

# Flow Sensor for Industrial Applications: Overview

For industrial applications, several different fluid/gas flows need to be monitored, as the flow of the fluid could influence the final product under production. Therefore, an accurate measurement is necessary to ensure a high quality product at the end of the production line.

Some of these applications need to fulfill the Safety Integration Level 2 (SIL2) standard. The RX MCU is supported by Functional Safety Platform Software that has already been certified by TÜV. This package supports diagnosis and safety functions that meet the SIL2 standard.

The FS1012 flow sensor, together, with the RX65N MCU allows customers to design a safety solution suitable to monitor the flow of the fluid/gas and access the data by using an Ethernet connection.

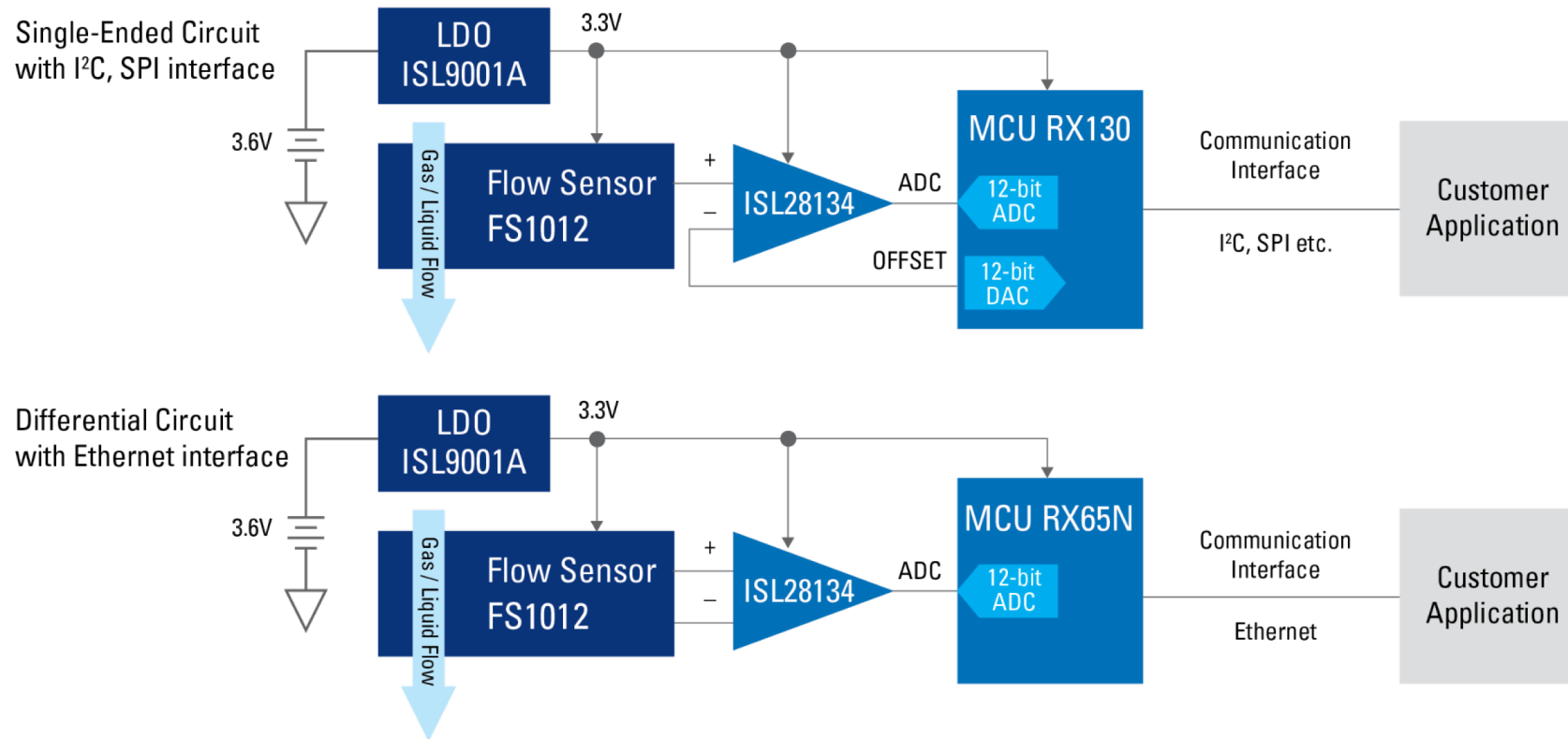
## Key Features:

- SIL compliance by TÜV for the MCUs
- Ease of use - the RX130 offers different integrated peripherals to support SIL compliance.
- Supports MEMS solid-state gas flow sensor for accurate measurements

## Applications:

- Factory automation
- Building automation

# Flow sensor for industrial application: block diagram



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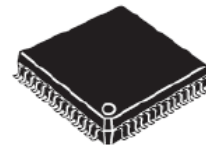
# RX130: HIGH PERFORMANCE MCU WITH TOUCH KEY FUNCTION

**Built-in max. 36-channel capacitive touch sensor**

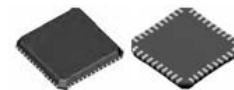
Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• 32-bit MCU @ 32MHz</li> <li>• Operation from a single 1.8 V to 5.5 V</li> <li>• Three low power mode                             <ul style="list-style-type: none"> <li>High Speed Mode : 96uA/MHz</li> <li>Software Standby Mode : 0.37uA</li> <li>Wakeup time from Standby Mode : 4.8uS</li> </ul> </li> <li>• High sensitive 36pin(max.324 Key capacitive touch sensing unit.</li> <li>• Useful functions for IEC60730 compliance</li> <li>• Up to 512KB Flash and 48B RAM</li> <li>• 48pin, 52pin and 64pin LQFP packages</li> </ul>	<ul style="list-style-type: none"> <li>• The RX130 Group integrates a built-in max. 36-channel capacitive touch sensor. The capacitive touch sensor uses an improved detection method compared to previous products and so has vastly improved noise immunity, sensitivity and water resistance.</li> </ul>	<ul style="list-style-type: none"> <li>• Healthcare</li> <li>• Home Appliance</li> <li>• Human Machine Interface</li> <li>• Industrial Sensor</li> <li>• Capacitive Touch Control UI</li> </ul>

## Typical application and key performances

32-MHz, 32-bit RX MCUs, 50 DMIPS, up to 512-KB flash memory, up to 36 pins capacitive touch sensing unit, up to 6 comms channels, 12-bit A/D, D/A, RTC, IEC60730 compliance, 1.8-V to 5.5-V single supply



PLQP0100KB-B 14 × 14mm, 0.5mm pitch  
 PLQP0080KB-B 12 × 12mm, 0.5mm pitch  
 PLQP0064GA-A 14 × 14mm, 0.8mm pitch  
 PLQP0064KB-C 10 × 10mm, 0.5mm pitch  
 PLQP0048KB-B 7 × 7mm, 0.5mm pitch



PWQN0048KB-A 7 × 7mm, 0.5mm pitch

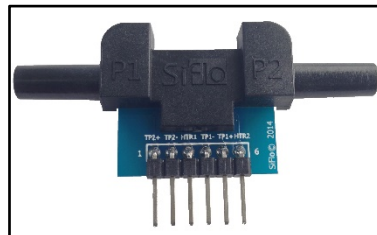
# FS2012/FS1012: Gas or liquid flow sensor

