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> ShangHJ Digital Load Cell Weight Sensor and HX711 ADC Module User Manual (1kg)

NC S20X2+S19X2

ShangHJ Digital Load Cell Weight Sensor and HX711 ADC Module User Manual (1kg)

Model: S20X2+S19X2

INTRODUCTION

This manual provides detailed instructions for the installation, setup, and operation of the ShangHJ Digital Load Cell Weight Sensor and HX711 ADC Module kit. This kit is designed for high-precision electronic weighing applications, compatible with microcontrollers like Arduino and Raspberry Pi, making it ideal for DIY portable electronic kitchen scales and similar projects.

PACKAGE CONTENTS

Verify that all components listed below are included in your package:

- 2 x 1kg Load Cell Weight Sensors
- 2 x HX711 AD Weight Modules

PRODUCT FEATURES

1kg Load Cell Weight Sensor

- **Maximum Capacity:** 1kg (2.2lb)
- **Output:** Direct voltage signal proportional to applied force.
- **Drive Voltage:** Requires 5-10V.
- **Compatibility:** Designed for use with Arduino and Raspberry Pi.
- **Wiring:** 4-lead configuration for easy integration.
- **Material:** Aluminium construction.

HX711 ADC Module

- **Chip:** Utilizes the 24-bit high-precision A/D converter chip HX711.
- **Input Channels:** Two selectable differential input channels.
- **PGA:** On-chip active low noise Programmable Gain Amplifier (PGA) with selectable gains of 32, 64, and 128.

- **Power Supply Regulator:** Integrated for load-cell and ADC analog power supply.
- **Oscillator:** On-chip oscillator, no external component required (optional external crystal).
- **Power-on-Reset:** On-chip power-on-reset function.
- **Operating Voltage:** 2.6V - 5.5V.
- **Operating Temperature:** -20°C to +85°C.
- **Data Rate:** Selectable 10SPS or 80SPS output data rate.
- **Interference Rejection:** Simultaneous 50Hz and 60Hz supply rejection.
- **Control:** Simple digital control and serial interface (pin-driven, no programming needed for basic control).
- **Current Consumption:** Normal operation <1.5mA, power down <1uA.

SETUP INSTRUCTIONS

Load Cell Dimensions

Refer to the diagram below for the physical dimensions of the 1kg load cell.

