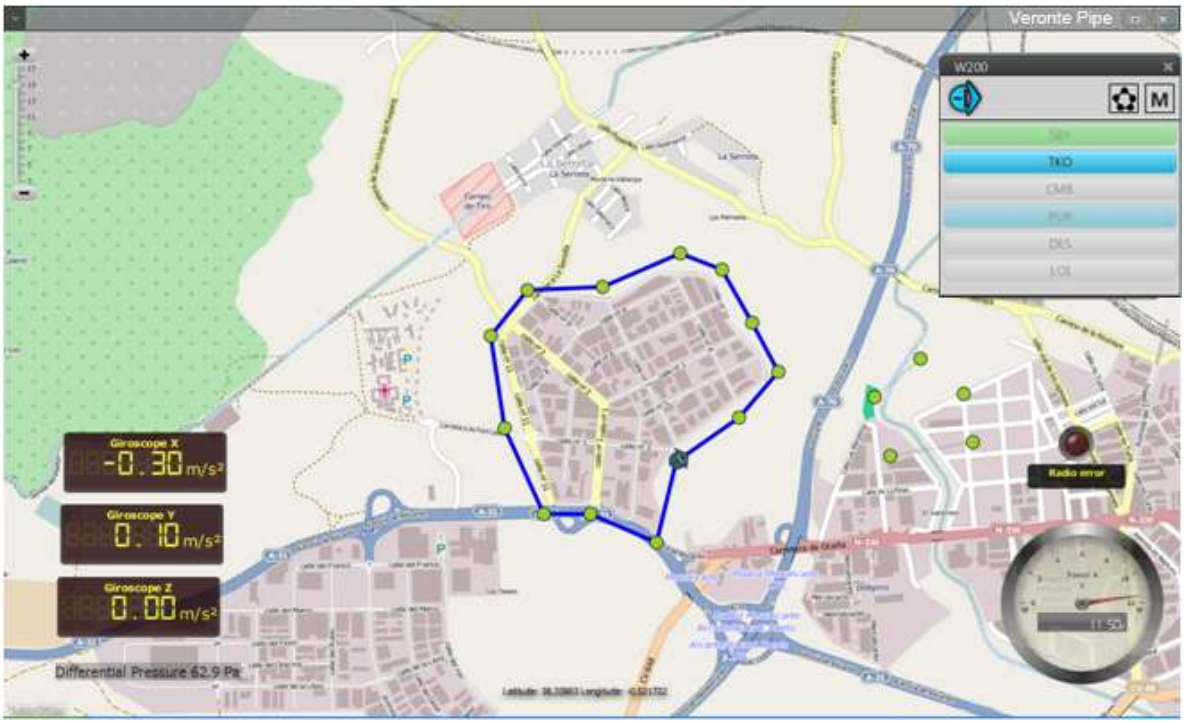
VERONTE PIPE

Software User Manual



EMBENTION

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Acronyms

HUM	Hardware User Manual
ID	Identification
PFD	Primary Flight Display
REC	Record
RPAS	Remotely Piloted Aircraft
SUM	Software User Manual
SRS	Software Requirements Specifications
UAV	Unmanned Aircraft Vehicle
WP	Waypoint

1. OVERVIEW

1.1. System Overview

Veronte Pipe is the software designed for operating any Veronte powered platform. Users achieve a combination of easy-to-use application, real-time response and, firstly, safe operations.

It has been developed using software standard model of IEEE STD 830-1998, Recommended Practice for Software Requirements Specifications (SRS) and STANAG 4671 documentation, subpart I about UAV Control Stations adapted to Veronte system.

Supported operations include:

Telemetry: View real time onboard UAV metrics, such as sensors, actuators and control states.
Telecommand: Support for all synchronous operator control commands that can be sent to the flight segment, e.g. operational mode switch, mission management, payload control and so on.
Mission design: Configure missions with waypoint definition, payload target definition and coverage analysis.
Mission analysis: Rebuild all recorded data from a previous flight and generate plots and reports.
Configuration: Edit RPAS settings, such as servo trim, interface/port management and so on.
Multiple Users: One o more operators can work simultaneously.

Veronte powered systems have two main elements, air and ground segments.

Figure 1: Veronte System Overview

Veronte Air includes any necessary element to; communicate with ground segment, take flight measures, control the aircraft and control the payload.

Veronte Ground redirects stick and PC data to the air segment, and manages bidirectional communications between Veronte Pipe and Veronte Air.

1.2. Veronte Pipe Interface

Workspace on Veronte Pipe is distributed as shown on Figure 2:

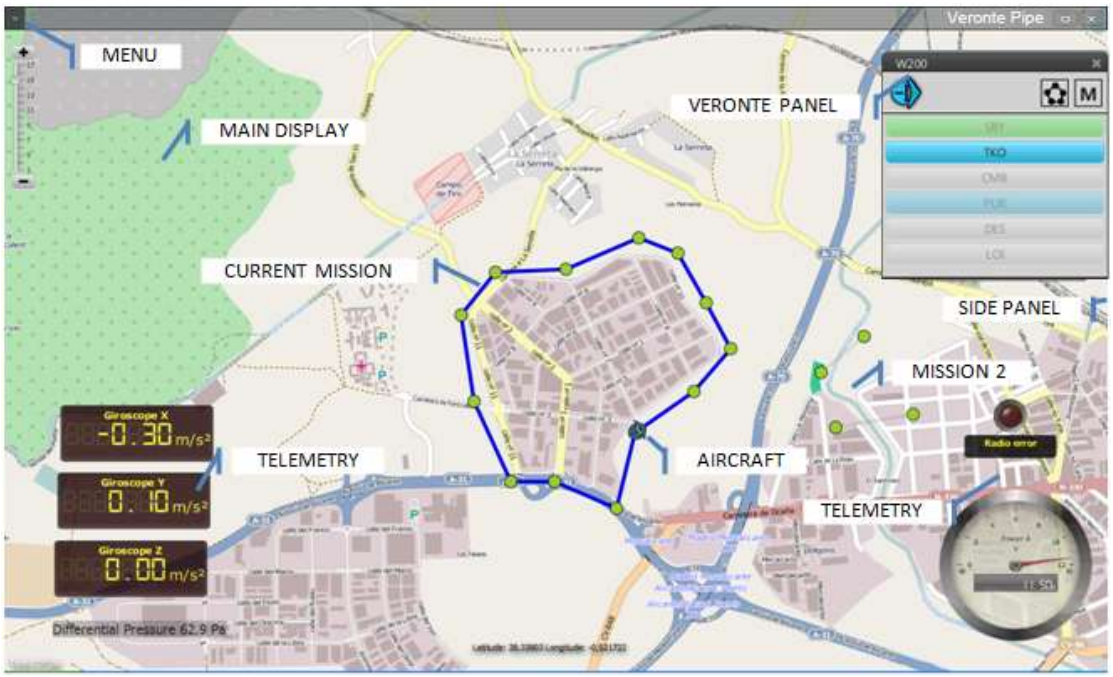


Figure 2: Interface

Each section has the following functions:

- **Menu:**
  - User: Manage user preferences.
  - Setup: Configure Pipe and Veronte units.
  - Telemetry: Select the way flight information is displayed.
  - Mission: Create and edit flight missions.
  - Log: View flight data log and introduce custom events.
  - Post Flight: Tools for recorded data analysis.
  - License: Manage Veronte licenses.
  - Help: Shows help information available.

- **Main Display:** Displays a selectable background map or a plain colour together with most important mission data.

- **Veronte Panel:** UAV information and telecommand buttons.

- **Side Panel:** Shows linked Veronte information.

- **Telemetry:** Configurable drag & drop flight information displays.

Menu items are displayed as toolbars which can be pinned to the top bar or moved freely along the screen.

2. INSTALLATION

2.1. Veronte Pipe installation

To install Veronte Pipe just execute “Veronte_Pipe.exe” and follow the indications.

2.2. Upgrade

Veronte checks for updates on system start up. A setup wizard will be displayed in order to guide the user on the update process. For manual updates follow the indications below.

⚠ **Caution!!** Although newer versions are usually compatible with older ones, when upgrading the system, updates must be done in the correct order. It is mandatory to update **Veronte Air** first, next **Veronte Ground** and last **Veronte Pipe**. Otherwise, part of the system could become unreachable.

⚠ **Caution!!** Never turn off Veronte during the update process. It could cause irreversible damage to the unit.

For manual Veronte upgrade open the setup toolbar, select the upload tool and follow the following steps:

Figure 3: Upload Display

1. Import an “.update” file.
2. Select “Update” option.
3. Choose Veronte to be updated from the list of linked Veronte units.
4. Select update file from list.
5. Press upload (a progress bar will be displayed and Veronte will automatically reboot).

⚠ **Note:** It is not possible to update a Veronte unit once the flight has started.

2.3. PC connection

Veronte ground unit must be connected to the same network than the pc running Veronte Pipe. In order to establish communications with Veronte, PC network interface IP must be in the same range than Veronte. IP can be changed in adapter settings in the control panel, it must be set to IP: 192.168.137.XXX where XXX can be any number selected by user except from 106. Once the IP has been changed, network interface must be selected in Veronte Pipe preferences.

3. USER MANAGEMENT

On startup, Veronte Pipe will require to enter a username and password. It is recommended that each user has their own user in order to avoid safety issues. User configuration can be set on the user toolbar.

Any user can create users with not more permissions than those associated to his user. The following capabilities can be assigned to each user.

Capability	Permissions
Telemetry	Watch mission progress; create and manage telemetry displays.
Configuration	Create and edit configurations and update Veronte.
Flight Planning	Create and edit missions.
Telecommand	Start flight and command Veronte actions.
Post Flight	Download flight information and analyse recorded data.

Table 1: User Permissions

4. SETUP

In order to configure Pipe or any Veronte device or Pipe application, use the setup toolbar. Use the open toolbar to open a configuration and load data on the combo box to configure it.

Veronte Setup dialog can be opened on the main menu:

Figure 4: Setup Toolbar

	Open	Open Veronte configurations.
	Discard	Discard all changes.
	Save	Save all modified data.
	Load	Select configuration to edit or create a new one. User can select from linked Veronte or opened one.
	Close	Close selected configuration.
	Duplicate	Create a copy of selected configuration.
	Upload	For saving the loaded data to a linked Veronte.
	Details	Displays configurable fields.

Table 2: Setup Toolbar

Configurable items are distributed on tabs, the following structure is followed:

Veronte autopilot:

Tab	Description
Veronte	Introduce Veronte information and aircraft layout.
Connection	Manage device connection to Veronte.
Devices	Configure any connected devices: servo, radio, camera...
Telemetry	Select telemetry data for recording and datalink transmit.
Control	Introduce control variables or active adaptive control.
Automation	Configure automatic actions on event detection (go home, turn on lights...).
Checklist	Configure pre-flight checks.
HIL Simulator	Configure parameters for HIL Simulator

Table 3: Setup Tabs

Veronte Pipe:

Field	Description
Preferences	Veronte Pipe preferences
Units	Configure unit preferences

Table 4: Veronte Pipe Preferences

4.1. Veronte Pipe

4.1.1. Preferences

Veronte Pipe preferences permit to configure general application parameters. User must select the PC network interface used for interfacing with Veronte systems.

