1x PDI Tuning

Release 6.12.60

Embention

2024-06-14

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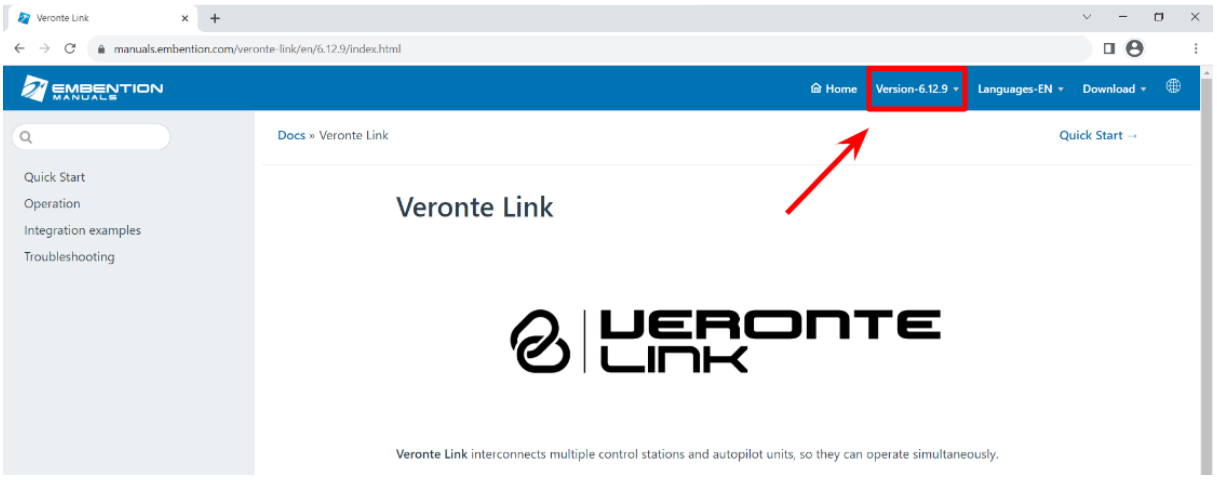
1x PDI Tuning allows to adjust Veronte Autopilot 1x control laws during actual flight.

Warning: Select your version before reading any user manual for software. The following image shows where to select a version from any Embention user manual.



CHAPTER

ONE

QUICK START

1x PDI Tuning is the application tool that allows the user to manage the control laws of the Autopilot 1x during operation by adjusting each of the P (proportional) I (integral) D (derivative) gains.

Once Autopilot 1x has been detected on Veronte Link, install **1x PDI Tuning**.

1.1 System Requirements

Before executing this software, users should check the following sections with the minimum and recommended PC hardware requirements.

Minimum requirements

- CPU: Intel Core i5-8365UE
- RAM: 8 GB DDR4
- STO: 256 GB SSD

Recommended requirements

- CPU: 12th Gen Intel(R) Core(TM) i7-12700H 14 cores up to 4,70 GHz
- RAM: 32,0 GB
- STO: 1TB SSD M.2 NVMe PCIe

1.2 Download

Once the **Veronte Autopilot 1x** has been purchased, a GitHub release should be created for the customer with the application.

To access to the release and download the software, read the Releases section of the **Joint Collaboration Framework** manual.

1.3 Installation

To install **1x PDI Tuning** on Windows just execute "1xVerontePDITuning.exe" and follow the indications of the *Setup Wizard*.

Warning: If users have any problems with the installation, please disable the antivirus and the Windows firewall. Disabling the antivirus depends on the antivirus software.

To disable the firewall, go to "Control Panel" → "System and Security" → "Windows Defender Firewall" and then, click on "Turn windows Defender Firewall on or off".