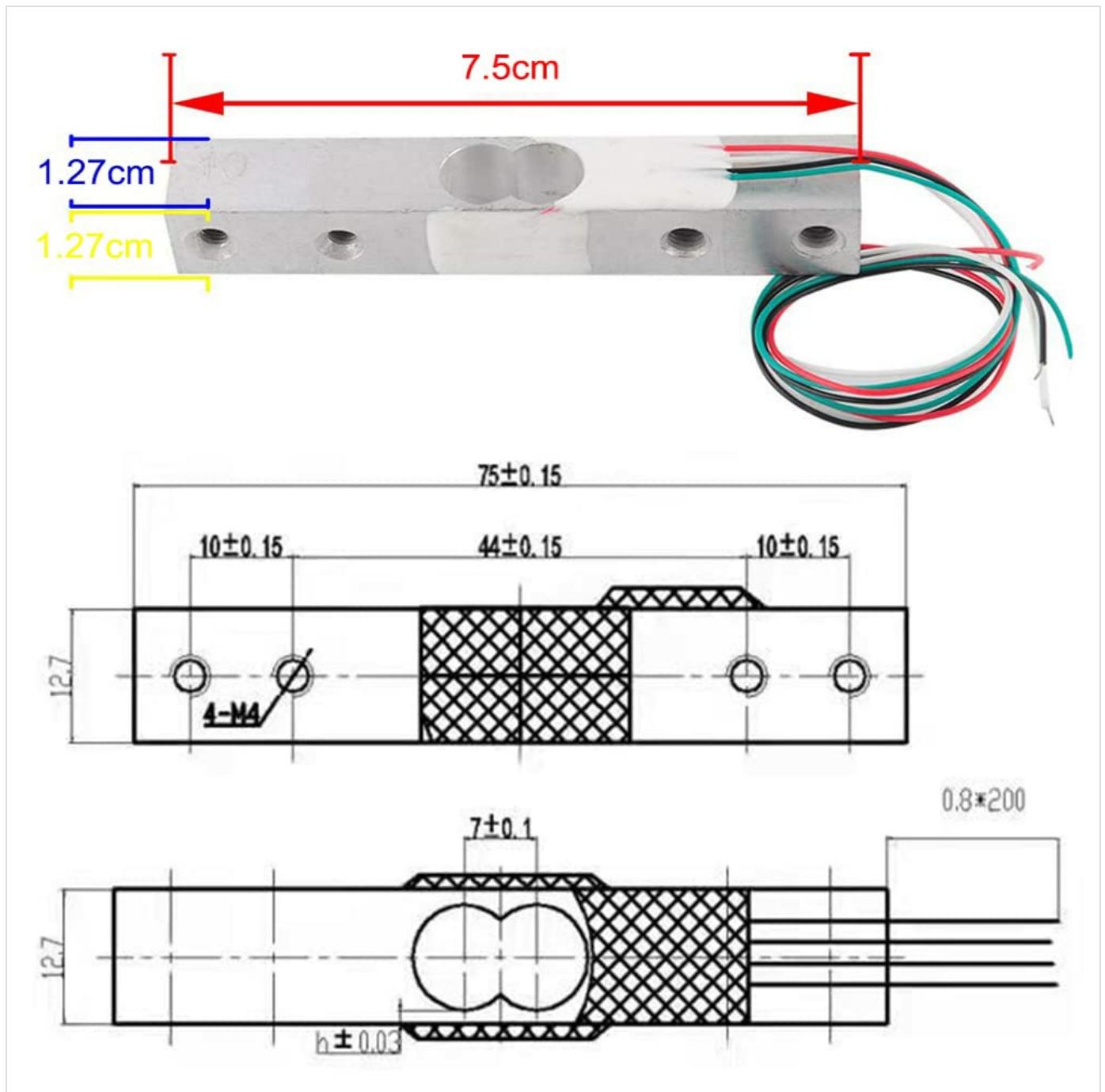


Figure 1: 1kg Load Cell Dimensions. The diagram illustrates the load cell's length as 7.5cm and its width and height as 1.27cm, along with mounting hole details.

HX711 Module Dimensions and Load Cell Wiring Diagram

The HX711 module dimensions are provided below, along with a schematic for connecting the load cell to the HX711 module.