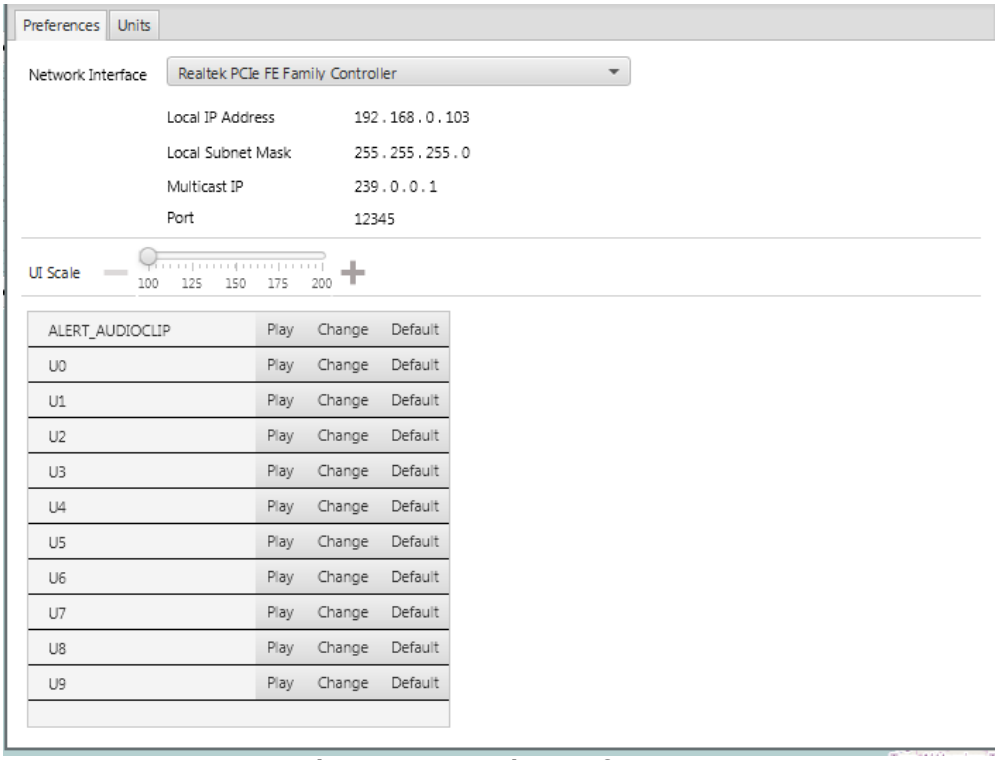


Figure 5: Veronte Pipe - Preferences

IU Scale permits to set the interface scale for adapting the application screen to the screen size on the system.

Alert Audioclips can be associated to system alerts on the Workspace configuration. Use this panel in order to enter custom sounds to the system.

4.1.2. Units

There are multiple system variables defined on the system arranged in categories. For each category, user can set as many custom units as desired by entering the corresponding conversion formula by entering multiple points on the graph.

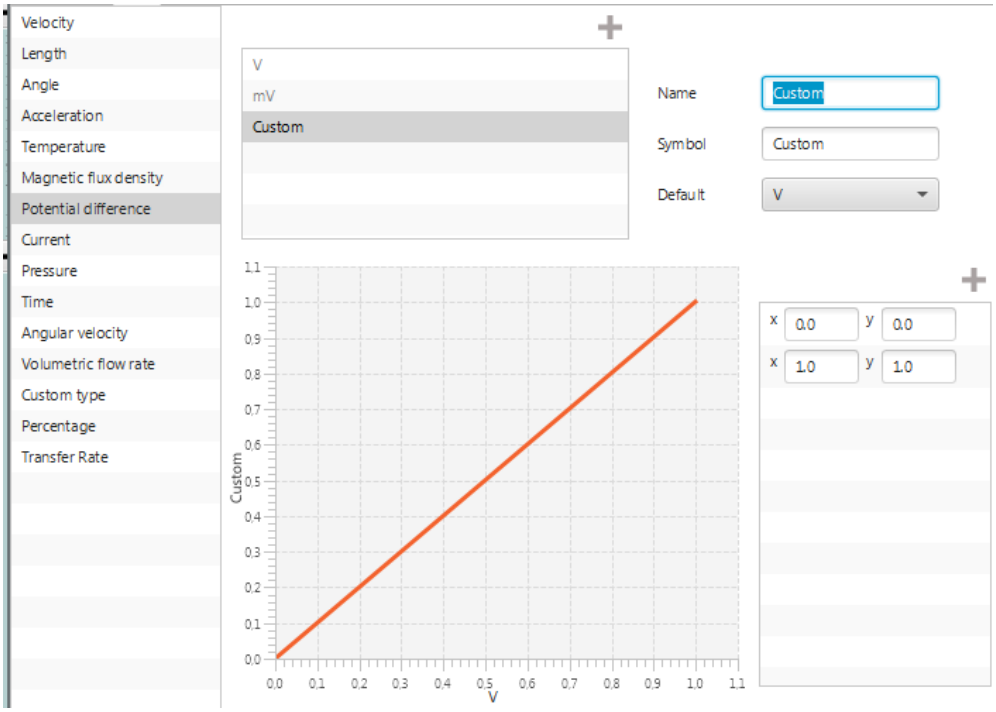


Figure 6: Veronte Pipe - Units

4.2. Veronte Autopilot

4.2.1. Veronte

Introduce Veronte identification and aircraft layout

Field	Description
Part Number	Introduce Veronte part number.
Aircraft	Aircraft name.
Address	Veronte identification number for datalink options.
ID	Introduce a 3 character ID for the aircraft.
Type	Select aircraft type.

Table 5: Setup – Veronte

Once selected aircraft type, layout must be entered so the system can configure aircraft distribution.

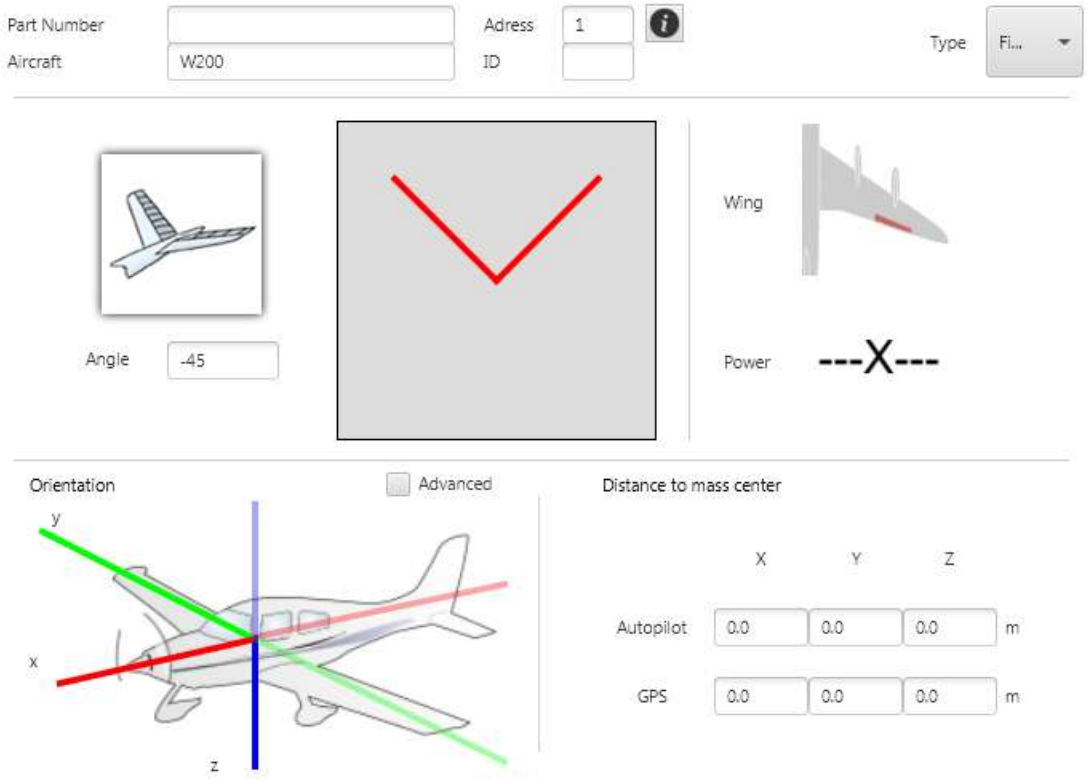


Figure 7: Setup - Veronte

Veronte orientation within the aircraft must be entered in the interface by clicking in one axis and selecting the Veronte axis that corresponds to this direction. Veronte and GPS antenna distance to mass centre must also be entered.

4.2.2. Connection

Select pinout connection for available Veronte connectors.

Field	Description
Pin	Connection to Veronte, check Veronte HUM (Hardware User Manual).
Signal	Select between the allowed signal types for selected pin.
Type	Select device type between actuator, sensor and aux.
Device	Select the device installed: • Actuator: Rudder, camera pan, camera tilt, aux... • Sensor: Temperature, flow, gas level...
Label	Give a name to the device. To be shown on labels.

Table 6: Connection Pinout

4.2.3. Devices

Enter connected devices configuration. Choose the device from the list and configurable information will be displayed.

Type	Description
Actuators	Configure control and auxiliary actuators and motors.
Payload	Enter payload and camera configuration.
Sensor	Configure sensor introducing limits and event information.
Other	Configure auxiliary devices.

Table 7: Device Configuration

4.2.3.1. Actuators

Actuators tab permits to set actuator movement and physical limits. This calibration must be performed in order to configure the actuator behaviour on the system. Per each actuator, user can set as many points as desired for calibrating the signal level for each actuator position.

⚠ **Note:** Maximum and minimum values must be set according to physical actuator limits. Configured limits will never be exceeded by the system in any flight mode.

Figure 8: Setup – Devices – Actuators

Actuator position is given as an "S" parameter which refers to the control variable associated to the actuator. Default units given are:

- Control surfaces (aileron, rudder...): Angle (in radians).
- Motor: Value between 0 and 1 where 1 is max power and 0 is the point where the motor starts the moving.

For "0" motor position it is recommended to set a 5% signal margin in order to make sure that the motor fully stops in all configurations.

Actuator positions must be given according to the international aeronautical sign convention:

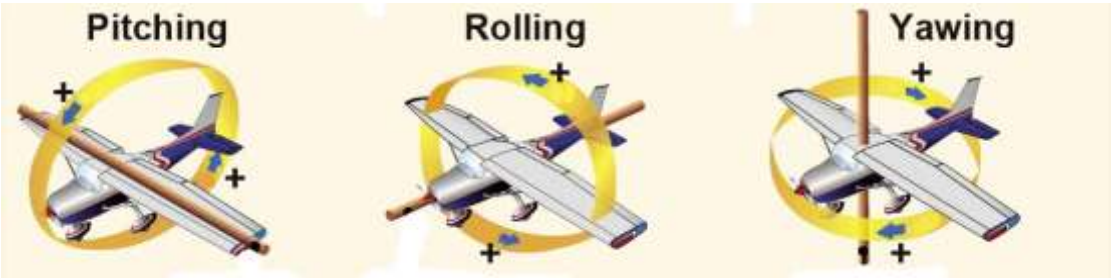


Figure 9: Sign Convention

Example, an elevator down position will generate a positive pitch so the elevator is considered positive on down position. Main actuators rules:

Actuator	Positive	Negative
Elevator	Down	Up
Rudder	Right	Left
Right Aileron	Up	Down
Left Aileron	Down	Up

Table 8: Actuator Configuration

In order to enter a new value on the table click on the "+" and use the graph or the text boxes in order to enter the desired value. In order to validate the entered values, move the actuator by using the "test pulse" tool. By pressing the "Test Pulse" button, the signal value on the slider will be commanded to the actuator.

System automatically sets an actuator position on system startup; this S value can be set by entering the desired value on the "Initial" position.

4.2.3.2. Sensors

Magnetometer

Magnetometer calibration should be performed once Veronte has been installed on the platform so the magnetic field during the operation is similar to the one measured during the calibration.

