

# lamaPLC project: Sension SCD CO<sup>2</sup> measurement module



The main distinction between these Sension sensors lies in their measurement technology, which affects their size and power use. The **SCD30** employs conventional **NDIR** (*Non-Dispersive Infrared*) technology, whereas the **SCD40/41** series utilises a more recent, compact Photoacoustic principle.

Feature	SCD30	SCD40	SCD41
<b>Technology</b>	NDIR (Dual-Channel)	Photoacoustic	Photoacoustic
<b>Size</b>	35 x 23 x 7 mm	10.1 x 10.1 x 6.5 mm	10.1 x 10.1 x 6.5 mm
<b>CO<sup>2</sup> Range</b>	0 - 40,000 ppm	400 - 2,000 ppm	400 - 5,000 ppm
<b>Accuracy</b>	±(30 ppm + 3% MV)	±(50 ppm + 5% MV)	±(40 ppm + 5% MV)
<b>Voltage</b>	3.3V - 5.5V	2.4V - 5.5V	2.4V - 5.5V
<b>Power (avg)</b>	~19 mA	~15 mA	~0.5 mA (Low Power Mode)
<b>Interface</b>	I <sup>2</sup> C (Address <b>0x61</b> ), UART, PWM	I <sup>2</sup> C	I <sup>2</sup> C
<b>Operating Temperature</b>	0°C to 50°C		

## Key Differences

- **Form Factor:** The SCD40/41 is approximately ten times smaller than the SCD30, making it well-suited for compact wearables or integrated smart home devices.
- **Precision vs Size:** The SCD30 generally offers slightly better accuracy and stability over extended periods, thanks to its dual-channel NDIR design, which naturally compensates for sensor drift.
- **Power Efficiency:** For battery-powered devices, the SCD41 is the preferred choice, featuring a “Single Shot” mode that significantly reduces power consumption compared to the SCD30 or SCD40.
- **Mounting:** The SCD40/41 is an SMD (Surface-Mount Device) component suitable for reflow soldering and mass production. In contrast, the SCD30 is usually hand-soldered or connected via pins.



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2026/02/14 23:38

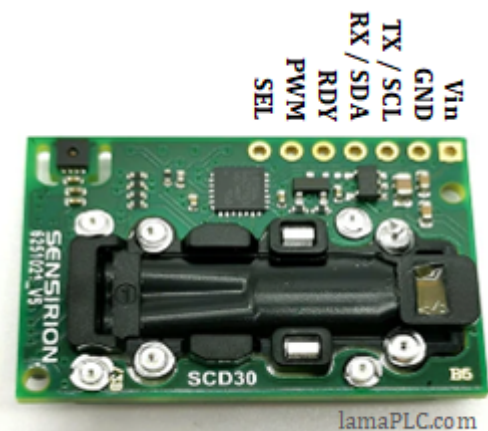
## SCD30

The SCD30 is a high-precision, 3-in-1 sensor module from Sensirion that measures Carbon Dioxide (CO<sup>2</sup>), Temperature, and Relative Humidity. It is considered a “true” CO<sup>2</sup> sensor because it uses Non-Dispersive Infrared (NDIR) technology to directly measure CO<sup>2</sup> molecules, rather than approximating levels from other gases.

### Key Features & Technology

- **Dual-Channel Detection:** It uses a dedicated reference channel to compensate for long-term drift, ensuring superior stability over its 15-year lifetime.
- **Integrated Compensation:** The module uses its built-in temperature and humidity data to internally calibrate and normalise the CO<sub>2</sub> readings.
- **Self-Calibration Options:** Supports Automatic Self-Calibration (ASC), which resets the sensor's baseline when exposed to fresh air (~400 ppm) regularly, or Forced Recalibration (FRC) for manual setup.
- **Adjustable Sampling:** While the default interval is 2 seconds, it can be set to 1-1800 seconds to reduce power consumption in battery-powered projects.

### SCD30 Pinout



Pin	Name	Description	Logic Level
1	VDD	Supply Voltage (3.3V - 5.5V)	—
2	GND	Ground	—
3	TX / SCL	Modbus Transmit / I <sup>2</sup> C Clock	3.0V (internal pull-up)
4	RX / SDA	Modbus Receive / I <sup>2</sup> C Data	3.0V (internal pull-up)
5	RDY	Data Ready (High when new data is available)	3.0V
6	PWM	Pulse Width Modulation output	3.0V
7	SEL	Interface Select (Floating/GND = I <sup>2</sup> C; High = Modbus)	< 4.0V

### Key Wiring Notes

- **Internal Pull-ups:** The module has internal 45 kΩ resistors connected to a 3V supply for the I<sup>2</sup>C lines.

