

JUNO BSX – OPERATING HOURS COUNTER OPERATION MANUAL - ADDITIONAL INFORMATION EN

Thank you for choosing the Juno BSX sensor from Sentinum. Please read the following operating instructions carefully to prevent damage to the sensor, yourself, and the environment.

Table of contents

1. Product versions	1
2. BM versions – electric magnetic field sensor	2
2.1. Additional safety instructions.....	2
2.2. Technical Functionality.....	3
2.3. Possible uses and application examples	3
2.4. Installation instructions	6
2.5. Interference.....	7
3. Labeling and certification	8

1. PRODUCT VERSIONS

ITEM CODE	FEATURES
S-JUNO-IX-LOEU-BSX-BM	INDUSTRIAL JUNO IP69k Operating hours counter with magnetic field sensor LoRaWAN®
S-JUNO-IX-MIOTY-BSX-BM	INDUSTRIAL JUNO IP69k Operating hours counter with magnetic field sensor mioty®
S-JUNO-IX-NBM1-BSX-BM	INDUSTRIAL JUNO IP69k Operating hours counter with magnetic field sensor Cellular
S-JUNO-IX-LOEU-BSX-BM-TH	INDUSTRIAL JUNO IP67 Operating hours counter and TH sensor, temperature and relative humidity with magnetic field sensor LoRaWAN® - only available on request and MOQ -
S-JUNO-IX-MIOTY-BSX-BM-TH	INDUSTRIAL JUNO IP67 operating hours counter and TH sensor, temperature and relative humidity with magnetic field sensor mioty® - only available on request and MOQ -
S-JUNO-IX-NBM1-BSX-BM-TH	INDUSTRIAL JUNO IP67 operating hours counter and TH sensor, temperature and relative humidity with magnetic field sensor Cellular - only available on request and MOQ -
S-JUNO-IX-LOEU-BSX	INDUSTRIAL JUNO IP69k Operating hours counter and TH sensor, temperature and relative humidity with magnetic field sensor LoRaWAN®
S-JUNO-IX-MIOTY-BSX	INDUSTRIAL JUNO IP69k operating hours counter with vibration and magnetic field sensor mioty®
S-JUNO-IX-NBM1-BSX	INDUSTRIAL JUNO IP69k Operating hours counter with vibration and magnetic field sensor Cellular
S-JUNO-IX-LOEU-BSX-TH	INDUSTRIAL JUNO IP67 operating hours counter with vibration and magnetic field sensor LoRaWAN® - only available on request and MOQ -
S-JUNO-IX-MIOTY-BSX-TH	INDUSTRIAL JUNO IP67 operating hours counter with vibration and magnetic field sensor mioty® - only available on request and MOQ -
S-JUNO-IX-NBM1-BSX-TH	INDUSTRIAL JUNO IP67 operating hours counter with vibration and magnetic field sensor Cellular - only available on request and MOQ -

2. BM VERSIONS – ELECTRICAL MAGNETIC FIELD SENSOR

The following information refers to the product versions (-BM) with electric magnetic field sensor.

2.1. ADDITIONAL SAFETY INSTRUCTIONS

Please refer to the operating instructions for the Juno for general safety instructions for the product

The following safety instructions refer to the product versions (-BM) with electric magnetic field sensor.

- Do not mount on live or hot components.
- Do not install in areas with strong magnetic fields (permanent magnets, electromagnets).
- Before commissioning, ensure that the system is de-energized.
- The sensor must not be opened or modified (loss of calibration).

Installation instructions:

Recommended installation location:

- As close as possible to the motor to be detected (<5 cm).
- Non-magnetic, low-vibration surface
- Sensor alignment can be arbitrary (3D detection), but one axis should be as radial as possible to the motor axis

Do not mount:

- Directly on ferromagnetic surfaces or thick steel housings (shielding)
- Next to power lines or large transformers

Fastening:

- Screws, clips, or adhesive pads – vibration-proof and thermally decoupled.

2.2. TECHNICAL FUNCTIONALITY

The operating hours counter uses changes in the magnetic field that occur during the operation of a machine or device to automatically detect periods of activity.

A **3-axis magnetic field sensor** is used, which measures the local magnetic field either permanently or periodically.

As soon as a characteristic magnetic field change is detected – e.g., by switching on a motor, by rotating parts, or by current flow in the environment – the electronics interpret this as "active operating status."

These active times are integrated over time to give the cumulative **operating hours**.

- The sensor continuously measures the magnetic field components **Bx, By, Bz** in μT .
- The sampling rate can be dynamically adjusted (e.g., 10 Hz to 100 Hz), depending on the desired response time and energy consumption.
- The microcontroller or a downstream signal processor analyzes the raw data.
- Monitoring of typical activity indicators:
 - **Magnetic field amplitude change** above a defined threshold value
 - **Frequency analysis** (e.g., periodic fluctuations in rotating parts)
 - **Noise or vibration patterns** in the magnetic field signal
 - If the system detects a consistent activity pattern over a defined period of time, the status is set to "active."
- During the active state, a timer or time base (RTC or MCU internal) runs.
- The runtime is continuously added up and saved in **non-volatile memory** (EEPROM or Flash) so that no data is lost even after a power failure.
- **Calibration / interference field compensation:**
 - An initial calibration compensates for the local geomagnetic field offset.
 - Long-term drift or external magnetic fields can be corrected using **adaptive filters**.
 - Optionally, the meter can also be readjusted using a calibration signal (e.g., "known off state").