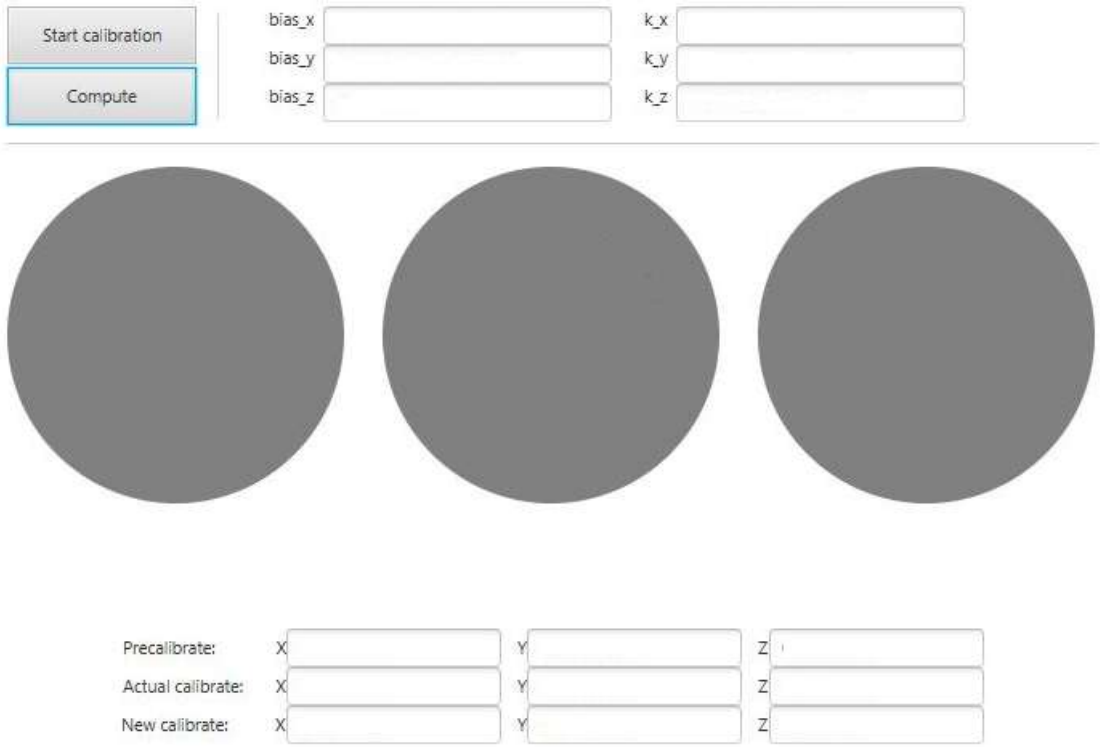


Figure 10: Setup – Devices – Sensor – Encoder

In order to start calibration, press on the "Start Calibration" button so the system can capture magnetometer data. During the calibration the system must be oriented in all possible directions so enough data can be captured. Once enough data has been captured, "Compute Data" sets the calibration.

The procedure for acquiring enough data for performing the calibration is:

- Hold the platform with your hands on the "Y" axis and rotate it parallel to ground.
- While the platform is rotating, rotate also yourself so the platform turns in two axes simultaneously.
- Turn the platform 90 degrees within your hands and repeat the operation.

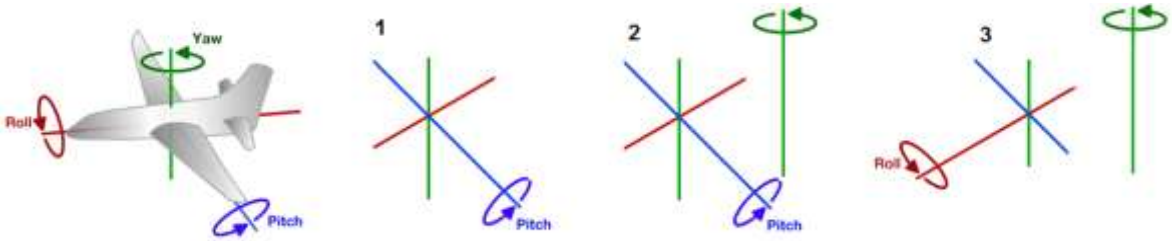


Figure 11: magnetometer calibration procedure

Once three circles have been drawn on the screen, captured data will be enough for saving the calibration data. The following image shows an example of the calibration result:

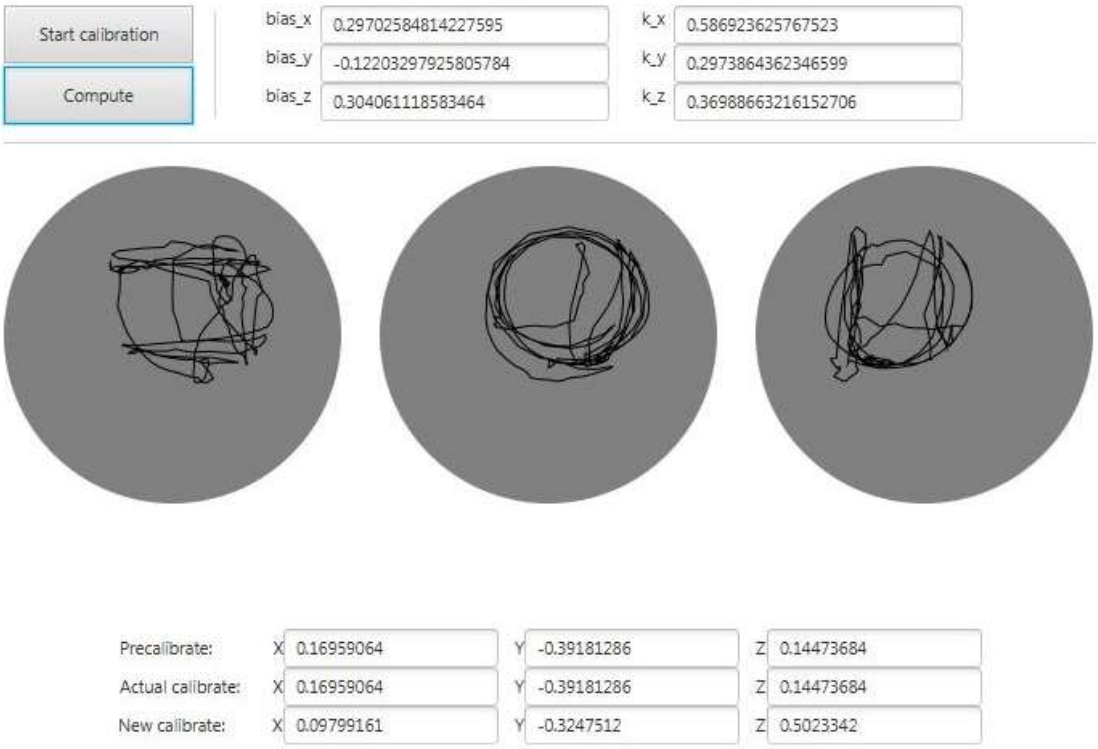


Figure 12: magnetometer calibration values

Encoder

Encoder display permits to configure encoders on the system. It permits to set the calibration parameters and the input and output variables as shown:

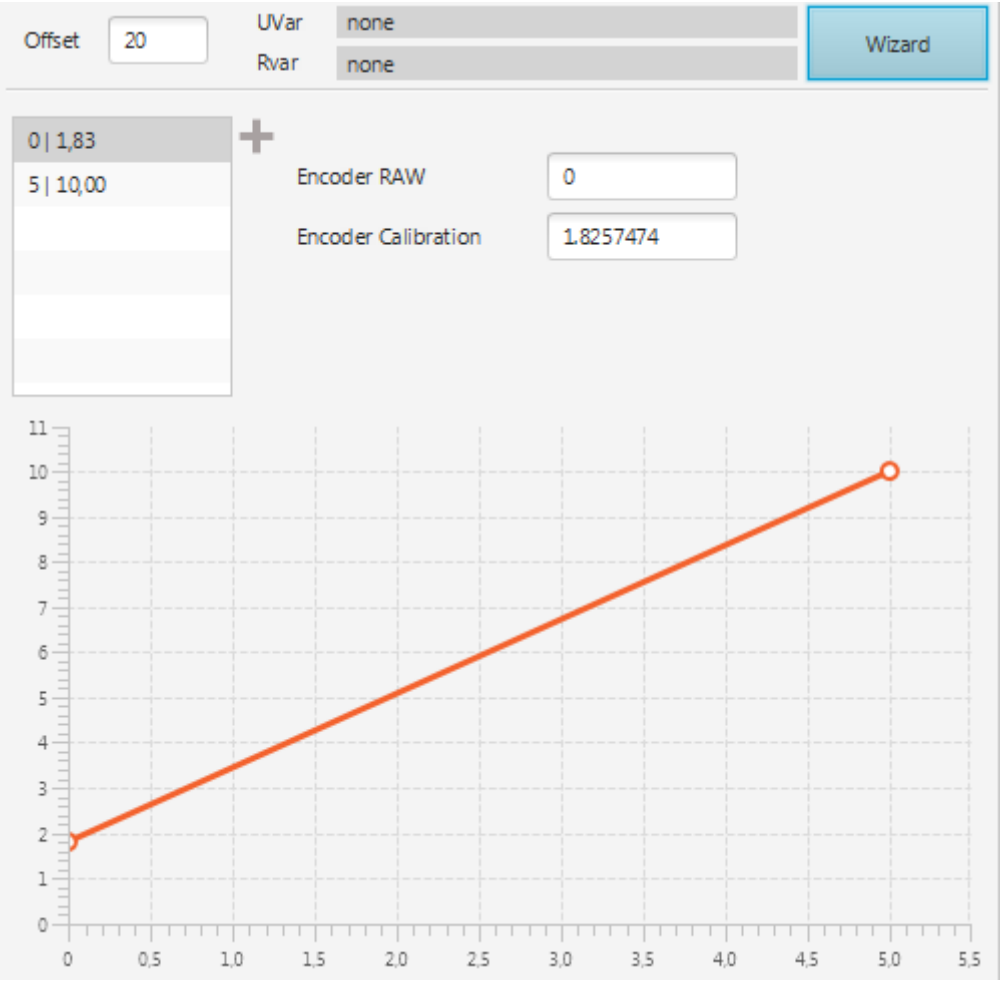


Figure 13: Setup – Devices – Sensor – Encoder

In order to calibrate an encoder the following values must be completed on the display:

- Offset: the entire graph will be displaced the offset value.
- Graph Points:
  - Encoder RAW: real encoder captured data.
  - Encoder Calibration: S value corresponding to the encoder data.
- UVar: Input variable for the encoder.
- RVar: Output variable for the encoder data.

The calibration wizard can also be used for calibrating encoders. Follow the described steps for performing the calibration.

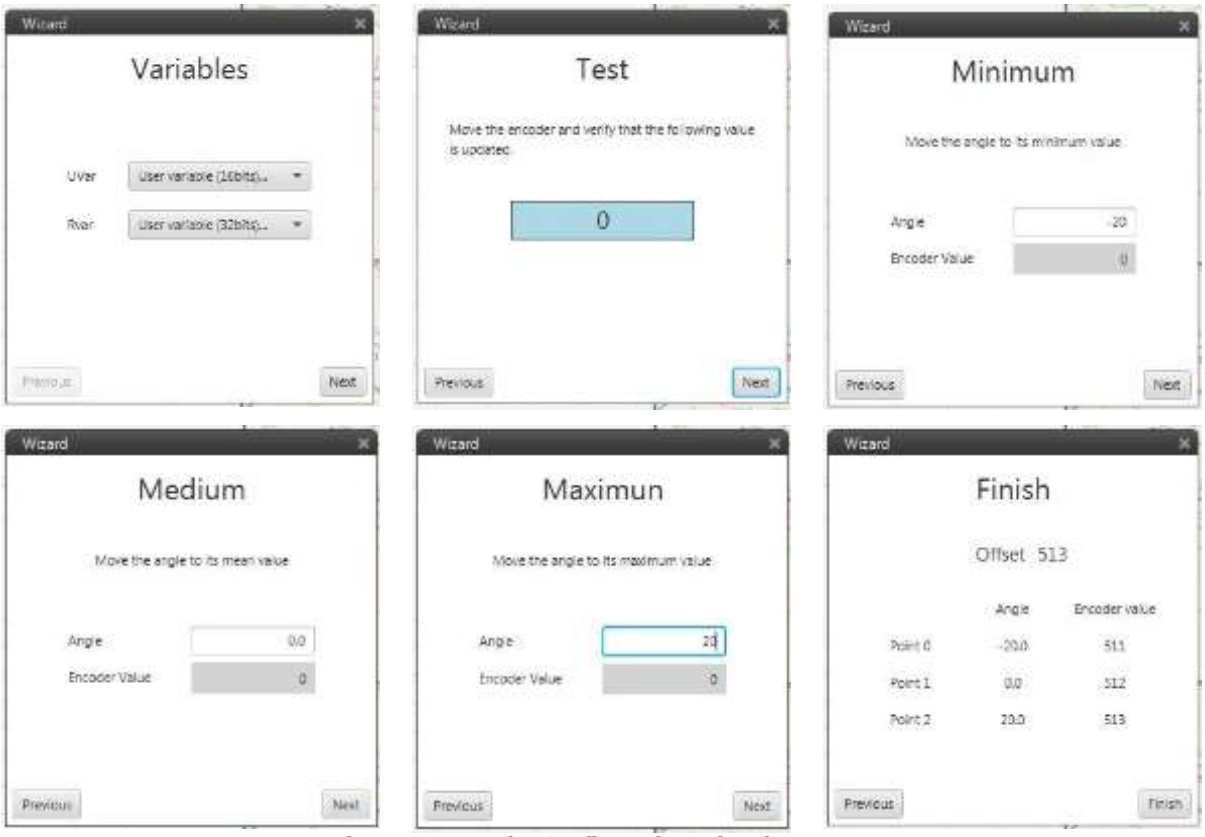


Figure 14: Encoder Configuration Wizard

4.2.3.3. Other

Stick

For each stick channel configured, user can set continuous movement commands to be performed. For configuring the stick select the wave type and enter the requested parameters.