- **Voltage Warning:** The module can be powered with 5V, but the SCL/SDA logic pins operate at 3V. When using a 5V microcontroller like an Arduino Uno, a level shifter is strongly advised to prevent damage to the sensor.
- **Interface Selection:** For I<sup>2</sup>C (the standard mode), leave the SEL pin floating or connect it to Ground. To use Modbus, connect the SEL pin to VDD via a voltage divider, ensuring the voltage does not exceed 4V.

## SCD30 Arduino example code

To use the SCD30 with an Arduino, the **SparkFun SCD30** Arduino Library and the Adafruit SCD30 Library are the most common choices.

```
#include <Wire.h>
#include "SparkFun_SCD30_Arduino_Library.h" //

SCD30 airSensor;

void setup() {
  Wire.begin();
  Serial.begin(9600);

  if (airSensor.begin() == false) {
    Serial.println("Sensor not detected. Check wiring!");
    while (1);
  }
  Serial.println("SCD30 detected!");
}

void loop() {
  if (airSensor.dataAvailable()) {
    Serial.print("CO2(ppm): ");
    Serial.print(airSensor.getCO2());
    Serial.print(" Temp(C): ");
    Serial.print(airSensor.getTemperature(), 1);
    Serial.print(" Humidity(%): ");
    Serial.println(airSensor.getHumidity(), 1);
  }
  delay(2000); // Sensor updates every 2 seconds by default
}
```

