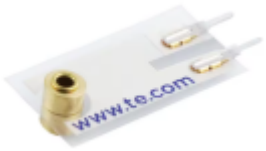
lamaPLC project: Arduino - Vibration sensors



A vibration sensor is a device that detects mechanical oscillations and transforms them into electrical signals to measure displacement, velocity, or acceleration. They are vital for predictive maintenance, enabling teams to identify machine issues, such as misalignment or bearing wear, before failures become catastrophic.

Common Types of Vibration Sensors

Selecting a sensor depends on the frequency range and whether your measurement target is displacement (position), velocity (speed), or acceleration.

Sensor Type	Best For	Typical Use Case	Key Benefit
Piezoelectric	High frequencies (>1 kHz)	Bearing monitoring, gearboxes, turbines	Extremely robust, wide frequency range
MEMS (Capacitive)	Low frequencies (0–1 kHz)	Imbalance, misalignment, looseness	Low cost, low power, long battery life
Eddy-Current	Shaft displacement	Non-contact monitoring of rotating shafts	Measures distance without physical contact
Velocity (Electrodynamic)	Machinery protection	Heavy industrial machines, pumps, fans	Self-powered and less prone to overload
Laser Displacement	Delicate/Hot surfaces	Precision measurement in clean or harsh environments	High precision, non-contact measurement

Key Applications

- **Industrial Health Monitoring:** Used on pumps, motors, and fans to detect early signs of wear and prevent downtime.
- **Structural Safety:** Installed on bridges, dams, and buildings to monitor seismic performance and structural health.
- **Security & Alarms:** Detects forced entry on doors or windows (e.g., car alarms or smart home sensors).
- **Quality Control:** Automotive and aerospace companies test finished products against vibration tolerance benchmarks

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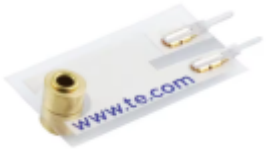
Comparison: GXFM0459 vs. LDTM-028K

Feature	GXFM0459 (Ceramic Module)	LDTM-028K (Film Sensor)
Physical Form	Rigid ceramic disk on a PCB	Flexible thin polymer film
Detection Type	Best for knocks, taps, or high-impact shocks	Best for continuous vibration and low-frequency motion
Wiring 3-pin	(VCC, GND, OUT)	2-pin (Raw AC output)
Signal Handling	Built-in amplifier/comparator	Requires external resistor/circuit

LDTM-028K (Film Sensor)



The **LDTM-028K** is a piezoelectric film vibration sensor.

It specifically features a cantilever beam design with an integrated mass (*the “M” in the name*) to increase its sensitivity, especially at lower frequencies.

LDTM 028K Key Characteristics

- **Technology:** It employs a flexible **PVDF** (*Polyvinylidene Fluoride*) polymer film that is 28 µm thick.
- **Operating Principle:** When the film is bent or vibrates, it produces a high voltage output proportional to the amount of strain.
- **Dual Function:**
  - **Vibration Sensor:** Functions as an accelerometer when its contacts support it, and it is free to vibrate.
  - **Flexible Switch:** Functions as a switch that produces sufficient voltage to directly activate MOSFET or CMOS circuits when pressed by direct contact.
- **Key Benefit:** The additional mass decreases the resonant frequency, increasing sensitivity to low-frequency movements and strong shocks.

LDTM 028K Technical Specifications

- **Sensitivity:** Approximately (200 mV/g at resonance).
- **Frequency Range:** Typically 0.1 Hz to 180 Hz.
- **Temperature Range:** 0°C to 85°C.

Wiring the Standalone LDTM 028K Sensor (Raw Element)

The standalone LDTM-028K features only two crimped contacts. Since piezoelectric elements can produce very high voltage spikes (AC), they need a dedicated circuit to protect your microcontroller and ensure the signal remains stable.

Parallel Resistor: Attach a 1 MΩ resistor across the sensor's two pins. It functions as a pull-down resistor, helping to dissipate static charge.

