# EX-ATEX Certified
# Hall Effect Single Channel Speed Sensor
# FTG 1088.xx Ex and FTG 1089.xx Ex

valid for sensors with serial no. 4906 and later

## Product ID

| Type # | Product # | Drawing # |
|---|---|---|
| FTG 1088.00 Ex<br>(DSD 1005.00 KTV Ex-atex T6-T1) | 343Z-03772 | 4-106.026B |
| FTG 1088.00 KTV-B<br>(DSD 1005.00 KTV-B) | 343Z-05108 | 4-112.989 |
| FTG 1088.01 Ex<br>(DSD 1005.00 PTV Ex-atex T6-T1) | 343Z-03770 | 4-106.026B |
| FTG 1088.00 S4 Ex | 343Z-03834 | 4-109.287B S4 |
| FTG 1089.00 Ex<br>(DSD 1010.00 KTV Ex-atex T6-T1) | 343Z-03832 | 4-106.026B |
| FTG 1089.01 Ex<br>(DSD 1010.00 PTV Ex-atex T6-T1) | 343Z-03837 | 4-106.026B |
| FTG 1089.00 S4 Ex | 343Z-03829 | 4-109.287B S4 |
| FTG 1089.02 Ex | 343Z-05605 | 106026A Rev. 1 |

## General

**Function**

The sensors FTG 1088.xx Ex and FTG 1089.xx Ex are suitable, in conjunction with a pole wheel, for generating square wave signals proportional to rotary speeds. The sensing element consists of a magnetically biased differential hall effect semiconductor in a bridge-circuit, followed by a Schmitt-trigger. The latter has an open collector output connected to the positive pole of the power supply through a 1.8k resistor.
The FTG 1088.xx Ex have a dynamic behaviour, so that pulse generation is guaranteed down to a speed corresponding to a frequency of 5 Hz.
The FTG 1089.xx Ex have a static behaviour, so that pulse generation is guaranteed down to a speed corresponding to a frequency of 0Hz

**Safety Notice**

The sensors FTG 1088.xx Ex and FTG 1089.xx Ex are certified for applications in areas with explosive atmospheres. These types are to be duly used in undamaged and clean condition. Modifications of sensors are prohibited if not expressly listed in these operating instructions.

**Conformity to Standards**

Sensor types FTG 1088.XX Ex and FTG 1089.xx Ex comply with the requirements of
EN 50014:1997, EN 50020:1994 and EN 1127-1:1997.
They have been designed, manufactured and tested according to the state of the art.
For their application the restrictions listed in the European Certificate of Conformity ZELM 03 ATEX 0147X and its 1. Supplement must be observed.

## Technical data

| | |
|---|---|
| Supply voltage | 5V ±10% (continuous), max. allowed 12V (short time)<br>protected against false polarity |
| Current consumption | Max. 16 mA (without load) |
| Signal output | • Square wave signal<br>• Signal levels without load $U_{High}$ ~ $U_{power\ supply}$, $U_{Low}$ < 0.4 V<br>• Max. allowed sink current = 25mA (at a saturation voltage < 0.4V)<br>• The output is connected through a pull-up resistor of 1.8 kOhm to the positive pole of the power supply. |
| Frequency range | FTG 1088.xx Ex: 5Hz...20 kHz<br>FTG 1089.xx Ex: 0Hz...20 kHz |
| Electromagnetic compatibility (EMC): | According to 89/336/EWG, EN 50081-2, EN 50082-2:<br>• Electrostatic discharge into housing, cable shield and wires: up to ±4 kV peak according to IEC 61000-4-2, severity level 2<br>• Radiated electromagnetic field: up to 30 V/m, 50% AM, 1 kHz in the range of |