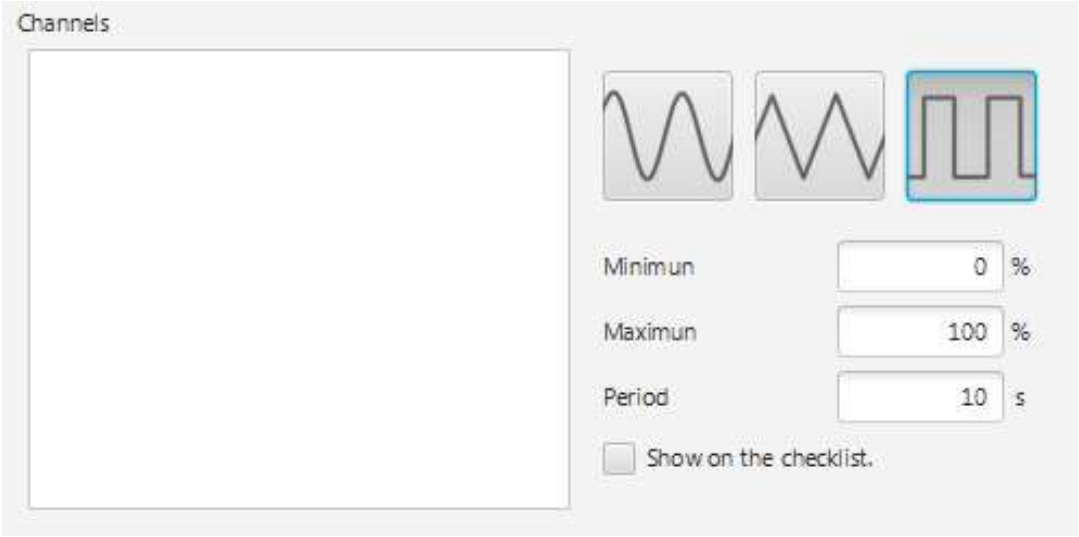


Figure 15: Stick Configuration

Configured parameters can be shown on the checklist in order to test the system prior to change flight phase.

To activate the automatic movement, use the activation button on the virtual stick configured on the workspace.

4.2.4. Telemetry

Telemetry tab permits to configure data to be stored or transmitted on the system. There are 4 main items that can be configured within this panel:

Type	Description
Data Link	Configures the variables to send throughout the datalink channel.
Log	Sets the variables to be stored on system Log.
User Log	User Log for custom applications.
Fast Log	Saves data at the maximum frequency available on the system. Recording time depends on the selected variables.

Table 9: Telemetry Configuration

Configuration display permits to enable the desired variables for each telemetry file and to set the maximum and minimum values together with precision for each one.

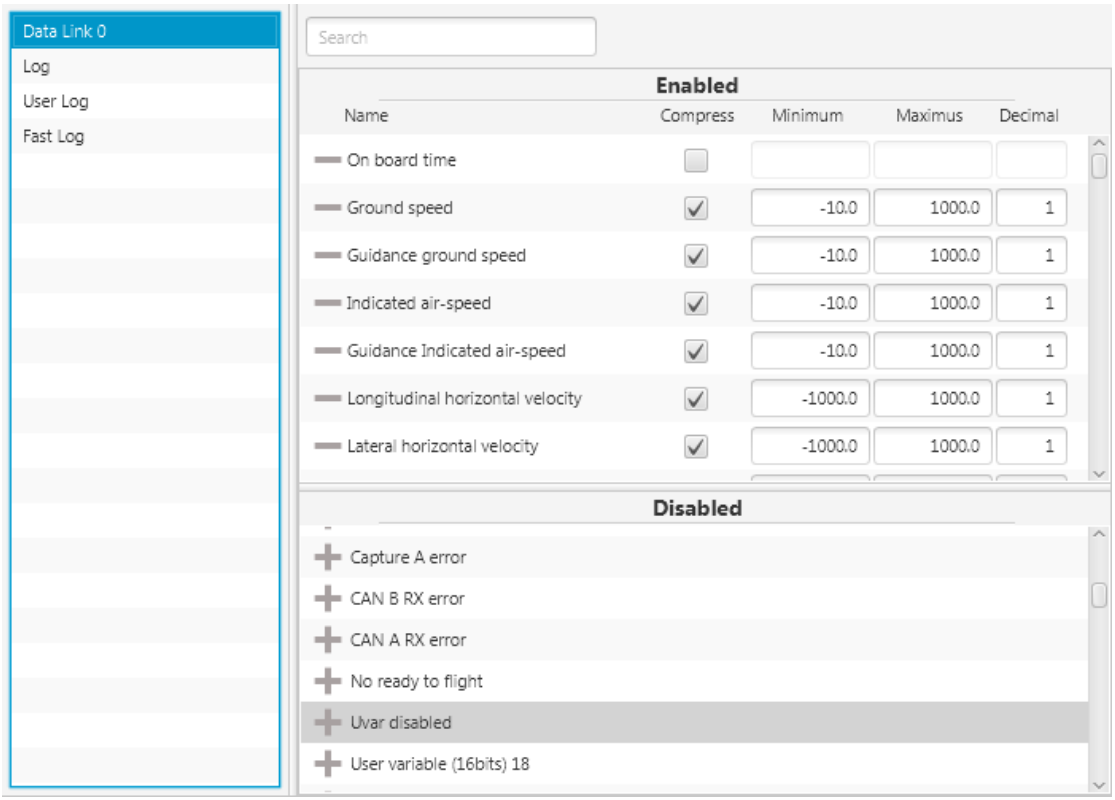


Figure 16: Setup - Telemetry

4.2.5. Control

User can configure platform control parameters for setting the unmanned system performance during the operation.

⚠ **Caution:** Only for experienced users

On the left side of the Control interface, user can enter as many flight phases as needed. Control parameters will be defined for each phase; user will be able to set automatic phase switch (on automation display) or use manual switch on Veronte Panel.

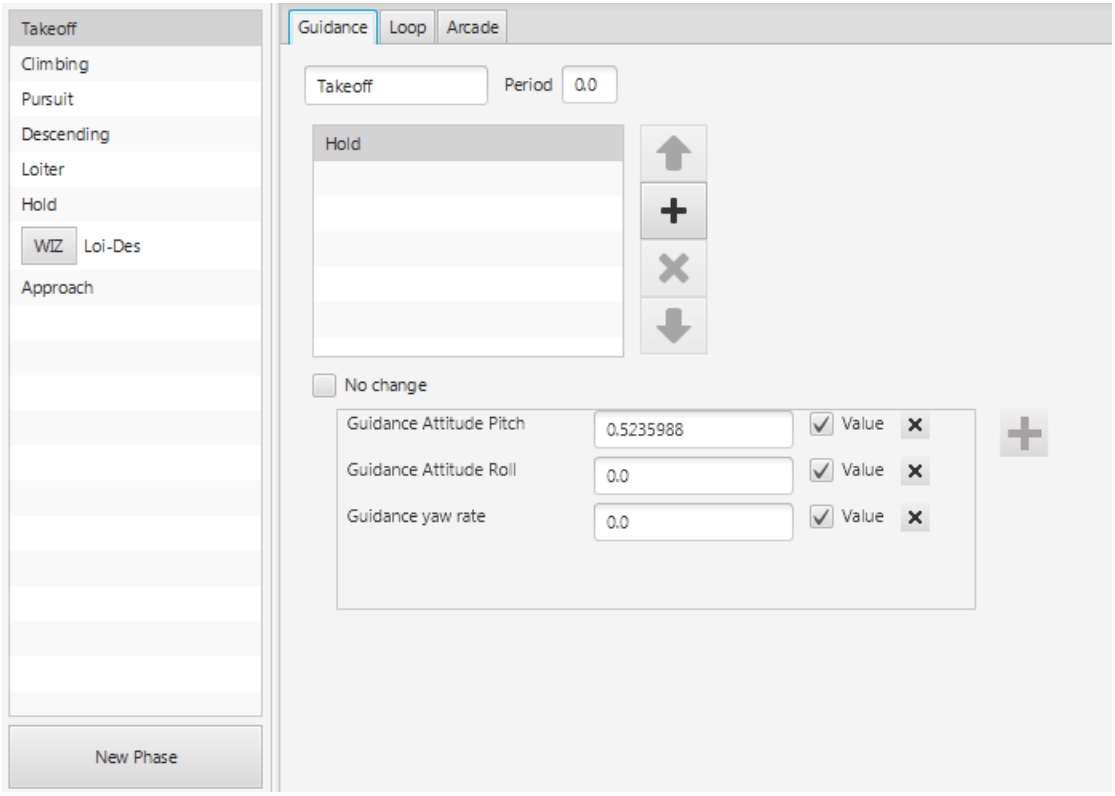


Figure 17: Setup - Control

For each phase user must configure three main elements:

Value	Description
Guidance	Select guidance type and main parameters
Loop	Set control loops.
Arcade	Configure arcade mode for assisted flight.

Table 10: Setup Control

4.2.5.1. Guidance

In order to configure the guidance, the following parameters must be entered:

Value	Description
Name	Set a custom name for the control phase, to be displayed on Veronte Panel.
Period	Enter a control step period for the control phase.
Type	Select the guidance type from available, described below.
Change	When “No Change” is selected, control parameters on phase entering will be maintained.

Table 11: Guidance Settings

For each guidance type the following parameters are configurable:

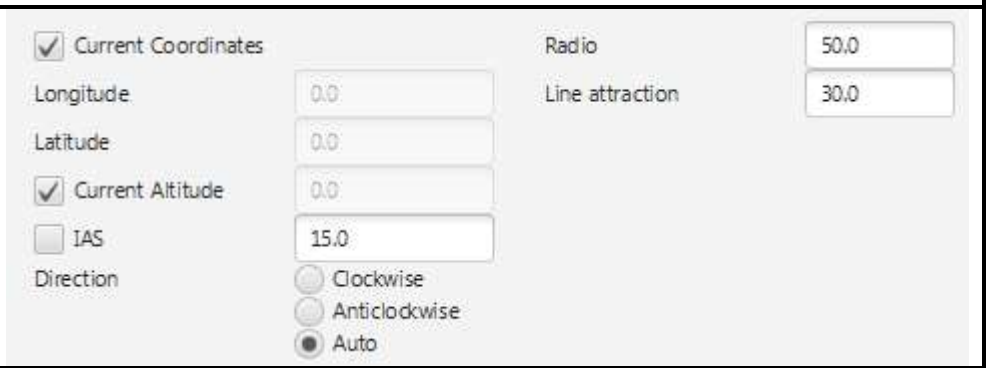
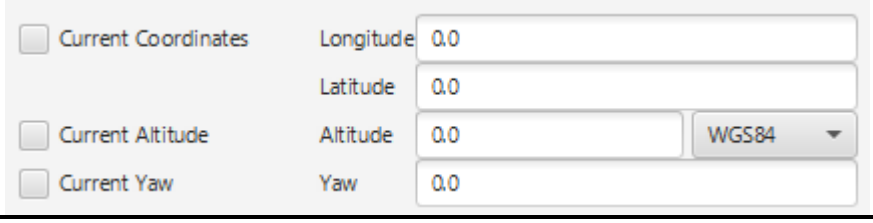
Type	Interface
Hold For each control parameter, introduce a fixed value or an aircraft variable to maintain.	
Loiter Select loitering parameters and coordinates to perform the manoeuvre.	
Way Select the waypoint to go on phase entering.	
Hover Enter hover parameters to be maintained during the hover.	

Table 12: Control Type

4.2.5.2. Loop

On each phase, controller parameters can be set for each control channel defined on Veronte Configuration. Each one of them having the following status options:

Value	Description
Off	Disables the PID controller.
On	Enables the PID controller.
Fixed	Sets the control parameters to a fixed value.

Table 13: PID Control Status

PID Settings

When configuring a PID, up to three control loops can be configured, select on the combo box the desired option.

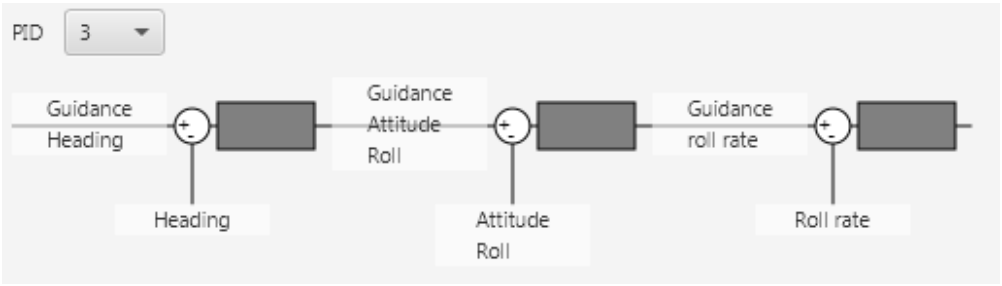


Figure 18: PID Architecture

For setting PID variables, select the variable to set and a list with available options will be displayed.

For setting the PID parameters click on the grey boxes and the PID diagram will be shown:

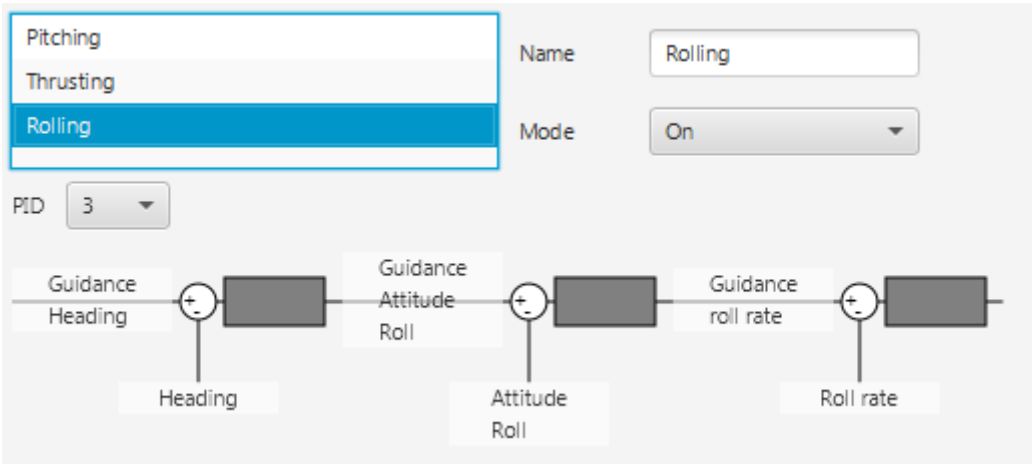


Figure 19: PID Diagram

For each block it is possible to configure the PID:

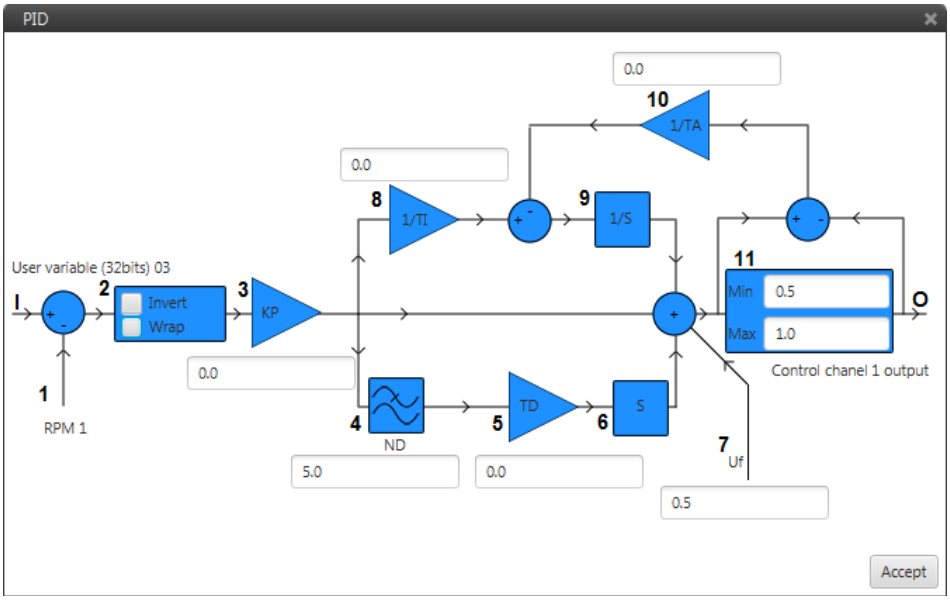


Figure 20: PID elements

Value	Description
I	Set Point
1	Measure
2	• **Invert:** Change error sign • **Wrap:** Wrap to pi [-π, π] It is used in some angular variables (radians) for avoiding numerical errors on the –π to π change and keep continuity of the error signal
3	Proportional gain
4	Discrete filter parameter
5	Derivative time parameter
6	Derivative
7	Constant value added to output
8	Inverse integral time parameter
9	Integral
10	Anti-windup parameter
11	Output bounds
O	Output

Output values for PID controller refer to virtual control channels, units must coincide with servo trim configuration settings.

PID diagram represents the following PID model:

$$C = K_p\left(1 + \frac{1}{T_i}IF(z) + \frac{T_d}{\frac{T_d}{N} + DF(z)}\right)$$

K_p=proportional gain

T_i=Integrator time

T_d=Derivative time

N=Derivative filter constant

For the derivation and integration models, Trapezoidal and Backward Euler models have been integrated:

$$IF(z) = \frac{T_8}{2}\frac{z+1}{z-1} \qquad ND(z) = \frac{T_8 z}{2z-1}$$

$ND = \frac{T_d}{\tau}$ where τ is the is the time constant on a first order FPB. When ND is set to 0, the FPB is disabled.

Sampling time has already been integrated: $K_i = \frac{K_p}{T_i}$.

Initial block permits to invert the input signal or apply a wrapper, it is used for angles to be maintained between $\pm\ 180º$.

On the output block it is possible to set the maximum and minimum values for the variable.

Fixed Settings

When fixed mode is selected the following diagram is displayed:

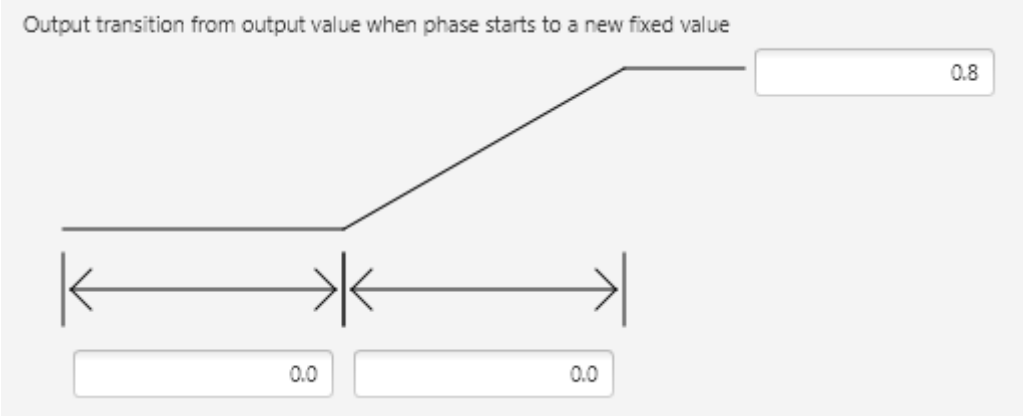


Figure 21: Fixed Value Settings

Three values must be entered, the remaining time in the starting conditions, the transition time and the variable final value.

4.2.5.3. Arcade Mode Settings

Arcade mode permits to have a simplified manual flight mode. The stick movements actuate directly over the control variables instead for a user friendly aircraft control.

Parameters are configured for each phase by setting values available when Show Arcade is selected.

Figure 22: Arcade Mode Settings

User can enter the affected control variables and the gain for each one. Select Integral for continuous variable value increase on joystick hold, or leave it unchecked for resetting the control variable value after joystick release.

4.2.6. Automation

Automation configuration permits to set actions to be performed under predefined detected events.

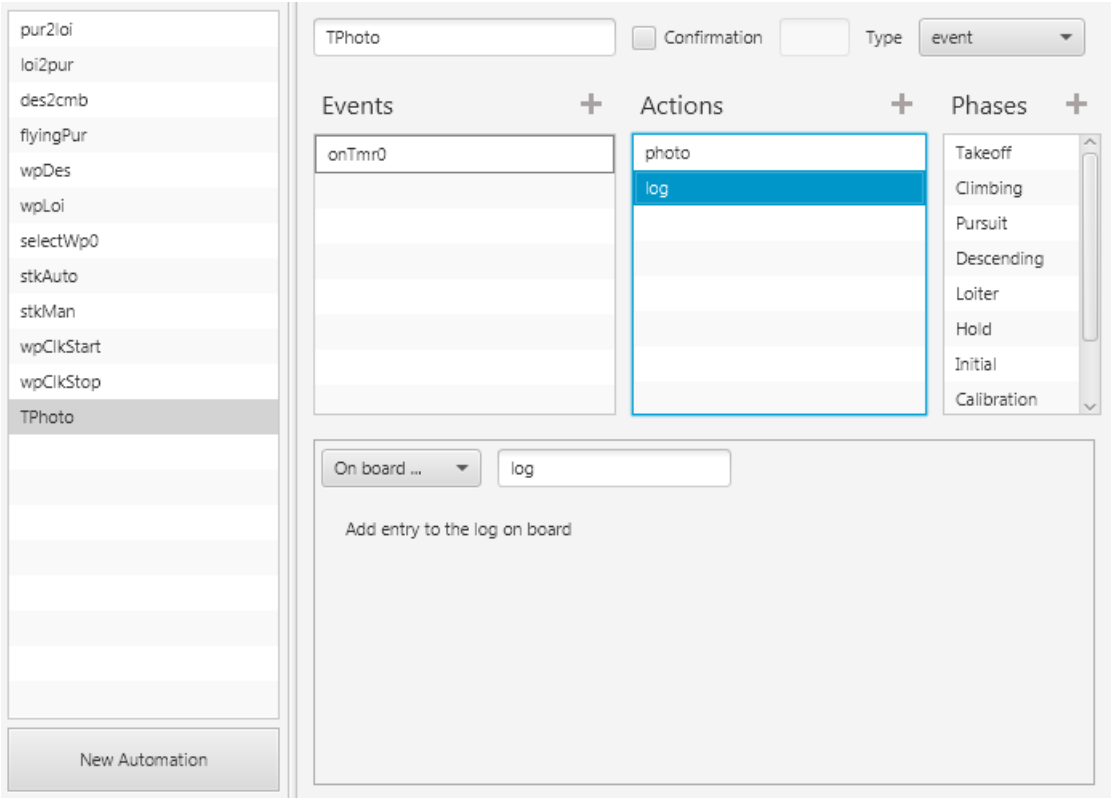


Figure 23: Automation Display

Automations are a combination of events and actions. All actions will be performed on event triggering. Each event on the list will individually activate the associated actions. Event groups permit to execute actions only once various events have been triggered.

