

## Variable Reluctance Speed Sensors for Use in Explosive Atmospheres North America CI 1, Div 2 & CI 1, Zone 2

**GREEN LINE**  
INDUSTRIAL SPEED SENSORS

### Product ID

Type #	Product #	Drawing #
EX10A	385Z-05588	114531
EX12A	385Z-05570	115725
EX12A35	385Z-05571	115725
EX38A	385Z-05566	115515
EX58AM	385Z-05554	115516
EX58AM25	385Z-05555	115516
EX58AM40	385Z-05556	115516
EX10S	385Z-05589	114534
EX38S	385Z-05567	114526
EX58S	385Z-05559	114465
EX58S25	385Z-05560	114465
EX58S40	385Z-05561	114465

### General

**Function** These Greenline variable reluctance (VR) speed sensors are certified for use in explosive atmospheres. They consist of an iron core, an inductive coil, and a permanent magnet. A ferrous pole wheel passing the sensor face changes the magnetic field strength, resulting in an AC voltage being induced in the coil. The frequency of the output signal is proportional to the speed of the moving target. The amplitude of the signal depends on speed, air gap, geometry of target, magnetic properties of target material, and the electrical load. VR sensors, also known as passive or electromagnetic sensors, do not require an external supply.

**Certification** This sensor is CSA listed for use in hazardous locations.  
Class I, Div 2, Groups A, B, C & D, CAN & US  
Class I, Zone 2 IIC CAN and Class I, Zone 2 IIB US  
Output rated:  
○ 30.0Vac, 10.0mA nominal.

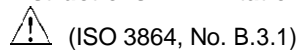
**Safety Information** The speed sensors are certified for applications in areas with explosive atmospheres according to CSA standards. These types are to be duly used in undamaged and clean condition. Modifications of sensors are prohibited if not expressly listed in this operating instruction.

#### ENGLISH:

**WARNING – Explosion Hazard. Do not connect or disconnect this equipment unless power has been removed or the area is known to be nonhazardous.**

**WARNING – Explosion Hazard. Substitution of components may impair suitability for Class I, Division 2.**

**The CSA Certificate of Compliance is an integral part of these operating instructions. All limitations and requirements must be fulfilled.**



**WARNING – Symbol indicates that all the specifications (electrical rating, required cautions, other related information) in the operating instructions have to be considered.**

**FRANCAIS:**

**AVERTISSEMENT – Danger d’explosion. Ne pas connecter ou déconnecter cet équipement tant que l’alimentation n’est pas coupée ou que l’environnement soit reconnu comme non-dangereux.**

**AVERTISSEMENT – Danger d’explosion. La substitution de composants peut rendre cet équipement impropre à une utilisation en Classe I, Division 2.**

**Le certificat de conformité CSA fait partie intégrante de ce manuel d’utilisation; Les exigences et restrictions mentionnées dans celui-ci doivent être respectées.**



(ISO 3864, No. B.3.1)

**AVERTISSEMENT – Ce symbole indique que les informations (spécification électrique, précautions nécessaire ou autres informations afférentes) du manuel d’utilisation doivent être considérées et respectées.**

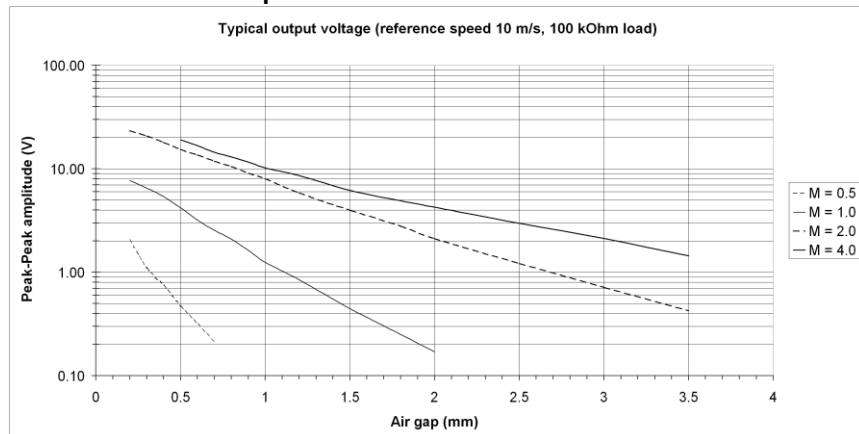
Last change by: TLI, 21.12.2015	Checked by: MT, 21.12.2015	Document status: APPROVED	Document Nr.: 118332	Document Revision: 008
<a href="http://www.jaquet.com">www.jaquet.com</a>	<a href="mailto:info@jaquet.com">info@jaquet.com</a>	Tel.: +41 61 306 88 22		Page 2/8