Application	Detection principle	Advantage
Electric motors	Magnetic field change due to rotating field	No additional current sensor required
Valves, actuators	Magnetic field when coil is activated	Direct activity detection possible
Machine units	Magnetic vibration/field fluctuation	Robust against vibration and noise
Retrofit solutions	External magnetic field change	Contactless, easy retrofitting

2.3. POSSIBLE USES AND APPLICATION EXAMPLES

Electromechanical drives

Device/component	Detection principle	Comment
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Electric motors (DC/AC/BLDC)	Magnetic field change due to rotating field or commutation	Standard application, high signal stability
Alternators/generators	Alternating magnetic field during power generation	Detection of charging or operating status
Fans	Rotating field or magnetic pulses	Runtime monitoring, maintenance interval control
Pumps (electrically driven)	Field change due to motor rotation	Contactless operation monitoring
Compressors	Magnetic field change in the drive	Can be used in refrigeration and compressed air technology
Electromagnetic clutches	Magnetic field during activation	Precise detection of switch-on cycles

Electromagnetic actuators

Device/component	Detection principle	Comment
Valves (e.g., solenoid valves)	Magnetic field of the coil when activated	Precise switching time detection possible
Relays / contactors	Field pulse when the coil is energized	Counting of switching cycles
Lifting magnets / linear drives	Field change during movement	Use in industrial automation or automotive engineering

Energy generation & distribution

Device / component	Detection principle	Comment
Alternator (automotive)	Induced field during power generation	Runtime detection without interference with the vehicle electrical system
Transformers	Magnetic stray fields during load	Contactless operation monitoring possible
Inverters / converters	Field change due to induction coils	Diagnostics and runtime monitoring

Household and industrial appliances

Device / component	Detection principle	Comment
Power tools (drills, saws, etc.)	Magnetic field change due to motor activity	Usage time tracking for rental equipment or maintenance
Vacuum cleaners / blowers / fan heaters	Rotating field of the motor	Runtime or maintenance monitoring
Induction heaters	Alternating magnetic field during activation	Runtime measurement, energy logging
Cooling units / air conditioning systems	Compressor field + fan field	Combined monitoring possible

Vehicle and mechanical engineering

Device / component	Detection principle	Comment
Starter generators / electric machines	Rotating field or current flow	Operating time and maintenance counters
Hydraulic pumps with electric drive	Magnetic field change due to motor	Runtime monitoring in mobile machines
Conveyor belts / Drive rollers	Magnetic field change in the drive	Runtime or cycle monitoring
Agricultural and construction machinery units	Magnetic field or vibration signature	Resistant to environmental influences

Other applications

Device/component	Detection principle	Comment
Solar tracking systems (tracking drives)	Magnetic field change due to motor movement	Operational monitoring in PV systems
Wind power auxiliary drives (yaw/pitch systems)	Field change due to motor movement	Operating hours logging for maintenance
Magnetic bearings / magnetic brakes	Field change during activation	Runtime measurement of function cycles

2.4. NOTES ON INSTALLATION

The strength and range of this field depend on several factors:

- Motor type (DC, BLDC, asynchronous)
- Housing material (magnetic or non-magnetic)
- Power and current flow
- Shielding / installation environment
- Position of the windings and magnets

As a rough guide (**we always recommend mounting directly on the device to be monitored, as this minimizes interference from other machines**):

Motor type	Typical field strength (active)	Recommended sensor distance	Comment
Small motor (e.g., fan, ventilator, <100 W)	50-200 μ T	5-20 mm	Direct proximity required, mount on motor housing if necessary
Medium motors (pumps, compressors, 100 W-2 kW)	100-500 μ T	20-50 mm	Good visibility, even when mounted on housing flange
Large industrial motors (>2 kW)	500 μ T - several mT	50-150 mm	Can also be mounted on adjacent chassis
Solenoid valves / relays	200-1000 μ T	0-10 mm	Place sensor directly on the coil
Generator / alternator	500 μ T - 5 mT	20-100 mm	Ideal: Position with minimal shielding (e.g., end cover)

Recommended mounting location

- **Directly on the motor housing or near the windings**, preferably in an unshielded location (not directly behind sheet steel).
- **Not on or next to live wires** to avoid interference fields from other sources.
- **Mechanically stable**, low vibration, and protected from direct heat radiation.
- **Alignment:** The sensor measures in 3D – the orientation is not critical, but **one axis should point radially to the motor field as far as possible** in order to capture the greatest effect.
- **Mounting:** e.g., using a screw, clip, or double-sided adhesive pad with thermal insulation.

2.5. INTERFERENCE

The magnetic field of a motor decreases **exponentially or according to $1/r^3$** (dipole field) with increasing distance.

This means

Even a few centimeters of distance significantly reduce the signal from a motor, while sources further away are hardly measurable.

Consequently:

- If the sensor is mounted **close to the target motor (e.g., <5 cm)**, the influence of **other machines** is **practically negligible**.
- If the sensor is moved further away (>10 cm), the useful signal can quickly become weaker and **stronger external fields (e.g., from larger motors or transformers)** can interfere.

3. MARKING AND CERTIFICATION