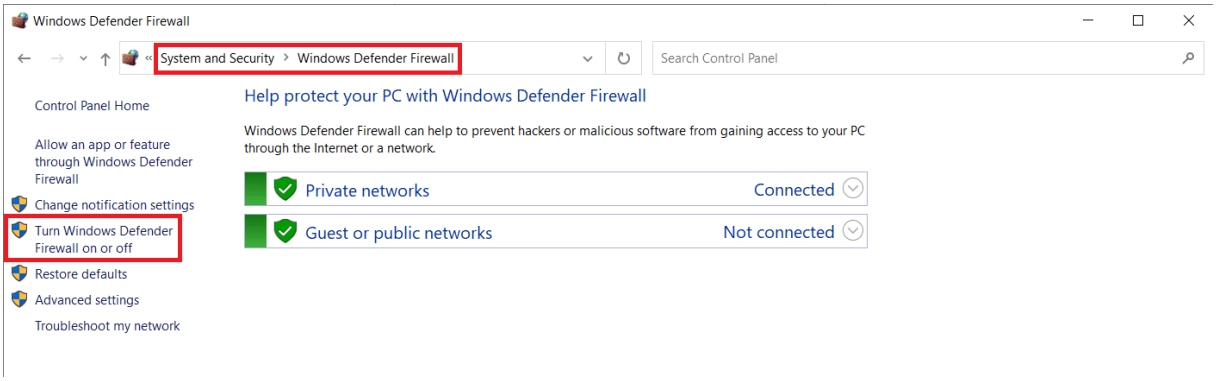


Fig. 1: **Windows Defender Firewall**

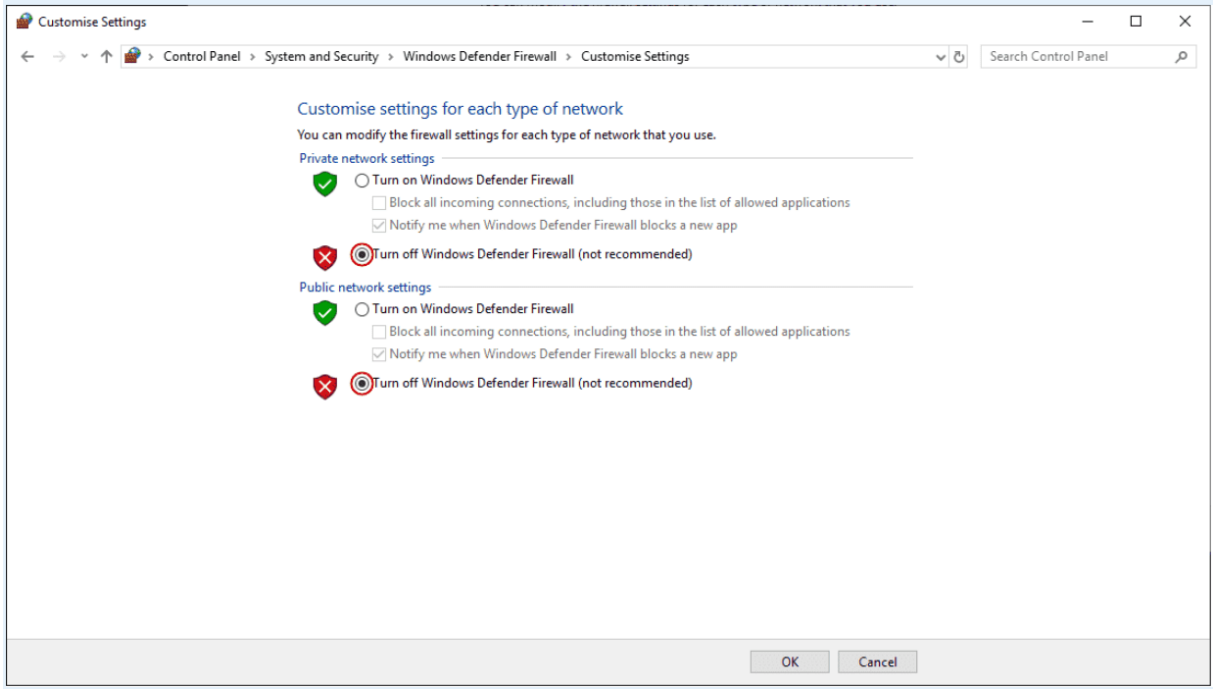


Fig. 2: **Windows Defender Firewall: Customize Settings**

CHAPTER

TWO

OPERATION

Once the installation is finished, open **1x PDI Tuning** and select the unit.

