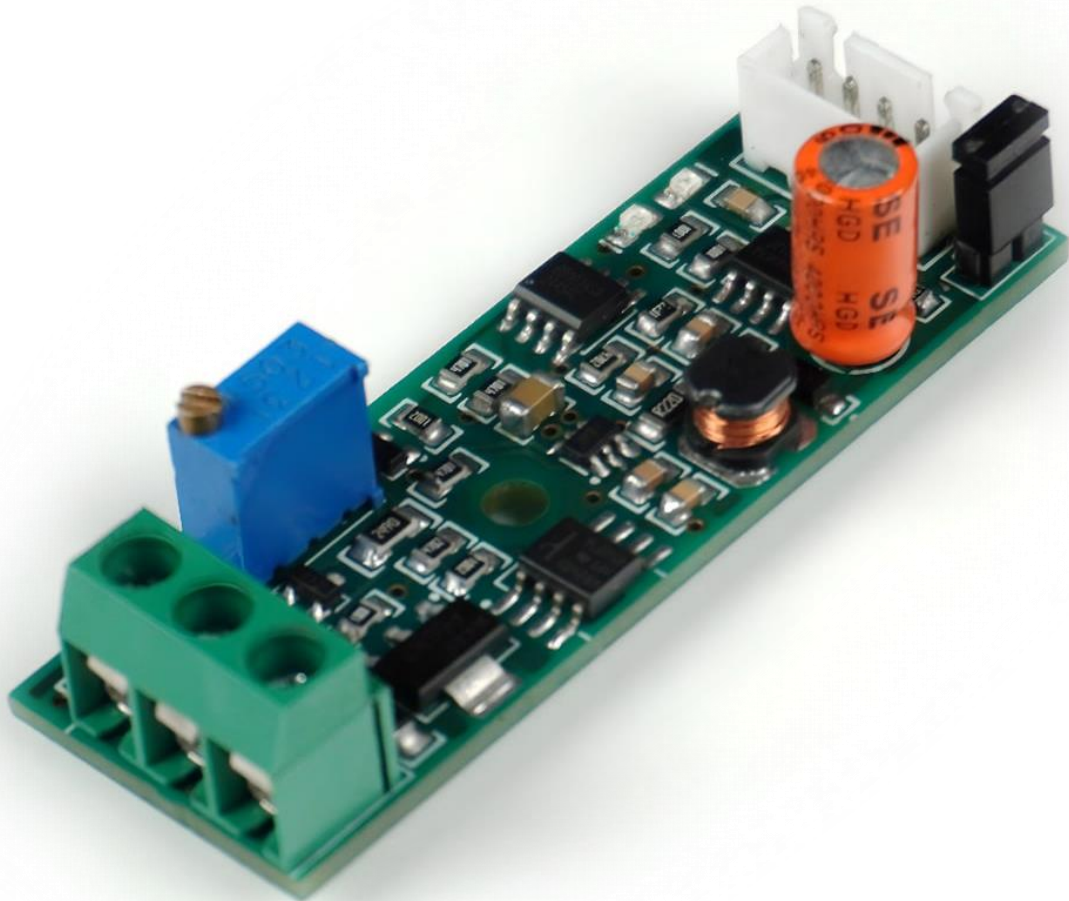


UART-to-Current Loop (0-20mA/4-20mA)



Introduction:

The Compact 0–20 mA / 4–20 mA Current Loop Converter is a high-precision interface module engineered for industrial weighing, packaging, and process automation applications. It is designed to convert UART (TTL, 0–5 V or 1–5 V) serial input into a proportional analog current output, ensuring seamless communication between digital controllers, PLCs, and legacy analog systems.

Operating from a single 5 V DC supply, the converter delivers stable and accurate current outputs across the full 0-20 mA or 4-20 mA range. Its high-resolution digital-to-analog conversion and precision calibration circuitry guarantee minimal linearity error and excellent long-term stability.

The module's compact form factor, low power consumption, and EMI-resistant design make it well-suited for integration into space-constrained industrial environments. It provides a reliable, cost-effective solution for transmitting control or measurement signals over standard current loops, enabling robust operation even in electrically noisy conditions.

With simple UART command compatibility and plug-and-play functionality, this converter simplifies system design and reduces the need for additional analog interface hardware-making it an ideal choice for modern automation systems requiring analog output compatibility.

Key Features:

Dual Output Range (0–20 mA / 4–20 mA, User-Selectable):

Supports both standard current loop formats for seamless integration with a wide range of industrial controllers and instrumentation systems.

UART TTL Input Interface:

Accepts real-time digital data such as weight, sensor readings, or control values directly from microcontrollers or embedded processors.

High-Resolution 12-Bit DAC:

Provides precise and stable analog current output, delivering smooth signal transitions and superior accuracy across the entire range.

Single 5V Power Supply with Onboard Voltage Booster:

Operates efficiently from a single 5V source while maintaining regulated internal voltages for consistent output under varying load conditions.

Customizable Communication Protocol:

Supports user-defined UART protocols to adapt easily to industry-specific data formats or proprietary communication standards.