| | |
|---|---|
| | 1 MHz to 1000 MHz according to IEC 61000-4-3, severity level 3<br>• Electrical fast transients/bursts, coupled to sensor cable with a capacitive coupling clamp: up to ±4 kV peak according to IEC 61000-4-4, severity level 4 |
| Housing | Argentan (German silver) CuNi10Zn42Pb DIN 2.0770, front side sealed hermetically, sensor components potted in chemical and age proof synthetic resin. Dimensions according to drawing. |
| Pole wheel | Toothed wheel made of a magnetically permeable material (e.g. Steel 1.0036)<br>• Minimum tooth width 10 mm<br>• Side offset < 0.2 mm<br>• Eccentricity < 0.2mm<br>• Involute gear wheel preferred (module ≥0.5) |
| Air gap sensor / pole wheel | Air gap between pole wheel (involute gear) and sensor housing:<br>FTG 1088.xx Ex:<br>• Module 0.5 mm: 0.1...0.4 mm<br>• Module 1.0 mm: 0.1...1.0 mm<br>• Module 2.0 mm (and larger): 0.1...1.3 mm<br><br>FTG 1089.xx Ex:<br>• Module 1 mm: 0.1...0.5 mm<br>• Module 2 mm: 0.1...1.3 mm<br>• Module 4 mm (and larger): 0.1...1.5 mm |
| Insulation | Housing and electronics galvanically separated (500 V/50 Hz/ 1 min) |
| Protection class | IP68 (head) and IP67 (cable or litz wire outlet) |
| Vibration immunity | 3 g in the range 4...100 Hz |
| Shock immunity | 20 g during 11 ms, half-sine wave |
| Temperature | see Ex certificate |
| Marking<br>Acc. to Directive 94/9/EC | CE 0820 Ex II 1 G II 1 D |
| **EX-Safety** | **For this explosion proof sensors a copy of the European Certificate of Conformity ZELM 03 ATEX 0147X and its 1. Supplement is attached.**<br>**See also below, the Ex related information in this documentation.** |
| **Connection** | The sensors must be connected according to the sensor drawing.<br>Sensor wires are susceptible to radiated noise. Hence, the sensor wires must be laid as far as possible from large electrical machines. They must not run parallel in the vicinity of power cables. The permissible cable length is limited from a safety point of view according to the 1. Supplement of the Certificate of Conformity ZELM 03 ATEX 0147X. |
| **Installation** | For installation, the CE directives for the installation of apparatus in explosive environments must be taken into account.<br>These sensors contain differential Hall probes. Therefore, the housing has to be aligned to the pole wheel according to the sensor drawing:<br>Deviations in positioning may affect the functioning and decrease the noise immunity of the sensor.<br>The sensor should be mounted with the middle of the face side over the middle of the pole wheel. Where the pole wheel has teeth or slots and with radial sensor location, the sensor would normally be mounted over the centre. 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 3mm from the edge of the pole wheel under all operating conditions.<br>**A solid and vibration free mounting of the sensor is important.**<br>Eventual sensor vibration relative to the pole wheel can induce additional output pulses.<br>The sensors are insensitive to oil, grease etc and can be installed in arduous conditions. 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. Within the air gap specified the amplitude of the output signals is not influenced by the air gap. |
| **Maintenance** | No maintenance required. The sensors cannot be repaired. |

## Type-list:

| Type # | Product # | Housing length [mm] | Cable/lace type | Cable/lace length [m] | Connection | Weight [gr] |
|---|---|---|---|---|---|---|
| FTG 1088.00 Ex (DSD 1005.00 KTV Ex-atex T6-T1) | 343Z-03772 | 35 | Wire | 0.4 | Open wire | 20 |
| FTG 1088.00 KTV-B (DSD 1005.00 KTV-B) | 343Z-05108 | | Wire | 0.130 | Terminal block | |
| FTG 1088.01 Ex (DSD 1005.00 PTV Ex-atex T6-T1) | 343Z-03770 | 35 | Wire | 0.105 | Connector | 23 |
| FTG 1088.00 S4 Ex | 343Z-03834 | 50 | Cable | 5 | Open wire | 100 |
| FTG 1089.00 Ex (DSD 1010.00 KTV Ex-atex T6-T1) | 343Z-03832 | 35 | Wire | 0.4 | Open wire | 20 |
| FTG 1089.01 Ex (DSD 1010.00 PTV Ex-atex T6-T1) | 343Z-03837 | 35 | Wire | 0.105 | Connector | 23 |
| FTG 1089.00 S4 Ex | 343Z-03829 | 50 | Cable | 5 | Open wire | 100 |
| FTG 1089.02 Ex | 343Z-05605 | 35 | Wire | 1 | Open wire | 25 |

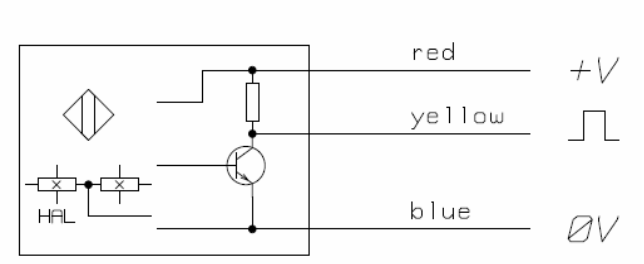
Wire:
- Twisted Teflon insulated wires, cross section=0.22 mm² (AWG 24), outer diameter=1.5 mm, colours red, blue and yellow