**Technical data**

Coil properties	Inductance @ 1 kHz: 170 mH ± 10% Resistance: 850 Ohm ± 10% Magnet polarity: north pole towards front face Pole piece: diameter 2.7 mm
Polarity	Upon approach of ferrous metal, the signal pin is positive with respect to GND.
Signal output	Using a sensor together with a toothed wheel having an involute gear form will generate a sinusoidal signal. Analysing the frequency will determine the rotational speed. The signal amplitude is proportional to the rate of change of magnetic flux generated by the pole wheel. In principle, it depends on the following parameters: Circumferential velocity of the toothed wheel Geometry of the toothed wheel, typically given by module or diametral pitch Air gap between toothed wheel and sensor's front surface Load impedance applied to the sensor

The figure below show the maximum Peak-Peak voltage, which can be achieved with the different sensor models. Please note that the min/max signal amplitudes should be dimensioned in such a way as to be compatible with the instrumentation ( trigger level and max I/P voltage ). A trigger level of 50mVrms is used as standard with Jaquet tachometers.

**The maximal signal output must be limited according to the limits given in the Certificate of Compliance.**



Legend:

- M=1: Gear with module 0.5 mm corresponds to 50.8 DP
- M=1: Gear with module 1 mm corresponds to 25.4 DP
- M=2: Gear with module 2 mm corresponds to 12.7 DP
- M=4: Gear with module 4 mm corresponds to 6.4 DP

Frequency range	Up to 20 kHz Lower limit depending on application (typically in the order of a few Hz)
Housing	Tightening torque: EX10... M10x1, tightening torque: max. 10 Nm EX12... M12x1, tightening torque: max. 12 Nm EX38... 3/8"-24 UNF-2A, tightening torque: max. 10 Nm EX58... 5/8"-18 UNF-2A, tightening torque: max. 35 Nm  Thread length: xxxxx25: 2.5" xxxxx35: 3.5" xxxxx40: 4.0" rest: shorter than 2.5", see drawing

Connection	Type A: Connector: M12x1 thread, 4 pins, black Type AM: Connector mates with straight plug MS3106A-10SL-4S, 2 pins Type S: Cable with open leads: 3-wire, 3 x 0.21 mm <sup>2</sup> (AWG24), stranded wires, PTFE isolation, green casing, max. outer Ø = 3.9 mm, min. bending radius = 60 mm, cable length according to dimensional drawing
Insulation	Housing and electronics galvanically isolated (Test: 500 V, 50 Hz for 1 minute)
Pole wheel	Prerequisite: Toothed wheel of a ferrous material (e.g. Steel 1.0036). Optimal performance with Involute gear Tooth width > 10 mm Side offset < 0.2 mm Eccentricity < 0.2 mm
Air gap between sensor and pole wheel	Depending on lowest circumferential speed which has to be detected, on trigger level and ex safety parameters. See figure and CSA ex information. <b>WARNING: Setting an airgap which is too small, can result in a hazardous event.</b>
Operating temperature	-40°C...125°C
Temperature rating for ex usage	T4, according to CSA standards

### Further Information

Safety	All mechanical installations must be carried out by an expert. General safety requirements have to be met.
Installation	The sensor has to be aligned to the pole wheel according to the sensor drawing independent of its rotational orientation. Deviations in positioning may affect the performance and decrease the noise immunity of the sensor. During installation, the smallest possible pole wheel to sensor gap should be set. The gap should however be set to prevent the face of the sensor ever touching the pole wheel. A sensor should be mounted with the middle of the face side over the middle of the pole wheel. Dependent upon the wheel width, a certain degree of axial movement is permissible. However, the middle of the sensor must be at minimum in a distance of 3 mm from the edge of the pole wheel under all operating conditions. A solid and vibration free mounting of the sensor is important. Eventual sensor vibration relative to the pole wheel can induce additional output pulses. The sensors are insensitive to oil, grease etc. and can be installed in arduous conditions.
Wiring	According to sensor drawing.
Grounding	The sensor housing must be connected to protective earth.
Maintenance	Product cannot be repaired.
Transport	Product must be handled with care to prevent damage of the front face.
Storage	Product must be stored in dry conditions. The storage temperature corresponds to the operation temperature.
Disposal	Product must be disposed of properly, it must not be disposed as domestic waste.