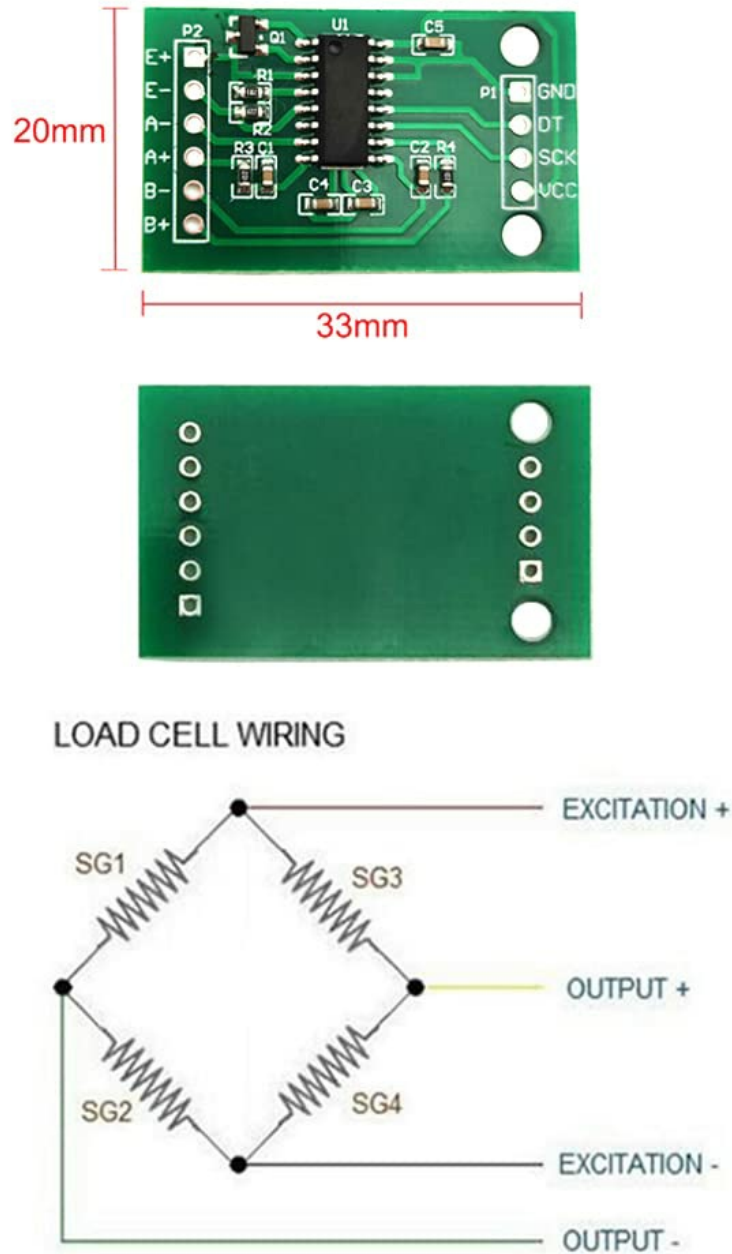


Figure 2: HX711 Module Dimensions and Load Cell Wiring. The image shows the HX711 module measuring 33mm by 20mm, and a standard Wheatstone bridge configuration for load cell wiring, indicating Excitation+ (E+), Excitation- (E-), Output+ (A+), and Output- (A-).

Load Cell Wiring to HX711 Module

Connect the load cell to the HX711 module as follows:

- **Red wire** to **E+** (Excitation +)
- **Black wire** to **E-** (Excitation -)
- **Green wire** to **A+** (Analog Input +)

- **White wire to A-** (Analog Input -)

Ensure these connections are secure to prevent signal interference or damage.

Connecting HX711 to Microcontroller (e.g., Arduino)

The HX711 module connects to your microcontroller using a simple serial interface. Refer to the diagram for a typical connection to an Arduino board.