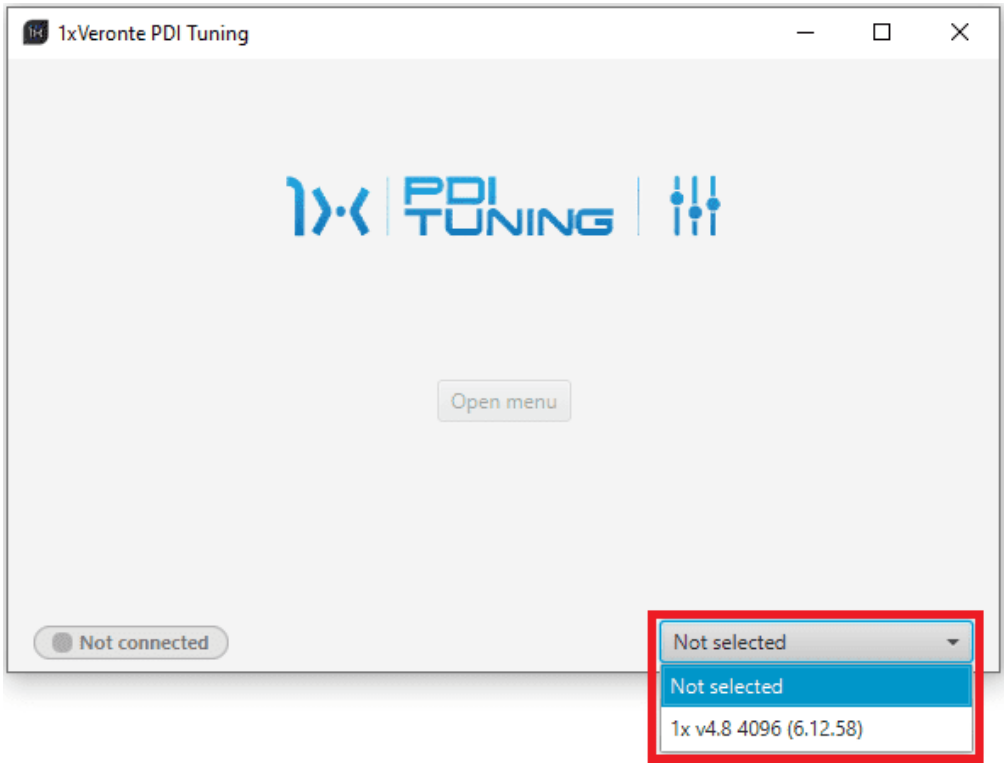


Fig. 1: **Select device**

Warning: If no unit is connected, e.g. when working offline, it is not possible to access the menus of the **1x PDI Tuning** software.

Fig. 2: **1x PDI Tuning - Device not connected**

If it is correctly connected, it should appear in **Normal mode** as shown in the following figure.

Fig. 3: **1x PDI Tuning**

Note:

- 1x unit can also appear as: Maintenance mode, Maintenance mode (loaded with errors) or Normal mode - Disconnected.
- **Maintenance mode (loaded with errors)** appears when something is wrong in the configuration.

The user can now access the software by clicking on '**Open menu**'. Then, the following window will be displayed:

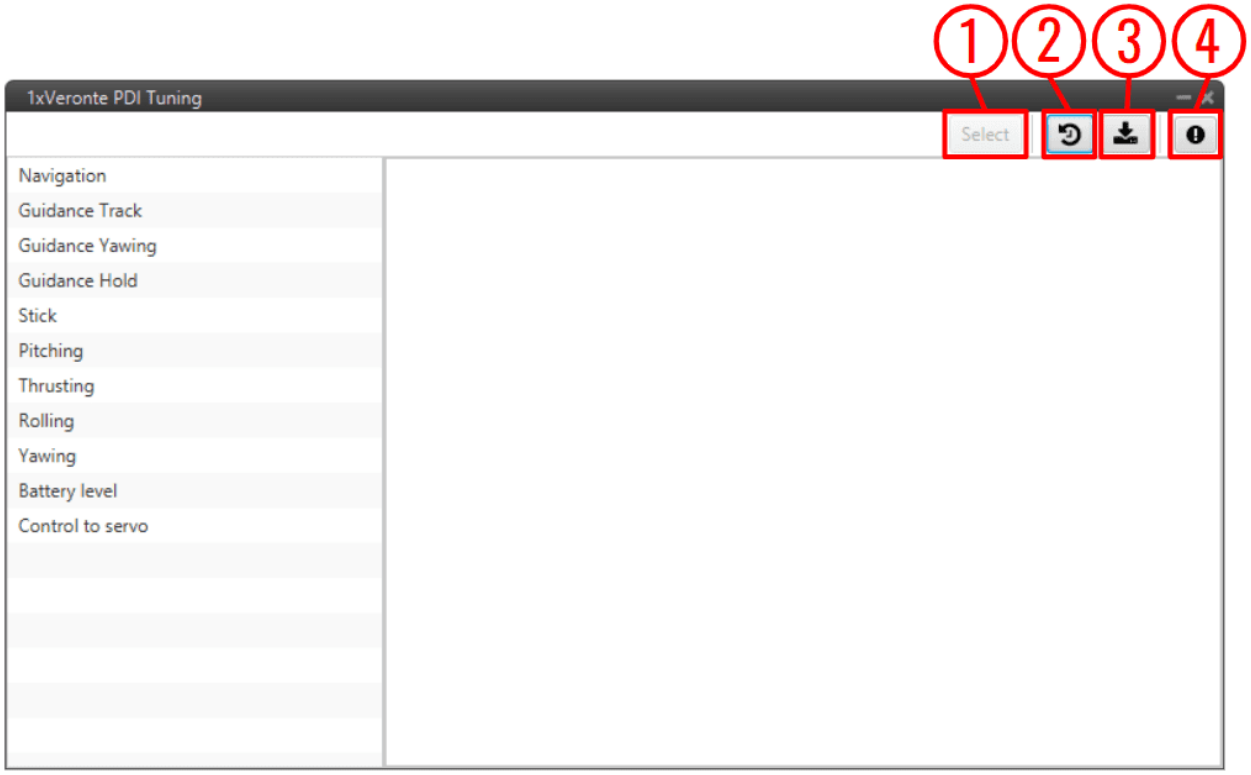


Fig. 4: **Initial menu**

1. **Select** button: After choosing the **PID block** to be 'tunned', click here to adjust its gains.

   The tuning procedure is detailed in the *Tuning - Operation* section of this manual.

   Note: If **no PID block** has been **chosen**, this **button** remains **disabled**.

2. **Access command history** button: This displays a panel where users can consult a history of the gains that have been commanded during the tuning procedure.

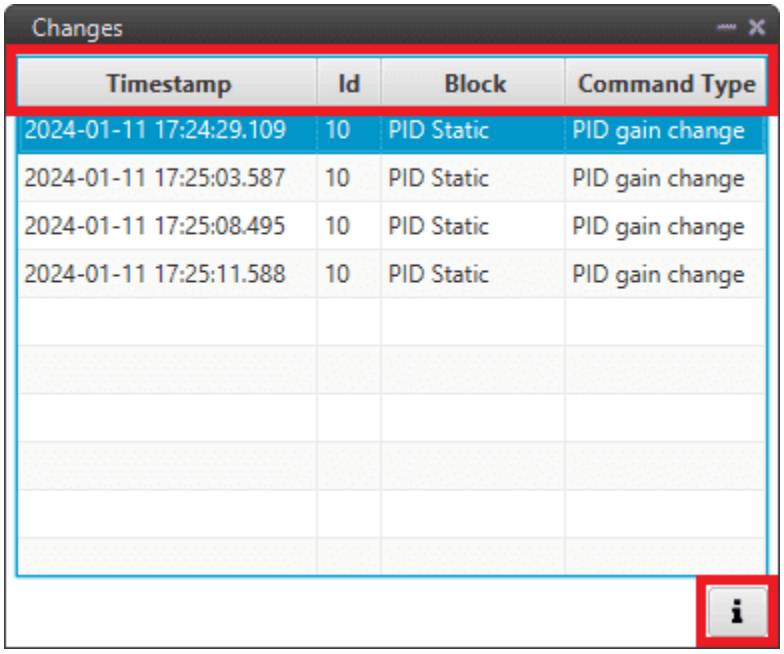


Fig. 5: **History panel**

To make it easier and quicker for the user to identify each record, the history has 4 columns.

Each column gives the following information:

- **Timestamp**: Indicates the day and the time the change was made.
- **Id**: This is the indentifier of the block.
- **Block**: The type of the PDI block, it can be PID Static or Tsched PID.
- **Command Type**: The type of command sent to the Autopilot 1x → **PID gain change**. For more information on this command, see *Tuning - Operation* section of this manual.

To access the gains commanded in the register, just **double click** on the register or **select it and then click** on the ℹ icon.

3. **Export configuration** button: By clicking on it, the current *Blocks configuration* saved in the Veronte Autopilot 1x will be stored in the selected folder.

