



## (1) EC TYPE-EXAMINATION CERTIFICATE (Translation)

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



(3) EC-type-examination Certificate Number:

**PTB 12 ATEX 3006**

(4) Equipment: TMP tripping units, types MS(R) 200 KA and MS(R) 220 VA

(5) Manufacturer: Ziehl industrie-elektronik GmbH + Co KG

(6) Address: Daimlerstr. 13, 74523 Schwäbisch Hall, Germany

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

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 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 test report PTB Ex 12-31156.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
**EN 60947-1, EN 60947-5-1, EN 60947-8, EN 50495, EN 61508, EN ISO 13849**

(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 in accordance with the Directive 94/9/EC. 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 equipment shall include the following:

 II (2) G [Ex e] [Ex d] [Ex px] or  II (2) D [Ex t] [Ex p]

Zertifizierungssektor Explosionsschutz  
On behalf of PTB:

Braunschweig, November 21, 2012



Dr.-Ing. F. Lienesch  
Regierungsdirektor



(13)

## SCHEDULE

(14)

### EC TYPE-EXAMINATION CERTIFICATE PTB 12 ATEX 3006

(15) Description of equipment

All TMP tripping units - also called "PTC thermistor relays" - MS(R) 220 KA (hardware version: List of parts drawing no. 1058 0223.1 of February 17, 2010) and MS(R) 220 VA (hardware version: List of parts drawing no. 1166 0220 of July 12, 2012) monitor, control and protect non-explosion-protected motors and explosion-protected motors in accordance with Directive 94/9/EC, Categories 2 and 3 (gas: zones 1 and 2; dust: zones 21 and 22). They operate according to the closed-circuit principle.

The modifications compared to the previous versions concern the evaluation of the functional safety in accordance with EN 50495, EN 61508, and EN ISO 13849.

Among the most important functions are: overtemperature detection, detection of wire interruption and short-circuit detection in all detector circuits.

The operating condition of the supply voltage and faults (overtemperature, PTC wire interruption and PTC short circuit) is signaled by light-emitting diodes (LEDs).

All functions in the thermistor tripping units serve to protect non-explosion-protected motors and explosion-protected motors in normal operation and in the case of failure.

The types MS(R) 220 KA and MS(R) 220 VA are manufactured in four variants each.

The TMP tripping units having a DC supply are without potential separation and permissible only with safety isolation transformers or when connected to a battery network.

For the mode of operation with high demand and the architecture "**1oo1**", composed of sub-systems according to type A, and hardware fault tolerance (HFT) = 0 (see EN 61508, Part 1, Table 2, and EN 61508, Part 2, Table 2), the following characteristic values of the functional safety were determined for the types MS(R) 220 KA and MS(R) 220 VA at an ambient temperature of 40 °C (component temperature: 60 °C):

## Motor protection by thermistor:

Safety integrity level: SIL 1 (type A)

### a) Types MS220KA and MS220VA

Fraction of the non-hazardous failures compared to the hazardous failures (SFF): 55 %

Fraction of the undetected, dangerous failures ( $\lambda_{DU}$ ):  $4.07 \times 10^{-7}/h$

Fraction of the detected, dangerous failures ( $\lambda_{DD}$ ):  $0 \times 10^{-7}/h$

Fraction of the undetected, safe failures ( $\lambda_{SU}$ ):  $5.55 \times 10^{-8}/h$

Fraction of the detected, safe failures ( $\lambda_{SD}$ ):  $4.44 \times 10^{-7}/h$

Average probability of a dangerous failure to perform the safety function on demand (PFD) at a proof test interval T1 of 36 months (in accordance with EN 60079-17):

PFD:  $5.35 \times 10^{-3}$  (requirement for SIL 1 as per standard:  $\geq 10^{-2}$  to  $< 10^{-1}$ ). The mean time between failures (MTBF) is 54 years.

### b) MSR220KA and MSR220VA

Fraction of the non-hazardous failures compared to the hazardous failures (SFF): 55 %

Fraction of the undetected, dangerous failures ( $\lambda_{DU}$ ):  $4.26 \times 10^{-7}/h$

Fraction of the detected, dangerous failures ( $\lambda_{DD}$ ):  $0 \times 10^{-7}/h$

Fraction of the undetected, safe failures ( $\lambda_{SU}$ ):  $6.1 \times 10^{-8}/h$

Fraction of the detected, safe failures ( $\lambda_{SD}$ ):  $4.52 \times 10^{-7}/h$

Average probability of a dangerous failure to perform the safety function on demand (PFD) at a proof test interval T1 of 36 months (in accordance with EN 60079-17):

PFD:  $6 \times 10^{-3}$  (requirement for SIL 1 as per standard:  $\geq 10^{-2}$  to  $< 10^{-1}$ ). The mean time between failures (MTBF) is 52 years.

For the safety-related parts of control systems in accordance with EN ISO 13849, the following data have been determined at an ambient temperature of 40 °C (component temperature: 60 °C):

Category 1 for a performance level (PL) = c, an average diagnostic coverage  $DC_{avg} = 0$ , and 268 years as mean time until a dangerous failure of each channel ( $MTTF_d$ ) occurs for the types MS(R) 220 KA and MS(R) 220 VA.

**Note:** The performance level is the result of the risk assessment, related to the fraction of the risk reduction due to the safety-related parts of the control system.

Additional information can be found in the operating instructions "PTC thermistor relay types MS(R) 220 KA (drawing no. 1058 0740 of November 09, 2012) and MS(R) 220 VA (drawing no. 1166 0740 of November 08, 2012) which are enclosed with the devices.

In addition, updated versions can be downloaded from the website [www.ziehl.de](http://www.ziehl.de).

**Note:**

**The data of the functional safety stated above are valid for an ambient temperature of 40 °C. Data for additional ambient temperatures can be obtained on request.**

- (16) Test report PTB Ex12-31156
- (17) Special conditions for safe use  
none
- (18) Essential health and safety requirements

The tests carried out and their positive results, as well as the proof furnished, dated October 28, 2011 (see 1058 1601) have confirmed compliance with the standards and, thus, with Directive 94/9/EC, Annex II (in particular 1.5). Suitably selected and adjusted safety devices of this type are necessary for the safe operation of explosion-protected motors. The devices themselves are to be installed outside potentially explosive atmospheres.

Zertifizierungssektor Explosionsschutz  
On behalf of PTB:

Braunschweig, November 21, 2012

  
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