Microcontroller Connection

- Connect one pin to GND.
- Connect the other pin to an Analogue Input pin (e.g., A0).

Protection (optional but recommended): To prevent voltage spikes from damaging the pins, some designers install a Schottky diode or a Zener diode across the terminals to clamp the voltage to the supply level.

Arduino example code for the LDTM 028K Standalone Sensor

Connect a 1 MΩ resistor in parallel with the sensor's two pins to prevent the analogue input from *"floating"* and to dissipate static charges, reducing the risk of false readings or excessive voltage.

- Move the signal wire from A0 to Digital Pin 2 (Interrupt 0).
- Keep the 1 MΩ resistor in parallel between Pin 2 and GND.

This sketch uses a *"hardware interrupt"* to promptly detect vibrations, even when the main program is busy with other tasks.

```
/*
 * LDTM-028K Interrupt-Driven Detection
 * Connect sensor to Digital Pin 2 with a 1M Ohm resistor to GND.
 */

const byte PIEZO_PIN = 2;       // Interrupt-capable pin (Uno/Nano: Pin 2 or
3)
const byte LED_PIN = 13;        // Built-in LED

// 'volatile' is required for variables shared between main loop and
interrupt
volatile bool vibrationDetected = false;

void setup() {
  Serial.begin(115200);         // Higher baud rate for fast events
  pinMode(LED_PIN, OUTPUT);
  pinMode(PIEZO_PIN, INPUT);    // Sensor acts as a digital pulse generator

  // Trigger the 'vibrationISR' function when Pin 2 goes from LOW to HIGH
(RISING)
  attachInterrupt(digitalPinToInterrupt(PIEZO_PIN), vibrationISR, RISING);

  Serial.println("System Armed. Waiting for vibration...");
}

void loop() {
  if (vibrationDetected) {
    Serial.println("!!! IMPACT DETECTED !!!");

    // Visual feedback
    digitalWrite(LED_PIN, HIGH);
```

```
    delay(500);                 // Short pause to show the LED lit
    digitalWrite(LED_PIN, LOW);

    // Reset the flag so we can catch the next one
    vibrationDetected = false;
  }

  // Your main code can do other things here without missing the sensor
trigger
}

// The Interrupt Service Routine (ISR) - Must be fast and short
void vibrationISR() {
  vibrationDetected = true;
}
```

Why use this method?

- **Zero Lag:** The *vibrationISR* function executes immediately when the piezo film detects a voltage spike.
- **Multitasking:** You can insert resource-intensive code in the *loop()* (such as driving a display or processing data) without risking missing a quick knock or vibration.
- **Power Saving:** This approach lets you put the Arduino into *"Sleep Mode"* and have the vibration sensor wake it.

GXFM0459 (Ceramic Module)

The GXFM0459 is a standard alphanumeric SKU for an Analog Piezoelectric Ceramic Vibration Module. It is designed to detect mechanical stress (taps, knocks, or vibrations) and convert it into an electrical signal proportional to the impact strength.

GXFM0459 Technical Specifications

The module typically integrates a ceramic piezo disk with a basic buffering circuit on a small PCB.

Parameter	Value
Operating Voltage	3.3V to 5V DC
Working Current	< 1mA
Output Type	Analog voltage (and sometimes TTL Digital)
Operating Temperature	-10 .. 70 °C

GXFM0459 Pinout and Connectivity

Most modules use a 3-pin or 4-pin header for easy integration with microcontrollers like Arduino.

- **S / A0 (Signal):** Analog output. Connect to an Analog Input pin (e.g., A0).
- **+ / VCC:** Power supply (3.3V or 5V).
- **- / GND:** Ground connection.
- **D0 (Optional):** Digital TTL output. High signal when vibration exceeds the threshold set by the

onboard potentiometer.