Specifications:

- **Input:** UART TTL (3.3V/5V compatible)
- **Output:** 0–20 mA or 4–20 mA (selectable)
- **Resolution:** 12-bit DAC (4096 steps)
- **Power Supply:** 5V DC (Single Power Supply)
- **Output Accuracy:** $\pm 0.1\%$ typical
- **Dimensions:** 58 mm x 20.25 mm (approximate)

Hardware Connection:

- **RX:** Receives UART data (TTL level) from the host controller's TX pin.
- **G:** Common ground reference shared with the host device.
- **TX:** Transmits UART data or status feedback to the host controller's RX pin.
- **5V:** Main power input; connect to a regulated +5V DC supply.



CONFIGURATION DETAILS – SERIAL COMMANDS:

- UART default baud rate: 9600
- The code treats both integer and decimal inputs as kilograms. Example: 5 → 5.000 kg, 5.0 → 5.000 kg.

Set Minimum Weight:

- **Command:** minWeight=<value>
- **Example:** minWeight=0 - sets minimum weight to 0.000 kg.

Set Maximum Weight:

- **Command:** maxWeight=<value>
- **Example:** maxWeight=40 - sets maximum weight to 40.000 kg.

Set Minimum Volt:

- **Command:** minVolt=<value>
- **Example:** minVolt=1 - sets minimum volt to 1.000 V.

Set Maximum Volt:

- **Command:** maxVolt=<value>
- **Example:** maxVolt=5 - sets maximum volt to 5.000 V.

Change Baud rate:

- **Command:** baud=<n> where <n> is a single digit representing the baud rate selection.
- After sending the command, adjust the Serial Monitor's baud setting to the corresponding value.

Command	Baud Rate
baud=0	4800
baud=1 (default)	9600
baud=2	19200
baud=3	38400
baud=4	57600
baud=5	115200

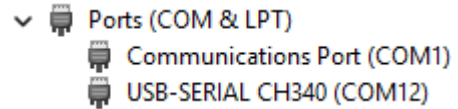
Output (0-20mA/4-20mA):

Decimal number of the weight or reading with or without sign, by default no special characters allowed, differs based on customized

Example Procedure:

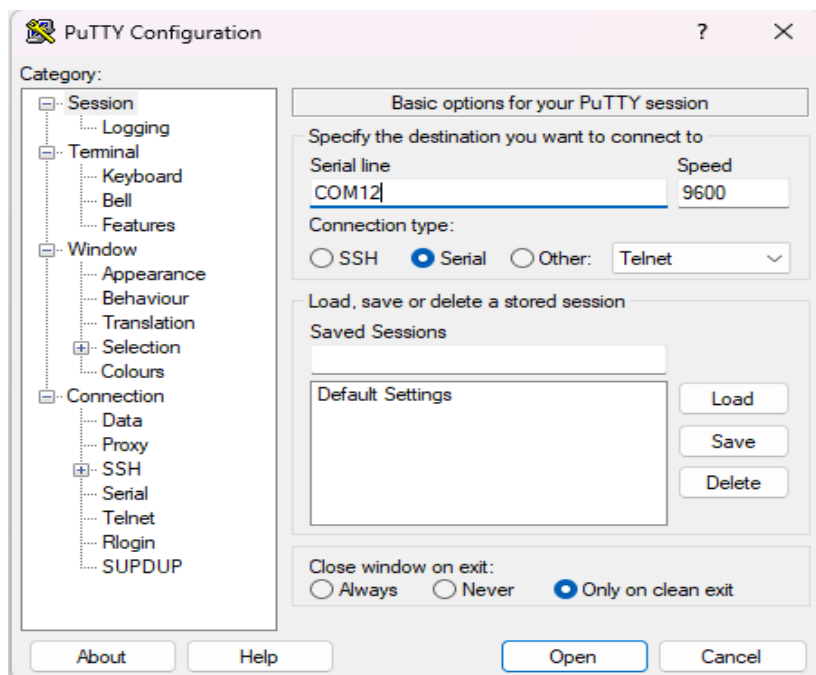
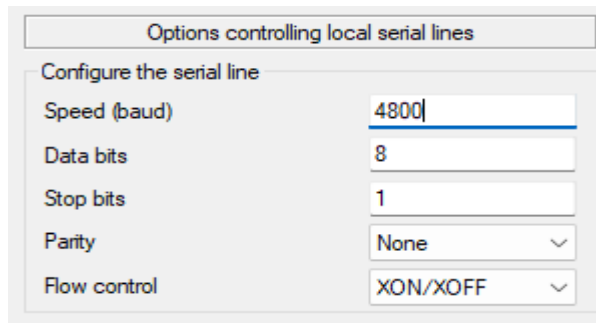
Download PuTTY -> <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

1. Open Device Manager in your PC or then click Ports (COM & LPT)
2. Check COM Port, Its Shows your Serial COM Port
3. Its shows Plugged COM Port.



Steps:

1. Open PuTTY Software
2. Connection Type: Click Serial
3. Type Your COM Port (ex.COM12)
4. Speed (Baud rate) default - 9600
5. Other Options Are default





- To change baud rate type baud=<n>, where n->0, 1, 2, 3, 4, 5. Example: baud=0
- Then change Speed (Baud rate) – 4800 for baud=0.