



(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 07 ATEX 3053 X



(4) Equipment: three-phase motor of the type series 1M.. 16.-....

(5) Manufacturer: Getriebebau NORD GmbH & Co. KG

(6) Address: Rudolf-Diesel-Strasse 1, 22934 Bargtheide, 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 report PTB Ex 07-37129.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0: 2004 EN 60079-1:2004 EN 60079-7: 2003 IEC 60079-11:1999

(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 to 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.

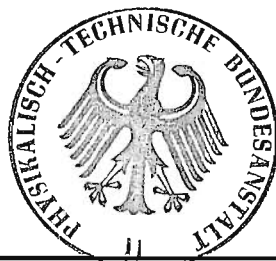
(12) The marking of the equipment shall include the following:

 **II 2 G Ex e II T1 - T3, Ex ed IIC T1 - T3,
Ex eib IIC T1 - T3 resp. Ex edib IIC T1 - T3**

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, October 04, 2007


Dr.-Ing. F. Lienesch
Regierungsdirektor



sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 3053 X

(15) Description of equipment

The motor series 1M.. 16.-.... conforms with the requirements of standards EN 60079 et seq. with their marking requirements.

The three-phase motors of types 1M.. 16.-.... are designed to Increased Safety "e" type of protection. Their enclosures are made from cast aluminium or grey cast iron and they provide for attachment of terminal boxes. The squirrel-cage rotor is made from cast aluminium. The shaft rotates in rolling bearings.

Cooling is achieved by heat exchange, using an external fan made from aluminium or plastic and by using the enclosure surface. An alternative option is to design the motors without external fan (non-ventilated design) and to use separately driven fans with drive motors separately certified for compliance with Directive 94/9/EC.

The motors may be additionally equipped with brakes or pulse generator, which are separately certified for compliance with Directive 94/9/EC. The device for direct temperature monitoring consists of three PTC thermistors embedded in the winding, and a tripping device that has been function-tested in compliance with Directive 94/9/EC.

Electric connection is by means of terminal compartments designed to Increased Safety "e" type of protection and sealed to IP55 standard. The enclosures are made from aluminium or grey cast iron, and they are provided with separately certified cable glands, sealing plug, terminal board and separately tested seals.

Electrical connection may alternatively be made with cable glands (certified in compliance with Directive 94/9/EC) with directly brought-out wires.

The ambient temperature range is 40 °C down to -20 °C. This range may be extended to 60 °C to -20 °C by special electrical or thermal design features, when using suitable terminal boxes, materials and components, or by the data sheet for the electrical rating.

The motors are suited for operation with a voltage-source converter.

The electric motor data, including specifications for compliance with the temperature class, are defined in a data sheet attached for the EC-Type-Examination Certificate.

(16) Report PTB Ex 07-37129

(17) Special conditions for safe use

has been specified in the associated data sheets

(18) Essential health and safety requirements

met by compliance with the aforementioned Standards

Zertifizierungsstelle Explosionsschutz

By order:

Braunschweig, October 04, 2007



Dr.-Ing. F. Lienesch
Regierungsdirektor



for the three-phase motor type 1MA7 163-4...

Ratings and specifications

This certificate is valid for the following designs, provided the motors of this type differ only negligibly from the sample tested as regards electrical and thermal stresses:

Star connection

Torque:	50	60	65.7	27	Nm
Power:	0.672	4.48	10	8.244	kW
Voltage: *)	53	200	400	400	V
Current:	14	17.6	18.9	17.6	A
Frequency:	5	25	50	100	Hz
Speed:	128	710	1455	2907	min ⁻¹
Duty type:			S1		
Temperature class:			F		

Delta connection

Torque:	50	60	65.7	56	Nm
Power:	0.672	4.48	17.663	17.3	kW
Voltage: *)	31	115	400	400	V
Current:	24.2	30.5	33.3	32.8	A
Frequency:	5	25	87	100	Hz
Speed:	128	710	2563	2946	min ⁻¹
Duty type:			S1		
Temperature class:			F		

*) Fundamental wave, measured at motor terminals.

The voltage depends on the converter input voltage, the voltage drop at the filter and across the motor connection cable. Even at minimum converter input voltage, it must not remain by more than 5 % below the rating, as specified in IEC 60034 – 1 (area "A"). This has to be considered in designing the motor, in converter parameterization (e.g. U/f adaptation), and at minimum converter input voltage. The maximum converter input voltage is 500 V.