Cable:
- FEP Teflon cable, 3-wire, 0.6 mm² (AWG 20), outer-Ø max. 4.7 mm, bending radius min. 70 mm, strand shielded screen (white, metal net), Jaquet Part-No. 824L-33024

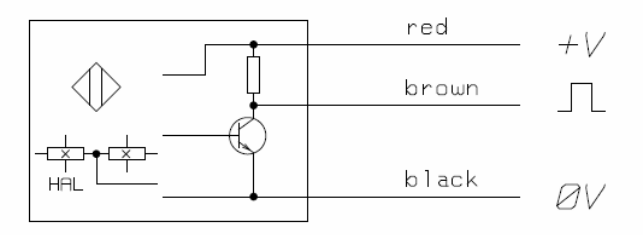
Connector:
- Molex-plug, Type 03-06-2031, Jaquet Part-No. 343C-72577

Terminal block:
- Phoenix contact MSTB 2,5/ 3-ST-5,08 and IC 2,5/ 3-ST-5,08

**Connection diagram (Standard):**




**“S4“ Variants:**



# CE-Declaration of Conformity

According to the CE guidelines

- Electromagnetic compatibility 89/336/EWG
- Apparatus used in explosive environment 94/4/EG

## The apparatus

Type name : FTG 1088.xx and FTG 1089.xx

Have been developed, and are constructed and produced in accordance with the guidelines 89/336/EG and 94/4/EG solely by :

Company : JAQUET AG, Thannerstrasse 15, CH-4009 Schweiz.

The following harmonised standards are applicable :

- EN 50081-2, EN 50011, CISPR 16
- EN 50082-2, EN 61000-4-2/3/4/5/6/8/11

- EN 50014
- EN 50020
- EN 50284
- EN 1127

- EN ISO 9001:2000

The following national standards are applicable :

- IEC 60068-2-1/2/30/6
- VDE 0165

Full technical documentation is available.
The associated instruction manuals are available under following numbers :

- 343D-63725 for FTG 1088.xx in original language.
- 343D-63726 for FTG 1089.xx in original language.

Basel, the 28.11.2002 Signature Head of engineering

**Prüf- und Zertifizierungsstelle**

**ZELM Ex**

# (1) EC-TYPE-EXAMINATION CERTIFICATE

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-TYPE-EXAMINATION CERTIFICATE Number:

## ZELM 03 ATEX 0147X

(4) Equipment: **Rotation speed sensor type FTG 1088... Ex und Typ FTG 1089... Ex**

(5) Manufacturer: **JAQUET AG**

(6) Address: **Thannerstrasse 15, CH-4009 Basel**

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Prüf- und Zertifizierungsstelle ZELM Ex, notified body No. 0820 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report ZELM Ex 0040315194.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 50 014: 1997+A1+A2** **EN 50020: 1994**
**prEN 61241-0: 2002** **31H/143/CD (IEC 61241-11): 2002**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this Certificate.

(12) The marking of the equipment shall include the following:

**Ex II 1 G EEx ia IIC T6 und II 1 D Ex iaD 20 T ...°C**

Zertifizierungsstelle **ZELM Ex**

Adolf Gruber

Zertifizierungsstelle ZELM Ex

Braunschweig, June 19, 2003

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EC-type-examination Certificates without signature and stamp are not valid. The certificates may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM Ex.
This English version is based on the German text. In the case of dispute, the German text shall prevail.

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig

Prüf- und Zertifizierungsstelle

ZELM Ex

(13) SCHEDULE

(14) EC-TYPE-EXAMINATION CERTIFICATE ZELM 03 ATEX 0147X

(15) Description of equipment

The rotation speed sensors are used for the recording of the rotation speed for the touchless scanning of rotating ferromagnetic rotating magnetic poles, gears, camshafts and the like.

Model key:

| type | Cable type | Cable length | Remarks |
|---|---|---|---|
| FTG 1088.00 Ex<br>FTG 1089.00 Ex | Single laces | 400 mm | |
| FTG 1088.01 Ex<br>FTG 1089.01 Ex | Single laces - twisted | 105 mm | with connection plug |
| FTG 1088.00 S4 Ex<br>FTG 1089.00 S4 Ex | 3-wire shielded teflon cord | max. 5 m | |

**The types FTG 1088... and FTG 1089... distinguish through the inner construction and the functional behavior. These differences are however for security reasons without importance.**

Electrical data

Supply- and signal circuit: type of protection intrinsic safety EEx ia IIC resp. ia IIB or iaD for use according to category 1D

only for the connection to certified intrinsically safe circuits

maximum values: $U_i$ = 10 V
$I_i$ = 204 mA
$P_i$ = 510 mW resp. 200 mW

Maximum effective inner capacity $C_i$ = 9 nF

The maximum effective inner inductance is negligibly small

The lower temperature boundary is for all versions and applications - 20 °C.