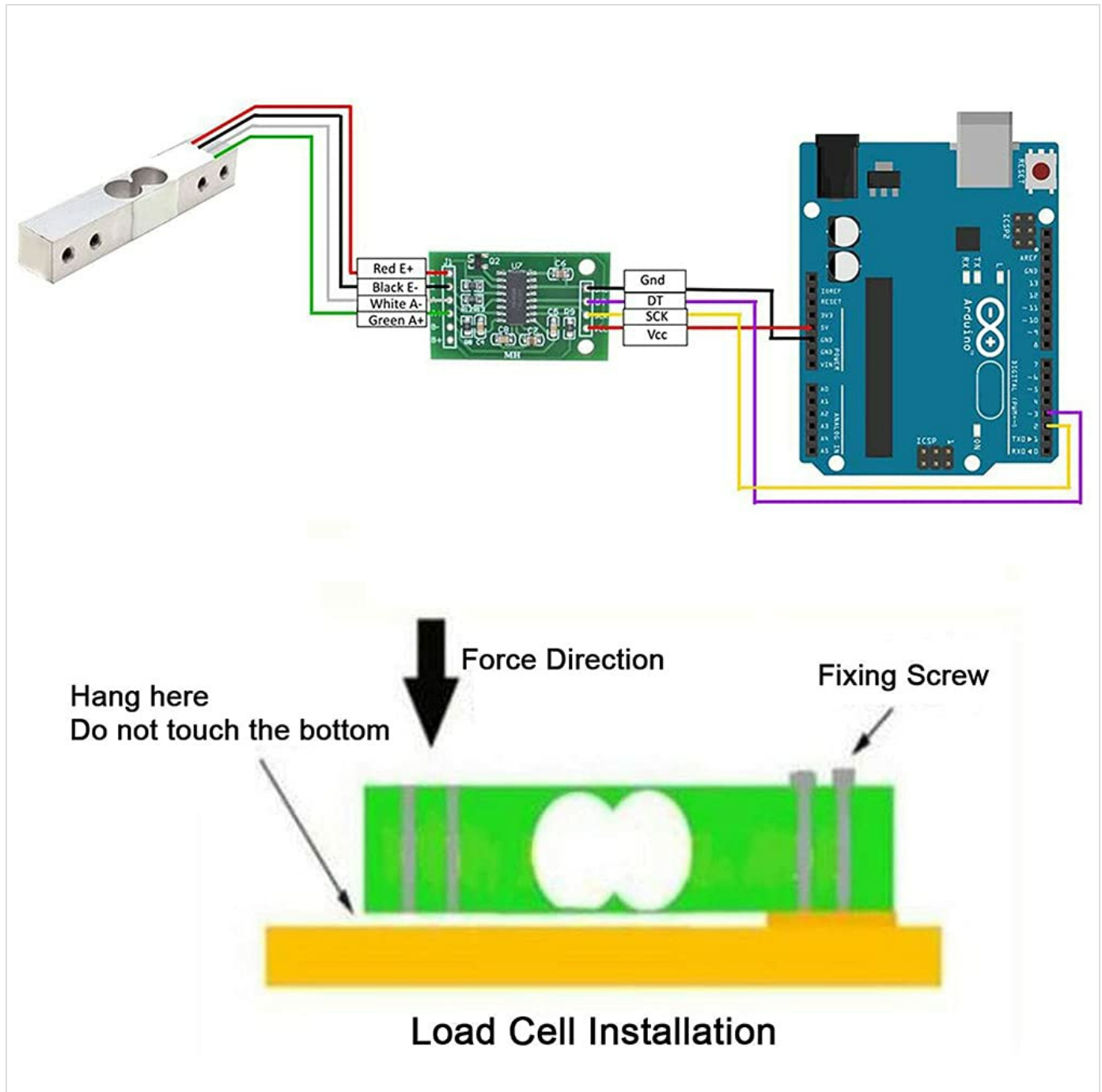


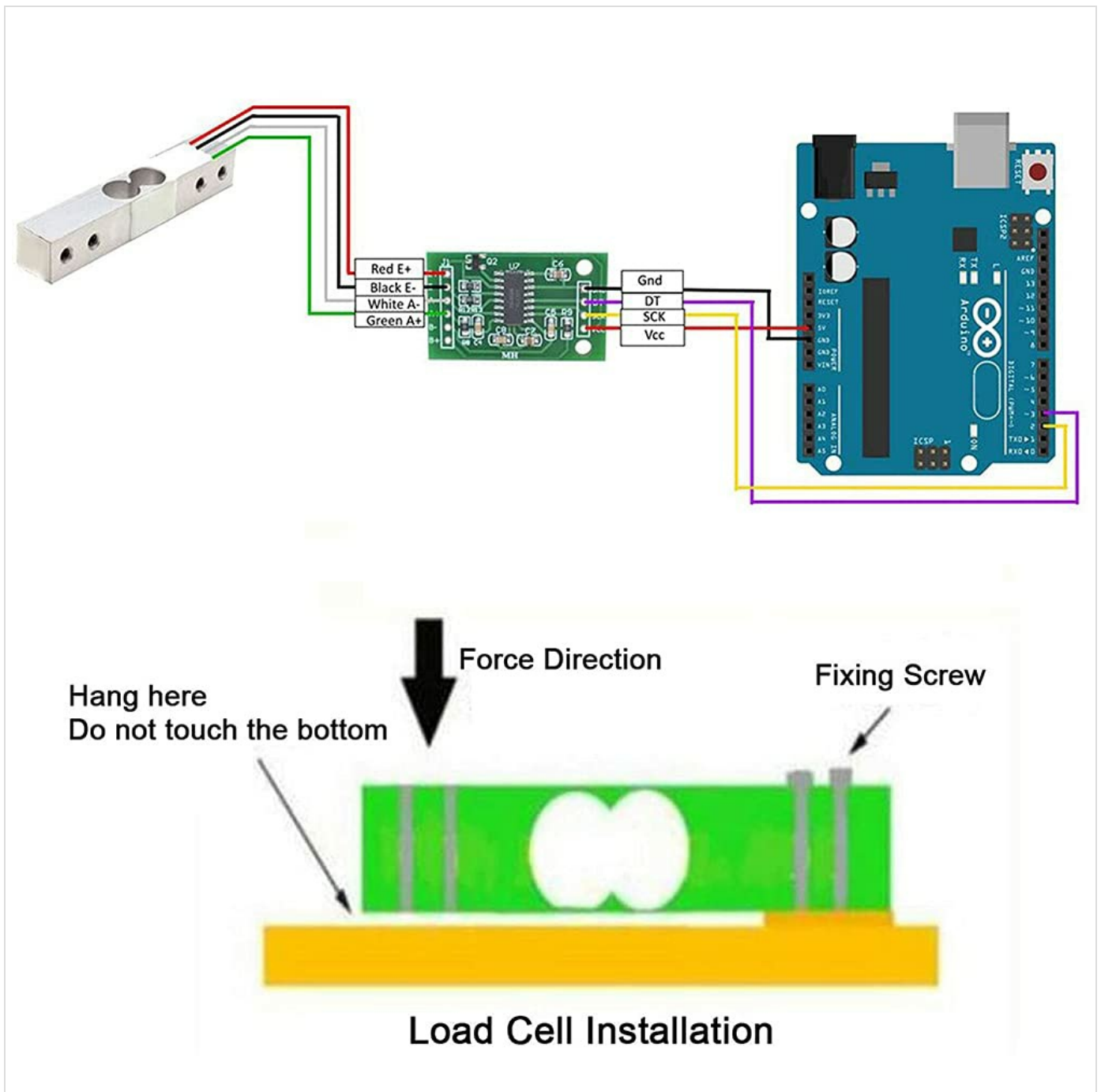
Figure 3: Load Cell and HX711 Module Connected to Arduino. This diagram illustrates the wiring from the load cell to the HX711 module, and then the HX711 module's Gnd, DT (Data), SCK (Clock), and Vcc pins connected to corresponding pins on an Arduino board.