## High Performance Solid-State MEMS Flow Sensor

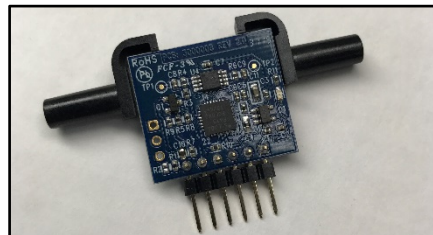
Features	Benefits	Applications
<ul style="list-style-type: none"><li>MEMS Thermopile sensing</li><li>Silicon-carbide coating over MEMS flow sensor</li><li>Low Power, 3V to 5V supply</li><li>Digital and Analog output (FS2012)</li><li>High accuracy (FS2012), 2% of reading (typical)</li><li>Flexible product versions:<ul style="list-style-type: none"><li>mV sensor voltage output</li><li>Fully calibrated and compensated flow for air or liquid</li></ul></li></ul>	<ul style="list-style-type: none"><li>Gas or Liquid flow</li><li>Robust solid isolation technology</li><li>No cavity in MEMS element to cause clogging</li><li>Resistant to vibration and pressure shock</li><li>Food grade compatible version</li><li>Fast response time</li><li>High sensitivity</li><li>Easy cleaning and sterilization</li><li>.</li></ul>	<ul style="list-style-type: none"><li>Process controls and monitoring</li><li>Oil and Gas leak detection</li><li>HVAC and air control systems</li><li>CPAP and respiratory devices</li><li>Breathalyzer</li><li>Automotive MAF</li><li>Air speed and wind meter</li><li>Liquid dispensing/metering systems</li><li>Medical infusion pumps</li></ul>

### Typical application and key performances

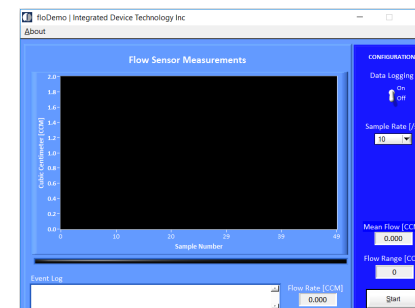
FS1012  
(mV Output)



FS2012  
(Calibrated)



FloDemo Software (FS2012)



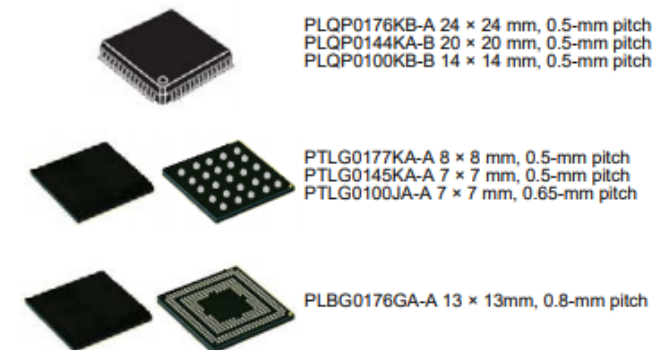
# RX65N: Communication MCU with enhanced security and HMI

## Communication MCU with RXv2 core and large capacity RAM

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• 32-bit MCU @ 120MHz</li> <li>• Ideal to carry out high-speed communication processing that is required for various communication interfaces such as Ethernet, USB, CAN, SD host/slave interface, and quad SPI.</li> <li>• Large-capacity memory of up to 2MB Flash and 640kB RAM</li> <li>• 100pin – 177pin packages</li> </ul>	<ul style="list-style-type: none"> <li>• RX65N and RX651 Groups are new mainstream RX microcontrollers with RXv2 core, large-capacity RAM, and enhanced security, connectivity, and HMI.</li> <li>• Cost optimized due to latest 40nm process technology</li> </ul>	<ul style="list-style-type: none"> <li>• Process controls and monitoring</li> <li>• Oil and Gas leak detection</li> <li>• HVAC and air control systems</li> <li>• CPAP and respiratory devices</li> <li>• Breathalyzer</li> <li>• Automotive MAF</li> <li>• Air speed and wind meter</li> <li>• Liquid dispensing/metering systems</li> <li>• Medical infusion pumps</li> </ul>

### Typical application and key performances

120-MHz 32-bit RX MCU, on-chip FPU, 240 DMIPS, up to 2-MB flash memory (supportive of the dual bank function), 640-KB SRAM, various communications interfaces including Ethernet MAC, SD host interface (optional), SD slave interface (optional), quad SPI, and CAN, 12-bit A/D converter, RTC, Encryption functions (optional), CMOS camera interface, Graphic-LCD controller, 2D drawing engine



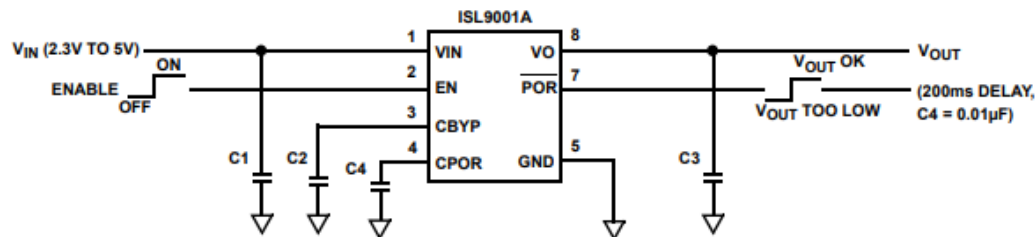
# ISL9001A: High accuracy high PSRR LDO in tiny package

*Low dropout regulator with low Iq and high PSRR*

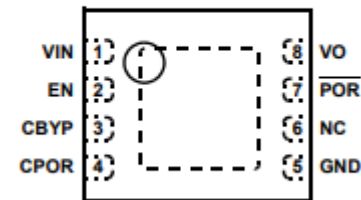
Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• Excellent transient response to large current steps</li> <li>• Excellent load regulation: &lt;0.1% voltage change across full range of load current</li> <li>• High PSRR: 90dB @ 1kHz</li> <li>• Extremely low quiescent current: 25µA</li> <li>• Low dropout voltage: typically 200mV @ 300mA</li> <li>• Low output noise: typically 30µVRMS @ 100µA (1.5V)</li> </ul>	<ul style="list-style-type: none"> <li>• When coupled with a no load quiescent current of 25µA (typical), and 0.1µA shutdown current, the ISL9001A is an ideal choice for low power consumption application.</li> </ul>	<ul style="list-style-type: none"> <li>• PDAs, cell phones and smart phones</li> <li>• Portable instruments, MP3 players</li> <li>• Handheld devices, including medical handhelds</li> </ul>

## Typical application and key performances

Typical application circuit



ISL9001A  
(8 LD DFN)  
TOP VIEW



# ISL28134: Chopper stabilized single or dual supply

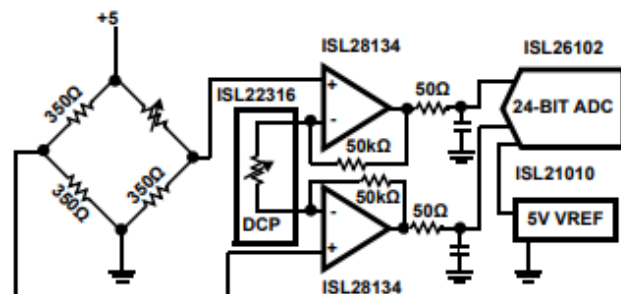
## OPAMP

*Ultra Low Noise, Zero Drift Rail-to-Rail Precision Op Amp*

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• Rail-to-rail inputs and outputs</li> <li>-CMRR at <math>V_{CM} = 0.1V</math> beyond <math>V_S</math>: 135dB, typ</li> <li>-<math>V_{OH}</math> and <math>V_{OL}</math>: 10mV from <math>V_S</math>, typ</li> <li>• No 1/f noise corner down to 0.1Hz</li> <li>• Low offset voltage: 2.5<math>\mu</math>V, Max</li> <li>• Superb offset drift: 15nV/<math>^{\circ}</math>C, Max</li> <li>• Wide bandwidth: 3.5MHz</li> </ul>	<ul style="list-style-type: none"> <li>• It uses auto-correction circuitry to provide very low input offset voltage, drift and a reduction of the 1/f noise corner below 0.1Hz.</li> <li>• It achieves ultra low offset voltage, offset temperature drift, wide gain bandwidth and rail-to-rail input/output swing while minimizing power consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• Sensor gain amps</li> <li>• Precision low drift, low frequency ADC drivers</li> <li>• Precision voltage reference buffers</li> <li>• Thermopile, thermocouple, and other temperature sensors front-end amplifiers</li> <li>• Inertial sensors</li> <li>• Process control systems</li> </ul>

### Typical application and key performances

PRECISION WEIGH SCALE / STRAIN GAUGE



$V_{OS}$  HISTOGRAM  $V_S = 5V$