The rated motor voltage may be adjusted by the number of turns per unit length of the winding. The rated current changes at a ratio which is the reciprocal of the rated voltage.

Monitoring device

A device for direct temperature monitoring, combined with defined converter settings, protect the motors against excessive heating as a result of overloading.

Because of the special features of converter-fed motors and the adapted monitoring device, the I_A/I_N ratio and the heating times t_E need not be specified.

The device for direct temperature monitoring has been type tested by Physikalisch-Technische Bundesanstalt. It consists of three DIN 44082 PTC thermistors, type M 120, which are embedded in the winding, and a tripping device that has been function-tested for this purpose on the basis of Directive 94/9/EC.

At a phase current of 128 A and a blocked shaft, the PTC thermistor must trip after 23 s ($\pm 20\%$) when starting from the cold state (20 °C).

Because of the temperature monitoring device, temperature class T3 is complied with on the basis of EN 60079-7.

Converter settings

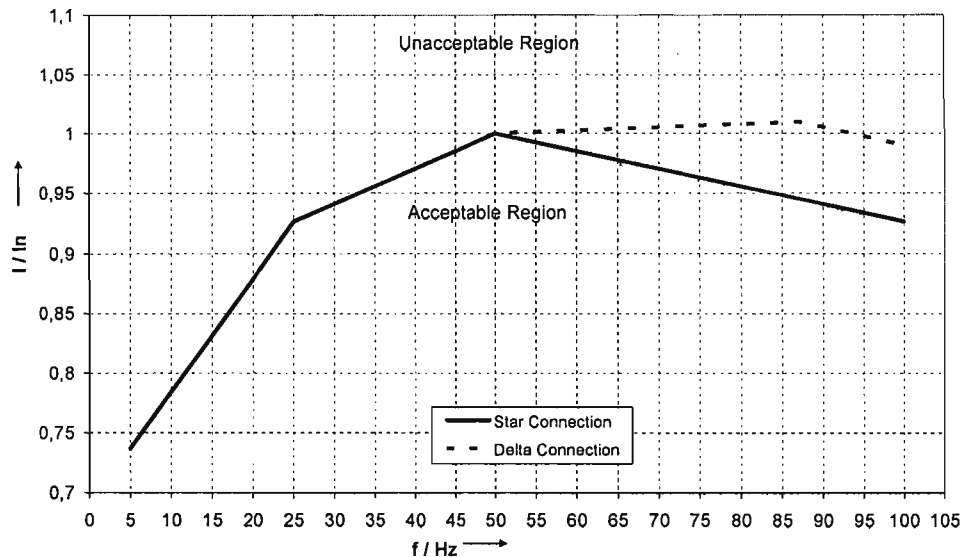
In connection with the above monitoring device, the converter has to be set as follows, and these settings must be maintained during operation:

Minimum clock frequency:	3	kHz
Motor current (short-term):	$1.5 \cdot I_N$	
Maximum overload period:	60	s
Minimum frequency f_{min} :	5	Hz
Maximum frequency f_{max} :	100 Y / 100 Δ	Hz
Permissible period of operation below f_{min} :	60	s

The maximum overload period and the permissible period for operation below f_{min} are based on a 10-minute time interval.

The torque as a function of frequency follows from the permissible continuous-current limit.

The continuous-current limit of the frequency converter has to be adjusted as a function of the frequency in compliance with the graph below:



Setting parameters for continuous-current limit of the frequency converter between 5 Hz and 100 Hz

All other settings have to be selected as required for the drive conditions.

Special conditions

Group operation of the motor is not accepted.

Motors of this type may only be operated with converters that meet the requirements defined above under "converter settings".

The rated current of the frequency converter may as a maximum be two times the rated motor current.

The current monitoring device for the frequency converter must record the r.m.s. machine current at a tolerance of $\pm 5\%$ based on the rated motor current.

Before starting the system, due care must be taken that no converter-induced overvoltage with peaks greater than 1556 V ($2 * \sqrt{2} * 550\text{ V}$) can occur at the terminals of the electric machine.

Test report PTB Ex 07-37125

Zertifizierungsstelle Explosionsschutz
By order



Dr.-Ing. F. Lienesch
Regierungsdirektor



Braunschweig, October 04, 2007

Braunschweig und Berlin

DATA SHEET 02 TO EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 3053 X

Manufacturer: Getriebebau NORD GmbH & Co. KG, 22941 Bargteheide, Germany

for the three-phase motor type 1MA7 166-4...

