)

Crono mode
Setting of the visualization of the time during lap:
ROLLING: classic visualization with time rolling
PRED. DELTA: predicted delta, predicted difference of the current lap with the best lap
PRED.TOTAL: predicted total, predicted time visualization

Best/Total
Best lap or total time session visualization:
BEST: display of the best lap during the lap and of the gain/loss time compared to the best lap when passing the finish line/split times
TOTAL: display of the total time of the session (specific function for off-road use)

Speed unit
Set the speed unit: Km/h (metric, default), mph (imperial)

Temperature (solo Start Next)
Set the temperature (this setting is of no use if the device is not attached to a Box Expander): °C (Degrees Celsius, default), °F (Fahrenheit)

Pulse RPM (solo Start Next)
Set the RPM reading parameters (this setting is of no use if the device is not attached to a Box Expander):
1 - one pulse per drive shaft rotation (ex. standard 2 stroke engines)
2 - two pulses per drive shaft rotation (ex. 2 stroke engines with waste spark)
4 - four pulses per drive shaft rotation (ex. 2 stroke engines with waste spark)
½ – one pulse per two drive shaft rotations (ex.: standard 4 stroke engines)

Led (solo Start Next)
Configure the use of the led:
BEST: the led switches on when retrieving the best lap or the best split time of the session (default)
RPM: maximum RPM exceeded, the led flashes when an RPM threshold is exceeded
TEMP: temperature alarm function, the led flashes when a set temperature threshold is exceeded.

6 – How to use and choose the finish line/circuit

Before using the device, you need to choose the way in which you want to use the Start device:

CLOSED CIRCUIT: circuits where the start and finish line coincide (ex. racetracks, kartdromes, etc.)
POINT TO POINT: circuits where the start and finish line do not coincide (ex. rallies, up-hill races, etc.)
ACCELERATION: for acceleration races where the finish line corresponds to reaching a certain distance or speed (ex. 0-100 km/h, ¼ mile, etc.)
DYNO BENCH: to use the lap timer even without GPS signal, ideal for dyno bench use

You select the finish line and circuit from the TRACK menu; access the Menu and click on the TRACK icon.

6.1 – Closed circuit

The standard mode of a track chronometer, in which a session is made of multiple times per lap; each time the finish line is crossed, the chronometer records the time taken to perform the lap and sets the chronometer back to zero to start a new lap.
On the first line where "Select" appears, click on RACE (you can amend your choice by pressing SHIFT); press NEXT to confirm.

6.2 – Point to point

Standing start mode; thanks to the internal accelerometer, Start will retrieve the starting point; the finish line will be retrieved using the GPS coordinates stored on the device, like with a normal circuit, in the TRACKS folder of the memory card.
For a standing start, you need to set on MANUAL the start mode of the recording (see chap. 5); this way you can first position the vehicle up to the starting point, then press YES to request the beginning of the storage when the vehicle is standing and ready to start the lap.
In the TRACK menu, press "Select" and choose RACE (you can change your choice by clicking on SHIFT), press NEXT to confirm your choice.
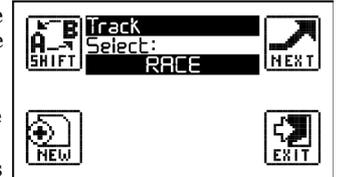
6.3 – Acceleration

Standing start mode; thanks to the internal accelerometer, Start will retrieve the starting point; the finish line will be retrieved using one of the options suggested depending on the type of race you are doing. Using this mode, each session has a single lap.
Press "Select" and choose ACCELERATION (you can change your choice by clicking on SHIFT), press NEXT to confirm your choice.
You will then be asked the finish line "Mode"; you can choose from the following entries: 100mt, 150mt, 400mt, 800mt, 1000mt, 0-100Km/h, 0-160Km/h, 0-60mph, 0-120mph, 1/2mile, 1/4mile, 1/8mile.
By choosing ACCELERATION, the storage function of a new session is automatically set to MANUAL so you can position the vehicle on the starting line and then press YES when the vehicle is standing and ready to start.
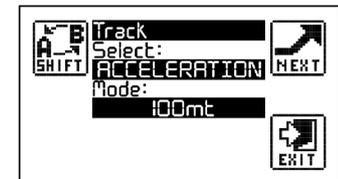
6.4 – Dyno Bench (solo Start Next)

Dyno Bench mode is the ideal to record data from your bike without GPS signal, so you can use it even on a building to record performance of your motorbike over a dyno bench.