When confirmation is active, a pop up window will be displayed before action takes place so user can cancel it. Type permits to select if once the event is triggered it remains as active (event) or if it is needed that all events take place at the same place to activate the action (condition).

Phases where automation is active must be entered for avoiding automations to take place on undesired phases.

Following actions are available:

Type	Description
Phase	Change flight phase.
Onboard log	Record onboard information.
Mode	Change flight mode.
Periodical	Configure timer for periodic actions. To be used as an periodic event.
Fly to	Select a waypoint to fly to.
Servo	Set a servo position to a predefined position for a given time.

Table 14: Automation Actions

Activation events are:

Type	Description
Waypoint	Execute actions on waypoint arrival.
Polygon	Execute actions when inside or outside a defined area.
Timer	Select a preconfigured timer.
Alarm	Select system fail detector.
Variable	Select a variable value.
Button	Configure a button to be displayed on Veronte panel.
Phase	Enter a phase.

Table 15: Automation Activation Events

4.2.7. Checklist

A checklist is configurable for each flight phase. This checklist will be displayed on the Veronte Panel and must be completed prior to exiting from a phase.

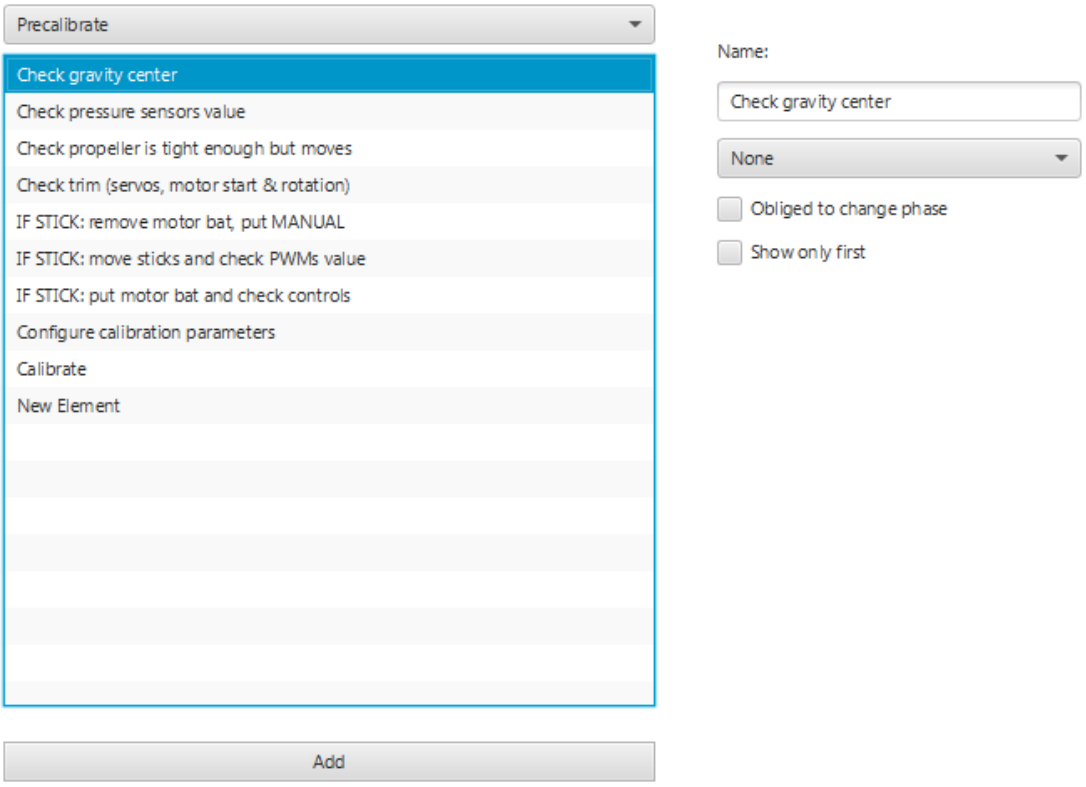


Figure 24: Checklist

Any custom test can be introduced to the checklist for performing customized checks, there are other system checks that can be included by selecting it form the combo box displayed. Main configurable items are described below:

Element	Description
Phase	Select the phase on which the checklist will be shown.
Name	Enter the checklist item name.
System checks	Select from the combo box preconfigured checklist elements.
Obliged to change phase	Select if required for phase change.
Show only first	Select for showing the checklist only once.

Table 16: Checklist Configuration

There are some preconfigured checklist items:

Element	Description
Atmosphere	Calibrate static pressure for altitude estimation (QNH)
Cparams	Enter sensor parameters for calibration
Calibrate	Start calibration (Required prior to Stand By)
Validate Mission	Check mission altitude
Asist GPS	Enter GPS position for quick GPS positioning
Test Servo	Test servos configured on stick
RTK	Enter control station GPS position for better RTK possitioning

4.2.8. HIL Simulator

Refer to the HIL Simulator manual in order to configure the HIL parameters.

5. TELEMETRY CONFIGURATION

Telemetry settings allow user to customize any information to be displayed on the screen for monitoring the operation. Custom workspaces can be created, set any workspace as default in order to open it automatically on system start.

Telemetry toolbar is shown below.

Figure 25: Telemetry Toolbar

	**Load**	Select the workspace to be displayed or create a new one.
	**Save**	For saving current telemetry configuration.
	**Lock**	Configured displays can be moved freely and resized along the screen. Press lock to avoid display free movement.
	**Details**	Displays any configurable fields.

Table 17: Telemetry Toolbar

When creating a new workspace, the following options are available:

Workspace	Description
Empty	Creates an empty workspace.
Clone	Creates a copy of an existing workspace and permits user to edit it.
Merge	Creates a new workspace by merging any existing workspace.

Table 18: Workspace Creation

The following display items are configurable:

- **Map:** Configure map display items and create extra pop-up maps.
- **Gauge:** Select the variable to be displayed and configure the appearance.
- **Cam:** Configure displayable information on cam.
- **PFD:** Configure Primary Flight Display preferences.
- **Stick:** Configure virtual sticks for manual control.

Each display it permits to select the Veronte unit information to be displayed. Choose “Selected” to display telemetry information from selected Veronte. To select one Veronte unit, click on it at “Veronte panel” or “side panel”.

5.1. Map Display

Map widget permits to configure the background map, select from the available list for setting the main window map.

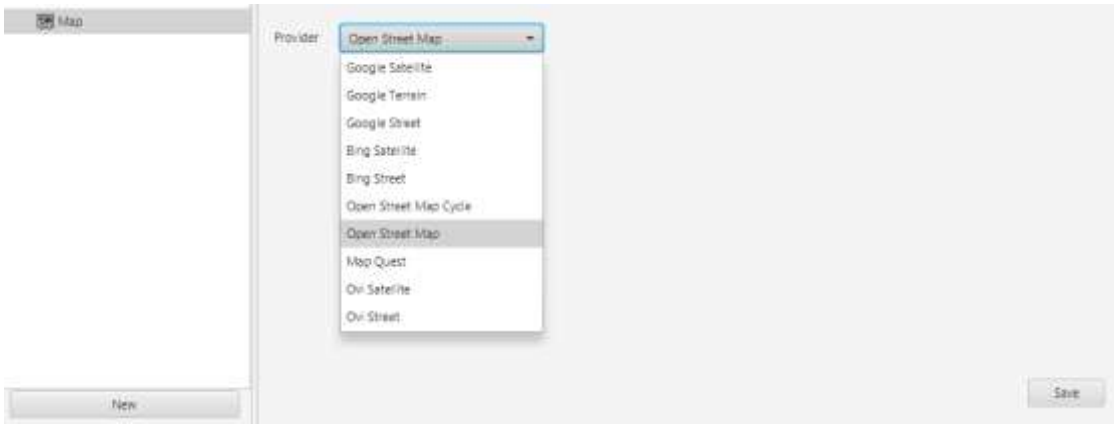


Figure 26: Map Settings

5.1.1. Custom Background Maps

Custom maps can be displayed in Veronte Pipe. It permits to include as many images as desired that will be displayed over the map.

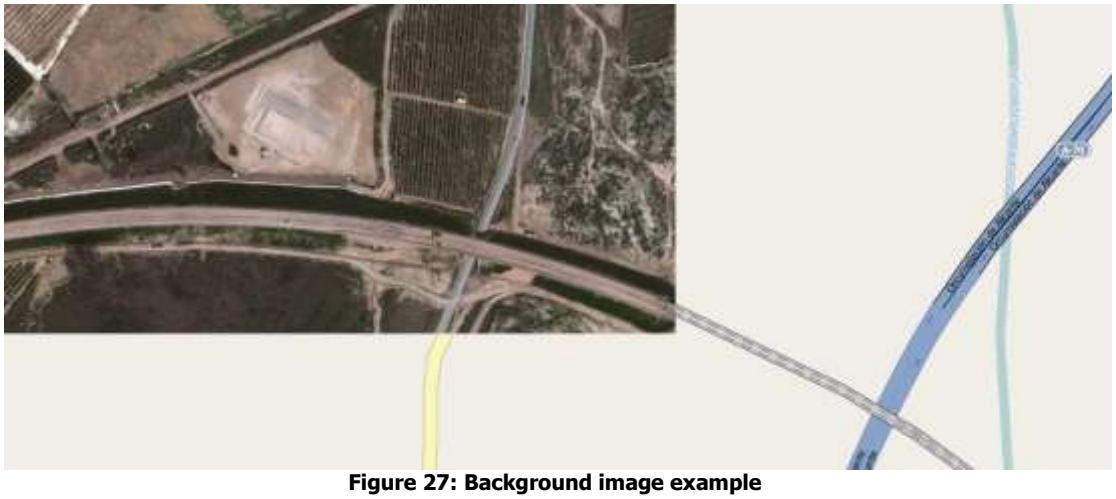


Figure 27: Background image example

In order to insert an image within the map, just drag the image and drop it on the map. A popup window will be displayed to position the image within the map. Click on save to go to the image manager where image coordinates can be entered manually.

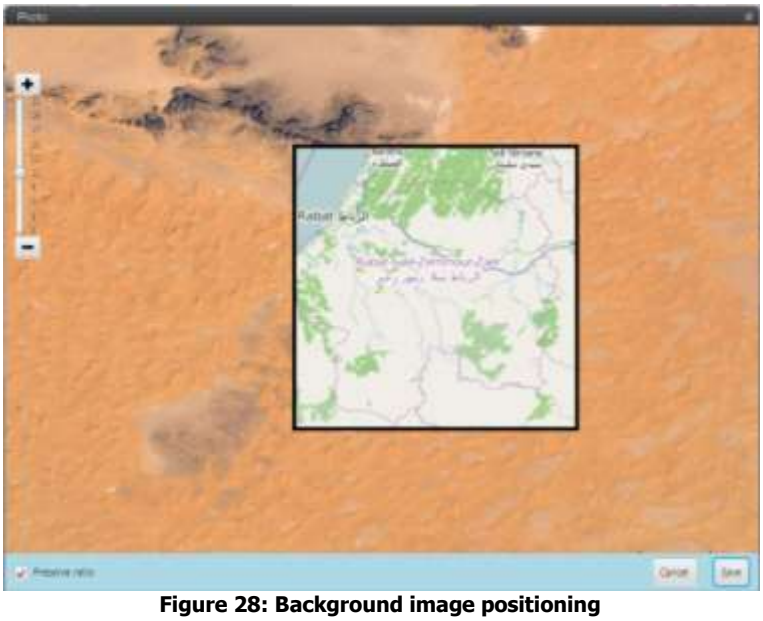


Figure 28: Background image positioning

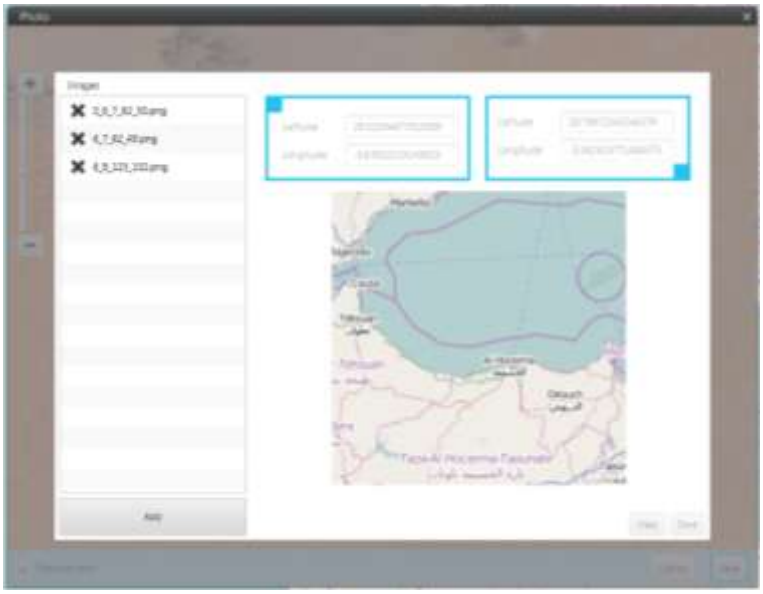


Figure 29: Background image manager

5.2. Gauge Display

Configure drag and drop displays for each telemetry variable and place it at any place on the screen.