## Communication topics on lamaPLC

Page	Date	Tags
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• <a href="#">lamaPLC Communication: RFID</a>	2026/04/23 21:51	<a href="#">communication</a> , <a href="#">rfid</a> , <a href="#">radio</a> , <a href="#">rf</a> , <a href="#">aidc</a> , <a href="#">prat</a> , <a href="#">arpt</a> , <a href="#">arat</a> , <a href="#">bap</a> , <a href="#">uhf</a> , <a href="#">nfc</a> , <a href="#">em4100</a> , <a href="#">t5557</a> , <a href="#">tag</a> , <a href="#">manchester</a> , <a href="#">fsk</a> , <a href="#">psk</a> , <a href="#">biphase</a> , <a href="#">nrz</a>
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• <a href="#">lamaPLC Communication: RS-422</a>	2026/04/23 21:51	<a href="#">bus</a> , <a href="#">communication</a> , <a href="#">rs-422</a> , <a href="#">rs</a> , <a href="#">basic</a>
• <a href="#">lamaPLC Communication: RS-485</a>	2026/04/23 21:51	<a href="#">bus</a> , <a href="#">communication</a> , <a href="#">rs-485</a> , <a href="#">rs</a> , <a href="#">basic</a> , <a href="#">profibus</a>
• <a href="#">lamaPLC Communication: SCADA</a>	2026/04/23 21:51	<a href="#">communication</a> , <a href="#">scada</a> , <a href="#">industry</a> , <a href="#">industrial</a> , <a href="#">hmi</a>
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• <a href="#">lamaPLC Communication: SPI</a>	2026/04/23 21:51	<a href="#">bus</a> , <a href="#">communication</a> , <a href="#">spi</a> , <a href="#">basic</a> , <a href="#">arduino</a> , <a href="#">ssi</a> , <a href="#">sdi</a> , <a href="#">miso</a> , <a href="#">sdo</a>
• <a href="#">lamaPLC Communication: TCP / UDP Basic</a>	2025/11/20 22:49	<a href="#">communication</a> , <a href="#">bus</a> , <a href="#">tcp</a> , <a href="#">udp</a> , <a href="#">tcp ip</a> , <a href="#">darpa</a> , <a href="#">ietf</a> , <a href="#">smtp</a> , <a href="#">http</a> , <a href="#">https</a> , <a href="#">ftp</a> , <a href="#">ftps</a> , <a href="#">ssh</a> , <a href="#">pop3</a> , <a href="#">imap</a> , <a href="#">mysql</a> , <a href="#">cpanel</a> , <a href="#">whm</a> , <a href="#">ssl</a> , <a href="#">webmail</a> , <a href="#">mqtt</a> , <a href="#">ethernet</a> , <a href="#">ip</a>
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• <a href="#">lamaPLC Communication: USB</a>	2026/04/23 21:51	<a href="#">usb</a> , <a href="#">usb otg</a> , <a href="#">otg</a> , <a href="#">msc</a> , <a href="#">ums</a> , <a href="#">mtp</a> , <a href="#">dfu</a> , <a href="#">uac</a> , <a href="#">adc</a> , <a href="#">communication</a> , <a href="#">bus</a> , <a href="#">basic</a>
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- [lamaPLC Communication: Wiegand](#) 2026/04/23 21:51 [wiegand, communication, interface, cr80, iec 7810, h10301, hid, wiegand 26, wiegand 32, wiegand 34, wiegand 35, wiegand 37, wiegand 38, wiegand 42 bus, communication, ws2812, ws2812b, ws 2812, ws 2812 b, 5050smd, 4020, 2020, 3535, 5050, nzt, rgb chip, led, arduino, rgb](#)
- [lamaPLC Communication: WS2812](#) 2024/11/16 00:36 [communication, ethernet, bus, ip, z-wave, ism](#)
- [lamaPLC Communication: Z-Wave](#) 2026/04/23 21:51 [communication, ethernet, bus, ip, zigbee, wpan, bluetooth, wi-fi, ism, ieee 802.15.4, zdo, zigbee pro, zc, zr, zed, smart energy, homegrid, homeplug, powerline, ipso, sunspec, 6lowpan, ipv6, rf4ce](#)
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- [LamaPLC: AHT10 Modul](#) 2026/03/22 03:14 [avago, apds-9900, apds-9930, apds-9960, als, proximity, detection, gesture recognition, gesture, i2c, communication, sensor, arduino, code](#)
- [lamaPLC: AI-Thinker LoRA products](#) 2026/04/23 21:51 [communication, i2c, as5600, as-5600, magnetic, induction, angle, sensor bme280, bme680, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, cjmcu](#)
- [LamaPLC: APDS - Avago ALS and proximity detection sensors with I<sup>2</sup>C communication](#) 2026/04/23 21:52 [cjmcu-164, sn74hc164d, 8-bit shift register, communication, 7-segment, cjmcu, arduino](#)
- [lamaPLC: AS5600 Magnetic Induction Angle Measurement Sensor Module](#) 2026/03/28 23:50 [cjmcu-219, ina-219, ina219, breakout board, i2c, communication, sensor, voltage, current, arduino, code, cjmcu](#)
- [LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I<sup>2</sup>C communication](#) 2026/04/23 21:52 [cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication](#)
- [lamaPLC: CJMCU-164; SN74HC164D 8-bit Shift Register Module](#) 2026/03/06 01:19 [cjmcu-3901, cjmcu, pmw3901, pmw-3901, optical flow, sensor, pixart, spi, communication, arduino, code, pmw3901mb-txqt](#)
- [LamaPLC: CJMCU-219/INA-219 breakout board/IC with I<sup>2</sup>C communication](#) 2026/04/23 21:52 [cjmcu, cjmcu-6701, acs758, acs-758, galvanic skin response, gsr, electrodermal activity, eda, spi, communication, arduino, code, sensor, healthcare](#)
- [LamaPLC: CJMCU-3216 / AP-3216 integrated digital ambient light and proximity sensor module/IC with I<sup>2</sup>C communication](#) 2026/04/23 21:52
- [LamaPLC: CJMCU-3901/PMW-3901 compact optical flow sensor module/IC by PixArt with SPI communication](#) 2026/04/23 21:52
- [LamaPLC: CJMCU-6701: Biosensor for measuring Galvanic Skin Response \(GSR\) with SPI communication](#) 2026/04/23 21:52

