

ServoSettings

Introduction

During the installation of a Pronto4 on various systems, it is often desirable to change the orientation or range of the servo motor motion to make the system more closely match the desired ranges of the vehicle. Additionally, the response of the PID that is used to drive the servos can be optimized to achieve the best performance possible.

Kairos has developed an application named ServoSettings that can modify servo settings and read motor operational parameters in real time. This program operates on a single motor over the selected USB serial port.

ServoSettings supports:

- Setting limits of motions
 - Start Position
 - End Position
- Reversing motor travel direction
- Changing PID parameters
 - Proportional
 - Integral
 - Derivative
- Continuously reading motor parameters
 - Position
 - Relative Motor Current

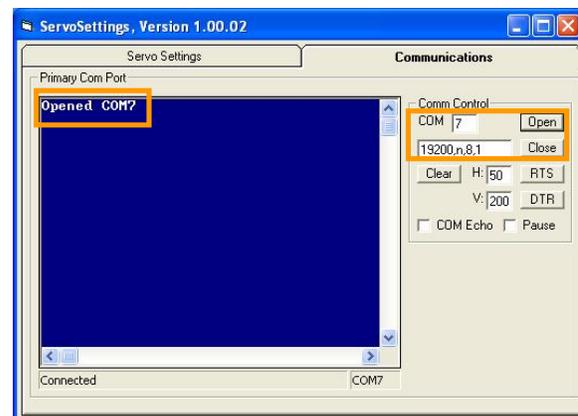
Setting Limits of Motion (i.e., Set Points) and Motor Travel Direction

Motor Modules are primarily controlled by pulse-width modulation (PWM) signaling. There is a mapping between PWM pulse and rotational position. The following procedure documents how to set the direction of rotation and the beginning and end of rotation when related to PWM pulse width.

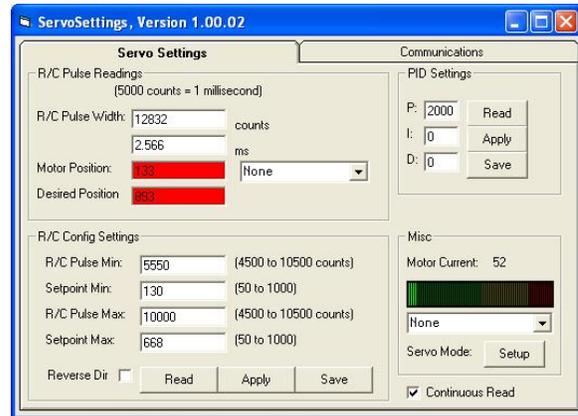
Note that these positions are set at the Kairos factory and should not be changed unless absolutely necessary. Any replacement motors or motor changes will probably not be set to the changed values. Change of motor rotation direction is common and performed based on stated customer needs.

Setting Limits of Motion and Motor Travel Direction Procedure

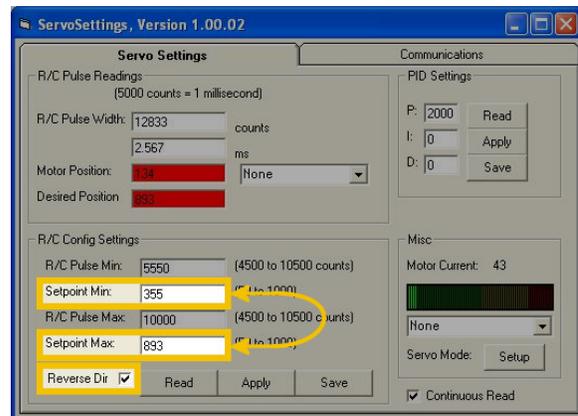
1. On the “Communications” tab, ensure the COM port of the servo to be modified is opened. The desired communications port can be found in the Windows hardware manager.



2. On the “Servo Settings” tab, review the current settings.
3. Edit settings *as appropriate*.
 - To read the live parameters of the Servo, click “Read” or ensure there is a checkmark in the “Continuous Read” check box.



- To reverse the rotation direction, ensure there is a checkmark in the “Reverse Dir” box.
- Start and end points are adjusted based upon direction of travel.
- Note that the “Setpoint Min” and “Setpoint Max” positions are changed by the program when reversing the direction of travel. This is done with a subtraction from 1023 to ensure that only the direction of rotation changes, while the end points remain the same.



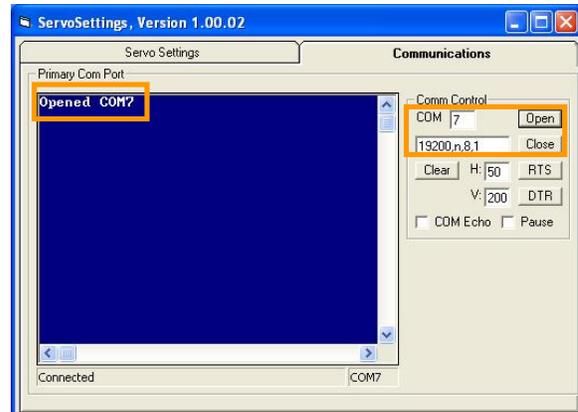
4. To temporarily validate the revised settings, click the “Apply” button and verify the changes. Changes are NOT saved.
5. To save revised settings, click the “Save” button.

Changing PID Parameters

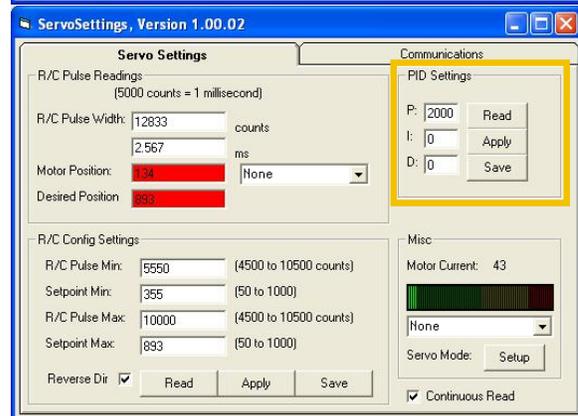
Motor Modules use a PID approach to achieve and hold the desired position. These parameters are factory set for usage by the majority of vehicles. Under rare circumstances, or for performance tuning, it may be desirable to change these parameters to achieve different PID results.

Changing PID Parameter Procedures

1. On the “Communications” tab, ensure the COM port of the servo to be modified is opened. The desired communications port can be found in the Windows hardware manager.



2. On the “Servo Settings” tab, review the current settings.
3. Edit settings as appropriate.
 - a. Locate the PID settings frame and READ the current values.
 - b. Change the PID settings one at a time starting with P, observe the results.
 - c. Change D, observe the results.
 - d. Change I, observe the results.
 - Note that most changes will be with the Proportional (P) term, which increases or decreases aggressiveness of motion. The Derivative (D) term helps with over/undershoot and oscillation. The Integration (I) term is for long term steady state error which in most cases will always be zero.
 - There are many tutorials available on the web for reference to assist in PID tuning procedures.

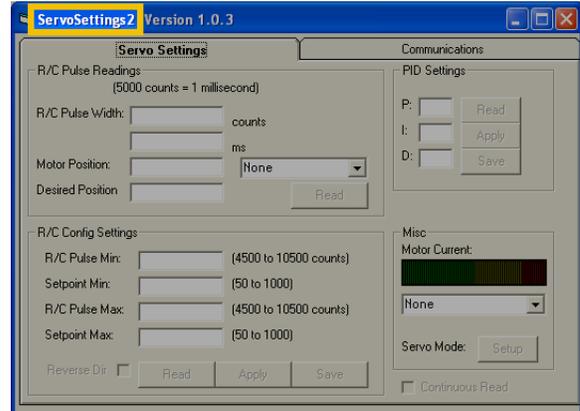


4. To temporarily validate the revised settings, click the “Apply” button and verify the changes. Changes are NOT saved.
5. To save revised settings, click the “Save” button.

Multiple ServoSettings Instances

Multiple instances of the ServoSettings application may be opened simultaneously. This allows data from multiple servos to be viewed and commanded simultaneously.

Multiple ServoSettings instances can be opened either through djBasis or Windows Explorer. To open a new instance through djBasis, on the “Executable Manager” tab, in the main table, click an existing djServoSettings.exe entry or select C:\GC07\djServoSettings.exe from the drop-down, then click the “Execute” button. To open a new instance through Windows Explorer, navigate to then double-click on d:\GC07\djServoSettings.exe.



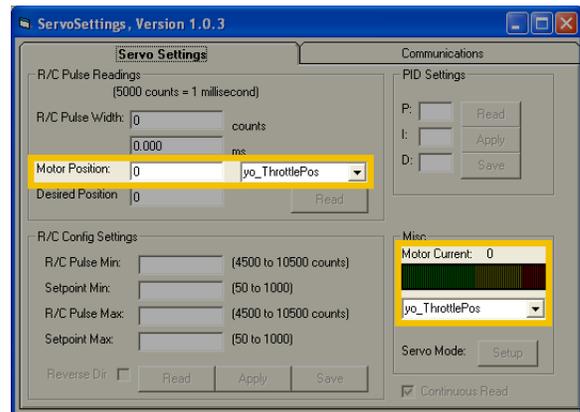
The first ServoSettings window’s title will be “ServoSettings, Version ...”. Subsequent windows will have an incremented title, starting with the number 2 (e.g., the second window opened will have the title “ServoSettings2, Version ...”). Up to 20 instances may be opened, but typically, no more than 4 are needed or recommended.

Each ServoSettings instance has its own INI file for settings, thus, when a window is closed its settings are saved. Upon subsequent instantiation, if there is an existing INI file for that window’s instance it will be opened with the saved settings (e.g., if four instances were previously used, then “ServoSettings” will be opened first, then “ServoSettings2”, “ServoSettings3”, and “ServoSettings4”).

SharedVariables

The ServoSettings application may display present servo values. Sometimes it is also desirable to have the corresponding SharedVariable updated to the present position and electrical current of an observed servo. This can be done via drop-down fields in the “R/C Pulse Readings” and “Misc” areas.

If actively reading servo values that should NOT be sent as shared variables, ensure the drop-down is set to “None”.



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