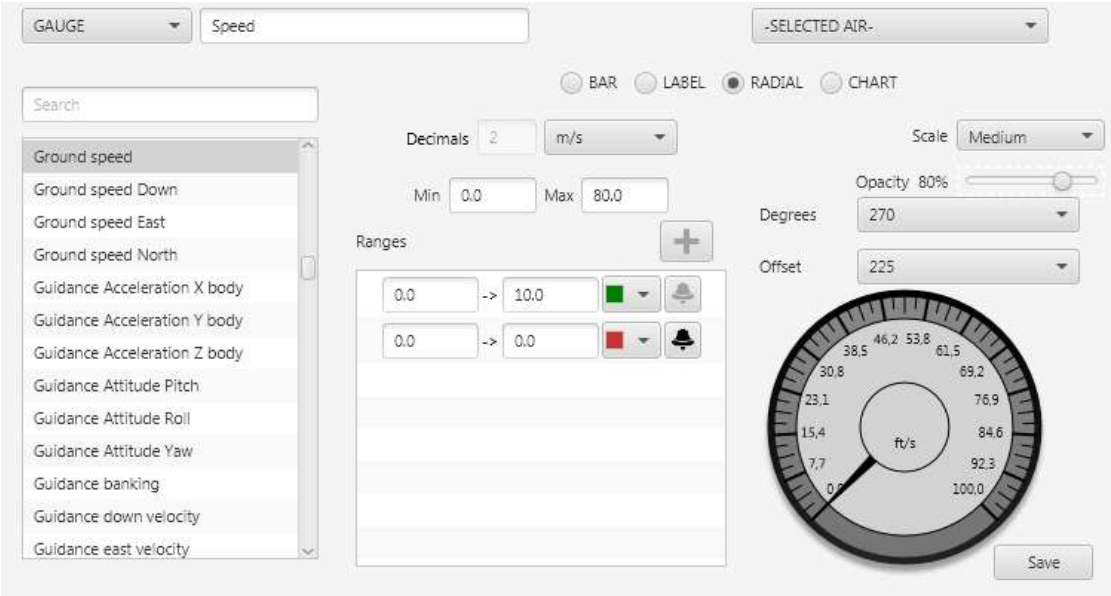
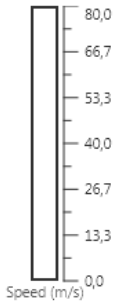
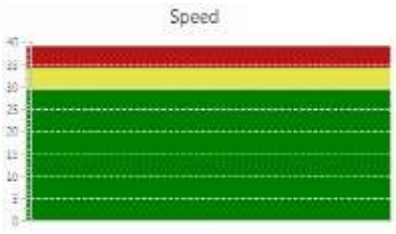


Figure 30: Gauge Configuration

In order to setup a gauge, select the variable to display from the available in the system and configure the display layout. Layout and colours are highly configurable, some gauge examples:

			
BAR	**LABEL**	**RADIAL**	**CHART**

5.3. Primary Flight Display

Primary flight display layout is highly configurable in colours and size. User can select the 2D and 3D visualization modes plus to display actuators and control channels.

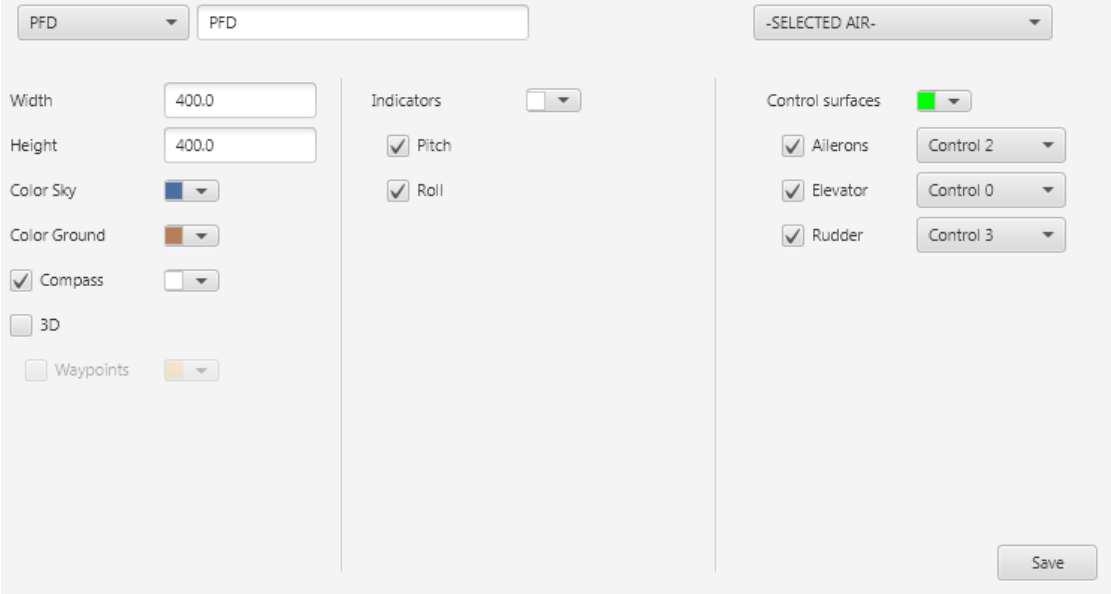
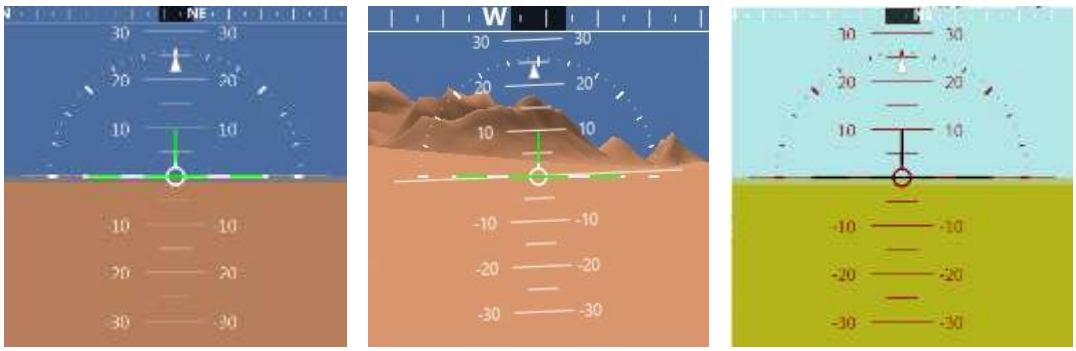


Figure 31:PFD Configuration

Some PFD display configurationas are shown as an example:



5.4. Stick

Virtual sticks can also be created for manually control the control channels from the computer. Following setup options are available:

Item	Description
Scale Value	Select the scale to show on the stick.
Stick Channel	Select the channel to control with the stick.
Return	When selected the stick automatically returns to middle position on stick release.

Table 19: Stick Configuration

Configuration panel and drag and drop stick are shown below:

Figure 32: Stick Configuration

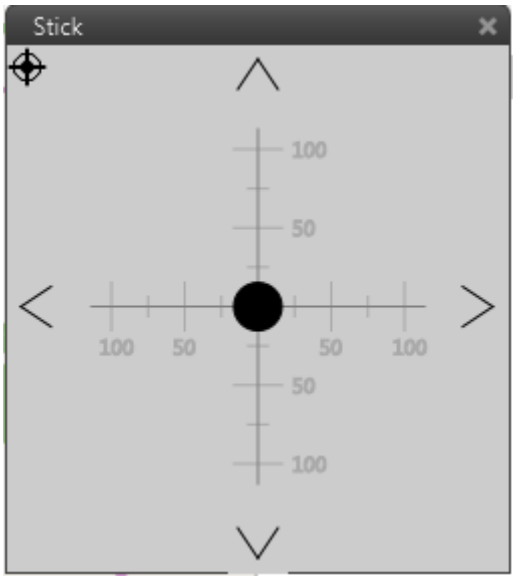


Figure 33: Stick Display

6. FLIGHT PLAN

For flight planning, the mission toolbar must be used:

Figure 34: Mission Toolbar

The main functions available are:

	Open	Open a mission to edit
	Load	Select mission to edit
	Close	Close loaded mission
	Discard	Discard changes
	Save	Save edited mission
	Save As	Save mission on disk or Veronte
	Sync	Save mission on change
	Select	Select a group of waypoints or targets.
	Add WP	Add new waypoint on click position.
	Polygon	Introduce number of polygon sides and draw it on the map.
	Link	Create and edit links among waypoints.
	Irregular Area	Draw irregular areas on the map for association with polygon events
	Regular Area	Draw regular areas on the map for association with polygon events
	Mapping	Draw a polygon for mapping applications.
	Ruler	Measure on map.

Table 20: Mission Toolbar

6.1. Waypoint Creation

Use the Add WP tool and press on the map for creating waypoints, then a display will appear for entering custom parameters:

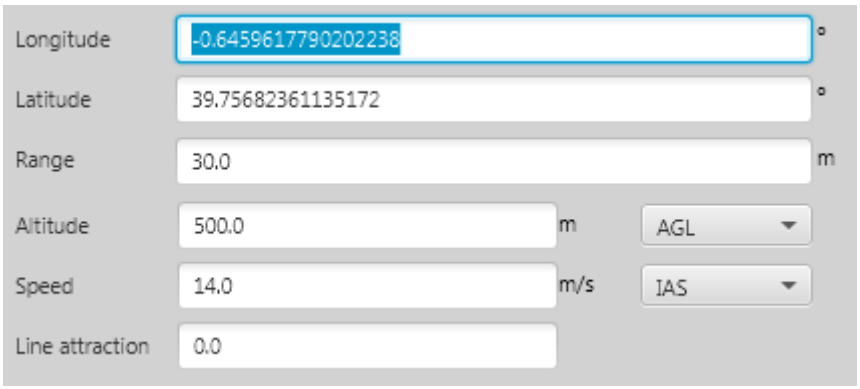


Figure 35: Waypoint Parameters

For moving waypoints, drag it to the desired position. For editing other parameters double-click will display editable fields.

For regular polygon drawing, select the polygon tool and enter the number of desired waypoints then click on the map for drawing:

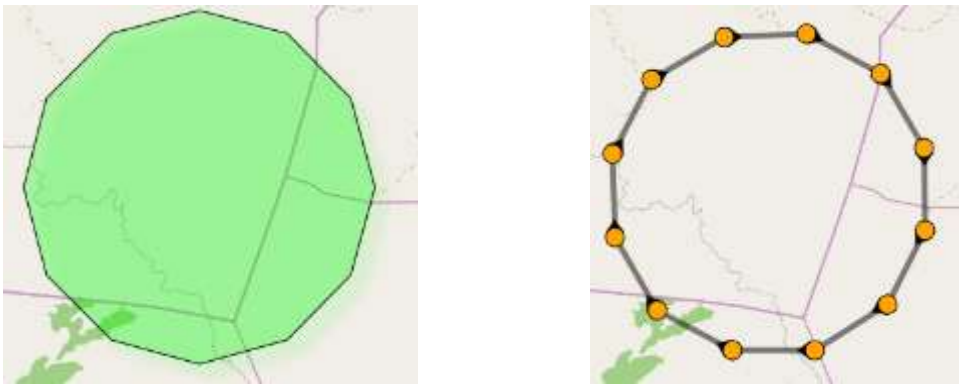


Figure 36: Polygon Creation

After the waypoints have been created, it can be joined creating the desired route with the link tool.

