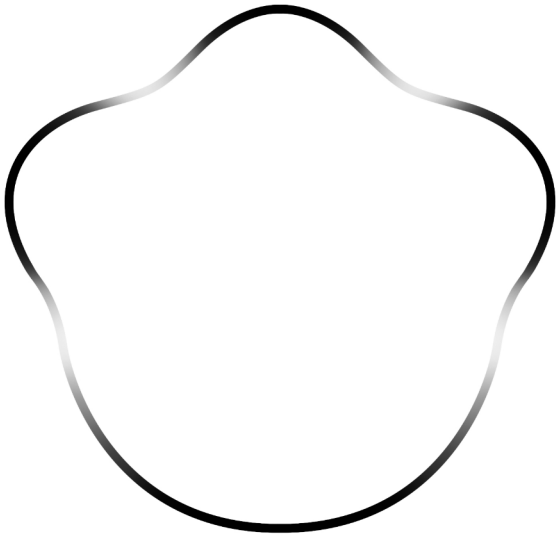

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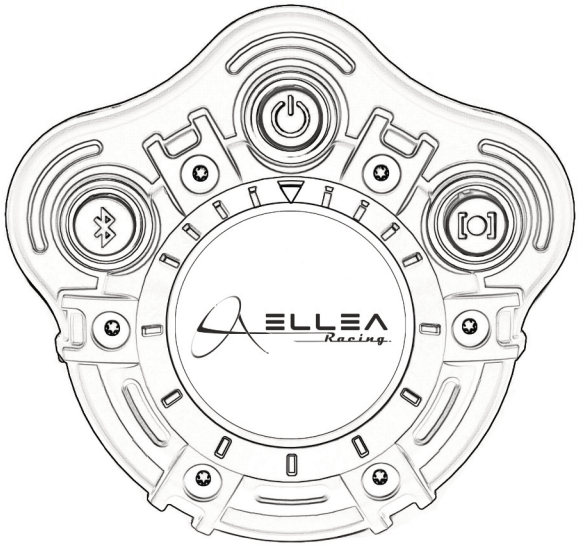


The QUASAR is an advanced multifunctional electronic passive safety system with a style elegant and sporty designed and made for all motorcyclists.

The device is based on an adaptive inclinometer that in real time processes data and estimates, in a conservative way, the safety amplitude of the lean angle (L.A.R. - “Lean Angle Range”) in relation to the thermal conditions of the tires.

Thanks to the on-board installation of its sensors, QUASAR wirelessly receives data telemetry that constitutes crucial information to combine performance and safety on the road and on the track.

The internal microprocessor acquires data such as internal and external pressure and temperature of the tires by processing them and returning them to the user in the form of visual and soon to be acoustic as well.

The display will show all the information you need for a more aware and safe driving.

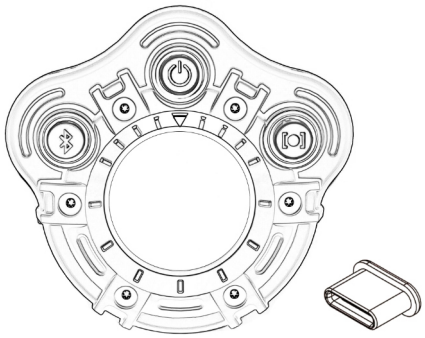
In particular, through specific graphics, the instrument will adaptively depict the changing limits of the critical lean angle based on the estimated theoretical grip, also considering the type of tire compound defined during set-up via the dedicated initialization app.

The rider will be able to have with the more advanced configurations, also possibility to record data telemetry and graphics of their session, using the GPS installed inside the device.

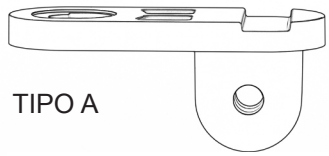
The device does not intervene in any way on the actions of the rider or the corrective electronics of his motorcycle.

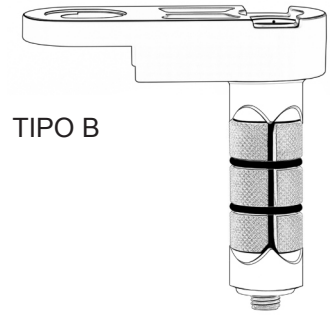
For more detailed information about the product, see the official website quasar.elleaing.com or write to the e-mail address quasar@elleaing.com.

COMPONENTS



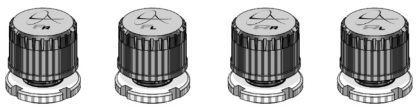
DEVICE BODY
QUASAR is the main device that allows, through notifications on the display, to signal safety alerts regarding the angle of bend of the vehicle. This is connected via Bluetooth protocol to the TTPMS and IR sensors. Inside it is a memory that will be able to record up to 8 hours of data.
With the USB-C connector cap inserted, the device allows for an IP-54 certified seal.



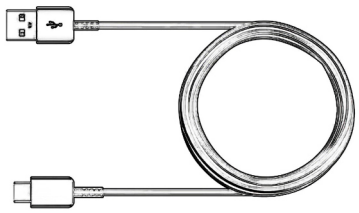


ADAPTERS (1)
Accessory required for mounting the device on the motorcycle.
It is possible to choose the model suitable for your needs when stage of purchasing the device.
TYPE A: can be installed on any type of motorcycle, requires Go Pro TM connector (not included).
TYPE B: installable ONLY on motorcycles having the central hole in the steering plate; key for mounting also present.

TTPMS SENSORS *(Tire Temperature & Pressure Measurement System)* (2)
Sensors for detecting the pressure and temperature inside of the tire. Installation should be done on the valves inflation valves of the front and rear tires of the motorcycle by simply screwing them in place of the caps.



IR SENSORS *(Infra Red)* (3)
Infrared sensors that, placed on the fenders, record the outside temperature of the tires by sending data to the main device that processes it.



USB-C CABLE
Inside the package is a cable for USB-A / USB-C power supply to recharge the battery of the device or download telemetry data to pc.

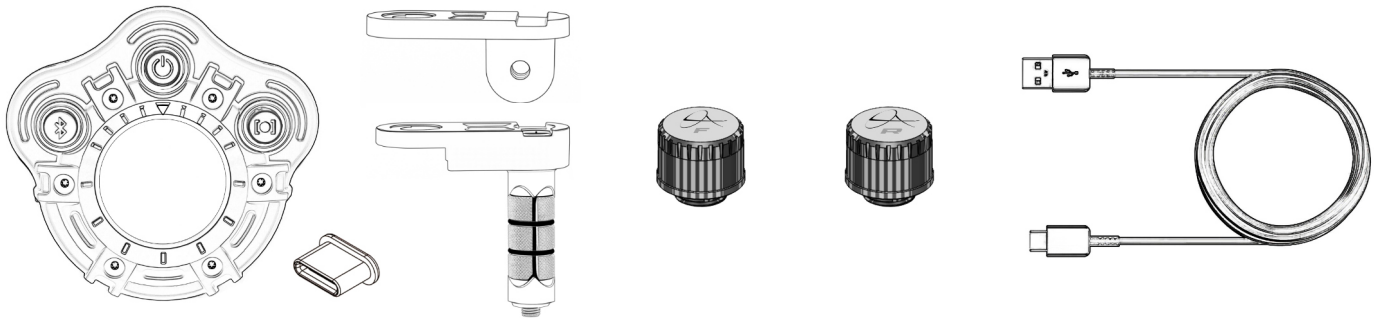
(1) During the purchase phase, it is necessary to choose an adapter to allow mounting the device on the motorcycle.
In the case of purchasing the Type B adapter, a wrench suitable for mounting on the steering plate is also included in the kit.
It is possible to purchase the missing type of adapter later in the official product store.
(2) After initializing the system via App and associating QUASAR with the TTPMS sensors, be careful not to confuse, during installation, the sensors between front and rear.
(3) The IR sensors are optional devices and the number of them varies depending on the package chosen. With the purchase of the Basic version they will not be in the package. Option to purchase the sensors separately in the official product store.

CONFIGURATIONS

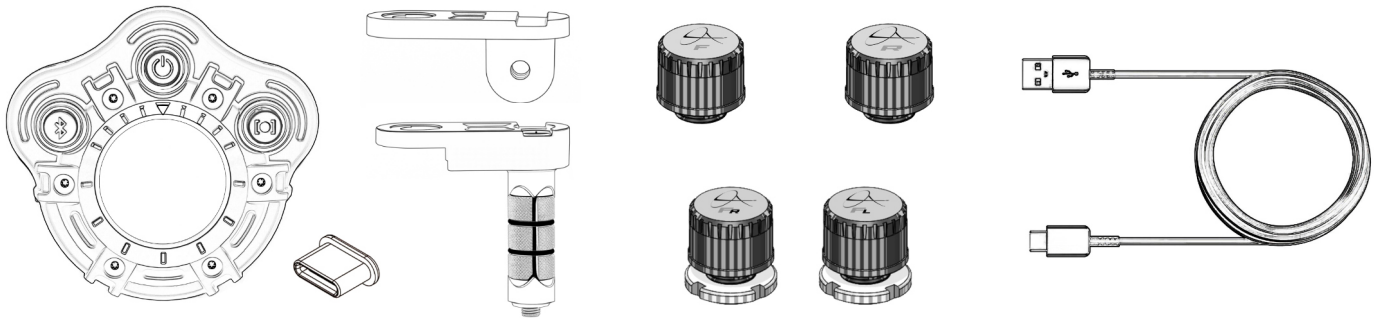
QUASAR is available in three different configurations depending on the number of sensors in the kit chosen.
The purchase of a kit does not preclude the future possibility of purchasing (via the official website quasar.elleaing.com) the missing sensors and upgrade the functionality of the device through the dedicated app.