Certificate: 2047906  
Project: 70040624

Group

Master Contract: 237563  
Date Issued: 2015-09-23

CLASS 2258 02- PROCESS CONTROL EQUIPMENT- For Hazardous Locations

CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - CERTIFIED TO U.S. STANDARDS

Class I, Division 2, Groups A, B, C and D:

Models EX10A, EX10S, EX12A, EX12A35, EX38A, EX38S, EX58AM, EX58AM25, EX58AM40, EX58S, EX58S25 and EX58S40 Electromagnetic Speed Sensor, output rated 300Vac/ 100 mA nominal.

Notes:

- 1) Set-up must limit output voltage to 30Vac max.
- 2) Certified as Component and required to be housed in suitable enclosure where the final combination is subjected to acceptance by the local Authority Having Jurisdiction.

#### APPLICABLE REQUIREMENTS

- |                                  |   |
|----------------------------------|---|
| CAN/CSA-C22.2 No. 0-10 (R 2015)  | - General Requirements – Canadian Electrical Code, Part II  |
| CSA C22.2 No. 30-M1986 (R 2012)  | - Explosion-Proof Enclosures für Use in Class I Hazardous Locations   |
| CSA C22.2 No. 142-M1987 (R 2014) | - Process Control Equipment   |
| CSA C22.2 No. 213-M1987 (R 2013) | - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations   |
| CSA C22.2 No 25-1966 (R 2014)    | - Enclosures for Use in Class II Groups E, F and G Hazardous Locations  |
| UL 916 (4th Ed.) (R2014)         | - Energy Management Equipment   |
| UL 1203 (5th Ed.) (R2015)        | - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations                                  |
| UL 1604 (3rd Ed.) (1994) (R2004) | - Electrical Equipment for Use in Class I and II, Division 2; Class III Hazardous (Classified) Locations                                    |
| ANSI/TSA-12.12.01-2013           | - Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations |



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#### MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The following reduced markings are etched or permanently engraved on the sensor housing, or provided on an etched meta) nameplate, permanently attached with non-removable fasteners:

- Manufacturer's name "Jaquet Technology Group" or CSA Master Contract Number "237563" in lieu of manufacturer's name, adjacent to the CSA Mark.
- Model number: As specified in the PRODUCTS section, above.
- The CSA Mark, with or without adjacent "C" and "US" indicators, as shown on the Certificate of Conformity;
- Hazardous Locations designation: As specified in the PRODUCTS section, above. (may be abbreviated)

An installation manual or data sheet shall be supplied with each unit. The following minimum content shall be included in this document:

- Specification for appropriate mounting, grounding, and wiring, including definition of lead color functions.
- The following words, or suitable equivalent:
  - This equipment (EX34H, EX34H35, EX58H, EX58H35, EX58H35 (5m) and EX58H85) is suitable for installation in Class I, Division 1 and 2, Group A, B, C and D hazardous locations or nonhazardous locations only.
  - This equipment (EX10A, EX10S, EX12A, EX12A35, EX38A, EX38S, EX58AM, EX58AM25, EX58AM40, EX58S, EX58S25 and EX58S40) is suitable for installation in Class I, Division 2, Group A, B, C and D hazardous locations or nonhazardous locations only.
  - WARNING - Explosion Hazard. Do not connect or disconnect this equipment unless power has been removed or the area is known to be nonhazardous.
  - WARNING - Explosion Hazard. Substitution of components may impair suitability for Class I, Division 2.
  - Electrical rating



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**Based on TN-076**

Optional Hazardous Location designation of CI I Zone 1 IIC CAN and CI I Zone 1 IIB US can also appear on the following speed sensor models:

EX58H, EX58H35, EX58H35 (Sm), EX58H85, EX34H, EX34H35

Optional Hazardous Location designation of CI I Zone 2 IIC CAN and CI I Zone 2 IIB US can also appear on the following speed sensor models:

EX10A, EX10S, EX12A, EX12A35, EX38A, EX38S, EX58AM, EX58AM25, EX58AM40, EX58S, EX58S25 and EX58S40