

Translation

(1) **EU-Type Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**



(3) **Certificate Number** TÜV 16 ATEX 172365 X **issue:** 00

(4) for the product: iSense monitoring system for grain silos

(5) of the manufacturer: EYE-GRAIN ApS

(6) Address: Marielundvej 32A
2730 Herlev
Denmark

Order number: 8000454945

Date of issue: 2017-04-03

(7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential ATEX Assessment Report No. 17 203 172365.

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

EN 60079-0:2012

EN 60079-11:2012

except in respect of those requirements listed at item 18 of the schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

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



II (1) D [Ex ia Da] resp. II 2 D Ex ia IIIB T135°C Db resp. II 1 D Ex ia IIIB T135°C Da

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body



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(13) **SCHEDULE**

(14) **EU-Type Examination Certificate No. TÜV 16 ATEX 172365 X issue 00**

(15) Description of product

The iSense is the Crop-Protector grain-quality monitoring and protection system. The system is designed to monitor environmental parameters of grain stored in explosion hazardous areas of Zone 21 and/or Zone 20 (hazardous zones, where combustible dust is present). In certain configurations of the iSense system, active automatic control of corrective actions is possible to maintain grain quality.

Some of the hardware modules of the iSense system are designed to be operated in the presence of combustible dust, in a potential explosive environment. In the iSense system, this is done using the "intrinsic safety" method. The Master-Hub and the Safety limiter are designed to ensure that the energy supplied to the parts of the system in the hazardous area, is below the level that can ignite dust.

The iSense monitoring system can be used in two different setups. The system can be either supplied by the Master-Hub or by the Safety limiter. A use of both devices (Master-Hub and Safety Limiter) is not allowed.

The parts of the iSense monitoring system are marked as follows:

Master Hub:	II (1) D [Ex ia Da]
Safety-Limiter:	II (1) D [Ex ia Da]
Sub Hub:	II 2 D Ex ia IIIB T135°C Db
Sensor-Cable:	II 1 D Ex ia IIIB T135°C Da

All parts of the system can be used in ambient temperature range of -40 °C up to 60 °C.

The electrical data of the System are as follows:

Master Hub:

mains supply connector [Conn8]	for connection to a supply circuit with the following values:
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$U_n =$	230	V AC, 50-60 Hz
$U_m =$	250	V

relay drive connector [Conn7]	for connection to a circuit with the following values:
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$U_n =$	12	V DC
$U_m =$	16	V
$I_m =$	35	A

weather-station connector [Conn12]	for connection to a circuit with the following values:
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$U_n =$	5.1	V DC
$U_m =$	6.3	V
$I_m =$	35	A

RS-485 connectors [Conn5 and Conn6]	for connection to a circuit with the following values:
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$U_n =$	5.1	V DC
$U_m =$	6.3	V
$I_m =$	35	A

Schedule to EU-Type Examination Certificate No. TÜV 16 ATEX 172365 X issue 00

Hazardous Outputs
[Conn1 to Conn4]

in type of protection intrinsic safety Ex ia
with the following maximum values:

$$\begin{aligned} U_o &= 6.3 \text{ V DC} \\ I_o &= 180 \text{ mA} \\ P_o &= 290 \text{ mW} \\ C_o &= 719 \text{ }\mu\text{F} \\ L_o &= 2.0 \text{ mH} \end{aligned}$$

Linear characteristic

The hazardous output circuits are galvanically separated from all other circuits.

Sub-Hub:
Supply Input
[Conn7]

only for connection to an intrinsically safe circuit Ex ia
Maximum values:

$$\begin{aligned} U_i &= 6.3 \text{ V DC} \\ I_i &= 210 \text{ mA} \\ P_i &= 340 \text{ mW} \\ C_i &= 100 \text{ nF} \\ L_i &\sim 0 \text{ mH} \end{aligned}$$

Supply Output
[Conn8]

in type of protection intrinsic safety Ex ia
with the following maximum values:

$$\begin{aligned} U_o &= 6.3 \text{ V DC} \\ I_o &= 210 \text{ mA} \\ P_o &= 340 \text{ mW} \\ C_o &= 719 \text{ }\mu\text{F} \\ L_o &= 2.0 \text{ mH} \end{aligned}$$

Linear characteristic

Sensor Output
[Conn1 to Conn6]

in type of protection intrinsic safety Ex ia
with the following maximum values:

$$\begin{aligned} U_o &= 6.3 \text{ V DC} \\ I_o &= 210 \text{ mA} \\ P_o &= 340 \text{ mW} \\ C_o &= 719 \text{ }\mu\text{F} \\ L_o &= 2.0 \text{ mH} \end{aligned}$$

Linear characteristic

All circuits are galvanically connected.

Sensor-Cable:
Supply
[Conn7]

only for connection to an intrinsically safe circuit Ex ia
Maximum values:

$$\begin{aligned} U_i &= 6.3 \text{ V DC} \\ I_i &= 210 \text{ mA} \\ P_i &= 340 \text{ mW} \\ C_i &= 100 \text{ nF} \\ L_i &\sim 0 \text{ mH} \end{aligned}$$

Schedule to EU-Type Examination Certificate No. TÜV 16 ATEX 172365 X issue 00

Safety-Limiter:

iGrain Handheld reader
[Conn1]

for connection to the iGrain Handheld reader with the following

values: $U_n = 5.1 \text{ V DC}$
 $U_m = 20 \text{ V}$

Hazardous Output
[Conn2]

in type of protection intrinsic safety Ex ia
with the following maximum values:

$U_o = 6.3 \text{ V DC}$
 $I_o = 180 \text{ mA}$
 $P_o = 290 \text{ mW}$
 $C_o = 719 \text{ } \mu\text{F}$
 $L_o = 2.0 \text{ mH}$
Linear characteristic

All circuits are galvanically connected.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 17 203 172365

(17) Specific Conditions for Use

1. The iSense monitoring system for grain silos shall be used either with a Master-Hub or with a Safety-Limiter and the battery powered iGrain Handheld Reader. A connection of both devices at the same time is not allowed.
2. The iSense monitoring system for grain silos shall consist only of one Master-Hub, up to 32 Sub-Hubs, 192 Sensor-Cables and a maximum cable length in the system of less than 4000m, with cable parameters of 200 pF/m and 30 μ H/m.
3. The ambient temperature range is not marked on every device of the system.
4. If the iSense monitoring system is powered by the Master-Hub the intrinsically safe circuits are galvanically separated from enclosure potential. If the system is powered by the Safety-Limiter with the iGrain Handheld Reader, the intrinsically safe circuit is connected to the enclosure potential of the Safety-Limiter.
5. The Sensor-Line metal top housing must be bonded to the PE earth via the earth screw on the housing and a conductor of at least 4mm².
6. The Sub-Hub has to be installed in a way that high charging electrostatic charging processes are avoided and the device shall be cleaned only with a wet cloth.
7. The maximum short-circuit current of the circuits relay drive connector, weather-station connector and RS-485 connector has to be less than 35 A.

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -