EX-ATEX Certified
Two wire Hall Effect Speed Sensor
DSF xx15.xx xHV Ex-atex

valid for sensors with serial no. 1210 and later

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Type #</th>
<th>Product #</th>
<th>Drawing #</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 1215.01 SHV Ex-atex (5m)</td>
<td>304Z-05197</td>
<td>4-113.216</td>
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<tr>
<td>DSF 1415.01 AHV Ex-atex S148</td>
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<td>4-113.351</td>
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<td>4-113.214</td>
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<tr>
<td>DSF 1615.05 AHV Ex-atex</td>
<td>304Z-05229</td>
<td>4-113.303</td>
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<tr>
<td>DSF 1615.08 AHV Ex-atex</td>
<td>304Z-05232</td>
<td>4-113.303</td>
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<tr>
<td>DSF 1615.11 AHV Ex-atex</td>
<td>3742607446</td>
<td>119174 Rev.02</td>
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<td>DSF 1615.12 AHV Ex-atex</td>
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<td>119174 Rev.02</td>
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<td>3-113.255</td>
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<td>DSF 2215.01 AHV Ex-atex</td>
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<td>4-113.118</td>
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<tr>
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<td>4-113.118 S13</td>
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<td>3-113.321</td>
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<tr>
<td>DSF 2215.01 S2HV Ex-atex (5m)</td>
<td>304Z-05165</td>
<td>4-113.122</td>
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<tr>
<td>DSF 2215.01 S3HV Ex-atex (10m)</td>
<td>304Z-05677</td>
<td>114827 Rev.00</td>
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<tr>
<td>DSF 2215.01 SHV Ex-atex (5m)</td>
<td>304Z-05164</td>
<td>4-113.120</td>
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<tr>
<td>DSF 2215.02 AHV Ex-atex</td>
<td>304Z-05522</td>
<td>114360 Rev.00</td>
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<td>DSF 2215.03 AHV Ex-atex</td>
<td>304Z-05633</td>
<td>114636 Rev.00</td>
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<tr>
<td>DSF EH15.01 AHV Ex-atex</td>
<td>304Z-05166</td>
<td>4-113.124</td>
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<tr>
<td>DSF EH15.01 S2HV Ex-atex (5m)</td>
<td>304Z-05168</td>
<td>4-113.128</td>
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<tr>
<td>DSF EH15.01 SHV Ex-atex (5m)</td>
<td>304Z-05167</td>
<td>4-113.126</td>
<td></td>
</tr>
</tbody>
</table>

General

Function
The DSF xx15.xx xHV Ex-atex series speed sensors are suitable for use with a pole wheel to generate speed proportional frequency signals. They exhibit a static behaviour, whereby pulse generation down to 0 Hz is guaranteed. The sensing element is a magnetically biased Hall device, followed by a 2 wire amplifier. The sensors differ in housing sizes and connection.

Safety Notice
The speed sensors DSF xx15.xx xHV Ex-atex 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
DSF xx15.xx xHV Ex-atex series sensors are certified according to EN 50014:1997 and EN 50020:2002 (see main certificate):
- II 2 G Ex ia IIC T6 for use in flammable gas atmospheres
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 0170X and its 1. Supplement must be observed. A copy of the EC Type Examination Certificate forms a constituent part of these operating instructions.
Technical data

Supply voltage  9 ... 18 VDC, protected against reverse polarity

Current consumption  Max. 10 mA

Signal output  The supply is provided from the non Ex environment via an 820 Ohm resistor. The current impulses generated are analysed on this resistor. Pulse levels of 2.2 V peak-peak are generated across the 820 Ohm resistor, with a d.c. component of ¾ supply voltage (see drawing). Short circuit proof and protected against reverse polarity.

Frequency range  0 Hz...15 kHz

Electromagnetic compatibility (EMC)  In accordance with 89/336/EG / EN 50081-2 / EN 50082-2:
- Electrostatic discharge into housing, cable shield and wires: up to ±4 kV peak according to IEC 61000-4-2, severity level 2
- 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
- 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  Stainless steel X12CrNiS188, material number 1.4305, front side hermetically sealed, electronic components potted in a chemical and age proof ceramic. Maximum permissible tightening torque:
- \( 12 \text{ Nm} \) for M12x1, \( 25 \text{ Nm} \) for M14x1, \( 35 \text{ Nm} \) for M16x1
- \( 50 \text{ Nm} \) for M18x1, \( 75 \text{ Nm} \) for M22x1
Dimensions according to table and drawings.

Cable  See below (type table).

Connector  See below (type table).

Pole wheel  Toothed wheel made of a magnetically permeable material (e.g. Steel 1.0036)
- Minimum tooth width 6 mm
- Side offset < 0.2 mm
- Eccentricity < 0.2 mm
- Involute gear wheel preferred (module 1.0)

Air gap sensor / pole wheel  Air gap range for standard sensors:
- Module 1: 0.2...0.5 mm
- Module 2: 0.2...1.5 mm
- Module 4 (and larger): 0.2...2.5 mm

For the following sensors the maximal air gaps listed above have to be reduced according to the value listed in the table and making it not useable for module 1 gears:

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Maximal air gap reduced by [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 1715.01 AHV Ex-atex S3</td>
<td>0.4</td>
</tr>
<tr>
<td>DSF 1815.01 AHV Ex-atex S173</td>
<td>0.3</td>
</tr>
<tr>
<td>DSF 2215.01 AHV Ex-atex S175</td>
<td>0.3</td>
</tr>
<tr>
<td>DSF 2215.02 AHV Ex-atex</td>
<td>0.5</td>
</tr>
<tr>
<td>DSF 2215.03 AHV Ex-atex</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Insulation  Housing, cable screen (if applicable) and electronics galvanically separated (500 V/50 Hz / 1 Min.)

Protection class  IP68 (head), IP67 (cable connection), IP 54 (where connector used)

Vibration immunity  5 g, in the range 5...2000Hz

Shock immunity  50 g, during 20 ms, half sine wave impact

Temperature  See tables on following pages. The restrictions given in the EC Type Examination Certificate and its 1. supplement must be adhered to.
- The minimum permissible operating temperature for all types is -20°C.
- The maximum permissible operating temperature depends upon the following parameters, as shown in the table below:
  - Sensor housing size
  - Maximum available electrical power from the intrinsically safe sensor power supply and from the intrinsically safe input circuit of the attached instrumentation and any Zener barriers.
  - Ex temperature class (T1-T6)
EX-Safety and Marking
For this explosion proof sensors a copy of the European Certificate of Conformity ZELM 03 ATEX 0170X and its 1. Supplement is attached.
See also below, the Ex related information in this documentation.
A connection diagram for use with Zener barriers is provided on the following pages.

Protection class: II 2 G Ex ia IIC T6

Connection
The sensor wires are susceptible to radiated noise. The following 2 points should therefore be noted:
A screened 2 core cable must always be used for sensor connections. The screen must be taken all the way to the terminal provided on the instrumentation and not earthed.
The sensor cables should be laid as far as possible from large electrical machines and on no account laid parallel to high voltage/current power lines.
The maximum permissible cable length is limited from a safety point of view according to the 1. Supplement of the Certificate of Conformity ZELM 03 ATEX 0170X. Furthermore it is a function of the sensor voltage, cable routing, the capacitance and inductance characteristics of the cable and the max. signal frequency. In general however, it is advisable to keep the distance between sensor and instrumentation as short as possible. The sensor cables can be extended using junction boxes having IP20 rated terminals. (corresponding to DIN 40050 or IEC 529) We recommend the use of JAQUET extension cable art. no. 824L-31081.
The screen must be connected to 0 Volts at the analyzing device.

Installation
For installation, the CE directives for the installation of apparatus in explosive environments must be taken into account.
The housing has to be aligned to the pole wheel according to the sensor drawing:
Deviations in positioning may affect the functioning and decrease the noise immunity of the sensor.
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.

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. 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.
### Operating temperature for II 2 G Ex ia IIC T6-T1:

<table>
<thead>
<tr>
<th>Sensor type or housing size</th>
<th>Maximum available electrical power [mW]</th>
<th>Maximum permissible operating temperature [°C]</th>
<th>Example: Zener Barriers from STAHL (PTB 01 ATEX 2088) or JAQUET speed measuring devices (Connection diagrams see below)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
</tr>
<tr>
<td>DSF 1215,** to DSF 1715,** <strong>and DSF EH15,</strong></td>
<td>450</td>
<td>104</td>
<td>104</td>
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<tr>
<td>DSF 1815,** to DSF 2115,**</td>
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<td>104</td>
<td>104</td>
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<tr>
<td>DSF 2215,**</td>
<td>450</td>
<td>104</td>
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</table>
### Type Table:

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Product #</th>
<th>Housing &amp; thread size (1)</th>
<th>Cable # (2)</th>
<th>Connector</th>
<th>Mating connector (3)</th>
<th>Operating temperature (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 1215.01 SHV Ex-atex (5m)</td>
<td>304Z-05197</td>
<td>M12x1</td>
<td>824L-35053</td>
<td>MS3102A-10SL-3P</td>
<td>MS3106A-10SL-3S</td>
<td>Class T6-T1</td>
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<tr>
<td>DSF 1415.01 AHV Ex-atex S148</td>
<td>304Z-05256</td>
<td>M14x1</td>
<td>MS3102A-10SL-3P</td>
<td>MS3106A-10SL-3S</td>
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<td></td>
</tr>
<tr>
<td>DSF 1615.01 SHV Ex-atex (5m)</td>
<td>304Z-05196</td>
<td>M16x1</td>
<td>824L-35053</td>
<td>MS3102A-10SL-3P</td>
<td>MS3106A-10SL-3S</td>
<td>Class T6-T1</td>
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<tr>
<td>DSF 1615.05 AHV Ex-atex</td>
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<td>M16x1</td>
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</tr>
<tr>
<td>DSF 1615.08 AHV Ex-atex</td>
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<td>M16x1</td>
<td>MS3102A-10SL-3P</td>
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<td>MS3102A-10SL-3P</td>
<td>MS3106A-10SL-3S</td>
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<td>M17x1</td>
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<td>DSF 1815.01 AHV Ex-atex S173</td>
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<td>M18x1</td>
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<td>M22x1</td>
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<td>MS3106A-10SL-3S</td>
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<td>MS3106A-10SL-3S</td>
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<tr>
<td>DSF 2215.01 S2HV Ex-atex (5m)</td>
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<td>M22x1</td>
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<tr>
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<td>5/8&quot;-18 UNF-2A</td>
<td>MS3102A-10SL-3P</td>
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<tr>
<td>DSF EH15.01 SHV Ex-atex (5m)</td>
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<td>5/8&quot;-18 UNF-2A</td>
<td>824L-35053</td>
<td>MS3102A-10SL-3P</td>
<td>MS3106A-10SL-3S</td>
<td>Class T6-T1</td>
</tr>
</tbody>
</table>

(1) The temperature and atmosphere limitations for each sensor housing size, as shown in the table, must be observed and the restrictions given in the EC Type Examination Certificate and its 1st supplement must be adhered to. For M17x1 the values for DSF 1815.01 must be taken, for 5/8"-18 UNF-2A the values for DSF 1615.08.

(2) Cables:

<table>
<thead>
<tr>
<th>Jaquet cable type</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>824L-35053</td>
<td>FEP Teflon cable; 4-wire (brown wire is not connected), 0.2 mm² (AWG 24), outer-Ø max. 4.2 mm, bending radius min. 60 mm, strand shielded screen (metal net), white Operating temperature: -100°C to +150°C</td>
</tr>
<tr>
<td>824L-36622</td>
<td>Silicone cable, 6-wire, 0.6 mm² (AWG 20), outer-Ø max. 13.0 mm, bending radius min. 65 mm, strand shielded screen (metal net), black Operating temperature: -40°C to +150°C</td>
</tr>
</tbody>
</table>

(3) Mating connector type MS 3106A-10SL-3S Jaquet part number: 820E-31141/820E-30691

The limitations relating to permissible cable capacitance and inductance detailed in the EC Type Examination Certificate and its 1st supplement under Ex power supply and instrumentation Ex input must be adhered to.
Connection diagram sensor type DSF xx15.01 AHV Ex-atex (for reference only, colors of wires may be different, check dimensional drawings):

Connection diagram sensor type DSF xx15.01 SHV Ex-atex and DSF xx15.01 S2HV Ex-atex (for reference only, colors of wires may be different, check dimensional drawings):
Connection using Zener barriers:

\[ \text{Anschluss } x-\text{atex} \text{m} \text{t} \text{ Zenerbarreren} \]

\[ \text{rot} = +V \text{SL} / \text{schwarz} = 0V \]

Ex-Bereich | sicherer Bereich
--- | ---
Hazardous area | Safe area

ÄNDERUNG: 5942 14.J.84 P1

ba zf ds f.15ex
CE-Declaration of Conformity

According to the CE guidelines

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

The apparatus

Typename: DSE ..15.xx.HV

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:

- 3040-64471 for DSE xxxx Ex Atex in original language.
- 304E-64471 for DSE xxxx Ex Atex in English.

Basel, the 25.08.2003

Signature

Head of engineering
Prüf- und Zertifizierungsstelle
ZELM Ex

EC-TYPE-EXAMINATION CERTIFICATE


(3) EC-TYPE-EXAMINATION CERTIFICATE Number: 

ZELM 03 ATEX 0170 X

(4) Equipment: Rotationsspeedsensor type DSF ..15.xx ..V Ex Atex

(5) Manufacturer: JAQUET AG

(6) Address: 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 proteelive 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 0900319224.

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

EN 50 014: 1997+A1+A2 EN 50020: 2002

(10) If the sign “X” is placed alter 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 proteelive 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 proteelive system. These are not covered by this Certificate.

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

II 2 G Ex ia IIC T6

Zertifizierungsstelle ZELM Ex

Braunschweig, November 26, 2003

This English version is based on the German text. In the case of dispute, the German text shall prevail.

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

Sheet 1/3
Prüf- und Zertifizierungsstelle

ZELM Ex

SCHEDULE

EC-TYPE-EXAMINATION CERTIFICATE ZELM 03 ATEX 0170 X

(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:
Rotation speed sensor type DSF .. 15.xx.. V Ex Atex

Version with firmly connected line
SH = teflon cable or
S2H = Silicone cable or
AH = version with plug adapter

Version differences irrelevant for security reasons

Thread size: 12 = M12
16 = M16
22 = M22
EH= 51F-18 UNF

Electrical data

Supply- and signal circuit type of protection Intrinsic Safety EEx ia IIIC

only for the connection to certified intrinsically safe circuits
maximum values: U; 18 V
I; 100mA
P; 450mW resp. 200 mW

Maximum effective inner capacity C = 16 nF
Maximum effective inner inductance L = 7.5 uH

The reactances of the Sm lang connection cable are already considered within this data.

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

The temperature class, the maximum permissible ambient temperature and the maximum permissible power of the connected, certified, intrinsically safe circuit (P) for the different versions are to be determined with the following table.

EC-type-examination Certificate: without signature and stamp are not valid. The certificates may only be circulated without alteration. Exports or alterations are subject to approval by the Prof. und Zertifizierungsstelle ZELM Ex.

This English version is based on the German text. In case of dispute, the German text shall prevail.

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

Sheet 2/3
### Table 1

<table>
<thead>
<tr>
<th>Type</th>
<th>max. ambient temperature for the temperature classes [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
</tr>
<tr>
<td>DSF 12...</td>
<td>450</td>
</tr>
<tr>
<td>DSF 16...</td>
<td>200</td>
</tr>
<tr>
<td>DSF 22...</td>
<td>450</td>
</tr>
<tr>
<td>DSF EH...</td>
<td>200</td>
</tr>
</tbody>
</table>

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(16) Report No.

ZELM Ex 0900319224

(17) Special conditions for safe use

1. The permissible ambient temperature range is to be determined according to the determination of this EC-Type-Examination Certificate.

2. The complete electrical data have to be taken from this EC-Type-Examination Certificate.

3. The instruction manual has to be considered.

(18) Essential Health and Safety Requirements

met by standards

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Zertifizierungsstelle ZELM Ex

Braunschweig, November 26, 2003

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1. Supplement
(Supplement according to EC-Directive 94/9 Annex III letter 6) to EC-type-examination Certificate
ZELM 03 ATEX 0170 X

Equipment: Rotation speed sensortype DSF .. 15.xx ..V Ex Atex
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 5m:

\[ C = 240 \text{ pF/m} \]
\[ L = 1.5 \text{ uH/m} \]

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 1130617488

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 27, 2006

Dipl.-Ing. Harald Zelm

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