Load Cell Installation

Proper installation of the load cell is crucial for accurate measurements. Follow these guidelines:

- One end of the sensor should be fixed securely using the screw holes.
- The other end must remain in a floating state, allowing it to deflect under load.
- Apply gravity or force in the direction indicated by any labels on the load cell.

- **Caution:** Do not directly press on the white rubber part of the load cell, as this can cause damage to the sensor.



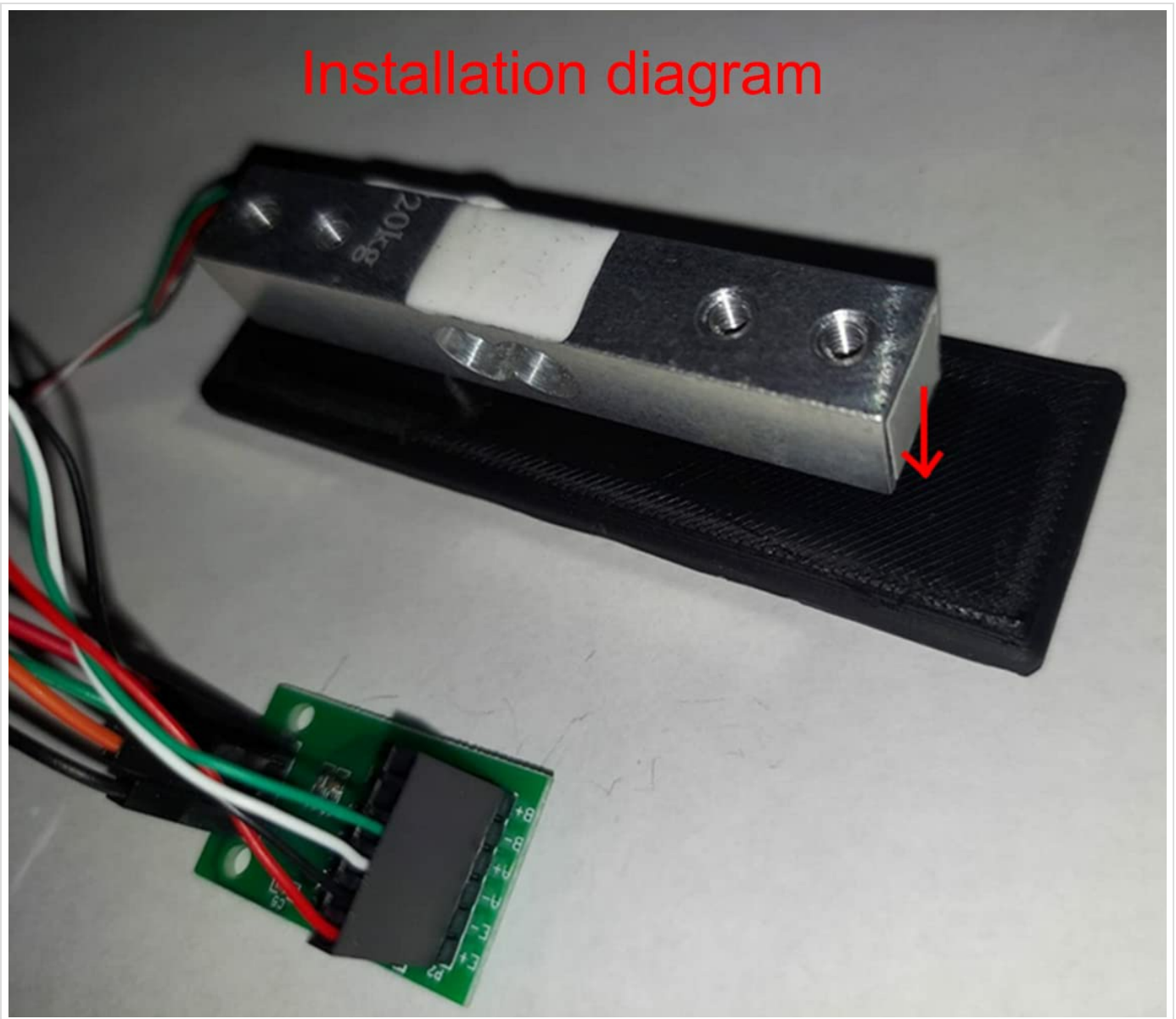


Figure 5: Example Installation Diagram. A photograph demonstrating a load cell mounted on a platform and connected to an HX711 module, illustrating a practical setup.

OPERATING INSTRUCTIONS

Once the load cell and HX711 module are correctly wired and installed, you can begin reading weight data. The HX711 module converts the analog signal from the load cell into a digital format that your microcontroller can interpret.

- **Power Supply:** Ensure the HX711 module receives a stable power supply within its operating range of 2.6V to 5.5V.
- **Microcontroller Programming:** Use a suitable library for your chosen microcontroller (e.g., Arduino HX711 library) to interface with the module. This library will handle the communication protocol for reading data from the DT (Data) and SCK (Clock) pins.
- **Calibration:** Accurate weight measurement requires calibration. This typically involves:
 1. Reading the sensor output with no load (tare).
 2. Placing a known weight on the load cell and reading the output.
 3. Calculating a calibration factor to convert raw sensor readings into actual weight units (grams, kilograms, pounds).
- **Data Rate Selection:** The HX711 supports 10SPS (samples per second) or 80SPS. The 10SPS rate offers better noise rejection for 50Hz/60Hz power line interference, while 80SPS provides faster readings. Select the appropriate rate based on your application's requirements.

MAINTENANCE

To ensure the longevity and accuracy of your load cell and HX711 module, observe the following maintenance guidelines:

- **Keep Dry:** Protect the components from moisture and humidity, which can damage electronic circuits.
- **Clean Gently:** If cleaning is necessary, use a soft, dry cloth. Avoid using liquids or abrasive cleaners.
- **Avoid Overload:** Do not exceed the 1kg maximum capacity of the load cell, as this can permanently damage the sensor.
- **Handle with Care:** Avoid dropping or subjecting the components to strong impacts.
- **Temperature Range:** Operate and store the modules within the specified temperature range of -20°C to +85°C.