During the purchase of the device, it will be necessary to select which model of adapter to include within the kit by taking advantage of the option to purchase either one type or both.

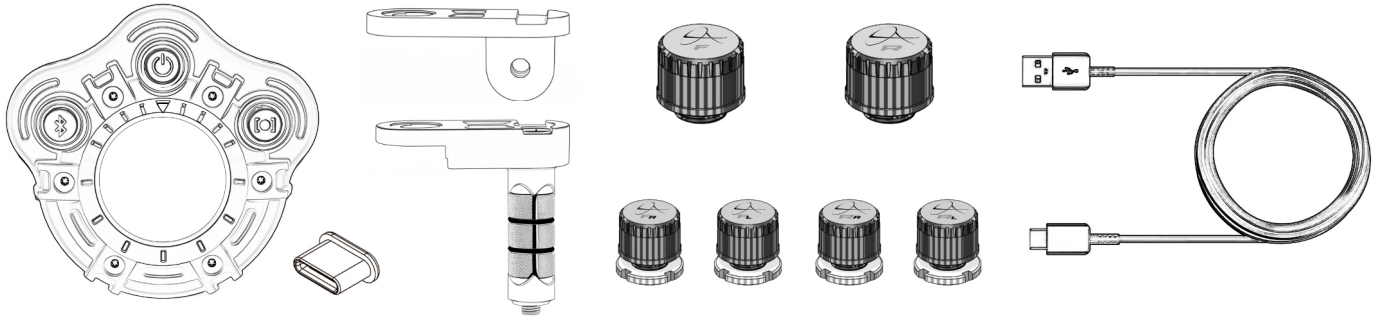
The **BASIC** package includes 2 sensors TTMPS → Sensing pressure and temperature inside (inner tube).



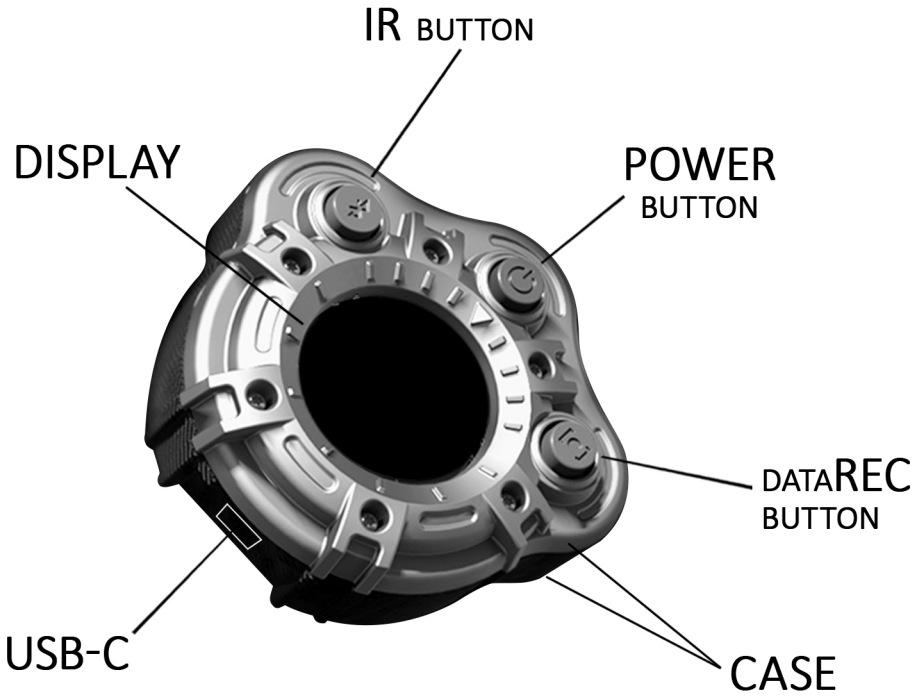
ADVANCED package includes 4 sensors: 2 TTMPS and 2 IR → Pressure sensing, internal temperature and external core temperature.



The **RACING** package contains all installable sensors: 2 TTPMS and 4 IR → Detecting pressure, internal temperature and external temperature on shoulders.



DESCRIPTION of FUNCTIONS



POWER button

Long pressure → turn on/off the device (press for about 3 seconds)
Short pressure → change the display mode (see chapter Interface)

IR button

Short pressure → turn on/off BT transfer of thermal data emitted by IR sensors

DATA REC button

Short press → turns on/off the recording of telemetry data to the internal memory (function available for Advanced and Racing configurations)

USB-C connector

Connection port that allows charging the battery of the device and downloading data from the internal memory as well as upload any firmware updates.

Display

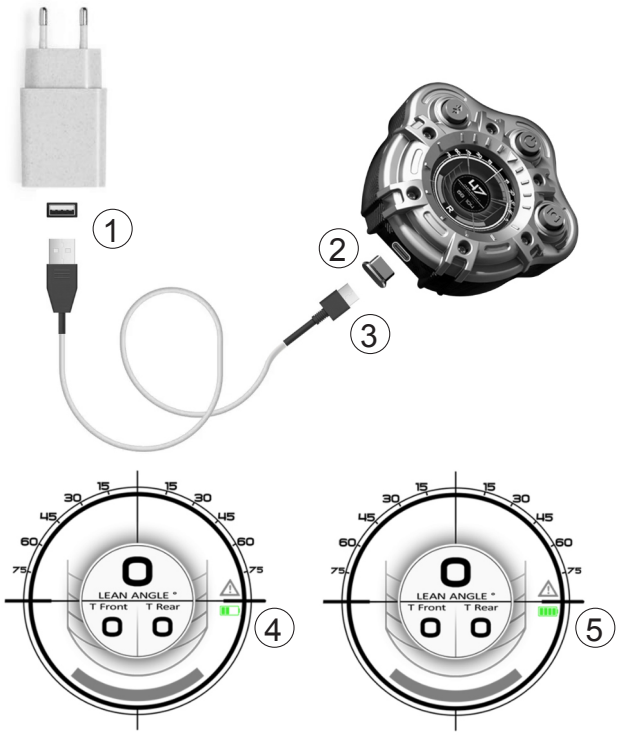
Interface with the user on which the information processed by QUASAR is visible in basic color scheme.

BATTERY RECHARGE

During shipment, QUASAR may accidentally turn on and the battery may discharge. Therefore, it is recommended to check its status and, if necessary, recharge device completely before using it.

The device is powered by an internal rechargeable Li-ion non-removable battery [4].
Charging the battery is divided into two phases: fast phase (up to 80% recharge) and slow phase (from 80% a 100%).
Fast charging allows stable and continuous use of the device; the slow phase works with a constant voltage so as to preserve the life and durability of the battery over time.

A full recharge of the battery (100%) will require 3-4 hours, while a stable use (80%) 2 hours of charging will be sufficient.
The life time of a fully charged battery, under optimal conditions, is about 3-4 hours.
color scheme.



1. Connect the USB-A side of the power cable to a wall adapter (not included in package) and then to a source of charging source;
2. Remove the USB-C protective cap from the device;
3. Connect the USB-C side of the power cable to the QUASAR device;
4. The battery icon turns blinking green. The battery is charging;
5. Charging will be complete when the battery remains solid green;
6. Remove the cable from the device and disconnect the charger.

STARTUP / SHUTDOWN

Pressing the POWER button for approximately 3 seconds allows the device to start.
The same procedure with the device turned on will turn the device off.

(4) Inside the QUASAR is an anti-tampering system that if nicked will void the warranty of the product. Therefore, opening the device is not recommended and if necessary, please contact service.

FIRMWARE UPDATE

We recommend updating the device firmware to the latest released version before use it.
This procedure must be done through the use of a pc.

1. Download from the Download section of the official website quasar.elleaing.com the latest version of the firmware available for the device;
2. Connect the USB-C side of the cable to the device and the USB-A side to the computer;
3. The device should be turned on and charging;
4. Start the firmware installation by clicking on the previously downloaded file;
5. The device display should turn off for a few seconds. At this stage the update is being installed. When the procedure is finished, the device will restart as just turned on and will be updated.

APP

The QUASAR APP for mobile devices (both Apple and Android) that is responsible for managing the device and the sensors connected to it will be available soon.
Within it are several sections that allow the rider to make the settings that are most consonant and to view all the information of his performance.

As soon as they become available on the various stores you will be contacted.

DEVICE CONNECTION

Device connection is made through the dedicated QUASAR APP app that can be downloaded via QR-code in the CONFIGURATION chapter or from the e-commerce quasar.elleaing.com.
You will be able to associate the device with your smartphone, view the options for configuration and perform the setting of the QUASAR with its sensors.

SENSORS CONNECTION

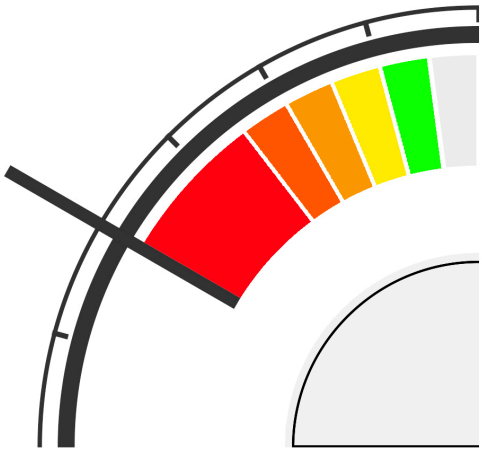
The sensors are connected wirelessly through Bluetooth protocol. The association of the sensors can be performed through the dedicated QUASAR APP app that can be downloaded via QR-code in the CONFIGURATION chapter or from e-commerce quasar-elleaing.com.