Fig. 6: **Exported configuration - PDI file**

4. **Feedback** button: Users can report a problem they have encountered by **creating an issue in their own 'Joint Collaboration Framework'**. The '**Download**' button downloads a zipped folder with the current 1x

configuration and more information needed for Embention to resolve the issue. It is advisable to attach this folder when creating the issue.

Note: The user's '**Joint Collaboration Framework**' is simply a **own Github repository for each customer**.

If the user has any questions about this Joint Collaboration Framework, please see Joint Collaboration Framework user manual or contact sales@embention.com.

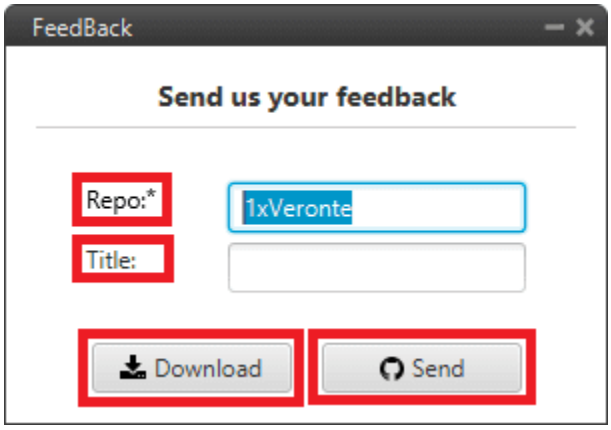


Fig. 7: **Feedback**

2.1 Tuning

All Block Programs created in **1x PDI Builder** are displayed here.

Fig. 8: **Block Programs**

The following steps describe how to tune the gains of PID blocks:

> **Warning:** All **changes** applied are **volatile** and will be lost after resetting the system.
>
> Once the desired values are found, it is recommended to note them on a piece of paper and then modify the block configuration in the **1x PDI Builder** software.

1. Select the program where the PID block to be tuned is located.

   When the user selects it, a tree is displayed with all the blocks of that program. This tree represents how these blocks are organized in the program.