• LamaPLC: DPS Infineon Temperature/Pressure sensors with I2C communication	2026/04/23 21:52	dps310, infineon, temperature, pressure, sensor, arduino, i2c, communication, code
• lamaPLC: DS18B20 1-Wire Digital Thermometer	2026/04/23 21:52	ds18b20, sensor, 1-wire, communication, arduino, thermometer, parasitic mode
• lamaPLC: Ebyte LoRA products	2026/04/23 21:51	ebyte, lora manufacturer, communication, lora, modul
• lamaPLC: Energy, power, current, and voltage	2025/05/31 23:32	i2c, i c, communication, arduino, energy, power, current, sensor, ina226
• LamaPLC: ENS ScioSense Multi-gas sensors with I <sup>2</sup> C communication	2026/04/23 21:52	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco <sub>2</sub> , tvoc, aqi, indoor air quality, iaq, CO <sub>2</sub> , VOC
• lamaPLC: ESP32 / ESP8266	2025/11/22 00:07	esp8266, esp32, esp32-c2, esp32-c3, esp32-c5, esp32-c6, esp32-c61, esp32-h2, esp32-s2, esp32-s3, esp32-p4, espressif systems, communication, ethernet, ip, wi-fi, thread, zigbee, matter, homekit, bluetooth, mqtt, adc, spi, uart, i2c, i2s, rmt, pwm, usb, usb otg, twai
• LamaPLC: Gas sensors	2023/07/01 17:29	gas, sensor, i2c, onewire, communication, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-135, gm-102b, gm-302b, gm-502b, gm-702b, alcohol, ch4, natural gas, smoke, lng, co, co2, lpg, h2, iso-butane, nox, nh3, benzene, town gas, formaldehyde, propane, humidity, temperature, voc, grv gas sens v2
• LamaPLC: GY-9250 MPU-9250/6500 9-axis Attitude Sensor Board	2026/04/23 21:52	ak8963, gy-9250, mpu-9250, 9-axis, motion detection, magnetometer, communication, i c, i2c, spi
• LamaPLC: HDC Texas Instruments Temperature/humidity sensors with I <sup>2</sup> C communication	2026/04/23 21:52	sht21, htu21, si7021, gy-21, gy-213v, hdc1080, gy-213v-hdc1080, cjmcu, cjmcu-1080, texas instruments, temperature, humidity, sensor, i2c, communication, arduino, code
• LamaPLC: HTU TE Connectivity temperature/humidity sensors with I <sup>2</sup> C communication	2026/04/23 21:52	htu, htu31d, htu21d, htu20d, sht20, htu20, sht21, htu21, si7021, gy-21, gy-213v, hdc1080, si702, gy-20, sht31, htu31, si7031, gy-31, te connectivity, temperature, humidity, i2c, communication, sensor, arduino, code
• LamaPLC: HX711 24-bit analog-to-digital converter (ADC)	2026/04/11 18:28	hx711, hx-711, analog-to-digital, adc, converter, load cell, wheatstone bridge, weight, sensor, communication, arduino, code
• lamaPLC: INA modules with Arduino libraries	2026/04/11 19:54	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina219, gy-219, ina226, gy-216, ina228, gy-228, ina237, ina238, ina260, ina3221, ina