TROUBLESHOOTING

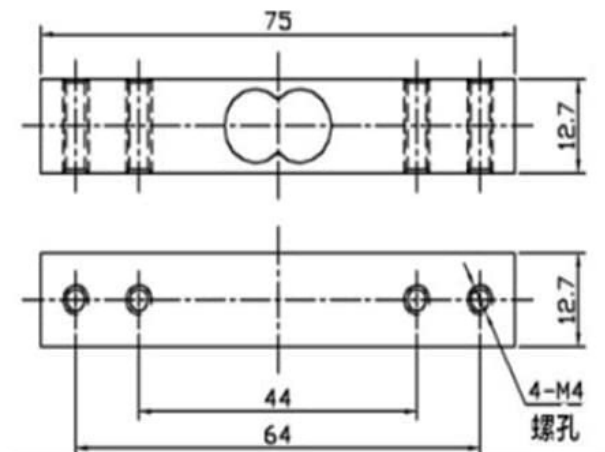
If you encounter issues, consider the following troubleshooting steps:

- **No Readings or Erratic Data:**
 - Check all wiring connections carefully, ensuring they match the specified color codes (Red to E+, Black to E-, Green to A+, White to A-).
 - Verify the power supply to the HX711 module is stable and within the 2.6V-5.5V range.
 - Ensure the load cell is correctly installed and not touching any surfaces that would impede its movement or apply unintended force.
 - Confirm that the microcontroller code and HX711 library are correctly implemented and initialized.
- **Inaccurate Readings:**
 - Perform a full calibration procedure with known weights.
 - Check for any physical obstructions or external forces affecting the load cell.
 - Ensure the load is applied centrally and consistently on the load cell.
 - Consider environmental factors like temperature fluctuations, although the HX711 has some temperature compensation.
- **Module Not Responding:**
 - Check the power connection to the HX711 module.
 - Verify the DT and SCK pins are correctly connected to the microcontroller.
 - Ensure the microcontroller's GPIO pins are configured correctly for input/output.

SPECIFICATIONS

Detailed specifications for the 1kg Load Cell and HX711 ADC Module are provided below.

1kg Load Cell Specifications



Application	Kitchen scale
Capacity	1kg
Rated output	$1.0 \pm 0.1 \text{ mV/V}$
Nonlinearity	0.03% F.S
Hysteresis	0.03% F.S
Repeatability	0.03% F.S
Creep	0.05% F.S/3min
Zero balance	$-0.15 \pm 0.05 \text{ mV/V}$
Output resistance	$1000 \pm 10 \Omega$
Corner load error	0.05% F.S
Temperature effect on sensitivity	0.03% F.S/10°C
Temperature effect on zero	0.3% F.S/10°C
Recommended excitation voltage	5V
Operating temperature range	-20~+65°C
Product size	75x12.7x12.7mm
Load cell material	Aluminium
Method of connecting wire	red Input(+), black Input(-), green output(+), white output(-).

Figure 6: 1kg Load Cell Detailed Specifications. This image presents a table outlining the technical specifications of the 1kg load cell, such as its 1kg capacity, $1.0 \pm 0.1 \text{ mV/V}$ rated output, 0.03% F.S nonlinearity, and recommended 5V excitation voltage.

