

Application brief

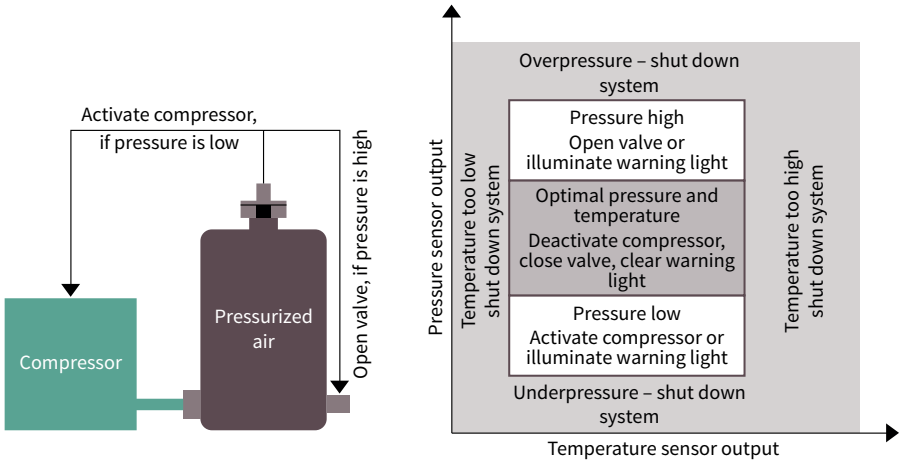
Efficient pressure sensing

Save energy and improve product lifetime by using the XENSIV™ pressure sensor with integrated microcontroller

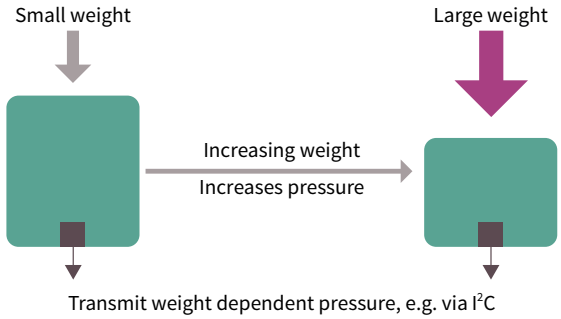
No matter if heating systems, air suspensions, espresso machines or car tires: numerous applications we use in our daily lives require a certain pressure to work at the optimum. However if a wrong pressure is applied not only the customer experience is negatively impacted, but also efficiency, product lifetime or even lead to total damage.

A digital pressure sensor helps to correctly monitor and regulate the pressure or shut down the system, if necessary (e.g. in case of air container damage). Our devices provide accurate real-time pressure values to determine, whether the system operates in the ideal range. Usually, an additional microcontroller is needed to evaluate the data provided by the pressure sensor and take action, when certain thresholds are exceeded.

Schematic example for monitoring and controlling pressure and temperature using SP40 products



Measuring weight that is resting on top of a flexible pressurized container, e.g. on an air suspension



System features

- Keep operating conditions in optimal range
- Automatic adjustment of pressure
- Avoid damage due to wrong pressure or temperature
- Pre-emptive indication of failures and predictive maintenance

System benefits

- Increased lifetime
- Increased efficiency
- Improved end user experience
- Reduced risk of severe failures

SP40 key features

- Integrated industry-standard 8-bit microcontroller
- High media robustness
- High pressure range of up to 1400 kPa
- Wide operating temperature range from -40°C to +125°C
- Integrated temperature sensor
- Integrated acceleration sensor
- Low power consumption
- Integrated self-diagnostics

www.infineon.com/tpms-sensors

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Infineon's XENSIV™ SP40 tire pressure sensor family offers low power sensors featuring an integrated microcontroller. Therefore they allow for significant cost reduction while at the same time providing a high level of energy efficiency, reliability and robustness. This makes the SP40 products suitable for a wide range of industrial and automotive applications operating at pressures between 100 kPa and 1400 kPa. Furthermore the sensors even operate at extreme temperatures of -40°C and +125°C.

On top of the integrated microcontroller, the SP40 products also feature a temperature, voltage and acceleration sensor. The latter has a sampling rate of up to 2 kHz and can be used to measure static acceleration or observe vibrations. Measuring vibrations help to pre-emptively detect failures, e.g. due to loose parts, making the SP40 products ideal for diagnostic purposes and predictive maintenance.

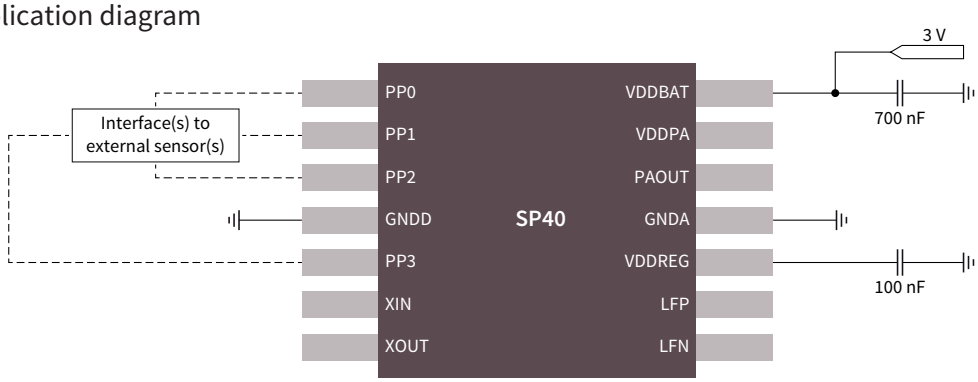
Depending on the application, it may still be necessary to communicate with other devices. For this, the following interfaces are implemented in SP40 with hardware support:

- I²C slave in fast mode (up to 400 kHz)
- UART
- RF transmitter operating in the 315 MHz or 434 MHz band
- LF receiver operating at 125 kHz

Other digital wired interfaces like PWM, I²C master, SPI or SENT can be realized in software by utilizing the 4 general purpose pins.

The RF transmitter and LF receiver can also be used for operating SP40 as a wireless pressure sensor. Learn more in our application brief "Wireless pressure sensing" available for download at www.infineon.com/tpms-sensors

Minimal application diagram



Available product derivatives

Product name	OPN	Pressure range	Flash available for application code
SP400-11-01	SP4001101XTMA1	100 kPa … 900 kPa	12 kB, not fragmented
SP400-11-11	SP4001111XTMA1	100 kPa … 900 kPa	12 kB + 2 kB, fragmented
SP400-15-11	SP4001511XTMA1	100 kPa … 1400 kPa	12 kB + 2 kB, fragmented

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