DISPLAY INTERFACE

QUASAR processes and favors to the display chromatic graphics that directly and immediate the level of performance at that moment available in relation to the thermal and pressure of the tires.

The colored bands displaying the lean angle (L.A. “Lean Angle”) vary their amplitude depending on the grip conditions estimated from the thermal state of the tires according to the following “Safety color scale”:

White → L.A. Low. No information provided;
Green → L.A. Medium-Low. Safe bend;
Yellow → L.A. Medium. Normal fold;
Brown → L.A. Medium-high. Accentuated crease;
Orange → L.A. High. Sporty bend / Limit of safety;
Red → L.A. Over Safety Limit. Possible risk of falling.



The same coloring is used to backlight the display during folding so as to make the real-time safety level as visible as possible.

In addition to the Safety Chromatic Scale, QUASAR has in memory a “Thermal Chromatic Scale.” This is representative of an infrared scale and is used to display the state of performance of the tires with respect to their Operating Temperature which, in turn, depends on the type of compound that is chosen via App during system initialization (see App section).

Specifically, this temperature color scale provides:

White → T° Very Cold. Very far from the performance level or not detected;
Blue → T° Cold. Far from the performance level;
Heavenly → T° Moderately Warm. Far from performance level but rising;
Yellow → T° Warm. Close to performance level;
Green → T° Optimal. Operating Thermal Range.
Orange → T° High. Moderately above the Thermal Operating Range;
Red → T° Excessive. Dangerously beyond the Thermal Operating Range; Risk of loss of grip.

Therefore, if the tire has reached its operating temperature the width of the bands displaying the bend angle will be maximum and the last red band will appear in proximity to the maximum bend angle (60° in the most extreme cases); otherwise with tire “cold” the red band will be displayed at lower bend angles, informing the rider of a potential danger. This makes the QUASAR's inclinometer ADAPTIVE.

The choice of tire type and compound (see App section) will not be possible to perform it in the QUASAR BASIC which, not having the IR sensors for detecting the external tire temperature, would not have the complete information to be able to estimate a correct level of “Thermal Grip” (see Insights section).
In this case, the algorithm associates by default an operating T° corresponding to a hard compound road tire but with a high level of operating temperature. This is in order to preserve the safety of the rider who will always see a conservative indication of the critical lean level, even there where he had a higher performance tire.

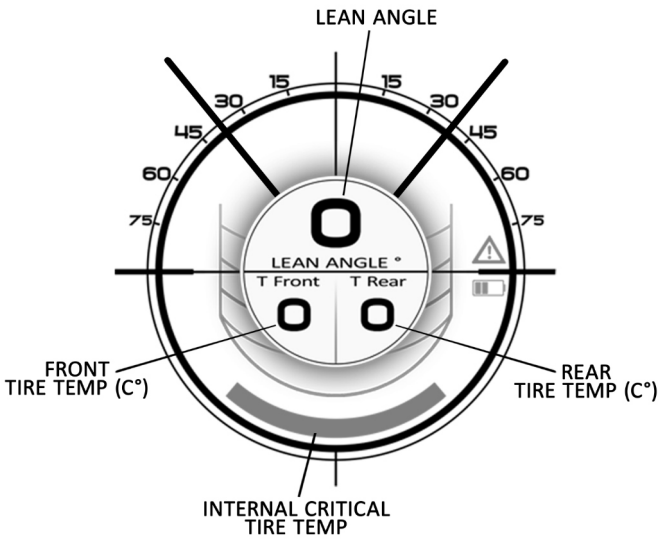
GRAPHIC INTERFACE

QUASAR offers three information display modes: Basic interface, Interface Advanced and Racing interface, consistent with the configurations.

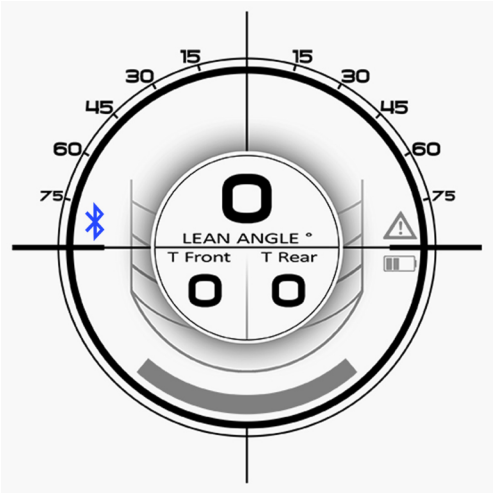
By activating them through the appropriate buttons, you will be able to switch between interfaces, but the information that QUASAR will display will always depend on the number of sensors installed on the motorcycle and therefore will depend on the configuration chosen and purchased.

BASIC interface
IIn this interface, the display shows the lean angle and, numerically in the center, the internal tire temperature, front and rear detected by the TTPMS sensors installed on the inflation valves.

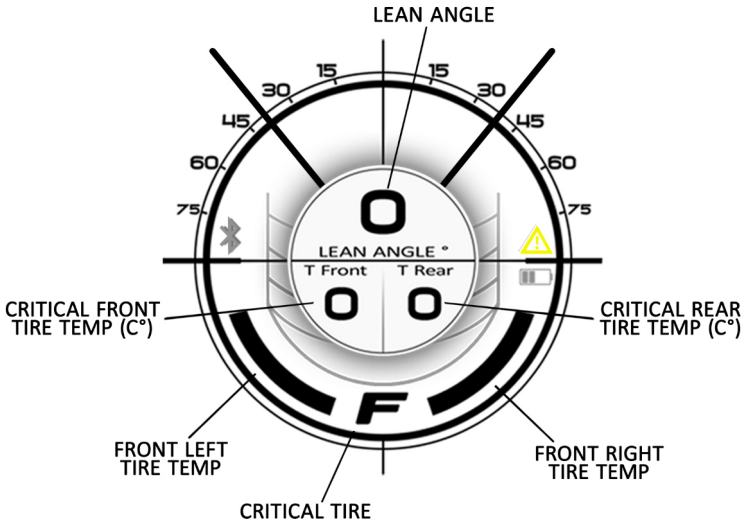
At the bottom is also shown, with graphics in thermal color scale, a central bar representative of the thermal condition of the most critical (the “coldest”) tire, so as to also have a colored visual indication and thus a more immediate and real-time perception real time of one's safety level:



Interfaccia **ADVANCED**
To get to this interface on the display, you need to position yourself on the Basic interface and press the IR button for the activation of the IR infrared sensor detection function, confirmed by the blue BT (Bluetooth) symbol on the left side of the display.



This interface is more suitable for an Advanced configuration equipped with two IR sensors (one per tire). In this configuration and interface, the display, in addition to the lean angle, shows (numerically in the central part) the external temperature detected on the central part of the tire through the two IR sensors installed on the front and rear fenders.
Having in the Advanced configuration only one IR sensor per wheel, the thermal color bands will show the same color between left and right shoulder and will refer to the most critical (the “coldest”) tire identified by the letter F (Front) or R (Rear) at the bottom center of the display:



Nota:

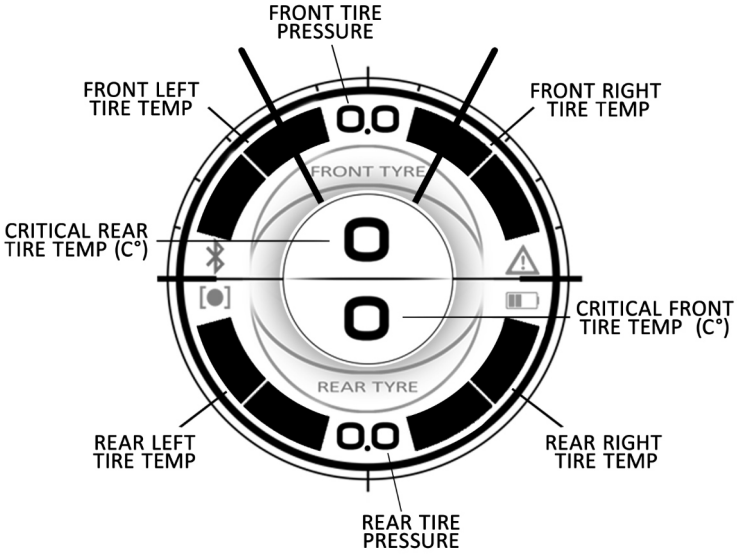
- if you have QUASAR in BASIC configuration, the ADVANCED interface will still be viewable but will show white bands and zero temperatures. In this situation QUASAR will detect an anomaly and the yellow Warning symbol will appear on the right side of the display.

RACING interface
The Racing interface can be viewed by briefly pressing the center POWER button.
Being on this mode and pressing the IR button will activate/deactivate the IR sensors.

The BT symbol on the left side of the display will confirm whether they are activated or not.
This interface is most suitable for a Racing configuration equipped with four IR sensors (two per tire).

In this configuration and interface, QUASAR displays thermal data both through the bands colored, (top for the front tire and bottom for the rear tire) and also through the relevant numerical data in the middle part of the display.
In addition, the top and bottom of the display numerically show the pressure of the front and rear tire respectively expressed in bar.

