General Questions

Q1. Does the 1020 product line detect non-ferrous debris?

A1. No, the 1020 series of sensors does not collect or detect non-ferrous debris such as aluminum, brass, ceramics, or dirt.

Q2. Is the 1020 product line orientation-specific?

A2. No, all 1020 sensors are completely axially symmetric and can operate reliably in any orientation. Its performance is unaffected by how it is mounted, allowing flexible installation in a wide variety of systems.

Q3. Does the 1020 product line require calibration?

A3. In applications where the sensor is positioned away from nearby ferrous materials, the 1020 product line does not require calibration. Because it detects disturbances in magnetic fields, non-ferrous metals such as aluminum, annealed stainless steel, magnesium, brass, lead, copper, zinc, and titanium have absolutely no effect on its readings. These materials are invisible to the sensor and allows for straightforward installation without the need for adjustment.

For applications, with close proximity to ferrous materials, calibration must be done on the implementation side by recording the analog output and adjusting the PLC or SCADA thresholds accordingly. There is no calibration button or procedure for KasperAero Industrial debris sensors. See installation guidelines for more information.

Q4. Can NZMS debris sensors detect both fine and coarse particles?

A4. Yes. All our industrial debris sensors are designed to respond to a wide range of particle sizes, from fine metallic dust that may point to early-stage wear, to larger chips or fragments that typically signal more severe mechanical damage. While our sensors can detect both, it does not differentiate particle size. The signal is influenced by the overall mass of metallic material accumulated on the sensor rather than whether that mass comes from many tiny particles or a single larger chip.

Q6. How are debris sensors integrated into a system?

A6. Debris sensors can be connected via analog, digital, IO Link, or Modbus (RTU), and CANbus outputs, depending on the sensor order code configuration (Ex. 1020_). Currently, only order code "A" has been developed. Order code A specifies a 0.25V - 10V analog output as well as a spare digital output. See the 1020 Product Family Data Sheet for sensor ordering code information.

Q7. Can the 1020 product line be integrated into larger systems?

A7. Yes. The NZMS sensor is designed with a wide range of mounting options, and its ability to withstand high pressures and temperatures makes it easy to integrate directly into larger systems.

Q7.   I checked my debris sensor and there's debris on the face. Should I clean it?

A7.   Whether or not to clean the sensor face depends on your specific application. Some systems may allow periodic cleaning, similar to a magnetic drain plug, while others may recommend leaving the sensor untouched. Always follow your maintenance guidelines to determine if and when cleaning is appropriate during the sensor's operational life.

Q8.   How long is the expected service life?

A8.   The 1020 product line is highly reliable due to its lack of moving parts. Its service life can be influenced by factors such as vibration, thermal cycles and thermal shocks, maximum operating temperature, and chemical compatibility with the monitored fluid. The durability of the housing and the sensor's seals (O-rings) also play a role. When installed and maintained according to specifications, the sensor is designed to provide long-term, dependable operation.

Technical Questions

Q10.   Why is proximity to ferrous objects important when implementing the 1020 product line?

A10.   The NZMS sensing technology, that is the backbone of the 1020 product line, works by detecting disturbances in a magnetic field. Nearby ferrous materials such as steel or even cold-worked stainless steel can alter the field and be picked up by the sensor. These effects can be minimized through careful design and post-installation calibration. For best results, the sensor should be positioned away from other ferrous objects. Fortunately, magnetic strength decreases rapidly with distance (dropping off with the cube of the distance), so objects farther away have little influence. A good rule of thumb is to imagine the attraction force between the object in question and the sensor.

Q12.   How do transient magnetic fields affect NZMS sensor performance?

A12.   Transient magnetic fields (such as those generated by high-voltage wiring, motors, pumps, or strong electromagnets) can influence sensor readings if the sensor is mounted too close. To minimize these effects, position the sensor away from electromagnetic noise if possible.

For best performance in noisy EMI environments ferrous guarding around the sensor may improve performance and sensor stability.

Q13.   Does the 1020 product line detect rust?

A13.   Yes, but only to a limited extent. Rust is weakly magnetic, and its detectability depends on the type present. Magnetite (Fe_3O_4) is more magnetic and easier to detect, while hematite (Fe_3O_3) is less magnetic and produces a weaker response. Because rust composition can vary significantly, KasperAero recommends independent testing to confirm performance in rust detection applications.

Q14.   What is the maximum sensitivity of the 1020 product line?

A14.   The underlying NZMS sensing technology is capable of extremely high sensitivity. The internal electronics take analog measurements of the magnetic field and scale them. The

internal scaling amplifies the measurement in such a way that the ADC of the PLC system is never the limiting factor. The limiting factor in debris measurement is the noise of the signal. This means that setting a debris threshold too low, or not allowing for proper hysteresis, will cause the sensor to be operate improperly.

For the 1020A sensor configuration, with a sensitivity of 1V per 0.040 grams, a typical installation using a PLC to monitor the sensor, with the sensor installed in a lubrication system for a large gear train, typical PLC threshold values might be set at 1-volt increments such as shown below.

> 1V = low level alarm
>
> 2V = medium level alarm
>
> 3V = high level alarm

See the output specific installation guidelines for more information.

Q17. How quickly does the sensor respond to debris?

A17. The 1020 series is intentionally designed to have a delayed reaction (typically under three seconds) to reduce false positives and ensure highly reliable data. This helps filter out noise and increases reliability by reducing nuisance trips.

Commercial Questions

Q18. How cost effective is the 1020 product line?

A18. The 1020 product line delivers high performance at a price that supports wide industrial deployment. It should be viewed as affordable insurance that helps prevent costly downtime, warranty claims, service visits, and potential contract penalties.

Cost can be reduced by ordering the default configuration (1020AW101). Costs can be reduced further by buying the base unit with no mounting adapter (1020AW000).

For large volume price breaks on industrial sensors, please contact our team. For mass market applications, please review our custom debris sensor options.

Q20. What kind of technical support is available after purchase?

A20. KasperAero provides comprehensive support for all product lines. Our team can assist with installation guidance, system integration, calibration questions, and troubleshooting. We also offer support for interpreting sensor data and optimizing sensor placement. Support is available via email, phone, or virtual consultation, and we aim to respond promptly to all inquiries.