

# MEMS SENSORS FOR INDUSTRY 5.0



Connected future: STMicroelectronics opens the potential of smart industry



## Revolutionary MEMS sensors paving the way for a human-centric and sustainable industry 5.0

**Industry 5.0** is the new phase of the industrial revolution set to create a more collaborative and sustainable manufacturing environment with a human orientation.

Sensors are contributing immensely to this transformation: optimizing efficiency, enabling safe and effective human-machine interaction, improving the effectiveness of workers, and supervising their security and well-being. ST is about to revolutionize industry 5.0 with **smart, open, and accurate** MEMS sensors, combined with **machine learning core (MLC)** and **intelligent sensor processing unit (ISPU)** technologies, which enable local signal processing inside sensors.

ST industrial MEMS sensors are part of our **10-year product longevity commitment program**.

### KEY APPLICATIONS

- Vibration/condition monitoring, anomaly detection, and predictive maintenance
- Robotics, automation, and drones
- Inertial navigation and position and motion tracking
- Industrial IoT and connected devices
- Structural health monitoring
- Precision/dynamic inclinometers and leveling instruments
- Antenna and platform pointing, leveling, and stabilization
- Optical image and lens stabilization
- Asset and parcel tracking, monitoring, shock detection, and logging
- Presence and motion detection
- Building automation and appliances
- Antitempering in smart meters and gas pressure measurement in gas meters

## Industry 5.0 sensors

Part number	Description	Full scale	Noise density (Typ.)	Package size (mm)
<b>Vibration sensor</b>				
IIS3DWB	Ultrawide bandwidth, low-noise, 3-axis digital vibration sensor	$\pm 2; \pm 4; \pm 8; \pm 16$	60 $\mu\text{g}/\sqrt{\text{Hz}}$	2.5 x 3 x 0.86 LGA-14
<b>Inclinometers</b>				
IIS2ICLX	High-accuracy and stability, high-resolution, low-power, 2-axis digital inclinometer with embedded machine learning core	$\pm 0.5; \pm 1; \pm 2; \pm 3$	15 $\mu\text{g}/\sqrt{\text{Hz}}$	5 x 5 x 1.7 LGA-16
IIS3DHHC	High-resolution, high-stability 3-axis digital inclinometer	$\pm 2.5$ g	45 $\mu\text{g}/\sqrt{\text{Hz}}$	
<b>Accelerometers</b>				
IIS2DLPC	High-performance, high versatility, ultralow-power 3-axis accelerometer	$\pm 2, \pm 4, \pm 8, \pm 16$ g	90 $\mu\text{g}/\sqrt{\text{Hz}}$	2 x 2 x 0.7 LGA-12
<b>Inertial measurement units</b>				
ISM330DHCX	High stability 6-axis IMU with embedded machine learning core:	$\pm 2, \pm 4, \pm 8, \pm 16$ g from $\pm 125$ up to $\pm 4000$ dps	60 $\mu\text{g}/\sqrt{\text{Hz}}$ (axel) 0.005°/s/ $\sqrt{\text{Hz}}$ (gyro)	2.5 x 3 x 0.83 LGA-14
ISM330IS/ ISM330ISN	6-axis IMU with ISPU - intelligent sensor processing unit	$\pm 2, \pm 4, \pm 8, \pm 16$ g from $\pm 125$ up to $\pm 2000$ dps	70 $\mu\text{g}/\sqrt{\text{Hz}}$ (axel) 0.0034°/s/ $\sqrt{\text{Hz}}$ (gyro)	
<b>Magnetometers</b>				
IIS2MDC	High-accuracy, ultra-low-power, 3-axis digital magnetometer	$\pm 50$ gauss	3 mG rms	2 x 2 x 0.7 LGA-12
<b>Pressure sensors</b>				
ILPS22QS	Dual full-scale, 1260 hPa and 4060 hPa, absolute digital output barometer with embedded Qvar electrostatic sensor	260 ~ 1260 hPa	ABS accuracy: 0.5 hPa	2.0 x 2.0 x 0.73 HLGA-10
ILPS28QSW	Dual full-scale, 1260 hPa and 4060 hPa, absolute digital output barometer with Qvar detection in a water-resistant package	260 ~ 4060 hPa		2.8 x 2.8 x 1.95 CCLGA-7
<b>Temperature sensors</b>				
STLM20	Ultralow current 2.4 V precision analog temperature sensor	-55°C to 130°C	Accuracy: $\pm 0.5^\circ\text{C}$	1.00 x 1.30 UDFN-4L / SOT323-5 L
STTS22H	Low-voltage, ultralow-power, 0.5°C accuracy I2 C/SMBus 3.0 temperature sensor	-40 to +125°C	Accuracy: $\pm 0.5^\circ\text{C}$ (max)	2 x 2 x 0.55 UDFN-6L
STTS751	2.25 V low-voltage local digital temperature sensor	-40°C to +125°C	Accuracy: $\pm 0.5^\circ\text{C}$	
<b>MEMS microphones</b>				
Part number	Description	SNR/Sensitivity/AOP	Current consumption ( $\mu\text{A}$ )	Package size (mm)
IMP23ABSU	Single-ended analog bottom port high performance MEMS microphone. Frequency response up to 80 kHz for ultrasound analysis	64 dB/-38 $\pm 1$ dBV/130 dB	120	Bottom port 3.5 x 2.65 x 0.98
IMP24DT05	Digital (PDM) top-port MEMS microphone with enhanced ESD protection, high SNR, and acoustic overload point	64 dB/-26 $\pm 3$ dBV/122.5 dB	650	Top port 4 x 3 x 1

## Evaluation tools

Order code	Description
STEVAL-MK1109V3	Professional MEMS tool: ST MEMS adapters motherboard based on the STM32F401VE and compatible with all ST MEMS adapters
X-NUCLE0-IKS02A1	Motion MEMS and MEMS microphone expansion board
STEVAL-STWINBX1	STWIN.box - SensorTile wireless industrial node development kit
STEVAL-BFA001V2B	Multisensor predictive maintenance kit with IO-Link stack v.1.1
STEVAL-PROTEUS1	Industrial sensor evaluation kit for condition monitoring based on the 2.4 GHz STM32WB5MMG module



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