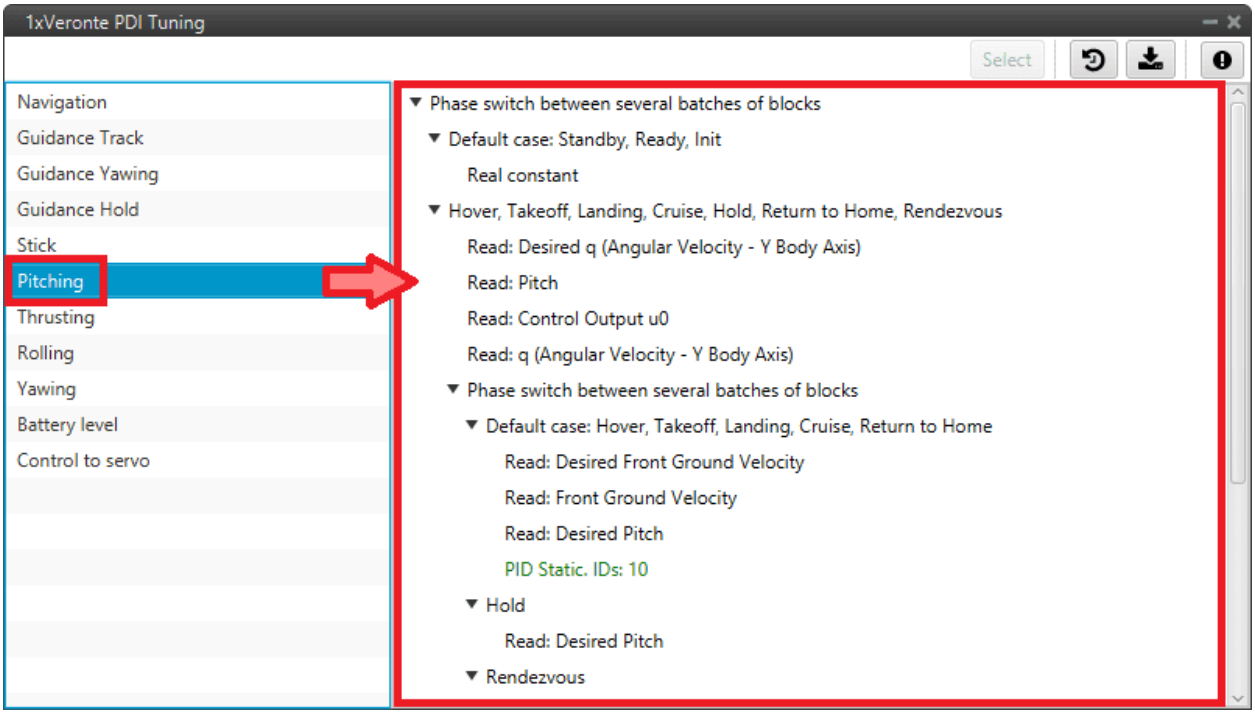


Fig. 9: **Program selected - Block tree**

2. Choose a valid PID block (PID Static or Tsched PID) from the tree (they are shown in green).

   To do this, click on the **PID block** and then click on the '**Select**' button at the top of the menu:

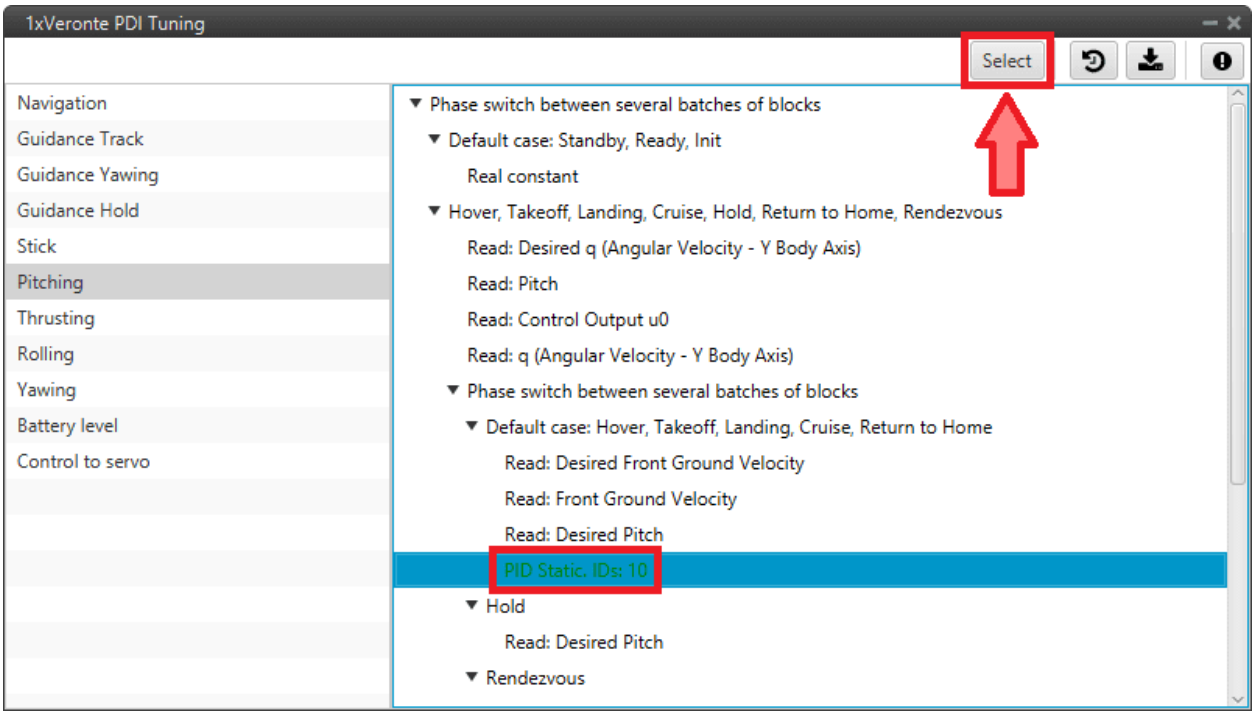


Fig. 10: **PID block selected**

Important:

- Only those PID blocks that have been **enabled to be commanded**, in the **1x PDI Builder** software, will appear as **valid PID blocks** in this tree.

  A PID block is enabled to be commanded if the 'wifi icon' of the block is activated.