Select DYNO BENCH and then press NEXT
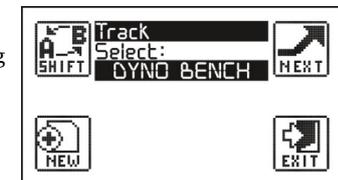
7 – Storage of a new finish line/circuit

You can download a list of the most famous world circuits directly from our website; if your racetrack is not available, you can create a new circuit using the RacePro software (see the software manual for details) or directly on the track by doing as follows:
Access the TRACK menu and select the NEW icon in the bottom left hand corner. The following screen will appear:

GPS: it informs us whether the GPS receiver is connected to the satellites.

I1: saves the coordinates of split time 1.

FINISH: saves the coordinates of the finish line

EXIT: exits the procedure without saving
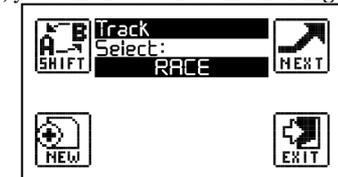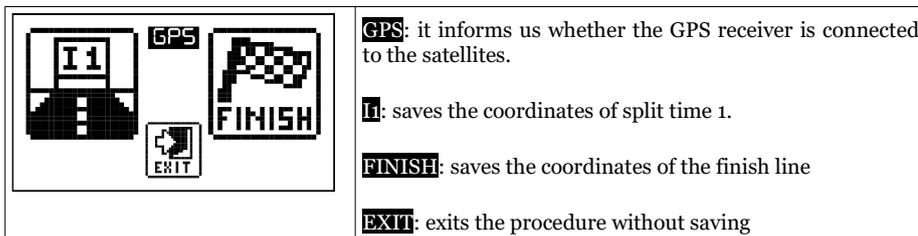
Wait for the GPS to retrieve the satellites (the letters GPS on a black background like in the photo); place yourself in the spot where you wish to store the coordinates, press the "I1" button if you wish to save split time 1 , press "Finish" if you want to save the finish line. When you press the button you have chosen, the icon you selected will turn into a confirmation icon , if you press "Finish", the procedure will be complete and the track will be saved in

the TRACKS folder of the memory card under TRACKxxx.TRK (xxx are a sequence of numbers); if you press "I1", the following screen will appear where you can set the second split time or simply the finish line, and so on up to three split times.

8 – Session analysis

8.1 – Viewing sessions and lap times

Access the device menu and select the LAPS icon; if there are no sessions registered, the device will return to the main menu; otherwise, the following screen will show the information relating to the first session.
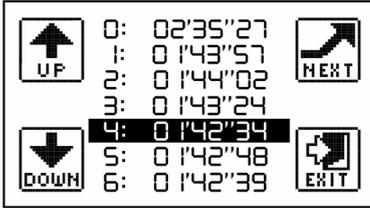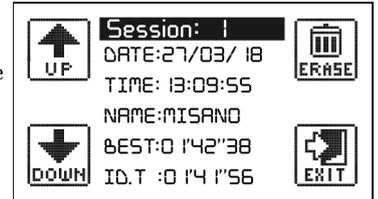
To scroll through the sessions, click on the arrows UP and DOWN; press the centre of the display to access and see the session times.

Press the UP and DOWN arrows to scroll the bar up and down; once you have chosen a time per lap you can press NEXT and view the details of a single lap.

Press one of the arrows (UP or DOWN) to view details of the previous or following lap, or press at the centre of the display to go back to the previous screen.
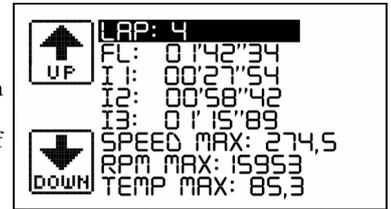
8.2 – Deleting a session

Access the device menu, click on the LAPS icon, view the session you wish to delete, press ERASE then confirm deletion by pressing the YES icon.

9 – Viewing values in real time

The real time values screen allows you to see all the measurements retrieved by the GPS, all the analogue and digital measurements retrieved by the Box Expander; from this screen it is possible to calibrate the sensors connected (the so-called "zero" of the sensors).

