MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

# Pressure 20 Click



PID: MIKROE-5153

**Pressure 20 Click** is a compact add-on board that contains a board-mount pressure sensor. This board features the ICP-20100, a high-accuracy digital barometric pressure and temperature sensor from TDK InvenSense. The ICP-20100 is based on MEMS capacitive technology with ultra-low noise, low power consumption, and temperature stability alongside programmable output: all-pressure, all-temperature, or pressure and temperature output. It converts output data into a 20-bit digital value and sends the information via a configurable host interface that supports SPI and I2C serial communications. It measures pressure from 30kPa up to 110kPa with an accuracy of ±20Pa over a wide operating temperature range. This Click board™ is suited for various pressure-based applications, industrial, consumer, weather stations, and more.

Pressure 20 Click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

## How does it work?

Pressure 20 Click as its foundation uses the ICP-20100, a high accuracy, low power, barometric pressure, and temperature sensor solution from TDK InvenSense. It integrates a capacitive pressure sensor for monitoring pressure changes in the range from 30kPa to 110kPa with an accuracy of ±20Pa over a wide operating temperature range. The ICP-20100 achieves the industry's lowest pressure noise of 0.4Pa RMS while attaining the industry's lowest power consumption and retains excellent temperature stability with a temperature coefficient of ±0.4Pa/°C.

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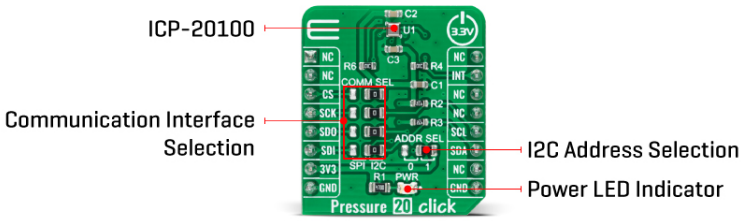


This MEMS sensor consists of a capacitive pressure sensor whose capacitance changes according to the pressure applied. An integrated temperature sensor on the same MEMS sensor allows accurate temperature measurements. Other industry-leading features include up to 20-bits output data, programmable digital filters, calibration, FIFO, and programmable interrupts.

Pressure 20 Click allows using both I2C and SPI interfaces with a maximum frequency of 1MHz for I2C and 12MHz for SPI communication. The selection can be made by positioning SMD jumpers labeled as COMM SEL in an appropriate position. Note that all the jumpers' positions must be on the same side, or the Click board™ may become unresponsive. While the I2C interface is selected, the ICP-20100 allows choosing the least significant bit (LSB) of its I2C slave address using the SMD jumper labeled ADDR SEL. This Click board™ also possesses an additional interrupt pin, routed to the INT pin on the mikroBUS™ socket, indicating when a specific interrupt event occurs, such as FIFO overflow/underflow, the threshold over/underrun, and more.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

## Specifications

| | |
|---|---|
| Type | Pressure |
| Applications | Can be used for various pressure-based applications, industrial, consumer, weather stations, and more |
| On-board modules | ICP-20100 - digital barometric pressure and temperature sensor from TDK InvenSense |
| Key Features | Low power consumption, advanced absolute and relative accuracy, improved temperature stability, programmable output and noise performance, digital filtering for pressure signals, programmable interrupt, selectable interface, and more |
| Interface | I2C,SPI |

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| | |
|---|---|
| ClickID | No |
| Compatibility | mikroBUS™ |
| Click board size | S (28.6 x 25.4 mm) |
| Input Voltage | 3.3V |

## Pinout diagram

This table shows how the pinout on Pressure 20 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

| Notes | Pin | mikroBUS | | | | Pin | Notes |
|---|---|---|---|---|---|---|---|
| | NC | 1 | AN | PWM | 16 | NC | |
| | NC | 2 | RST | INT | 15 | **INT** | Interrupt |
| SPI Chip Select | **CS** | 3 | CS | RX | 14 | NC | |
| SPI Clock | **SCK** | 4 | SCK | TX | 13 | NC | |
| SPI Data OUT | **SDO** | 5 | MISO | SCL | 12 | **SCL** | I2C Clock |
| SPI Data IN | **SDI** | 6 | MOSI | SDA | 11 | **SDA** | I2C Data |
| Power Supply | **3.3V** | 7 | 3.3V | 5V | 10 | NC | |
| Ground | **GND** | 8 | GND | GND | 9 | **GND** | Ground |

## Onboard settings and indicators

| Label | Name | Default | Description |
|---|---|---|---|
| LD1 | PWR | - | Power LED Indicator |
| JP1 | ADDR SEL | Right | I2C Address Selection 0/1: Left position 0, Right position 1 |
| JP2-JP5 | COMM SEL | Right | Communication Interface Selection SPI/I2C: Left position SPI, Right position I2C |

## Pressure 20 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | - | 3.3 | - | V |
| Operating Pressure Range | 30 | - | 110 | kPa |
| Absolute Accuracy | - | ±20 | - | Pa |
| Resolution | - | 20 | - | bits |
| Temperature Coefficient | - | ±0.4 | - | Pa/°C |
| Operating Temperature Range | -40 | ±25 | ±85 | °C |

## Software Support

We provide a library for the Pressure 20 Click as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github

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account.

**Library Description**

This library contains API for Pressure 20 Click driver.

Key functions

- pressure20_get_int_pin This function returns the INT pin logic state.
- pressure20_clear_interrupts This function reads and clears the interrupt status register.
- pressure20_read_data This function reads the pressure [mBar] and temperature [Celsius] data.

**Example Description**

This example demonstrates the use of Pressure 20 Click board™ by reading and displaying the pressure and temperature data on the USB UART.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Pressure20

**Additional notes and informations**

Depending on the development board you are using, you may need USB UART click, USB UART 2 Click or RS232 Click to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MikroElektronika compilers.

## mikroSDK

This Click board™ is supported with mikroSDK - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

## Resources

mikroBUS™

mikroSDK

Click board™ Catalog

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Click boards™

## Downloads

Pressure 20 click example on Libstock

ICP-20100 datasheet

Pressure 20 click schematic

Pressure 20 click 2D and 3D files