Otherwise, the adaptive bend angle band, present in the previous two configurations Basic and Advanced, does not appear. However, QUASAR will still favor the function of colored backlighting based on lean levels in order to transfer to the Rider the perception of the safety status in real time:



The RACING configuration, which is more complete and suitable for sports riding on motorcycles equipped with high performance tires (sport road and/or track), will allow to display numerically the estimated value of the theoretical “T-Grip” (Performance Temperatures - see Section Insights) most critical between the left and right shoulder of the tire both front and rear.

Finally, in this configuration, the display will show with two red lines the limits of the lean angle as a function of the T-Grip for immediate visualization of the potential of the crease in real time.

The rider will therefore always be able to approach his session on the track or on the road with a greater awareness that, if well used, will certainly raise the threshold of his safety.

Through the QUASAR APP it will be possible to set the correct and desired pressure value carefully chosen on the basis of all the information provided in the in-depth section (page ....) as a guide and check its maintenance in real time both numerically and through a colored graphics of more immediate and instinctive interpretation.

Specifically, this color scale referring to pressure provides:

White	→	Pressure Not Detected. No information provided;
Blue	→	Pressure Low. Far below the preset level. Discrepancy in defect of more than 0.3 bar;
Yellow	→	Pressure Medium-Low. Slightly below the preset level; Discrepancy in defect of only 0.1 bar, in low tolerance.
Green	→	Pressure Medium. In line with optimum preset level;
Orange	→	Pressure Medium-High. Slightly above the preset level. Discrepancy in excess of only 0.1 bar, in high tolerance.
Red	→	Pressure High. Far beyond the preset level. Discrepancy in excess of only 0.3 bar; in high tolerance.

Note:

- The tire pressure data is expressed in bars rounded to the first decimal place (to example, an actual value of 1.67 bar will be displayed as 1.7 bar, while an actual value of 1.64 will be rounded to 1.6 bar).
- If you have the ADVANCED configuration, with only two IR sensors (one per wheel) the bands thermal chromatic ones will present the same color between the left and right shoulder, while they will be different in the complete RACING configuration as they have two sensors per wheel positioned on the relevant side shoulders of the tyres.
- If you have the BASIC configuration the RACING interface will still be viewable but it will show white bands and zero temperatures if the BT button is active. In this situation QUASAR will detect an anomaly and the yellow warning symbol will appear on the right side of the display. If you disable BT transfer, the BASIC configuration will show data only coming from the TTPMS sensors in coherence with the BASIC configuration.

With the dedicated video editing App (currently under development and dedicated only to the Advanced and Racing versions) and data synchronization via the device's internal gyroscope and camera (where present), you can visually pairing recorded data, creating a new and exciting way to control, on-screen, your driving performance in relation to the tire compound you choose.

ADAPTER INSTALLATION

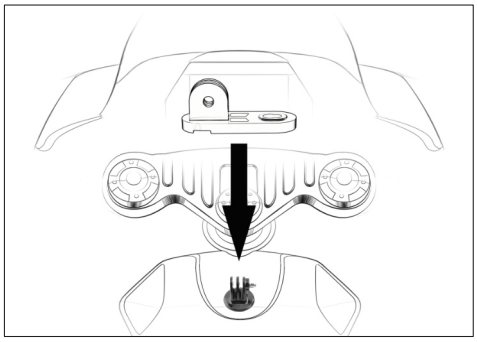
QUASAR can be installed on the motorcycle using modular adapters depending on the type of steering plate present. However, for a more precise reading of the lean angle, we recommend installing it on a fixed part of the motorcycle in the center of gravity. On the contrary, the support surface does not influence the detection of the lean angle.

TYPE A ADAPTER

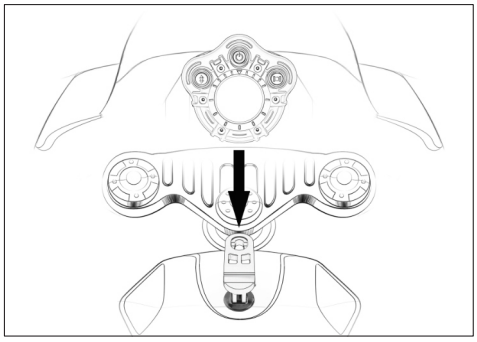
This type of adapter can be used for any type of motorcycle, both with and without a central hole in the steering plate. It must be installed on the motorcycle using a common GoProTM connection system or similar (not supplied) preliminarily fixed to the motorcycle either on a plate or on a tank.

The installation procedure involves the following steps:

1. Carefully remove the adapter from the package, orient it with the device attachment screw towards the rear window of the motorcycle and fix it using the appropriate coupling to the Go Pro ™ connector;

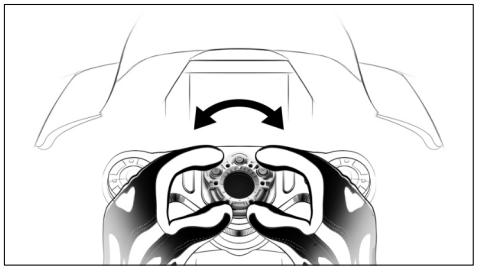


2. Take the device and connect it to the adapter using the screw provided, without tightening completely;

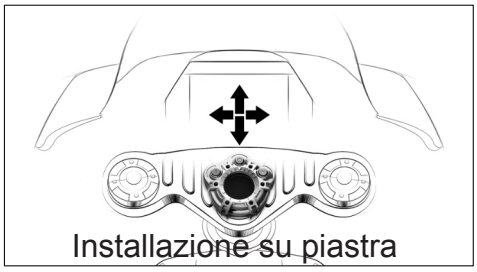


Installazione su serbatoio

3. To correctly carry out this assembly phase, it is recommended to position the motorcycle on the center stand and on a flat surface.
   Move the device until a value of 0 (zero) degrees is reached in the box dedicated to the tilt angle (upper part of the display). Tighten the fixing screw again until it stops;



4. To ensure that the assembly is solid, move the device in various directions and check that it does not undergo any noticeable movements.



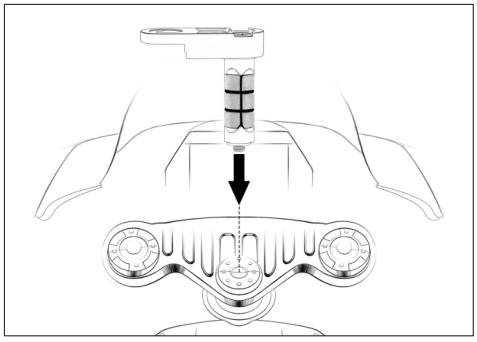
Installazione su piastra

TYPE B ADAPTER

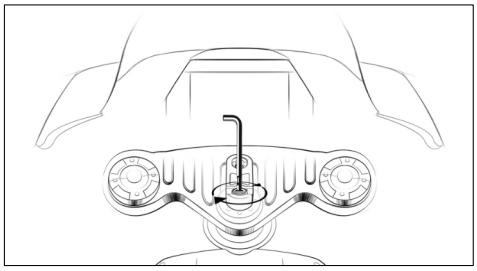
This type of adapter can only be used on motorcycles with a steering plate equipped with a central hole with a compatible diameter.
This adapter consists of an expansion plug that allows a solid connection between the motorcycle and the device.

The installation procedure involves the following steps:

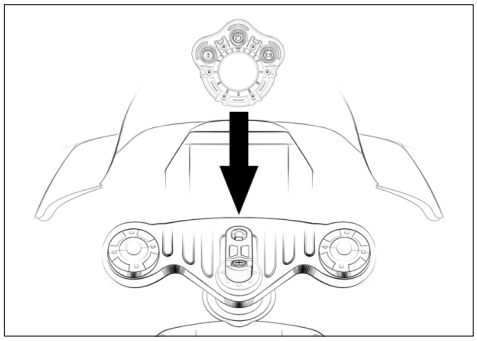
1. Carefully remove the adapter from the package and insert the expansion pin into the hole in the steering plate, making sure that the diameter of the hole is compatible with the maximum expansion capacity of the plug.
   Orient the adapter with the device attachment screw towards the rear window of the motorcycle;



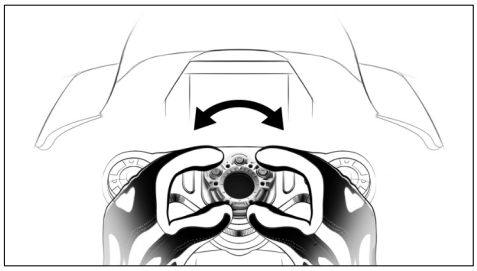
2. Screw in the expansion plug using the supplied wrench;



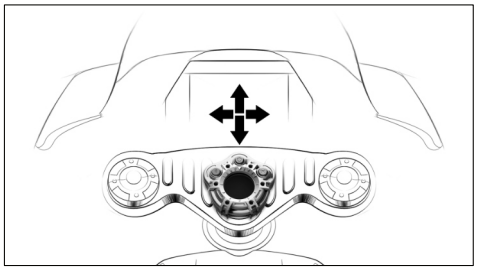
3. Take the device and connect it to the adapter using the dedicated screw, without tightening completely;



4. To correctly carry out this assembly phase, it is recommended to position the motorcycle on the central stand and on a flat surface.
   Move the device until it reaches a value of 0 (zero) degrees in the box dedicated to the tilt angle (upper part of the display). Tighten the fixing screw again until it stops;



5. To ensure that the assembly is solid, move the device in various directions and check that it does not undergo any noticeable movements.