GXFM0459 Key Features

- **Proportional Output:** Unlike simple digital switches such as the SW-420, the GXFM0459 provides an analog signal, enabling you to gauge the strength of a strike, which is useful for electronic drum applications.
- **Adjustable Sensitivity:** If your version features a potentiometer (the small blue screw), you can turn it to set the threshold that triggers the digital output (D0).
- **Durability:** The ceramic element is sturdy and highly responsive to quick, high-frequency impacts, such as tapping on a table.

Arduino - GXFM0459 Module Wiring Diagram

If your module has 4 pins, follow this standard setup:

Module Pin	Arduino Pin	Description
VCC / +	5V	Power supply for the module.
GND / -	GND	Ground connection.
A0 / S	Analog A0	Raw signal for measuring vibration intensity.
D0 / L	Digital D2	(Optional) Threshold-based high/low trigger.

Arduino - GXFM0459 Example Code

This sketch monitors the analog value to detect the “strength” of a knock while also using the digital pin to trigger an alert instantly.

```
/*
 * GXFM0459 Ceramic Vibration Sensor Example
 * Reads analog intensity and digital hit detection.
 */

const int ANALOG_PIN = A0;  // Connect to A0 for intensity
const int DIGITAL_PIN = 2;  // Connect to D2 for quick trigger
const int LED_PIN = 13;     // Built-in LED for feedback

void setup() {
  Serial.begin(115200);     // High baud rate for fast vibration data
  pinMode(DIGITAL_PIN, INPUT);
  pinMode(LED_PIN, OUTPUT);

  Serial.println("GXFM0459 Ready. Tap the sensor!");
}

void loop() {
  // 1. Read Analog Intensity (0-1023)
  int intensity = analogRead(ANALOG_PIN);
```

```
  // 2. Read Digital Trigger (0 or 1)
  bool hitDetected = digitalRead(DIGITAL_PIN);

  // Only print if there is actual movement to avoid flooding the monitor
  if (intensity > 5 || hitDetected == HIGH) {
    Serial.print("Intensity: ");
    Serial.print(intensity);

    if (hitDetected == HIGH) {
      Serial.println(" | *** DIGITAL TRIGGERED ***");
      digitalWrite(LED_PIN, HIGH); // Light up on hit
      delay(50);                   // Brief flash
      digitalWrite(LED_PIN, LOW);
    } else {
      Serial.println();
    }
  }

  delay(10); // Small delay for stability
}
```

Sensor topics on lamaPLC

Page	Date	Tags
• lamaPLC project: Arduino - OLED SH1106 with AHT20/BMP280 Sensor	2026/04/23 21:51	bmp280, aht20, temperature, humidity, pressure, sensor, arduino, oled, sh1106, arduino code
• lamaPLC project: Arduino - Vibration sensors	2026/04/15 17:21	vibration, sensor, piezoelectric, mems, eddy-current, electrodynamic, gxfm0459, ldtm-028k, arduino, arduino code
• lamaPLC project: Digitales Potentiometer Board Moduls	2026/04/11 18:29	sensor, module, arduino code, renesas, x9c series, x9c102, x9c103, x9c104, x9c503, xdcp, digitally controlled potentiometer
• lamaPLC project: Sension SCD CO² measurement module	2026/04/15 19:34	scd30, scd40, scd41, iaq, ndir, sensor, i2c, arduino code
• lamaPLC: A0221AU / A02YYUW Waterproof Ultrasonic Distance Sensor with UART communication	2026/04/23 21:52	a0221au, a02yyuw, waterproof, ultrasonic, distance, sensor, uart, ip67, serial, sen0311, dfrobot
• LamaPLC: AHT10 Modul	2026/03/22 03:14	communication, i2c, temperature, humidity, sensor, aht, aht 10, modul
• LamaPLC: AHT20 / BMP280 Modul	2026/04/23 21:52	bmp280, aht20, adafruit, temperature, humidity, pressure, sensor, arduino, code, i2c
• LamaPLC: Allegro ACS758 Hall-effect linear current sensors	2026/04/23 21:52	cjmcu, cjmcu-758, acs758, acs758lcb-050b, acs758lcb-100b, acs758kcb-150b, acs758ecb-200b, hall-effect, current, sensor, analog, arduino, code