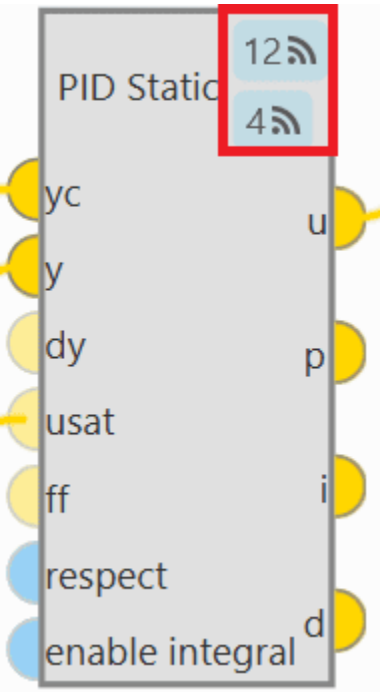


Fig. 11: **PID block enable**

The first icon is for enabling 'Command PID' and the second is for the 'Autotune' command.

For more information about this, see the Control blocks - Block Programs section of the **1x PDI Builder** user manual.

Warning: Be careful when **selecting the PID block**. To make sure it is the **correct block**, the user should not rely on the order in which the blocks are in the tree, but always check the **ID** of the block.

3. Then, the following window will appear:

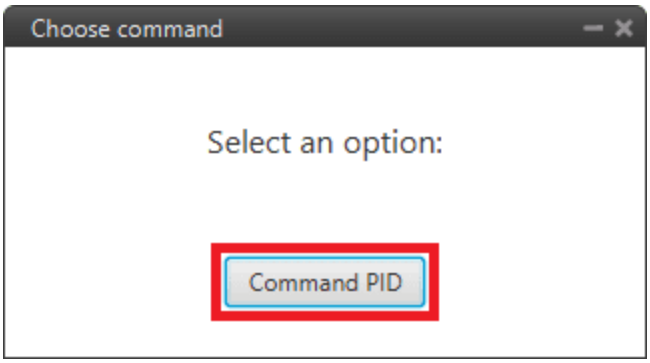


Fig. 12: **Tuning options**

Command PID: In this panel users can **manually entering** the values of the **PID gains** and the **type** (standard or parallel). Depending on the **PID block** selected, this panel is different:

- **PID Static** block:

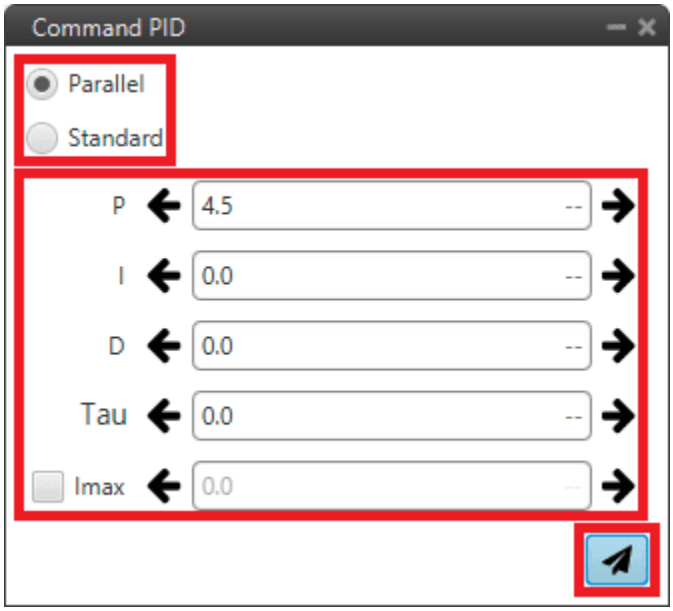


Fig. 13: **Command PID panel - PID Static block**

  - **Type**: Parallel or Standard type can be selected.
  - Users can increase or decrease each of the **P/I/D**, **Tau** or **Imax** gains.

- **Tsched PID** block: As in the Tsched PID block configuration the gains are adjusted for each of the values in the table, this panel also reflects this table with the values so that the gains can be adjusted for each of them:

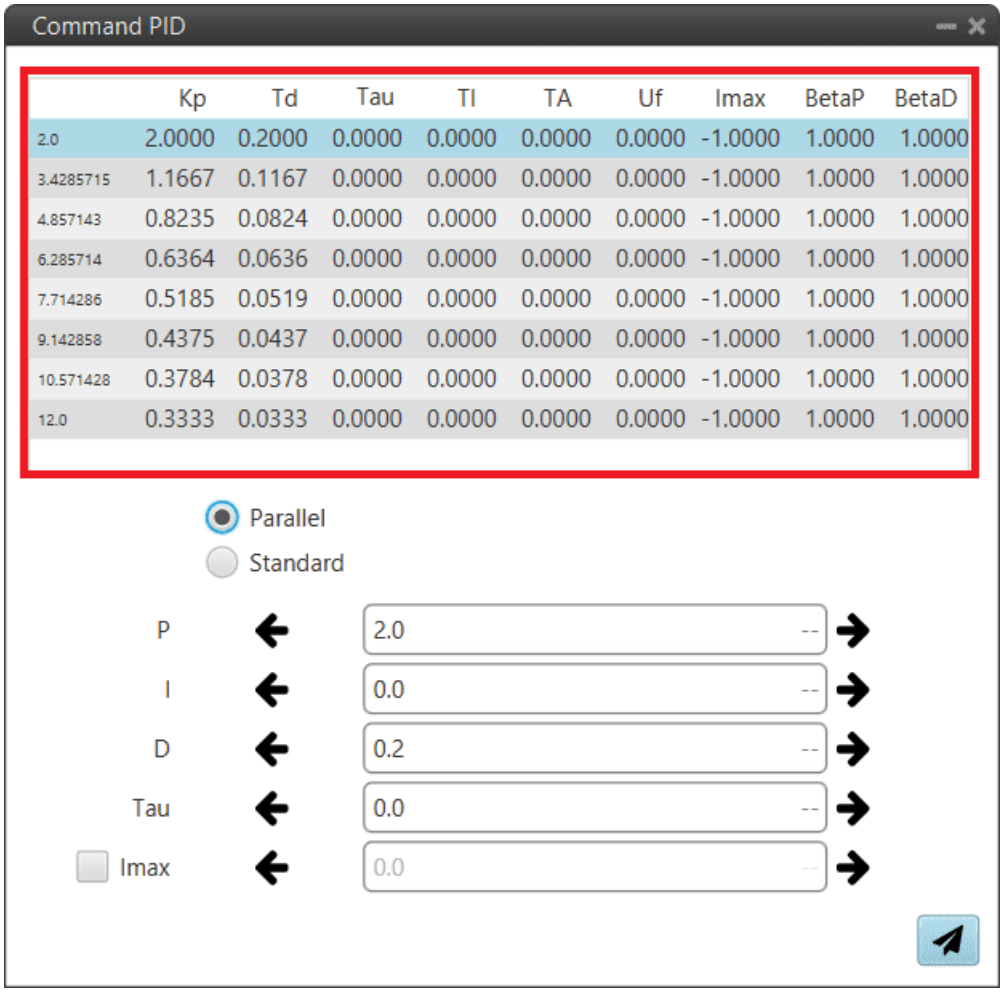


Fig. 14: **Command PID panel - Tsched PID block**

For more information on these parameters, please refer to PID - Control blocks of the **Block Programs** section of the **1x PDI Builder** user manual.

4. Finally, after making the modifications, press the **send** button to update Autopilot 1x with the new values.

   In addition, if the values are sent correctly, the following message will appear:

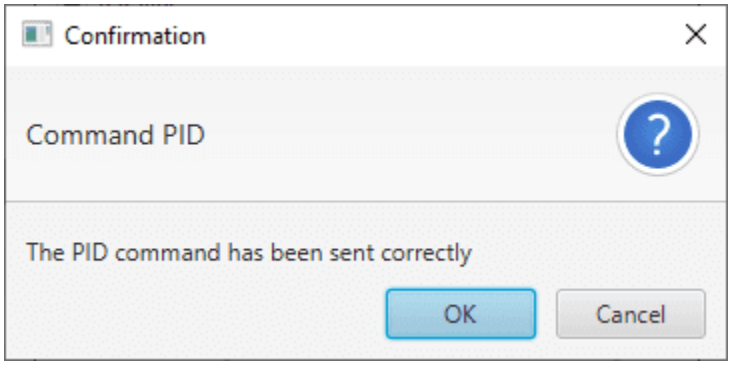


Fig. 15: **Command PID message**

CHAPTER

THREE

SOFTWARE CHANGELOG

This section presents the changes between the previous software version (**v.6.12.54**) and the current one (**v.6.12.60**).

Improved

- Compatibility with **Autopilots 1x** that include an internal **Remote ID**.