To access these screens, access the menu, select the INFO icon and then select VALUE; a series of screens will appear and you can scroll these by clicking on the UP and DOWN arrows:
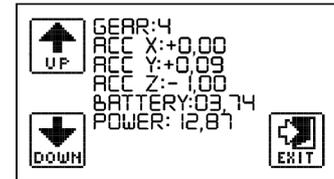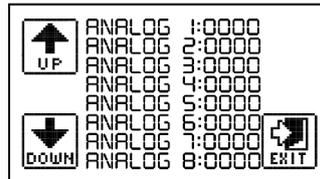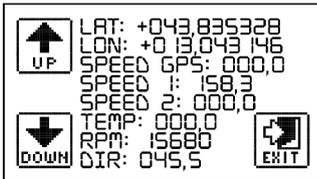
With regard to the analogues and SPEED 1 and SPEED 2, these will appear with their default name if they have not been changed; if they have been changed, the name associated to the analogue access will appear.

To change the name, you need to open the configuration file CONFIG.CFG in the RacePro software and refer to the software manual.

10 – PC connection (only Start Next)

10.1 – USB data download

The files contained in the memory are managed like any files in a digital archive memory (USB stick, memory card, etc,); this is why there is no download time, you simply need to connect the Start device to the PC and copy the files contained in the SESSION folder.

The *.SES file is formatted as follows:

NAME DATE TIME CIRCUIT BEST-LAP IDEAL-TIME.SES

Do not rename the session files under any circumstances; Start will no longer be able to open the files.
To eliminate the content of the memory, eliminate all the files inside the SESSION folder.

10.2 – Wi-Fi

The new Start Next ST400-N is equipped with an integrated Wi-Fi module that will be used for data download and settings related to storage. Wi-Fi turns on when the product is turned on and turns off when the motorcycle exceeds 30Km/h, to reactivate the Wi-Fi it will be necessary to turn off and on the GPS receiver.

N.B: the Wi-Fi module is active only on the main screen and when the product is charging, it is deactivated when you browse the menu.

After connection between RacePro and Start Next, all the sessions stored in memory will be displayed, select a session and click the "Download Session" button to start the data download or the "Delete Session" button to delete the session.
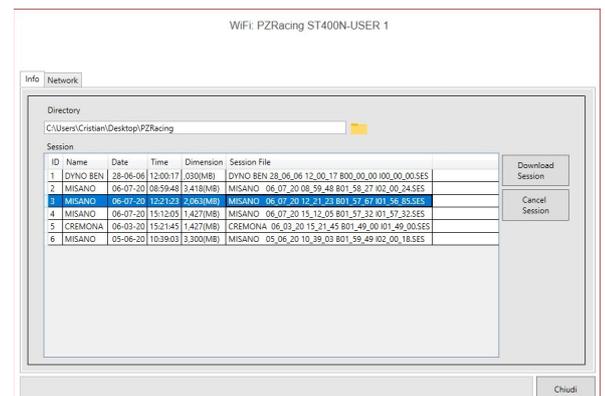
The default data for the Wi-Fi network are the following:

Network name: PZRacing ST400N-USER 1
Password: 12345678

From the software, in the Network tab, it is possible, **and recommended**, to change the last part of the network name (USER 1) and the password. Once modified it will be necessary to close the RacePro program, turn off and on the GPS receiver.

11 – Gear indication (only Start Next with box expander)

Start can view and save the gear inserted in two different ways:

- calculating the RPM/speed ratio (for vehicles which don't have a potentiometer on the gear)
- retrieving the analogue exit of the gear potentiometer

By accessing the "GEAR" menu, the screen you see here to the side will appear.
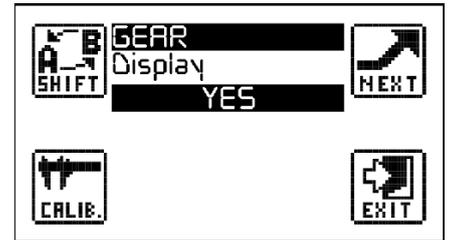
11.1 - Setting the gear using RPM/SPEED ratio (only Start Next)

The first entry you have to set up is visualization of the gear inserted on the display; if you select "NO", the gear will only be saved; if you select "YES", the gear will also be viewed on SCREEN 2 and SCREEN 3.
After "Input", select "RPM/SPEED1" if you wish to use the speed of the Box Expander 2, select "RPM/SPEED2" if you wish to use the speed registered by the Box Expander 3.