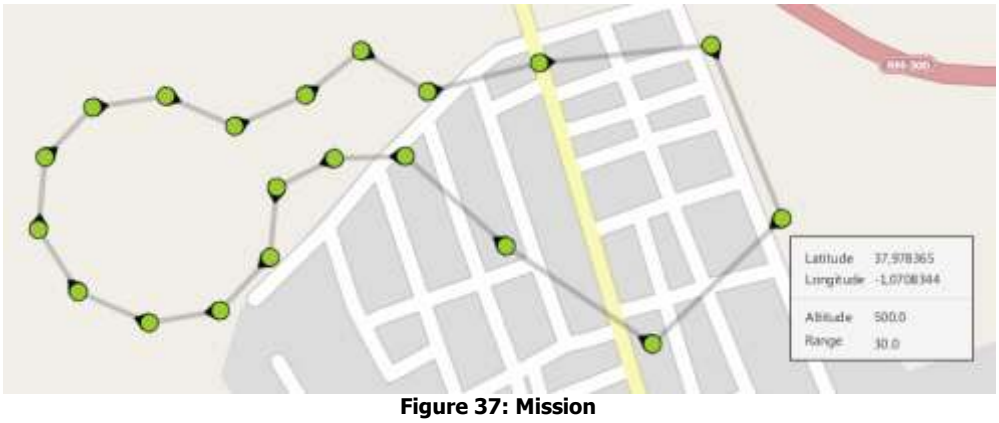


Figure 37: Mission

Each waypoint can have multiple entries but just one output.

6.2. Mapping Tool

Mapping tool permits to draw a polygon on the map and configure camera parameters in order to automatically generate a mapping mission. Select the mapping tool and a display will be shown in order to create a new mission or select one mapping mission already created.

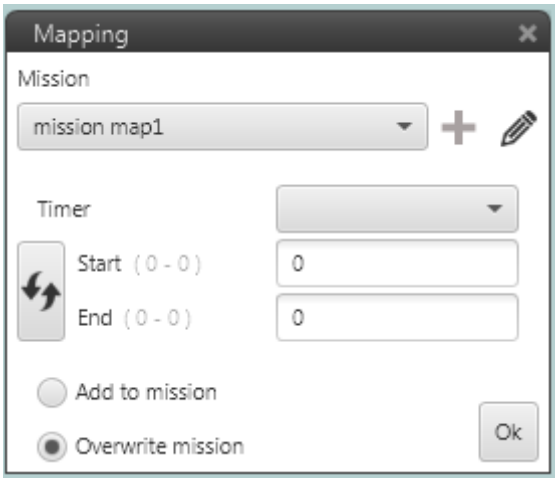


Figure 38: Mapping Mission 1

For creating a new mission, select the desired area for mapping:

Figure 39: Mapping Creation

Enter the requested parameters so the mission can automatically be generated:

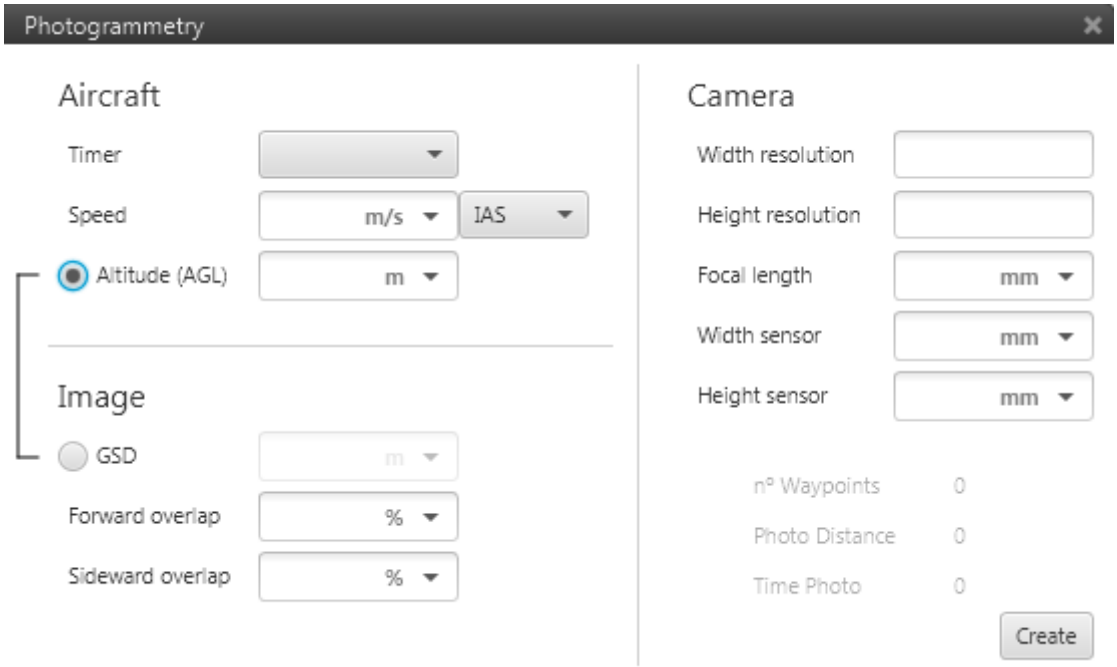


Figure 40: Mapping Parameters

Click on crate and the mission will be generated:

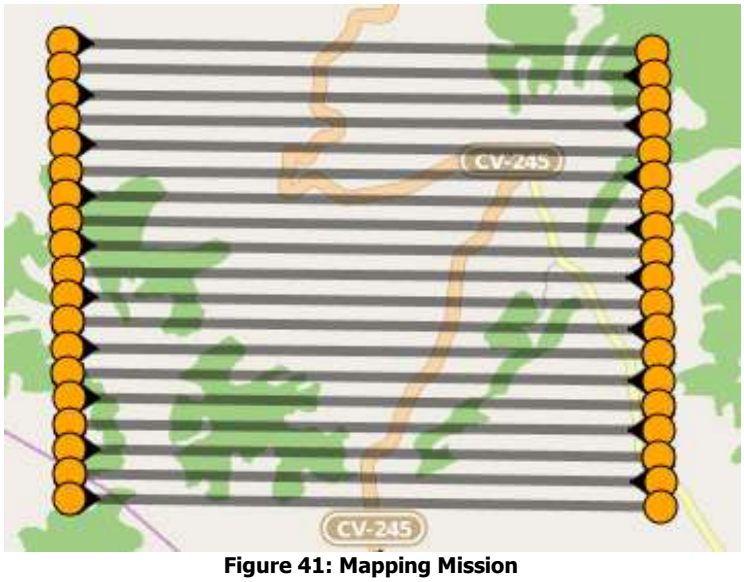


Figure 41: Mapping Mission

Once the mapping mission has been generated, the complete mission or the selected part can be included to the mission on Veronte. Select if the mission must be added to the existing mission (selected on the mission toolbar) or if it must be overwritten and press “Accept” to save it.

7. OPERATION

Once both Veronte units, the one on the control station and the one onboard, are configured and the mission has been loaded to the aircraft, the system is ready to start the mission. A list with linked Veronte units is displayed on the side panel. This display shows information and warnings.

Figure 42: Side Panel

Click on any Veronte to display its Veronte Panel; it permits to control any telecommand actions.

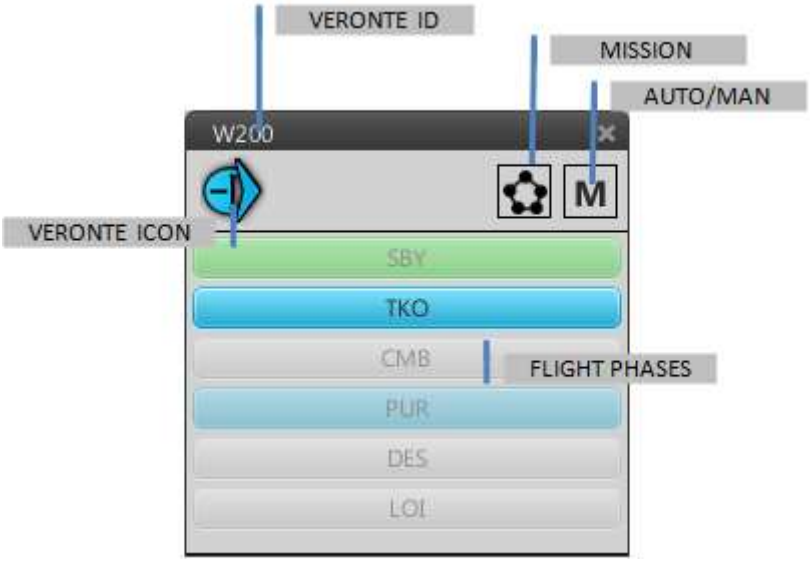


Figure 43: Veronte Panel

Current phase is marked in green, select one of the blue phases to change to phase manually. In order to change phases all required checklist elements must be completed. In order to enter a phase there are two options. By clicking on the phase name the system will enter on the phase with the preconfigured parameters, click on the settings button on the right for entering to the flight phase changing the phase parameters. The view icon enables the visualization of the phase on the screen.

Phase parameters can also be configured on the control tab on the setup menu. Dependencies between phases and automatic phase transitions are configured on the automations panel.

During the flight, the following actions can be performed:

- **Flight monitoring:** Flight data can be monitored on the control station using telemetry displays. Telemetry display configuration can be edited during the flight.
- **Edit mission:** Mission can be edited prior or during the flight.

- **Change phase:** Phases permit to set the vehicle configuration to an specific performance. Click on a phase to initiate this phase.
- **Activate manual mode:** By pressing the preconfigured joystick button or selecting manual in Veronte panel, it is possible to control the aircraft in manual mode. Once the manual mode is deactivated it will continue in automatic mode, continuing with preconfigured route.
- **Abort mission:** ´Go Home´ button can be configured to appear in the Veronte panel. It can be configured on the automations panel.

8. Log

Log toolbar shows recorded events and permits to introduce custom events to be saved. Introduce event information and press enter to record it on the log.

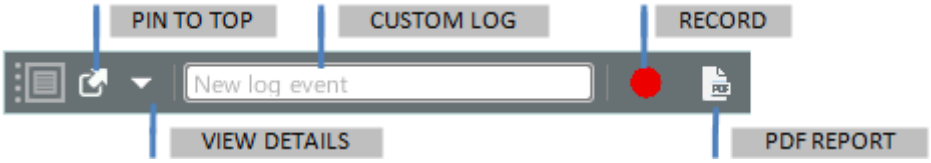


Figure 44: Log Toolbar

Record button permits to stop capturing log information. By clicking on REC, a new log saving will start.

It is possible to generate a PDF reports containing saved log information. Click on the "Report" icon and enter requested information to generate the report.

Figure 45: Report Information

9. POST-FLIGHT

Once the mission is finished, the operator can download telemetry data from Veronte to perform a virtual tour. Use the post flight toolbar:

Figure 46: Post Flight Toolbar

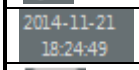
	**Play / Pause**	Manage tour play.
	**Time**	Control the time progress.
	**Speed**	To speed up the tour.
	**Export**	Download Veronte files and export data

Table 21: Post Flight Toolbar

9.1. Data export

Flight data stored in Veronte Pipe is saved at a low frequency, in order to improve the tour accuracy it is possible to download the information on the autopilot by using the download button. This panel permits also to erase data from both Veronte Autopilot and the system.

Select the Veronte unit for data downloading and choose the flight files to be download. Right panel will show file download progress.

9.2. Tour

Flight data can be played on Veronte Pipe permitting to display all available flightinformation as done during the flgith.

In order to play a tour, select the date and mark the Veronte Autopilot information to be played, flight data available will be shown on the timeline.