

SILENTSYS

ultralow noise systems

USER GUIDE



HIGH SPEED SERVO CONTROLLER PID-01



SILENTSYS SAS
10 rue Xavier Bichat
72000, Le Mans
FRANCE



support@silentsys.com

www.silentsys.com



I. INTRODUCTION

The PID-01 is a High-Speed Servo Controller. It is a product developed by SILENTSYS SAS to offer the best performances in term of voltage noise. PID-01 is digitally controlled using an integrated touchscreen and provides Proportional, simple Integrator and double Integrator functions. It features ultralow noise, more than 200 dB open-loop gain, and a bandwidth of >30 MHz.

The electronic architecture was made to reach ultralow noise while keeping a high efficiency. The electronic circuit is integrated in a modern designed aluminum enclosure with standard connectors for an easy use.

The PID-01 module works with the provided AC/DC switching power supply of 9 VDC and disposes of a 4 mm grounding hole for a banana connector if needed.

IMPORTANT: Read the operating instructions carefully and especially observe the safety information. If you do not follow the safety instructions and information on proper handling in this manual, we assume no liability for any resulting personal injury or damage to property. Such cases will invalidate the warranty/guarantee.

II. DELIVERY CONTENT

The PID-01 is delivered with a case for easy transportation and protection. Inside the case, you will find:

- PID-01 high speed servo controller
- AC/DC switching power supply – XP-POWER ACM36US09
- User Guide (this document)
- Data Report

IMPORTANT: For up-to-date Operating Instructions, please contact us directly (see contact information at the end of this document).



III. SAFETY INSTRUCTIONS

- Consult an expert when in doubt about operation, safety or connection of the device.
- Maintenance, modifications and repairs are to be performed exclusively by SILENTSYS SAS.
- If you are not sure about the correct connection or use, or if questions arise which are not covered by these operating instructions, please do not hesitate to contact our technical support or another qualified specialist.
- The device is not a toy. Keep it out of the reach of children and pets.
- Protect the product from extreme temperatures, direct sunlight, strong jolts, high humidity, moisture, flammable gases, vapors and solvents.
- Do not place the product under any mechanical stress.
- If it is no longer possible to operate the product safely, take it out of operation and protect it from any accidental use. Safe operation can no longer be guaranteed if the product:
 - is visibly damaged,
 - is no longer working properly,
 - has been stored for extended periods in poor ambient conditions or
 - has been subjected to any serious transport-related stresses.
- Also observe the safety and operating instructions of any other devices which are connected to the product.
- Never open the device or insert objects into it through its holes. Such cases will void the warranty/guarantee.
- Always lay the cables so that nobody can trip over or become entangled in them. This poses a risk of injury.
- Check the product for damage(s) each time before use. If you discover any damages, do not use the product.
- Do not operate the product in interior places or rooms with unfavorable ambient conditions. This can damage the sensitive electronics found inside the product and can potentially pose life-threatening risks. Poor ambient conditions are:
 - High humidity (>80 % relative, condensation)
 - Humidity, dust, flammable gases, solvent vapors, benzine
 - Electromagnetic fields (motors, transformers, audio systems for model building etc.) or electrostatic fields
- The maximum altitude allowed is 2'000 m (6'561 ft) above sea level.
- This device is powered down by removing the mains plug, which must remain accessible.

IV. DISPOSAL



Electronic devices are recyclable waste and must not be disposed of in the household waste. At the end of its service life, dispose of the product according to the relevant statutory regulations. You thus fulfill your statutory obligations and contribute to the protection of the environment.