The temperature class resp. the maximum surface temperature, the maximum permissible ambient temperature and the maximal permissible power of the connected, certified, intrinsically safe circuit ($P_i$) for the different versions are to take from the tables 1 resp. 2.

**Table 1**

| | | maximum ambient temperature for the temperature classes in °C | | | | | |
|---|---|---|---|---|---|---|---|
| Category | $P_i$ [mW] | T1 | T2 | T3 | T4 | T5 | T6 |
| 2G | 510 | 100 | 100 | 100 | 100 | 70 | 55 |
| | 200 | 100 | 100 | 100 | 100 | 85 | 70 |
| 1G | 510 | 100 | 100 | 100 | 80 | 50 | 40 |
| | 200 | 100 | 100 | 100 | 95 | 65 | 55 |

Prüf- und Zertifizierungsstelle

ZELM Ex

**Schedule to EC-TYPE-EXAMINATION CERTIFICATE ZELM 03 ATEX 0147X**

**Table 2**

| Category | $P_i$ [mW] | maximum ambient temperature | maximum surface temperature |
|---|---|---|---|
| 1D | 510 | 100 °C | 155 °C |
| | 200 | 100 °C | 125 °C |

(16) Report No.

ZELM Ex 0040315194

(17) Special conditions for safe use

1. The Rotation Speed Sensors may be used only in intrinsically safe electric circuits in accordance with the information in this EC-type-examination certificate. Because of possible ignition hazards, which can arise due to mistakes and/or transient currents in the potential equalization system galvanic separation is to be favored in the supply- and signal circuit. Associated apparatus without galvanic separation may be used only if the corresponding requirements are kept according to IEC 60079-14.
2. The permissible ambient temperature range is to be determined according to the determination of this EC-type-examination certificate.
3. The versions with plug adapter resp. with single laces are only intended for mounting in an appropriate enclosure, which assure an adequate protection corresponding the environmental conditions and allowed the proper electric connection. The supply cable of the corresponding version is to protect against mechanical hazards and against electrostatic charge where appropriate by correct installation.
4. The metal case of the rotation speed sensors is to be included in the local potential equalization as far as dangerous electrostatic charge for example through flowing media or mechanical friction must be reckoned on.
5. The tightness for the purposes of zone separating measures for the mounting across the boundary between different zones is not subject of this certification and must be ensured by appropriate measures of installation.
6. The instruction manual has to be considered.

(18) Essential Health and Safety Requirements

Met by standards. The rotation speed sensors correspond with the norms EN 50014 and EN 50020. For the commitment 1 D the performed draft standards were used besides since no harmonized European standards that are to be applied in connection with the type of protection "Intrinsic safety" are available in the moment.

Zertifizierungsstelle ZELM Ex

Adolf Gruber

Zertifizierungsstelle und Prüf- ZELM Ex

Braunschweig, June 19, 2003

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Prüf- und Zertifizierungsstelle

ZELM Ex

# 1. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

**to EC-type-examination Certificate**

## ZELM 03 ATEX 0147 X

| | |
|---|---|
| Equipment: | **Rotation speed sensor type FTG 1088... Ex and Type FTG 1089... Ex** |
| Manufacturer: | **JAQUET AG** |
| Address: | **Thannerstrasse 15, CH-4009 Basel** |

Description of supplement

The 1. Supplement considers application different length of the connecting cables for different types of sensors.
Additional to the maximum values of the effective inner capacitance and inductance mentioned in the EC-Type Examination Certificate following maximal values of the capacitance and inductance are to be considered by using connecting cables with the length of more than 5 m:

$C_i$ = 240 pF/m
$L_i$ = 1,5 µH/m

The explosion protection of the equipment is not affected by these changes.
The equipment may be used in future also in consideration of this Supplement.
The type of protection, all further data as well as the special conditions remain unchanged and also apply to this 1. Supplement.

References:

The instruction manual has to be observed.

Report No.

ZELM Ex 0840617485

Essential Health and Safety Requirements

The Essential Health and Safety Requirements are still fulfilled under consideration of the Standards mentioned in the EC-type-examination Certificate.

Zertifizierungsstelle **ZELM** Ex

Braunschweig, September 26, 2006

Dipl.-Ing. Harald Zelm

Zertifizierungsstelle ZELM Ex Prüf- und

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