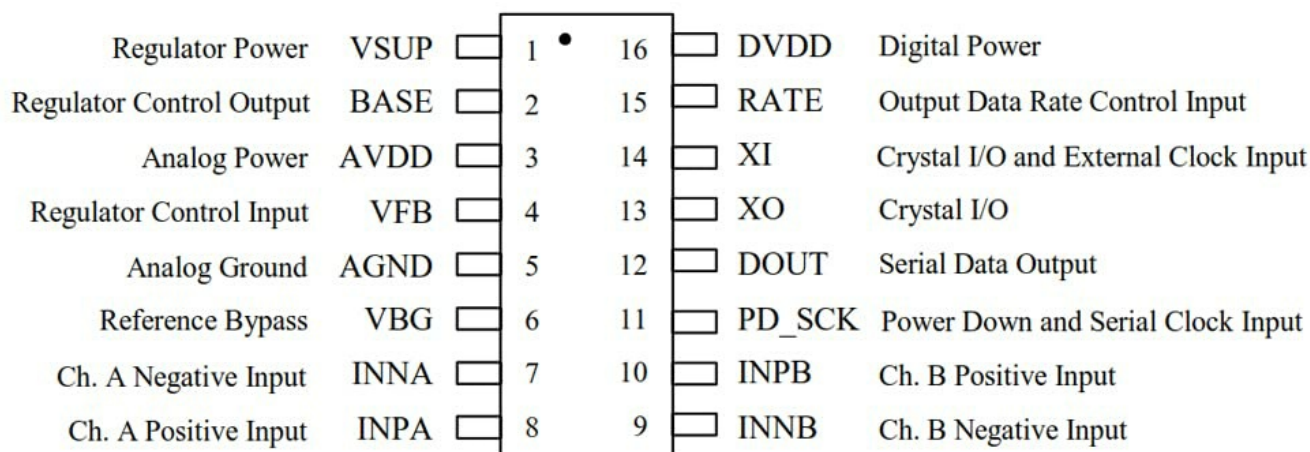
Load Cell Specifications

Parameter	Value
Application	Kitchen scale
Capacity	1kg
Rated output	$1.0 \pm 0.1 \text{ mV/V}$
Nonlinearity	0.03% F.S
Hysteresis	0.03% F.S
Repeatability	0.03% F.S

Parameter	Value
Creep	0.05% F.S/3min
Zero balance	-0.15±0.05mV/V
Output resistance	1000±10Ω
Corner load error	0.05% F.S
Temperature effect on sensitivity	0.03% F.S/10°C
Temperature effect on zero	0.3% F.S/10°C
Recommended excitation voltage	5V
Operating temperature range	-20 ~ +65°C
Product size	75x12.7x12.7mm
Load cell material	Aluminium
Method of connecting wire	red Input(+), black Input(-), green output(+), white output(-).

HX711 ADC Module Pinout

The HX711 chip pinout and function table are provided for advanced users and detailed integration.



Pin #	Name	Function	Description
1	VSUP	Power	Regulator supply: 2.7 ~ 5.5V
2	BASE	Analog Output	Regulator control output (NC when not used)
3	AVDD	Power	Analog supply: 2.6 ~ 5.5V
4	VFB	Analog Input	Regulator control input (connect to AGND when not used)
5	AGND	Ground	Analog Ground
6	VBG	Analog Output	Reference bypass output
7	INA-	Analog Input	Channel A negative input
8	INA+	Analog Input	Channel A positive input
9	INB-	Analog Input	Channel B negative input
10	INB+	Analog Input	Channel B positive input
11	PD_SCK	Digital Input	Power down control (high active) and serial clock input
12	DOUT	Digital Output	Serial data output
13	XO	Digital I/O	Crystal I/O (NC when not used)
14	XI	Digital Input	Crystal I/O or external clock input, 0: use on-chip oscillator
15	RATE	Digital Input	Output data rate control, 0: 10Hz; 1: 80Hz
16	DVDD	Power	Digital supply: 2.6 ~ 5.5V

Figure 7: HX711 Chip Pinout and Function Table. This image displays the 16-pin configuration of the HX711 chip, along with a table that lists each pin number, its name (e.g., VSUP, DVDD, DOUT, PD_SCK), its function, and a brief description of its purpose.

HX711 Pinout and Functions

Pin #	Name	Function	Description
1	VSUP	Regulator Power	Regulator supply: 2.7 ~ 5.5V
2	BASE	Analog Output	Regulator control output (NC when not used)
3	AVDD	Analog Power	Analog supply: 2.6 ~ 5.5V
4	VFB	Analog Input	Regulator control input (connect to AGND when not used)
5	AGND	Analog Ground	Analog Ground
6	VBG	Analog Output	Reference bypass output

Pin #	Name	Function	Description
7	INA-	Analog Input	Channel A negative input
8	INA+	Analog Input	Channel A positive input
9	INPB+	Analog Input	Channel B positive input
10	INPB-	Analog Input	Channel B negative input
11	PD_SCK	Digital Input	Power down control (high active) and serial clock input
12	DOUT	Digital Output	Serial data output
13	XO	Digital I/O	Crystal I/O (NC when not used)
14	XI	Digital Input	Crystal I/O or external clock input, 0: use on-chip oscillator
15	RATE	Digital Input	Output data rate control, 0: 10Hz; 1: 80Hz
16	DVDD	Digital Power	Digital supply: 2.6 ~ 5.5V

WARRANTY AND SUPPORT

This product is intended for DIY and educational purposes. Specific warranty information is not provided with this kit. For technical support, please refer to online communities and resources related to Arduino, Raspberry Pi, load cells, and the HX711 module. Many open-source libraries and tutorials are available to assist with integration and programming.

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Name

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Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question