• LamaPLC: APDS - Avago ALS and proximity detection sensors with I²C communication	2026/04/23 21:52	avago, apds-9900, apds-9930, apds-9960, als, proximity, detection, gesture recognition, gesture, i2c, communication, sensor, arduino, code
• lamaPLC: Arduino Modul: BME680	2026/05/12 18:40	code, c, 2026, arduino, bme680, sensor, i2c, comunication
• lamaPLC: AS5600 Magnetic Induction Angle Measurement Sensor Module	2026/05/13 00:06	communication, i2c, as5600, as-5600, magnetic, induction, angle, sensor
• LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication	2026/04/23 21:52	bme280, bme680, bme688, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, ai, cjmcu, volatile organic compounds, vocs, volatile sulfur compounds, vscs, iaq
• LamaPLC: BQ25570 / CJMCU-2557 - Texas Instruments nano-power management IC and module	2026/04/23 21:52	bq25570, sensor, texas instruments, nano-power management, dc-dc boost charger, mppt, solar, thermoelectric, piezoelectric, energy harvesting, eh
• LamaPLC: CJMCU-219/INA-219 breakout board/IC with I²C communication	2026/04/23 21:52	cjmcu-219, ina-219, ina219, breakout board, i2c, communication, sensor, voltage, current, arduino, code, cjmcu
• LamaPLC: CJMCU-3216 / AP-3216 integrated digital ambient light and proximity sensor module/IC with I²C communication	2026/04/23 21:52	cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication
• LamaPLC: CJMCU-3901/PMW-3901 compact optical flow sensor module/IC by PixArt with SPI communication	2026/04/23 21:52	cjmcu-3901, cjmcu, pmw3901, pmw-3901, optical flow, sensor, pixart, spi, communication, arduino, code, pmw3901mb-txqt
• LamaPLC: CJMCU-6701: Biosensor for measuring Galvanic Skin Response (GSR) with SPI 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-6814 combined gas sensor module for CO, NO_2, NH_3	2026/04/23 21:52	analog, cjmcu, cjmcu-6814, mics6814, mics-6814, sensor, arduino, code, carbon monoxide, co, ammonia, nh_3, nitrogen dioxide, no_2
• lamaPLC: CJMCU-811 CCS811 Gas Sensor (VOCs TVOC CO2)	2026/04/23 21:52	cjmcu-811, ccs811, gas, sensor, vocs, tvoc, eco2, co2, arduino, air quality metal oxide, mox, i2c, micropython, rp2040-eth
• LamaPLC: CJMCU-8221 Analog Devices Precision instrumentation amplifier module	2026/04/23 21:52	cjmcu-8221, ad8221ar, analog devices, amplifier, sensor, cjmcu
• LamaPLC: D6T Omron Non-Contact Thermal Sensors with I²C communication	2026/04/23 21:52	d6t, d6t-32l, d6t-44l, d6t-8l, d6t-1a, omron, non-contact, thermal, sensor, i2c, arduino, code
• LamaPLC: DHT Temperature /Humidity sensors with 1-wire / I²C communication	2026/04/23 21:52	dht11, dht20, dht22, temperature, humidity, pressure, sensor, 1-wire, arduino, code