• <a href="#">lamaPLC: INA226 - current/voltage/power monitor with I<sup>2</sup>C communication</a>	2026/04/23 21:52	<a href="#">i2c</a> , <a href="#">i c</a> , <a href="#">communication</a> , <a href="#">arduino</a> , <a href="#">energy</a> , <a href="#">power</a> , <a href="#">current</a> , <a href="#">monitor</a> , <a href="#">sensor</a> , <a href="#">ina226</a> , <a href="#">ina219</a> , <a href="#">ina</a>
• <a href="#">lamaPlc: Industrial Ethernet (IE) Basic</a>	2026/04/23 21:51	<a href="#">communication</a> , <a href="#">bus</a> , <a href="#">ethernet</a> , <a href="#">industrial ethernet</a> , <a href="#">ie</a> , <a href="#">ethercat</a> , <a href="#">ethernet ip</a> , <a href="#">profinet</a> , <a href="#">powerlink</a> , <a href="#">sercos</a> , <a href="#">iii</a> , <a href="#">cc-link</a> , <a href="#">modbus tcp</a> , <a href="#">ieee</a> , <a href="#">rstp</a> , <a href="#">stp</a>
• <a href="#">lamaPLC: LCD 1602/2004 with I<sup>2</sup>C communication</a>	2026/02/14 18:27	<a href="#">communication</a> , <a href="#">i2c</a> , <a href="#">display</a> , <a href="#">lcd</a> , <a href="#">1602</a> , <a href="#">2004</a> , <a href="#">hd44780</a> , <a href="#">pcf8574</a> , <a href="#">pcf8574t</a> , <a href="#">pcf8574at</a> , <a href="#">arduino</a>
• <a href="#">lamaPLC: LTC3588 - Nanopower energy harvesting power supply IC</a>	2026/04/23 21:52	<a href="#">communication</a> , <a href="#">arduino</a> , <a href="#">sensor</a> , <a href="#">energy harvesting</a> , <a href="#">energy</a> , <a href="#">ambient power</a>
• <a href="#">LamaPLC: MAX30100/MAX30102 Heart Rate Click Sensor Module</a>	2026/04/23 21:52	<a href="#">max30102</a> , <a href="#">max30100</a> , <a href="#">heart rate click</a> , <a href="#">sensor</a> , <a href="#">communication</a> , <a href="#">i2c</a> , <a href="#">arduino</a> , <a href="#">code</a>
• <a href="#">lamaPLC: MCP23017 / MCP23S17 16-Bit I/O Expander with Serial Interface I<sup>2</sup>C / SPI</a>	2026/04/23 21:52	<a href="#">communication</a> , <a href="#">i2c</a> , <a href="#">mcp23017</a> , <a href="#">mcp23s17</a> , <a href="#">spi</a> , <a href="#">i o expander</a> , <a href="#">serial</a> , <a href="#">cjmcu-2317</a> , <a href="#">cjmcu</a>
• <a href="#">LamaPLC: MH-Z19 series of NDIR CO<sub>2</sub> sensors</a>	2026/04/23 21:52	<a href="#">mh-z19</a> , <a href="#">mh-z19d</a> , <a href="#">mh-z19c</a> , <a href="#">mh-z19b</a> , <a href="#">mh-z19e</a> , <a href="#">ndir</a> , <a href="#">co2</a> , <a href="#">sensor</a> , <a href="#">winsen</a> , <a href="#">uart</a> , <a href="#">pwm</a> , <a href="#">communication</a> , <a href="#">non-dispersive infrared</a> , <a href="#">infrared</a> , <a href="#">ir</a> , <a href="#">temperature</a> , <a href="#">arduino</a> , <a href="#">code</a> , <a href="#">tasmota</a>
• <a href="#">LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I<sup>2</sup>C communication</a>	2026/04/23 21:52	<a href="#">paj7620u2</a> , <a href="#">gy-paj7620</a> , <a href="#">pixart</a> , <a href="#">gesture recognition</a> , <a href="#">i2c</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a>