Then press the "CALIB." button to perform calibration of the inserted gear; the screen that appears will be a confirmation screen with the options "YES" and "NO". Before clicking "YES", we advise you to switch on the vehicle and put into first gear with the clutch pulled.
Perform calibration as follows:

- Click on the "Yes" button.
- Number "1" will appear; put into first gear, release the clutch and continue at constant engine speed (approx. 5000 RPMs).
- After about five seconds, number "2" will appear; put into second gear and continue at constant engine speed (approx. 5000 RPMs).
- Do this with all the gears of your vehicle.
- When the number that comes after the number of gears appears on the display (ex. if your bike has 6 gears, wait for number 7), press STOP to terminate calibration.
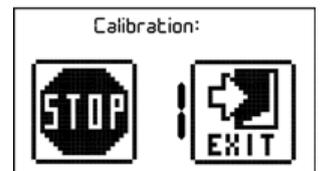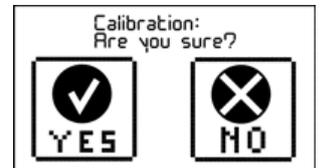
11.2 - Setting the gear using the analogue input (only Start Next)

The first entry you have to set up is visualization of the gear inserted on the display; if you select "NO", the gear will only be saved; if you select "YES", the gear will also be viewed on SCREEN 2 and SCREEN 3.
Under "Input", select analogue input to which the gear potentiometer output is connected.

Then press "Calibration" to calibrate the gear; the screen which will appear will be a confirmation screen with the options YES and NO.
You do not need to start the vehicle to perform the calibration, but you need to access the instruments panel.

- Press "Yes".
- Number "1" will appear, put into first gear.
- After about five seconds, number "2" will appear; put into second gear.
- Do this with all the gears of your vehicle.
- When the number that comes after the number of gears appears on the display (ex. if your bike has 6 gears, wait for number 7), press STOP to terminate calibration.
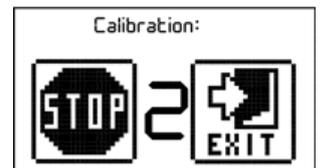
12 – Linear potentiometer calibration (only Start Next)

It is possible to calibrate the linear potentiometers directly from the instrument.

N.B: it is necessary to have configured the analogue channels from the RacePro software using the presettings for the linear potentiometers (POTENTIOMETER 150mm and POTENTIOMETER 75mm), it is possible to calibrate only the analogue inputs set with one of these two voices.

Enter the menu and click on the SUSP icon, the analog inputs set as linear potentiometers will be displayed, select the potentiometer you want to calibrate, bring the potentiometer to its maximum extension and press CALIB icon.
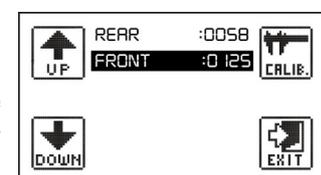
13 – Accelerometer (only Start Next)

Start is equipped with an internal accelerometer that is used for detecting the start and to store the values on the recorded file.
We remind you that in order to have a correct reading of the values of the internal accelerometer it is necessary to install the Start integral with the vehicle frame, therefore the data stored by installing the lap timer on the steering wheel or on the fork plate will not be truthful.
On the side the orientation of the accelerometer axes.

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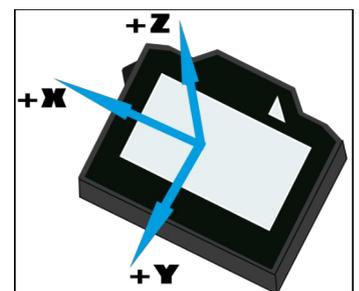
14 – Self-diagnosis

Start has a self-diagnosis function that allows you to verify all the features of the product. To perform the diagnosis, access the Menu, press the INFO icon, then press the TEST icon; once diagnosis has started, the product will verify all the internal components and signal OK in the event of a positive outcome and ERROR in the event of a negative outcome.

15 – Firmware installed and date of first use

It is possible to check both, the date of the first use of the product and the version of the firmware installed at start-up.
By holding down the power button, after the initial logo has been created, the version of the firmware installed will be diplayed at the bottom right of the display and, at the bottom left, the date of first use (date on which the first session has been created).

16 – Replace the startup image

It is possible to change the startup image (Start Next or Start Basic) by inserting an image in the IMAGE folder. The image must have the following characteristics:

Format: Bitmap (.bmp)
Dimensions: 128x64px
Color: monochrome

Any image with different characteristics will be discarded and the default one will be used.