• 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: 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 I²C communication	2026/04/23 21:52	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco₂, tvoc, aqi, indoor air quality, iaq, co₂, voc
• lamaPLC: ENS160 + AHT21 Air Quality Sensor - CO, ECO, TVOC, Temp & Humidity Module	2026/04/23 21:52	arduino, ens160, aht21, air quality, sensor, co, eco, tvoc, module, aqi
• 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: GM MEMS Gas-sensors	2026/04/23 21:52	gm-102b, gm-302b, gm-502b, gm-702b, mems, gas-quality, sensor, arduino, code, nitrogen dioxide, no₂, volatile organic compounds, voc, carbon monoxide, co, ethyl alcohol, c₂h₅ch, formaldehyde, ch₂o, alcohol, c₂h₅oh
• lamaPLC: GY-511 6DOF sensor module	2026/04/23 21:52	stmicroelectronics, lsm303dlhc, i2c, lsm303, sensor, gy-511, 6dof, pololu, module, arduino
• LamaPLC: HC-SR04 Ultrasonic Sensor Module	2026/04/23 21:52	hc-sr04, ultrasonic, sensor, arduino, code
• LamaPLC: HDC Texas Instruments Temperature/humidity sensors with I²C 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 I²C 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	2026/04/23 21:52	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina219, gy-219, ina226, gy-216, ina228, gy-228, ina237, ina238, ina260, ina3221, ina
• lamaPLC: INA226 - current/voltage/power monitor with I²C communication	2026/04/23 21:52	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina226, ina219, ina
• lamaPLC: LTC3588 - Nanopower energy harvesting power supply IC	2026/04/23 21:52	communication, arduino, sensor, energy harvesting, eh, energy, ambient power
• LamaPLC: M01 - V0.4 Laser ranging sensor with UART communication	2026/04/23 21:52	distance measurement, laser, distance, sensor, m01
• LamaPLC: MAX30100/MAX30102 Heart Rate Click Sensor Module	2026/04/23 21:52	max30102, max30100, heart rate click, sensor, communication, i2c, arduino, code
• lamaPLC: Max31865 RTD to Digital Converter - PT100/PT1000 Platine	2026/04/23 21:52	max31865, rtd, pt 100, pt 1000, temperature, spi, platinum, arduino, code, sensor, adafruit
• LamaPLC: MAX4466/MAX9814: Low-noise Microphone Preamplifiers	2026/04/23 21:52	audio, microphone, analogue audio, max4466, max9814, max 4466, max 9814, agc, preamplifiers, sensor, arduino, code
• LamaPLC: MH-Z19 series of NDIR CO_2 sensors	2026/04/23 21:52	mh-z19, mh-z19d, mh-z19c, mh-z19b, mh-z19e, ndir, co_2, sensor, winsen, uart, pwm, communication, non-dispersive infrared, infrared, ir, temperature, arduino, code, tasmota
• lamaPLC: MPU-6050 (HW-123, GY-521) 6-axis MotionTracking device	2026/04/23 21:52	mpu-6050, hw-123, gy-521, 6-axis motiontracking, dmp, temperature, sensor, mems, arduino code, arduino, accelerometer, gyroscope, tilt
• LamaPLC: MQ Winsen Gas-sensors	2026/04/23 21:52	mq, mq-2, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-131, mq-135, mq-137, winsen, gas-sensor, sensor, arduino, code, alcohol, c_2h_5oh, benzine gas, smoke, lpg, propane, c_3h_8, hydrogen, h_2, methane, ch_4, iso-butane, town gas, ammonia, nh_3
• LamaPLC: PIR sensors	2026/04/23 21:52	hc-sr501, hc-sr505, am-312, ekmb ekmc, pir, motion, sensor, arduino, code
• LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I²C communication	2026/04/23 21:52	paj7620u2, gy-paj7620, pixart, gesture recognition, i2c, communication, sensor, arduino, code
• lamaPLC: PT100 / PT1000	2025/09/23 18:59	pt100, pt1000, temperature, sensor, platine, rtd
• lamaPLC: PTA8C04 4-channel PT100 Modbus Modul	2026/02/14 18:42	pta8c04, sensor, modbus, rtu, rs-485, communication, platine, um72
• LamaPLC: RCWL - Microwave radar sensor	2026/04/23 21:52	rcwl-0516, rcwl, microwave, radar, sensor, arduino, code
• lamaPLC: RD-xx - Ai-Thinker Radar Module with UART communication	2026/04/23 21:52	radar, s3km1110, fmcw, rd-01, rd-03, rd-03d, ai-thinker, k-band, 24 ghz, sensor, distance, micro-movements