• <a href="#">lamaPlc: Profinet</a>	2026/04/23 21:51	<a href="#">communication</a> , <a href="#">bus</a> , <a href="#">profinet</a> , <a href="#">mrp</a> , <a href="#">rstp</a> , <a href="#">gsdml</a> , <a href="#">xml</a> , <a href="#">profibus</a> , <a href="#">ethernet</a> , <a href="#">tcp</a>
• <a href="#">lamaPLC: PTA8C04 4-channel PT100 Modbus Modul</a>	2026/02/14 18:42	<a href="#">pta8c04</a> , <a href="#">sensor</a> , <a href="#">modbus</a> , <a href="#">rtu</a> , <a href="#">rs-485</a> , <a href="#">communication</a> , <a href="#">platine</a> , <a href="#">um72</a>
• <a href="#">LamaPLC: S7-1500 and Metrawatt EM2389 Modbus TCP communication</a>	2026/04/23 21:52	<a href="#">simatic</a> , <a href="#">s7</a> , <a href="#">modbus</a> , <a href="#">communication</a> , <a href="#">metrawatt</a> , <a href="#">em2389</a> , <a href="#">source code</a> , <a href="#">scl</a> , <a href="#">mid</a>
• <a href="#">LamaPLC: S7-1500 and Sicam Q200 Modbus TCP communication</a>	2026/04/23 21:52	<a href="#">simatic</a> , <a href="#">s7</a> , <a href="#">modbus</a> , <a href="#">tia portal</a> , <a href="#">communication</a> , <a href="#">sicam</a> , <a href="#">q200</a> , <a href="#">sicam q200</a> , <a href="#">source code</a> , <a href="#">scl</a> , <a href="#">class a</a>
• <a href="#">lamaPLC: S7-1500 and UICPAL Temp.humi.sensor Modbus TCP communication</a>	2023/06/19 23:24	<a href="#">bus</a> , <a href="#">communication</a> , <a href="#">s7</a> , <a href="#">simatic</a> , <a href="#">s7 1500</a> , <a href="#">s7 1200</a> , <a href="#">scl</a> , <a href="#">uicpal</a> , <a href="#">temperature</a> , <a href="#">humidity</a> , <a href="#">modbus</a> , <a href="#">example</a> , <a href="#">download</a> , <a href="#">tia portal</a>
• <a href="#">LamaPLC: SGP Sensirion TVOC/VOC sensors with I<sup>2</sup>C communication</a>	2026/04/15 19:41	<a href="#">sgp30</a> , <a href="#">sgp40</a> , <a href="#">sgp41</a> , <a href="#">sensirion</a> , <a href="#">gas-sensor</a> , <a href="#">i2c</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a> , <a href="#">eco2</a> , <a href="#">voc</a> , <a href="#">tvoc</a> , <a href="#">indoor air quality</a> , <a href="#">iaq</a> , <a href="#">nox</a> , <a href="#">hydrogen</a>
• <a href="#">LamaPLC: SHT Sensirion Temperature/humidity sensor with I<sup>2</sup>C communication</a>	2026/04/23 21:52	<a href="#">sht20</a> , <a href="#">sht21</a> , <a href="#">sht25</a> , <a href="#">sht30</a> , <a href="#">sht31</a> , <a href="#">sht35</a> , <a href="#">sht40</a> , <a href="#">gy21</a> , <a href="#">temperature</a> , <a href="#">humidity</a> , <a href="#">i2c</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a>
• <a href="#">lamaPLC: TCA9548A (HW617); Low-Voltage 8-Channel I<sup>2</sup>C Switch Module</a>	2026/02/14 23:51	<a href="#">tca9548a</a> , <a href="#">hw617</a> , <a href="#">i2c</a> , <a href="#">switch</a> , <a href="#">communication</a> , <a href="#">expansion board</a> , <a href="#">arduino</a>