Installazione su piastra

Warning

ASome motorcycles have a hole cover ring that erroneously lets the diameter appear compatible with the plug, but sometimes it is not because beyond the ring the hole has a larger diameter and the plug does not engage.

It is important, for road safety reasons, to make sure that you have correctly tightened the adapter screw to the Quasar threaded insert.
It is recommended, regardless of the movement of the device after tightening, to use a restraint system (such as a steel cable) that allows you to always keep the Quasar connected to your motorcycle.
The procedure described above is to be considered mandatory for use on the track, be it for training, testing and/or sports competitions.

Failure to follow the installation recommendations for all devices attached to the Quasar could lead to unexpected situations or potentially dangerous situations for road safety which, in the event of negligence, can never be attributed to Ellea Ingegneria Srl.

Please refer to the in-depth reading of the "Terms and Conditions" section at the bottom of the page of the quasar.elleaing.com website.

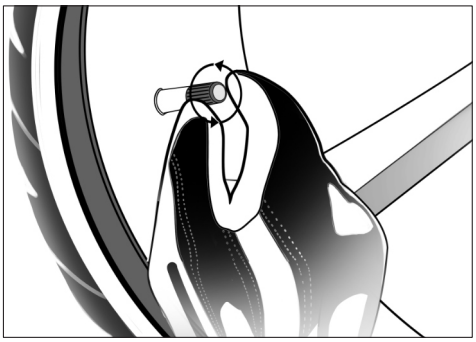
TTPMS SENSOR INSTALLATION

The TTPMS sensors have the task of reading the internal pressure of the tires and indicating the temperature on the QUASAR display in real time.
The sensors are present in all purchase configurations.

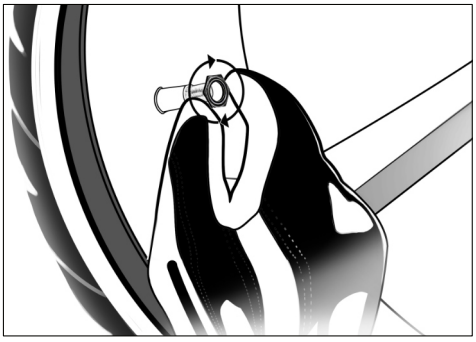
To synchronize the sensors with QUASAR it will be necessary to use the dedicated QUASAR App downloadable via QR-code in the CONFIGURATION chapter or from the quasar e-commerce. elleing.com.

The installation procedure includes the following steps:

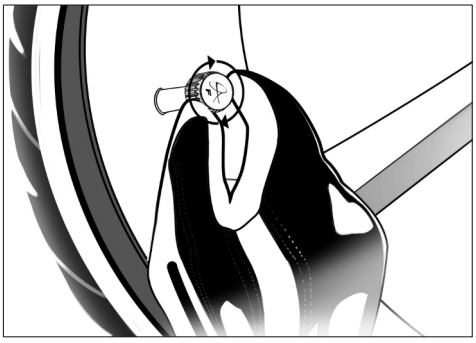
1. Unscrew the cap of the inflation valve from the front wheel tire;
2. Remove the TTPMS sensor identified with F (Front) and its corresponding anti-unscrewing screw from the package;



3. Screw the anti-unscrewing nut inside the inflation valve;



4. Take the TTPMS sensor marked with F (Front) and install it, screwing it, to the inflation valve;
5. Using a hex wrench, screw the anti-unscrewing nut until it comes into contact with the sensor, creating adequate pressure, but not excessive;
6. Perform the same operation for the rear tire using the cap marked with R (Rear).



Once installed, it is recommended not to remove the TTPMS sensors from the motorcycle, checking their charge level at each use through the dedicated App and/or checking the connection.

Warning

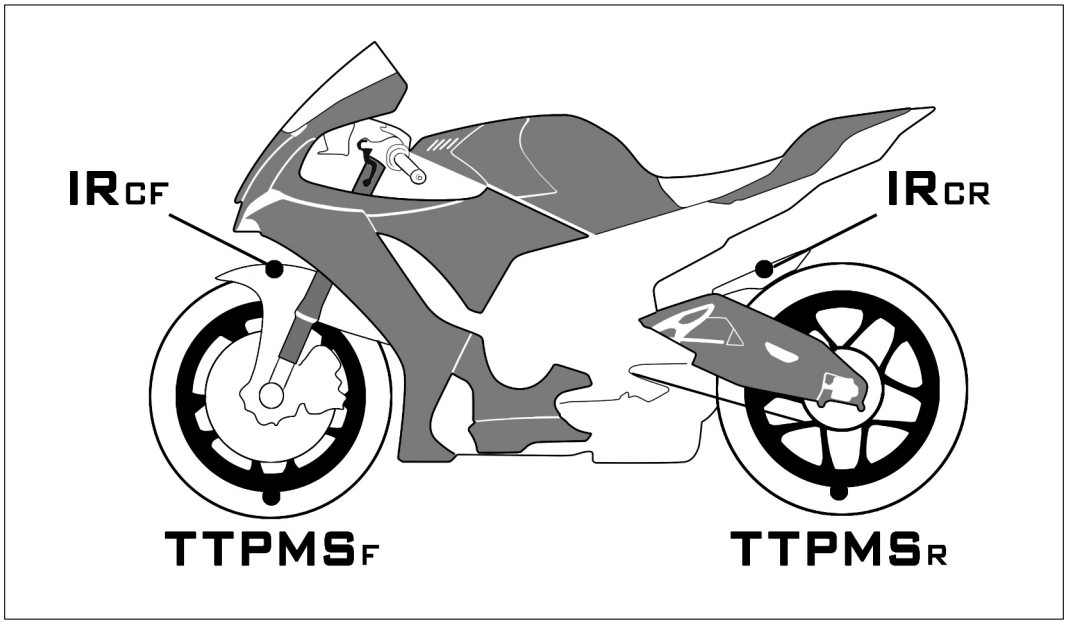
It is important to check, after having screwed the TTPMS sensors to the inflation valves, that there are no interference problems with other mechanical components. There is the possibility of having to change the valve type from the “I” version to the “L” version or vice versa.

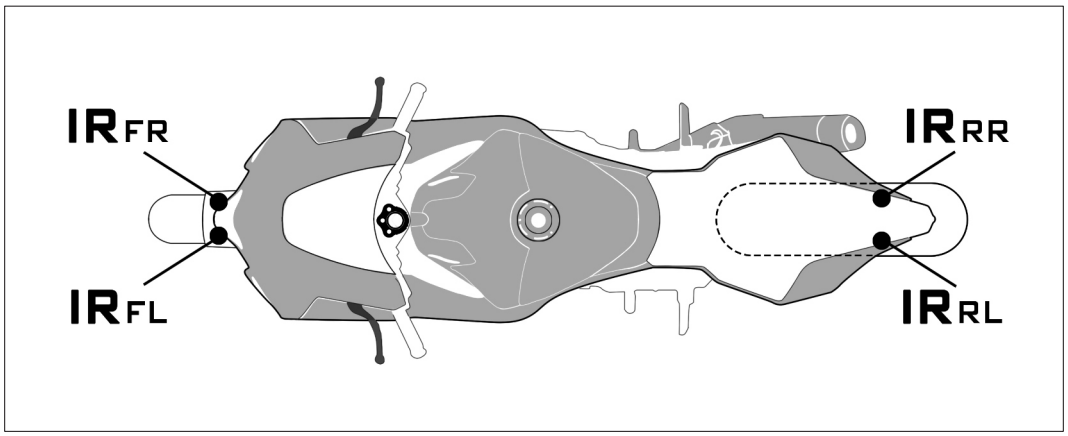
IR SENSOR INSTALLATION

IR sensors allow you to view the external temperature on the surface of the tires.
These sensors, specially designed and manufactured by Ellea Racing, allow a more directed reading and a more precise processing of the safety "Lean Angle Range", combining the internal temperature of the TTPMS sensor with the external temperature of the tires. The calculation is carried out for both the front and rear wheel, arriving at an estimate of the tire's T-Grip (see Insights Section).

In the Basic purchase configuration these sensors are not present while in the Advanced there are 2 IR sensors to be placed each on a wheel possibly in a central position. This version is more suitable for a user who rides his motorcycle on the road and does not use an accentuated level of lean and still appreciates greater driving awareness.

With the Racing package, the most complete, 4 sensors will be available: each pair will be placed on a tire to detect the data on the right and left shoulder. This more technical and sporty configuration is dedicated to those who drive on the track or on the road and are looking for higher and more significant levels of performance which, consequently, generate the need for precise knowledge of the thermal and pressure parameters of their tires.





To synchronize the sensors with the device, you will need to use the dedicated QUASAR App downloadable via QR-code in the CONFIGURATION chapter or from the quasar e-commerce. elleing.com.