• lamaPLC: RP2040_ETH_Modul: Read BME 680/688 sensor data	2026/05/12 21:06	code, micropython, 2026, rp2040 eth, bme680, i2c, sensor, communication
• lamaPLC: RP2040_ETH_Modul: Read BME 680/688 sensor data and store in Modbus input registers	2026/05/12 18:58	code, micropython, 2026, rp2040 eth, bme680, i2c, sensor, communication
• LamaPLC: Sensors	2026/04/15 19:42	sensor
• LamaPLC: SGP Sensirion TVOC/VOC sensors with I²C communication	2026/04/15 19:41	sgp30, sgp40, sgp41, sensirion, gas-sensor, i2c, communication, sensor, arduino, code, eco₂, voc, tvoc, indoor air quality, iaq, nox, hydrogen
• LamaPLC: SHT Sensirion Temperature/humidity sensor with I²C communication	2026/04/23 21:52	sht20, sht21, sht25, sht30, sht31, sht35, sht40, gy21, temperature, humidity, i2c, communication, sensor, arduino, code
• LamaPLC: Texas Instruments ADCs: Delta-sigma multi-channel Analog Converters with SPI communication	2026/04/23 21:52	ads111x, ads12xx, delta-sigma, converter, texas instruments, adc, spi, communication, sensor, arduino, code, ads1110, ads1112, ads1113, ads1114, ads1115, ads1118, ads1119, ads1220, ads1232, ads1234, ads1256, ads1261, ads1263, multi channel
• LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I²C communication	2026/04/23 21:52	tof050c, vl6180, tof200c, vl53l0x, tof400c, vl53l1x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• LamaPLC: UICPAL Temp.humi.sensor	2023/06/25 00:43	simatic, s7, modbus, communication, temperature, humidity, sensor
• LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I²C communication	2026/04/23 21:52	vl53l0x, vl53l1x, vl53l0 1xv2, gy-530, time-of-flight, tof, laser-ranging, i2c, communication, sensor, arduino, code
• LamaPLC: VL6180X STMicroelectronics Time-of-Flight (ToF) sensor with I²C communication	2026/04/23 21:52	vl6180x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• LamaPLC: Waveshare TOF Laser Range Sensor with UART / I²C communication	2026/04/23 21:52	distance measurement, laser, range, sensor, tof, waveshare
• lamaPLC: XGZP68xx: Silicon Pressure Sensors/Module	2026/05/15 15:17	communication, i2c, sensor, modul, pressure, cfsensor, xgzp68xx, xgzp6810d, xgzp6857d, xgzp6859d, xgzp6887d, xgzp6897d, xgzp6899a, piezoresistive, capacitive
• lamaPLC: YR-3180 - Weight sensor module with UART or Modbus communication	2026/02/15 00:00	communication, modbus, rtu, sensor, weight, yr-3180, hx710b, arduino, ttl, rs-485
• LM393: Dual differential comparator (flame, light, sound sensors)	2026/05/12 22:18	communication, analog, lm393, lm-393, flame, ir, sound, hall, sensor, ky-026, hw-484, ky-037, ky-038, fc-03, hc-89, ky-024, modul

• Magnetic angle sensors	2026/04/23 21:52	magnetic angle sensor, magnetic flux, sensor, spi, i2c, pwm, communication, modul, as5047p, as5600, mt6701, mt6816, mt6835, tle5012b, amr, gmr, tmr, anisotropic magnetoresistive
• NT18B07: 7 Kanal RS485 Temperatur Sensor with Modbus RTU	2026/02/14 18:49	nt18b07, sensor, modbus, rtu, rs-485, communication, platine
• PT100 / PT1000 sensors	2026/04/23 21:52	rtd, pt100, pt1000, sensor, temperature
• Radar Module RD-xx	2026/04/23 21:52	radar, s3km1110, fmcw, rd-03, k-band, 24 ghz, sensor, distance, micro-movements

Vibration, Sensor, Piezoelectric, MEMS, Eddy-Current, Electrodynamic, GXFM0459, LDTM-028K, Arduino, Arduino code