V. CONNECTION INTERFACES

FRONT VIEW



Main input SMA connector
(with optional monitoring)

Main output SMA connector
(with optional monitoring)

REAR VIEW



4 mm banana plug grounding hole

ON/OFF power button
POWER IN P1J input jack

VI. QUICK START

- 1) Place the PID-01 unit on a stable, level and robust surface. Make sure that ventilation slots in the casing are not covered up.
- 2) Plug the provided power supply on an electrical socket.
- 3) Plug the adaptor of the provided power supply to the "POWER IN" input connector of the PID-01 on the rear face.
- 4) Turn ON the PID-01 by pressing the ON/OFF button on the rear face. The button will illuminate when the PID-01 is powered on.
- 5) The PID-01 is ready to be used. You can now connect the PID-01 to your devices.
- 6) To turn OFF the PID-01, press the ON/OFF button on the rear face of the PID-01 and unplug the provided power supply from the PID-01 or the electrical socket. Socket must be accessible.

VII. TOUCHSCREEN CONTROLS

Proportional Gain (256 values):
 $G = -28 \text{ dB to } 23 \text{ dB}$ (0.2 dB increments)

Simple Integrator (16 values):
 $F_1 = [0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000] \text{ kHz}$

Double Integrator (16 values):
 $F_2 = [0.001, 0.01, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000] \text{ kHz}$

Enable/Disable P, I and I²

INPUT IMPEDANCE: 50 Ω

OUTPUT IMPEDANCE: 50 Ω

Output Impedance 50 Ω

Input Impedance 50 Ω

SIGN: +

Output Voltage Sign (+ or -)

OUTPUT OFFSET: 0.00V

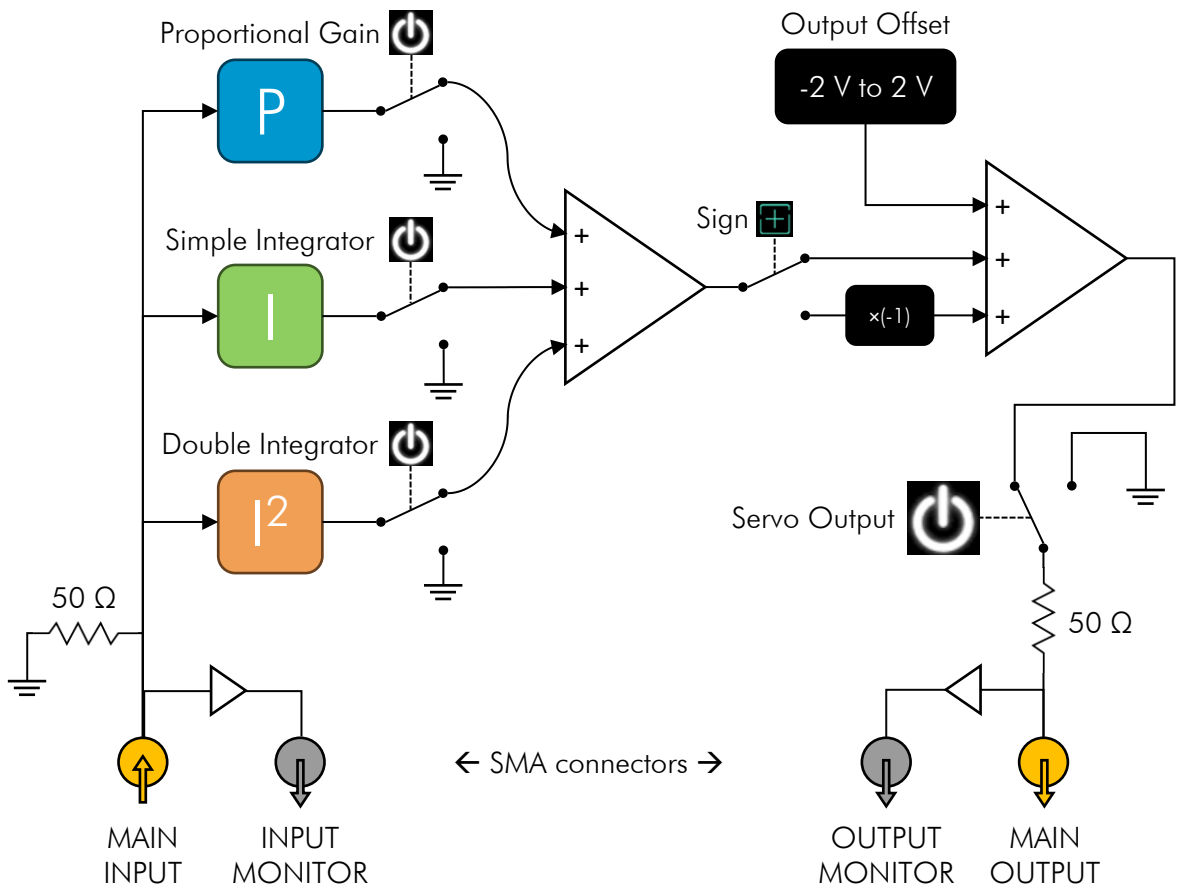
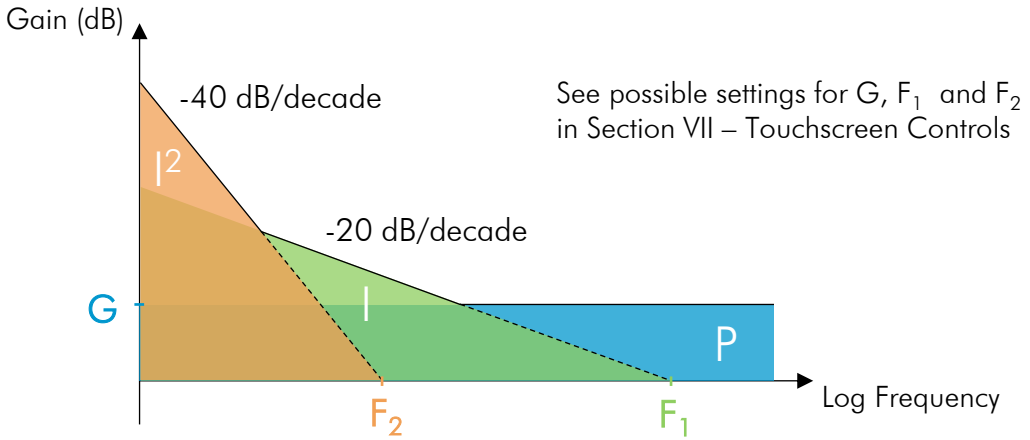
Output Voltage Offset: from -2V to 2V (0.01 V increments)