• <a href="#">LamaPLC: Texas Instruments ADCs: Delta-sigma multi-channel Analog Converters with SPI communication</a>	2026/04/23 21:52	<a href="#">ads111x</a> , <a href="#">ads12xx</a> , <a href="#">delta-sigma</a> , <a href="#">converter</a> , <a href="#">texas instruments</a> , <a href="#">adc</a> , <a href="#">spi</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a> , <a href="#">ads1110</a> , <a href="#">ads1112</a> , <a href="#">ads1113</a> , <a href="#">ads1114</a> , <a href="#">ads1115</a> , <a href="#">ads1118</a> , <a href="#">ads1119</a> , <a href="#">ads1220</a> , <a href="#">ads1232</a> , <a href="#">ads1234</a> , <a href="#">ads1256</a> , <a href="#">ads1261</a> , <a href="#">ads1263</a> , <a href="#">multi channel</a>
• <a href="#">LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I<sup>2</sup>C communication</a>	2026/04/23 21:52	<a href="#">tof050c</a> , <a href="#">vl6180</a> , <a href="#">tof200c</a> , <a href="#">vl53l0x</a> , <a href="#">tof400c</a> , <a href="#">vl53l1x</a> , <a href="#">stmicroelectronics</a> , <a href="#">time-of-flight</a> , <a href="#">tof</a> , <a href="#">i2c</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a>
• <a href="#">lamaPLC: TWAI basics</a>	2026/04/23 21:51	<a href="#">bus</a> , <a href="#">communication</a> , <a href="#">as-i</a> , <a href="#">basic</a> , <a href="#">can</a> , <a href="#">twai</a> , <a href="#">espressif</a> , <a href="#">esp32</a>
• <a href="#">LamaPLC: UICPAL Temp.humi.sensor</a>	2023/06/25 00:43	<a href="#">simatic</a> , <a href="#">s7</a> , <a href="#">modbus</a> , <a href="#">communication</a> , <a href="#">temperature</a> , <a href="#">humidity</a> , <a href="#">sensor</a>
• <a href="#">LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I<sup>2</sup>C communication</a>	2026/04/23 21:52	<a href="#">vl53l0x</a> , <a href="#">vl53l1x</a> , <a href="#">vl53l0 1xv2</a> , <a href="#">gy-530</a> , <a href="#">time-of-flight</a> , <a href="#">tof</a> , <a href="#">laser-ranging</a> , <a href="#">i2c</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a>
• <a href="#">LamaPLC: VL6180X STMicroelectronics Time-of-Flight (ToF) sensor with I<sup>2</sup>C communication</a>	2026/04/23 21:52	<a href="#">vl6180x</a> , <a href="#">stmicroelectronics</a> , <a href="#">time-of-flight</a> , <a href="#">tof</a> , <a href="#">i2c</a> , <a href="#">communication</a> , <a href="#">sensor</a> , <a href="#">arduino</a> , <a href="#">code</a>
• <a href="#">lamaPLC: Waveshare LoRA products</a>	2026/03/07 01:46	<a href="#">waveshare</a> , <a href="#">lora manufacturer</a> , <a href="#">communication</a> , <a href="#">lora</a> , <a href="#">modul</a> , <a href="#">usb-to-lora-xf02</a> , <a href="#">core 1262</a> , <a href="#">1262</a> , <a href="#">spi</a> , <a href="#">arduino</a> , <a href="#">rp2040-lora</a> , <a href="#">rp2040</a>
• <a href="#">LamaPLC: XTM35SC Modbus communication</a>	2024/08/18 16:52	<a href="#">xtm35sc</a> , <a href="#">modbus</a> , <a href="#">modbus rtu</a> , <a href="#">measuring</a> , <a href="#">power</a> , <a href="#">communication</a> , <a href="#">current meter</a> , <a href="#">voltmeter</a>
• <a href="#">lamaPLC: YR-3180 - Weight sensor module with UART or Modbus communication</a>	2026/02/15 00:00	<a href="#">communication</a> , <a href="#">modbus</a> , <a href="#">rtu</a> , <a href="#">sensor</a> , <a href="#">weight</a> , <a href="#">yr-3180</a> , <a href="#">hx710b</a> , <a href="#">arduino</a> , <a href="#">ttl</a> , <a href="#">rs-485</a>
• <a href="#">Magnetic angle sensors</a>	2026/03/05 21:19	<a href="#">magnetic angle sensor</a> , <a href="#">magnetic flux</a> , <a href="#">sensor</a> , <a href="#">spi</a> , <a href="#">i2c</a> , <a href="#">pwm</a> , <a href="#">communication</a> , <a href="#">modul</a> , <a href="#">as5047p</a> , <a href="#">as5600</a> , <a href="#">mt6701</a> , <a href="#">mt6816</a> , <a href="#">mt6835</a> , <a href="#">tle5012b</a> , <a href="#">amr</a> , <a href="#">gmr</a> , <a href="#">tmr</a> , <a href="#">anisotropic magnetoresistive</a>
• <a href="#">NT18B07: 7 Kanal RS485 Temperatur Sensor with Modbus RTU</a>	2026/02/14 18:49	<a href="#">nt18b07</a> , <a href="#">sensor</a> , <a href="#">modbus</a> , <a href="#">rtu</a> , <a href="#">rs-485</a> , <a href="#">communication</a> , <a href="#">platine</a>
• <a href="#">Simatic Modbus S7 error- and statuscodes</a>	2026/04/23 21:52	<a href="#">communication</a> , <a href="#">bus</a> , <a href="#">modbus</a> , <a href="#">error</a> , <a href="#">modbus error code</a> , <a href="#">7000</a> , <a href="#">7001</a> , <a href="#">7002</a> , <a href="#">7003</a> , <a href="#">7004</a> , <a href="#">7005</a> , <a href="#">7006</a> , <a href="#">80a1</a> , <a href="#">simatic</a> , <a href="#">s7</a> , <a href="#">siemens</a> , <a href="#">tia</a>
• <a href="#">Waveshare</a>	2026/04/23 21:52	<a href="#">waveshare</a> , <a href="#">converter</a> , <a href="#">modbus</a> , <a href="#">modbus rtu</a> , <a href="#">modbus tcp</a> , <a href="#">communication</a>
• <a href="#">XTM35SC current / voltage meter</a>	2026/04/23 21:52	<a href="#">xtm35sc</a> , <a href="#">modbus</a> , <a href="#">modbus rtu</a> , <a href="#">measuring</a> , <a href="#">power</a> , <a href="#">communication</a> , <a href="#">current meter</a> , <a href="#">voltmeter</a>

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