The installation procedure includes the following steps:

ADVANCED

1. Remove the front and rear mudguards from themotorcycle so that you can carry out the operations to accommodate the sensors;

2. Using a drill / screwdriver, make a hole in the front mudguard. Based on the needs and driving style, the sensors will be installed in a position suitable for what the driver wants to know and detect. If road sports tires are used, it is believed that the optimal position to place the sensors is at a distance of 10 cm from the front edge and in the middle of the mudguard. This position guarantees precise temperature detection and a stable installation;

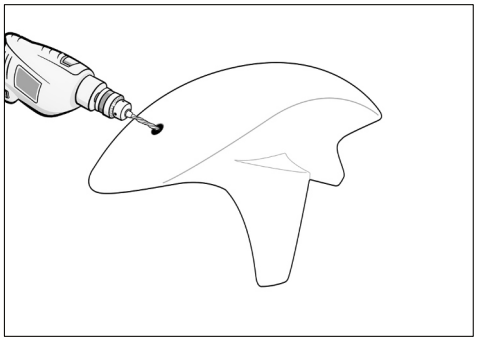
3. Remove the IR sensors and their corresponding fixing nuts from the box. For the front wheel, the sensor indicated with the wording F (Front) must be used;

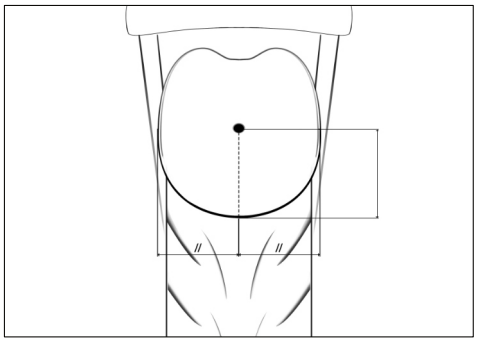
4. Place the sensor in the hole created on the upper surface of the mudguard and anchor it with the nut in the lower part. Use a key (not supplied) to lock the unit to the mudguard;

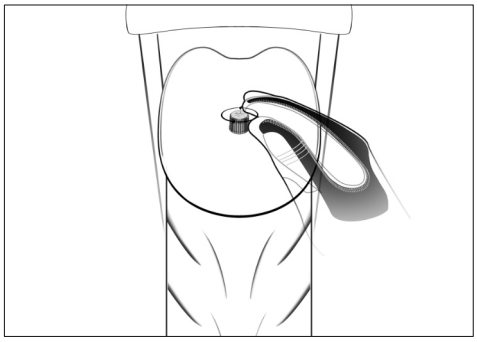
5. Carefully check the stability of the sensor to prevent any possible loss of the same during use of the motorcycle;

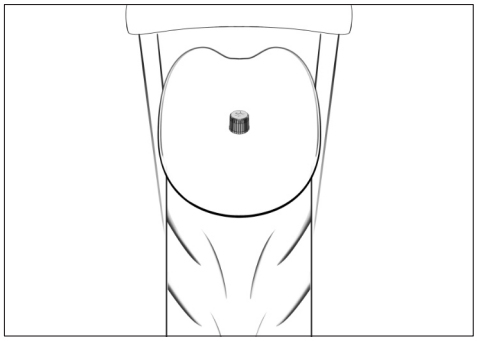
6. Repeat the entire operation also for the rear mudguard, making the hole in the same position as the front one and using the sensor marked with the word R (Rear);

7. Reassemble the mudguards on the motorcycle, making sure there is enough clearance between the mudguard and the tire.









For those who use their motorcycle on the track, exaggerating the level of driving, it is necessary to verify that during the braking phase there is sufficient space between the fairing and the sensor. Once installed, it is advisable not to remove the IR sensors from the motorcycle, checking their charge level at each use through the dedicated App and/or checking the connection.

RACING

1. Remove the front and rear mudguards from the motorcycle so that you can carry out the operations to accommodate the sensors;

2. Using a drill / screwdriver, make 2 holes on the front mudguard in correspondencewith the right and left shoulder of the tire.
   Based on the needs and driving style, the sensors will be installed in a position that is suitable for what the driver wants to know and detect. If using road sports tires, it is believed that the optimal position for placing the sensors is at a distance of 10 cm from the front edge of the mudguard and 2 cm from the outer edge of the side profile. This position guarantees precise temperature detection and a stable installation;

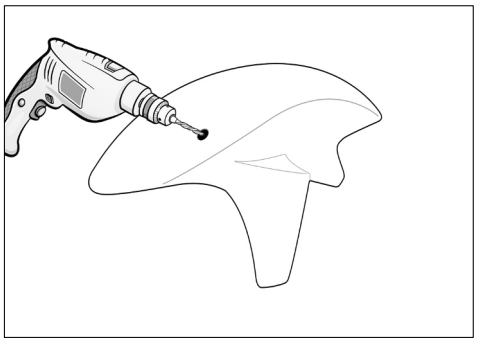
3. Remove the IR sensors and their corresponding fixing nuts from the box. For the front wheel, the sensors indicated with the words FR (Front Right) and FL (Front Left) must be used;

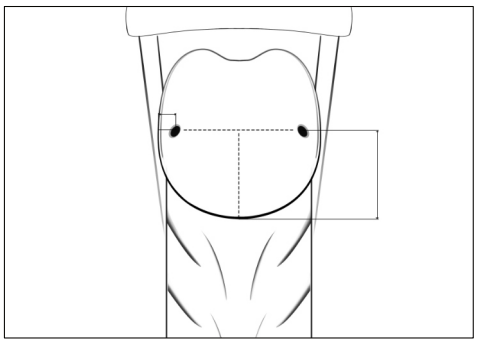
4. Taking care to insert the unit in its correct position, place the sensor in the hole created corresponding to the correct shoulder. Place the sensor in the hole created on the upper surface of the mudguard and anchor it using the nut on the lower part. Use a key (not supplied) to lock the unit to the mudguard;

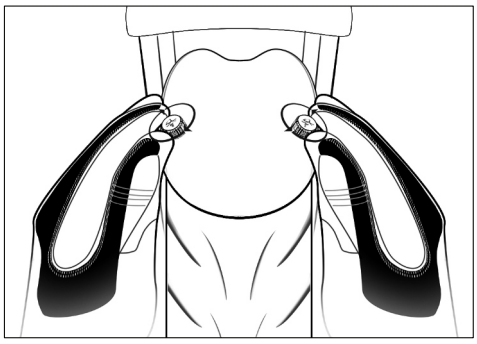
5. Carefully check the stability of each individual sensor to prevent any loss of the same during use of the motorcycle;

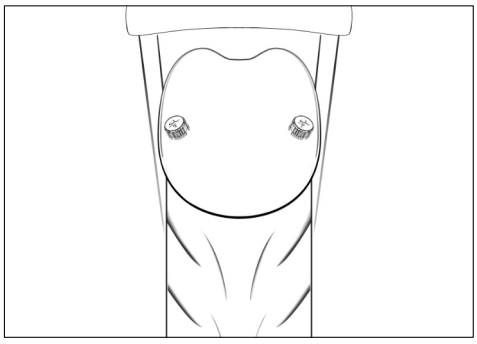
6. Repeat the entire operation also for the rear mudguard, making the holes in the same position described for the front one and using the sensors marked with the words RR (Rear Right) and RL (Rear Left);

7. Reassemble the mudguards on the motorcycle.







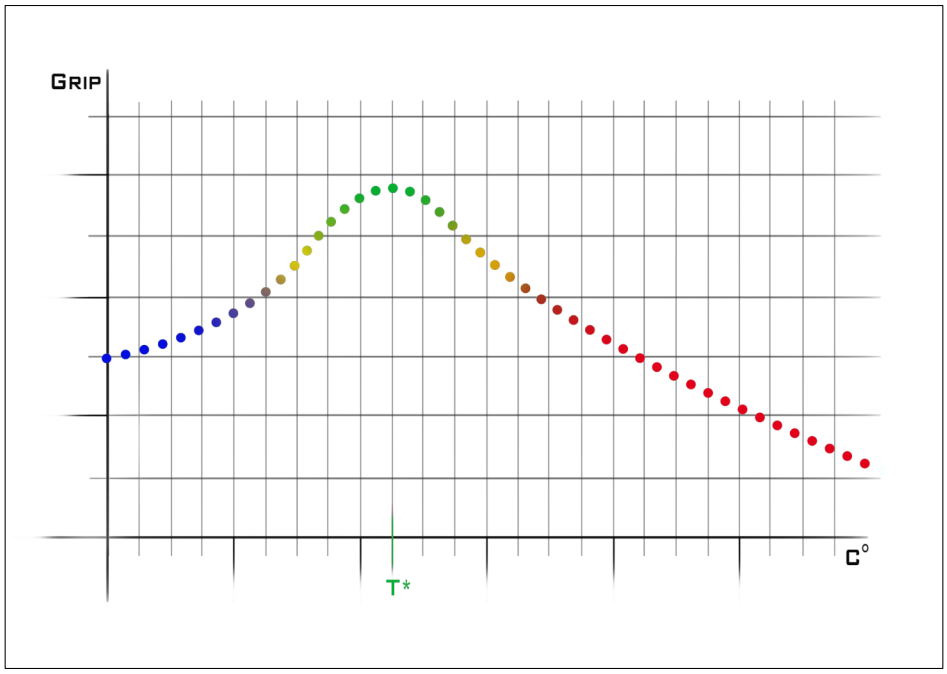


For those who use their motorcycle on the track, exaggerating the driving level, it is necessary to check that during the braking phase there is sufficient space between the fairing and the sensor.

INSIGHT

The performance level of tires depends on many factors starting from the type, the compound and their intended use: road or track. But the factors that most influence a tire are Temperature and Pressure. In particular, the higher the performance required based on the type of use, the narrower the Thermal Window that identifies the "Operating Temperature" around which the Tire will express the best of its characteristics in terms of grip.

But be careful: the temperature that QUASAR estimates for determining the safe lean angle is neither the one detected inside the inner tube by the TTPMS, nor the one detected on the external surface of the tires by the IR sensors, but rather the one present inside the central layers of the tread, i.e. inside the compound, generally higher than the external surface one. This particular Temperature is also known as T-Grip and depends on many factors.