SERVO OUTPUT Voltage: 0.0V

Real-Time Output Voltage

Enable/Disable Output

VIII. FUNCTIONAL DIAGRAM



IX. TECHNICAL DATA

Specifications

- Number of inputs: 1
- Number of outputs: 3 (including input monitor and output monitor)
- Input impedance: 50 Ω
- Output impedance: 50 Ω
- Input voltage range max: ± 5 V
- Output voltage range max: $\pm 4,5$ V
- Input/Output connectors: SMA female
- Control bandwidth: >30 MHz
- Output offset range: ± 2 V
- Provided power supply : XP-POWER ACM36US09

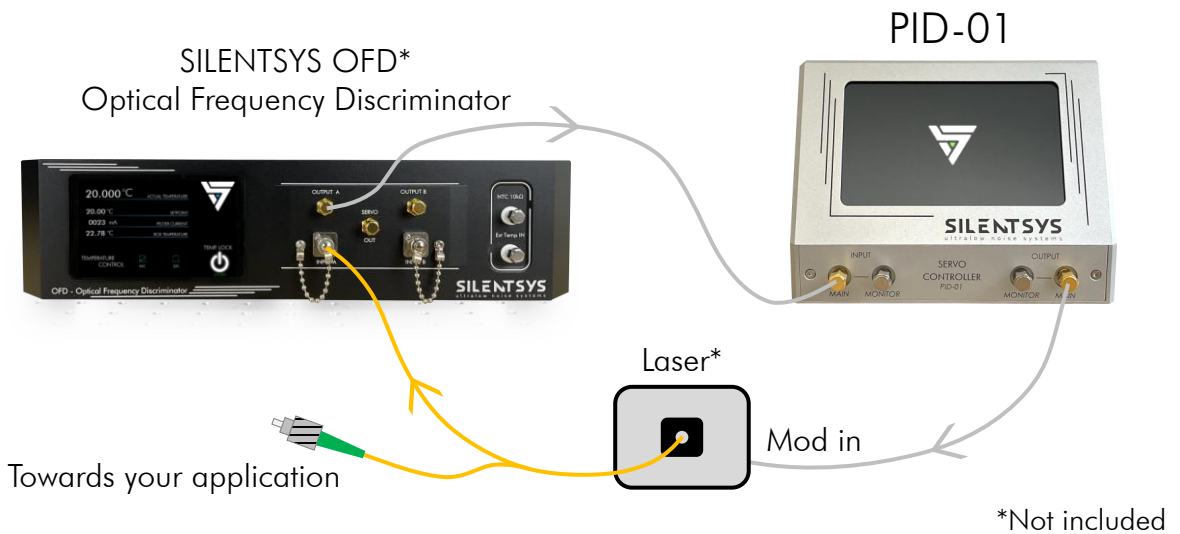
Mechanicals characteristics

- Product dimensions: 155 mm x 150 mm x 112 mm
- Product weight: approx. 1.5 kg
- Aluminum case
- Operating temperature: $+10^{\circ}\text{C}$ to 40°C

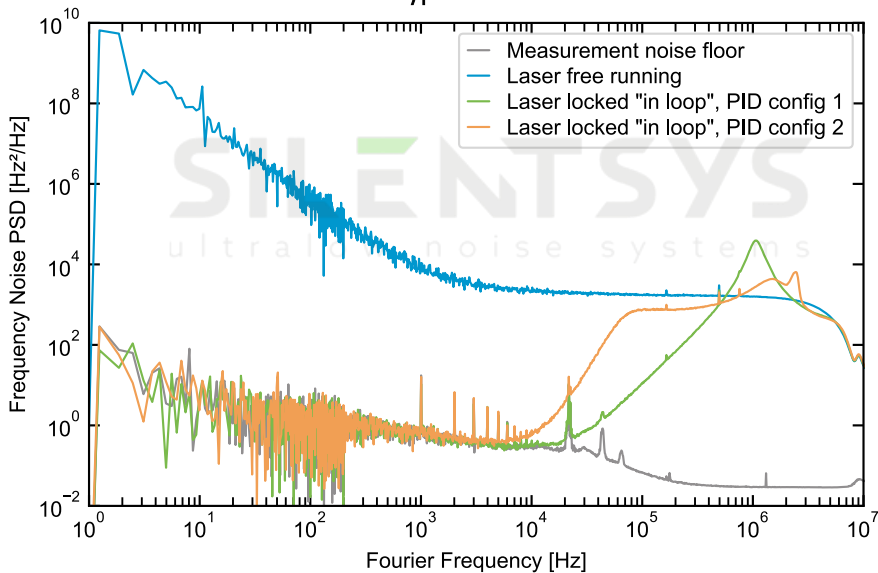
X. APPLICATION

The following illustration shows an example usage of the PID-01 for laser frequency stabilization. To achieve this, a SILENTSYS Optical Frequency Discriminator (OFD) is required. The OFD converts the frequency fluctuations of the laser into a voltage signal for the PID-01.

The output of the PID-01 is connected to the modulation input of the laser to produce a feedback loop. Appropriate parameters are then chosen for the Proportional, Integrator, and Double Integrator functions to correct the frequency fluctuations of the laser and achieve a laser linewidth narrowing.



Typical Result



ABOUT SILENTSYS

SILENTSYS SAS is a French company that develops, produces and commercializes innovative ultralow noise systems covering photonics, microwave/THz and electronic modules. Thanks to our well-established know-how and our patented designs, SILENTSYS offers high-performance systems that are compact, easy to use and affordable.

Our goal is to provide systems that are highly compatible with the needs of emerging industrial and laboratory applications such as those related to quantum technologies (Communications, Cryptography, Computing, Metrology, Sensing...).

CONTACT

Sales: sales@silentsys.com

Technical Support: support@silentsys.com

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LOCATION



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