A latest-generation road sports tire, generally also used on the track, shows an "Exercise Bell" similar to the one shown above. Once the type of tire (road or track) and its compound (soft, medium, hard) have been set via APP, this curve will be processed in real time by QUASAR, providing in an approximately conservative way and with adaptive graphics, the narrower or wider Lean Angle Range, depending on the theoretical T-Grip estimated within the tire compound.

Of course, it is impossible to process the correct performance curve for all the types of tire, compound and manufacturer currently existing on the market. For this reason, Ellea Racing, in collaboration with various Racing Teams and certification bodies, has conducted a series of tests to categorize the main types of tire, identifying and grouping them by "families".

This approximation, physically and engineeringly acceptable within the tolerance of the instrument itself and human perception, has allowed QUASAR to be able to provide, albeit in an approximate way, a semi-empirical analysis method that provides conservative information capable of increasing driving safety.

The most important approximation and working hypothesis consists in the assumption of a type of average asphalt in good conditions, in addition to unworn tires. (see General Terms and Conditions).

The characteristic thermal curve also called performance curve of the tire is very variable and will be more accentuated and high in proximity to the T-Grip the closer it is to a road-sports or track tire (slick).

On the contrary, the road tire, which is the best known and widespread model, generally has a much lower T-Grip and a very extended and wide "operating bell", so as to generate good performance at different temperatures and external conditions. However, even in these cases the fact remains that the tire will have its own characteristic curve and knowing it will allow, even if only approximately, to obtain an additional tool for the benefit and service of a more aware and safe driving.

From this differentiation on the types of tires, Ellea Racing has taken the initiative to create three different configurations of the QUASAR: BASIC, ADVANCED and RACING. The Basic version, in fact, was deliberately created to address all motorcycle enthusiasts whose vehicle is equipped with road tires whose temperature difference between the operating temperature and that of the external surrounding environment is, at least in the periods of standard use, low, making the choice of only TTPMS sensors to keep it under control correct and sufficient.
As the riding level increases in parallel with that of the motorcycles and their tires, this thermal difference will also tend to increase, making it more sensible to switch from the QUASAR to the more advanced versions also equipped with IR sensors.

It is therefore easy to understand how essential it is for the Rider to acquire technical knowledge and familiarity on tires which, sometimes differently, are not always given the right importance, starting from the most widespread: the road-sports tire present on the majority of high-speed road motorcycles.

So let's do a quick review together on how to identify a tire that can satisfy our needs, guaranteeing us maximum safety!

SIZE

The size of the tires must always be taken into account in order to be aware of your driving potential, as well as temperatures and pressures.
This information is displayed with a code on the sidewall of the tire.

For example a tire with the abbreviation 120/70 R17 identifies respectively:

- The width of the contact surface of the tire with the road (in millimeters);
- The ratio between the height of the sidewalls and the width of the tread;
- The structure of the wheel (radial);
- The diameter of the rim.

LOAD AND SPEED INDEXES

The load index of a motorcycle tire is the maximum weight it can support. It is a numeric code (between 20 and 120) that is found on the sidewall of all tires, next to the size.

The speed index refers to the maximum speed that a tire can reach while in motion. It is an alphabetic code between A1 and W.

Please remember that it is forbidden to drive with wheels whose load and speed coefficients are lower than those of the original tires. The reverse is permitted.
As with the load index, each letter corresponds to an equivalent in km/h:

- Q: 160 km/h.
- R: 170 km/h.
- S: 180 km/h.
- T: 190 km/h.
- H: 210 km/h.
- VR: > 210 km/h.
- V: 240 km/h.
- ZR: > 240 km/h.

SIDEWALL

The sidewall is the portion of the tire that goes from the bead to the tread. Its task is to provide lateral stability to the tire. All the markings of the tire are shown on the sidewall.

TREAD WIDTH

This number indicates the nominal width of the tread, measured in millimeters from sidewall to sidewall. In this case, it is 120 mm. Please note: the width that the tire physically has when mounted on the rim may differ from the nominal width indicated.

HEIGHT / WIDTH RATIO

This number indicates the ratio between the height of the sidewall and the width of the tire. In this case, the height represents 70% of the width (120 mm), so it measures 84 mm.

RIM DIAMETER

On a sports tire, the code is usually "ZR".
The "Z" indicates the speed index of the tire, which in this case is greater than 240 kmh/ 149 mph.
The "R" denotes the radial construction of the tire. The "17" indicates that the rim has a diameter of 17 inches while "M/C" is the code to recognize tires for motorcycles only.

Last but not least, remember that based on the load index and the speed index, it is necessary to set the tire pressure in accordance with the manufacturer's instructions.

Even more important is to remember that the pressure value must be measured when the tire is hot and not when it is cold, and this confirms the validity of QUASAR also as a tool for checking the setting of your motorcycle.

THE IMPORTANCE OF THE CORRECT PRESSURE VALUE

One of the essential parameters to always keep under control on your tires and which is in close connection with their temperature is certainly the pressure.
An incorrect pressure can cause irregular wear of the tire, compromise its grip and increase the risk of accidents.

The correct tire pressure values, generally expressed in bar, can be found in the use and maintenance manual of your motorcycle or on a label specifically applied to the vehicle. Generally these values depend on the type of motorcycle and its use: road or track.

In this section we only give general indications that allow you to understand the operating ranges but please refer to the more precise data provided by the manufacturer for an optimal and safe check.

Touring motorcycle:

Single rider
Front tire 2.3 ± 0.1 bar Rear tire 2.7 ± 0.1 bar

Rider with passenger
Front tire 2.3 ± 0.1 bar Rear tire 2.9 ± 0.1 bar

Sports motorcycle for road use:

Front tire 2.5 ± 0.1 bar Rear tire 2.9 ± 0.1 bar

Sports motorcycle for track use:

Front tire 2.0 ± 0.1 bar Rear tire 1.4 ± 0.1 bar

The above values refer to “cold” inflation, i.e. at room temperature [20 °C].

The climate greatly affects the air pressure inside the tire chamber.
In summer, as temperatures rise, the pressure increases. It is therefore advisable to slightly decrease it by one or two tenths of a bar compared to the standard values.
On the contrary, in winter, the pressure decreases and therefore it is advisable to slightly increase it by the same amounts.

For use on the track, it is also necessary to consider the effect of high speeds which, associated with softer compounds that have lower performance temperatures, determines an increase in pressure due to the heat generated by friction with the asphalt.

In these cases it is therefore advisable to perform a "hot" setting check after using any heated blankets, in the hope of maintaining the performance temperature on the track and therefore the correct pressure level.
In general, an increase in pressure of around 0.2-0.3 bar can be considered compared to the setting values at room temperature.

On the contrary, if you drive on the road and tackle a route with changes in altitude, it is necessary to remember that a lower atmospheric pressure determines the need for a slight increase in tyre pressure.

The consequences of too high a pressure level in the tire, visually indicated by the color RED on the QUASAR, warns of a possible reduced grip due to the smaller contact surface. This causes irregular and accelerated wear as well as a more stiff and less comfortable ride.

On the contrary, the consequences of too low a pressure level in the tire, visually indicated by the color BLUE on the QUASAR, warns of a possible reduced stability with a potential safety risk. The resulting irregular wear would manifest itself with a greater wear of the tire shoulders, increasing the risk of falling in direct proportionality to the lean angle.

These recommendations on tire pressure values refer to generalized situations and to a smooth road surface free of roughness, unevenness, potholes or other factors that may require a more in-depth analysis.

It is therefore recommended to always refer to the pressures recommended by the motorcycle manufacturer and the tire manufacturer, specifying the intended use.

In the case of approved road circuit tires or road tires for occasional use on the circuit (for the so-called "Track Day Rider"), at the end of use on the circuit it is essential to restore the pressure recommended by the motorcycle manufacturer before returning to the road.

TECHNICAL SPECIFICATION

DEVICE

Processor:	ESP 32
Case material:	PCABS with added glass powder 20%
Bluetooth frequency:	2.4 GHz
Waterproof certification:	IP54
Humidity:	95% max
Display resolution:	240 x 240 px
Battery capacity:	835 mAh
Battery life:	2-3 years ~
Battery charging:	4-6 hours (depending on the electrical source used)
Battery duration:	3-4 hours ~
Device weight:	100 gr ~

TTPMS SENSORS

Processor:	ARM MO
Bluetooth frequency:	2.4 GHz
Response time:	< 5 sec
Waterproof certification:	IP67
Humidity:	95% max
Tire pressure range:	100-1300 KPa
Tire pressure accuracy:	+-10 kPa
Tire temperature accuracy:	+- 3°C
Operating temperature range:	-30°C ~ +80°C
Storage temperature range:	-30°C ~ +85°C
Battery capacity:	140 mAh
Battery life:	2-3 years ~
Sensor weight:	10g ~

MAINTENANCE and SAFETY WARNINGS

The device does not intervene in any way on the actions of the driver or on the corrective electronics of his motorcycle.

The estimate of the motorcycle's performance parameters in relation to the telemetry data detected via the interface with external sensors is only one way to increase the motorcyclist's awareness of driving, but this does not exempt him from paying the utmost attention to driving and to the additional risks and dangers arising from external factors that could nullify the result and lead to non-standard situations.

The estimates, in fact, are carried out by the microprocessor assuming an optimal state of the tyres and a dry road surface free of irregularities that, otherwise, could actually cause an unpredictable loss of grip.

The device also presupposes a good knowledge of the pressure ranges that the motorcyclist must check using the tire manual and set before using his motorcycle.

Therefore, the buyer, aware of the above, declares to accept the risks and to assume full responsibility, both civil and criminal, for any damage to things, people and structures directly caused or attributable to their actions and behavior.

The buyer consequently exonerates Ellea Ingegneria / Ellea Racing from any and all liability, immediately renouncing any claim for damages or indemnity against them, under any title or provision of law.

Storage: when the device is not used for a long period and to avoid the formation of oxides and mold, store the device in a cool, dry and well-ventilated environment. If you plan not to use the product for a prolonged period of time, it is recommended to remove the device from the place where it is stored at least once a month.

Do not drop: the product may not work properly if subjected to strong impacts or vibrations.

Keep dry: This product has received an IP54 waterproof rating and may not function properly if immersed in water or exposed to high levels of humidity. Rusty internal mechanisms may cause irreparable damage.

Avoid sudden temperature changes: Sudden temperature changes may cause condensation to form inside the device. To prevent this, place the device in a carrying case or plastic bag (not included) before subjecting it to sudden temperature changes.

Keep away from strong magnetic fields: Do not use or store the device near equipment that produces strong electromagnetic radiation or magnetic fields.
Electrostatic charges or strong magnetic fields may interfere with the display, damage data stored in the internal memory, or affect the internal circuitry of the product.

Cleaning: When cleaning the body of the device, use an electrostatic cloth to remove dust and other debris, then wipe gently with a soft, dry cloth.

If the device comes into contact with sand or is used in a particularly salty environment, clean it with a cloth slightly soaked in clean water, then dry it carefully. Do not use alcohol, thinner or other volatile chemicals to clean the device as it may cause discoloration or damage to the body.

Important: Dust or other foreign materials inside the device may cause damage not covered by the warranty.

Display: The display is manufactured with very high precision. Although it may contain pixels that are always on or always off, this is not a malfunction and will not have any effect on the reading of the information provided during its use.

In rare cases, static electricity may cause LCD displays to become brighter or dimmer than normal. This does not indicate a malfunction and the display will quickly return to normal.

Dust and other debris on the display can be removed with a blower. Any stains can be removed by lightly wiping the surface with a soft cloth.

Do not apply pressure to the display as this may cause damage, malfunction or abnormal behavior. If the monitor breaks, be careful not to injure yourself with glass fragments and avoid contact of the liquid crystals with your skin, eyes or mouth.

The battery: the device is equipped with an internal battery that is not removable and replaceable. This is connected to an anti-tampering system that, if tampered with, will void the product warranty.

The battery charging is managed by a microchip that, in the event of overheating or abnormal charging that could damage it, blocks the process and then resumes it when the conditions return to optimal.

Charge the battery indoors at ambient temperatures between 5° and 35°C. The battery will not charge if the temperature is below 0°C or above 50°C. On cold days, the battery capacity may decrease.

The internal temperature of the battery may increase while the device is in use.
Failure to observe this precaution could damage the battery or compromise its performance.

Repeatedly turning the device on and off when the battery is fully discharged may shorten the battery life. Fully discharged batteries must be charged before use.

Do not move the device while charging. Failure to do so may, in very rare cases, cause the device to display a full charge when the battery has only been partially charged.

Remove, wait for the device to cool down and reinsert the charging cable to restart charging.

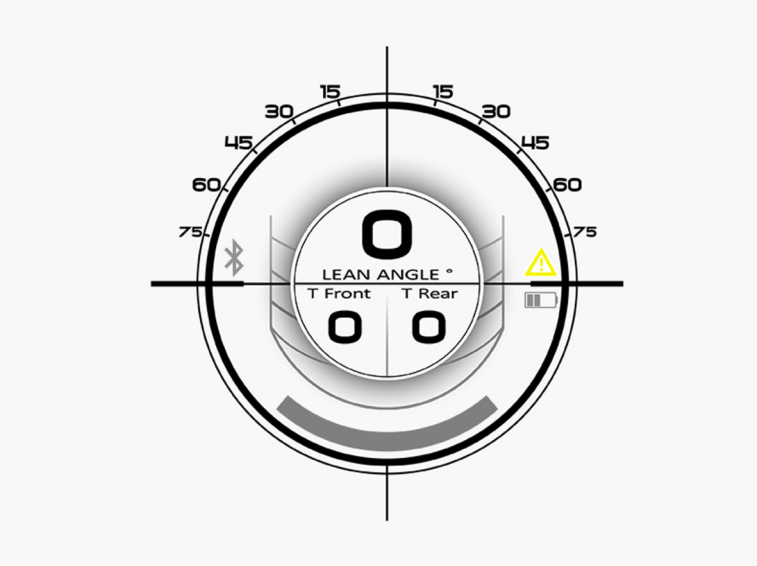
Continued charging of the battery when it is already fully charged may decrease battery performance.

In the event of battery life, charging and malfunction problems, please contact the manufacturer's support service at quasar@elleaing.com for an in-depth diagnosis.

In the event of the battery's life cycle having expired, contact the manufacturer's support service at quasar@elleaing.com for its replacement.

WARNING

If the Warning symbol appears on the right side of the device display (yellow triangle with central exclamation point), the first action to take is to stop.



In the app there is a section dedicated to the various problems encountered; by opening it you can find out the reason for the warning signal to appear.

Some situations in which the warning symbol will appear are:

- in the event of loss or breakage of some sensor;
- the temperature is not detected on one or both tires;
- the temperature is detected correctly but the device has not been connected to the sensors due to the failure to connect the Bluetooth (dedicated blue button);

The app also contains other reasons for the warning symbol to appear.
If it is not possible to resolve the problem that causes the warning, please contact support at quasar@elleaing.com.

CERTIFICATIONS

The Validation phase was carried out through various tests to ensure compliance with the current regulations.

- CE Europe Certification;
- RoHs Compliance;
- Electromagnetic Compatibility (EMC) verification for which the electrical and electronic equipment does not create electromagnetic disturbances towards other devices in the vicinity and/or does not suffer disturbances from other devices;
- Waterproof control;
- Compliance control in conditions of random vibration at high RT and operating temperatures.

WARRENTY TERMS

Thank you for purchasing the Ellea Racing product.
If the purchased product requires warranty service, please contact the support service by email.

To avoid further inconvenience, we recommend that you carefully read the user manual before contacting the support service.

The Quasar device is guaranteed against any manufacturing defects for two years, starting from the date of purchase.
There is also a right of withdrawal with the return shipment of the item at the expense of the buyer no later than 14 days (2 weeks) from the date of purchase. In this case, the product must be intact with all the accessories present in the package when received.

If during the warranty period the product is found to be defective due to the materials used or manufacturing defects, the Ellea Racing support service will repair the product, without any expense for labor and spare parts, in accordance with the conditions indicated below.
Ellea Racing reserves the right (at its discretion) to replace or repair the product.

1. The warranty is valid only upon presentation of the invoice or purchase receipt indicating the date on which the purchase was made; all of this must be presented together with the product itself.
Ellea Racing reserves the right to refuse the free maintenance service for products still covered by warranty, if it does not have the required documentation or if the information contained therein is incomplete or illegible.

2. This warranty does not cover the following cases:

   - necessary maintenance, repairs or replacements of components due to normal deterioration over time;
   - modifications to adapt the product to a purpose other than the original one, as indicated in the user manuals, without the written consent of Ellea Racing;
   - costs relating to transport and all transport risks relating directly or indirectly to the product warranty;
   - any damage resulting from modifications of various types made to the product, without the written consent of Ellea Racing.

3. This warranty does not apply in the following cases:

   - damage caused by improper use of the product, including use of the product for purposes other than those intended by Ellea Racing, negligence with respect to the rules of use and maintenance contained in the instruction manual;
   - damage caused by accidents including the presence of lightning, water, fire, misuse or negligence;
   - damage resulting from repairs or modifications carried out by unauthorized individuals, organizations or companies;
   - presence of defects in the systems in which this product is integrated or with which it is used.

GENERAL CONDITIONS OF SALE

Possibility to download the document regarding the “General Conditions of Sale” from the section Download on the official website quasar.elleaing.com.

INFORMATION ON PERSONAL DATA

Possibility to download the document regarding the “Information on personal data” from the section Download on the official website quasar.elleaing.com.

EU DECLARATION OF CONFORMITY

Product
Ellea Ingengeria - Quasar

Manufacturer or its authorized representative

ELLEA Ingegneria S.r.l.
Corso Vittorio Emanuele II, 83
10128 - Torino
Italy

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration:
Device with information display for motorcycles
Brand: Ellea Ingegneria
Model: Quasar

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- **2014/53/EU – RED**
- **1999/519/EC – Human Exposure**

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

- **EN 300 328 V2.2.2** “Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive”;

- **EN 301 489-1 V2.2.3** “Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements”;

- **EN 301 489-17 V3.2.4** “Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband DataTransmission Systems”;

- **EN 62368-1:2020 + A11:2020** “Audio/video, information and communication technology equipment - Part 1: Safety requirements”;

- **EN 60529:1991 + AC:1993 + A1:2000 + A2:2013** “Degrees of protection provided by enclosures (IP Code)”;

- **EN 62311:2008** “Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)”;

Signed for and on behalf of: ELLEA Ingegneria S.r.l.

Torino, 17-02-2025

Alfredo Labianca
Director & Business Executive