Ratings and specifications

This certificate is valid for the following designs, provided the motors of this type differ only negligibly from the sample tested as regards electrical and thermal stresses:

Star connection

Torque:	62	88	88	35.5	Nm
Power:	0.774	6.6	13.531	10.901	kW
Voltage: *)	40	200	400	400	V
Current:	21	26	26	23.4	A
Frequency:	5	25	50	100	Hz
Speed:	119	716	1468	2932	min ⁻¹
Duty type:			S1		
Temperature class:			F		

Delta connection

Torque:	62	88	88	75	Nm
Power:	0.774	6.602	23.757	23.235	kW
Voltage: *)	23	115	400	400	V
Current:	36.4	45	46	44.9	A
Frequency:	5	25	87	100	Hz
Speed:	119	716	2576	2958	min ⁻¹
Duty type:			S1		
Temperature class:			F		

*) Fundamental wave, measured at motor terminals.

The voltage depends on the converter input voltage, the voltage drop at the filter and across the motor connection cable. Even at minimum converter input voltage, it must not remain by more than 5 % below the rating, as specified in IEC 60034 – 1 (area "A"). This has to be considered in designing the motor, in converter parameterization (e.g. U/f adaptation), and at minimum converter input voltage. The maximum converter input voltage is 500 V.

The rated motor voltage may be adjusted by the number of turns per unit length of the winding. The rated current changes at a ratio which is the reciprocal of the rated voltage.

Monitoring device

A device for direct temperature monitoring, combined with defined converter settings, protect the motors against excessive heating as a result of overloading.

Because of the special features of converter-fed motors and the adapted monitoring device, the I_A/I_N ratio and the heating times t_E need not be specified.

The device for direct temperature monitoring has been type tested by Physikalisch-Technische Bundesanstalt. It consists of three DIN 44082 PTC thermistors, type M 120, which are embedded in the winding, and a tripping device that has been function-tested for this purpose on the basis of Directive 94/9/EC.

At a phase current of 186.7 A and a blocked shaft, the PTC thermistor must trip after 22 s ($\pm 20\%$) when starting from the cold state (20 °C).

Because of the temperature monitoring device, temperature class T3 is complied with on the basis of EN 60079-7.

Converter settings

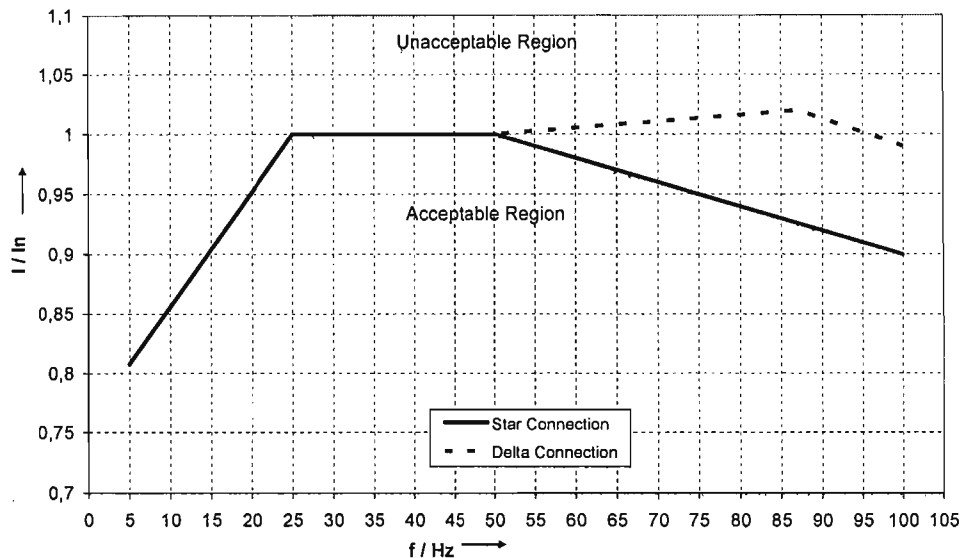
In connection with the above monitoring device, the converter has to be set as follows, and these settings must be maintained during operation:

Minimum clock frequency:	3	kHz
Motor current (short-term):	$1.5 \cdot I_N$	
Maximum overload period:	60	s
Minimum frequency f_{\min} :	5	Hz
Maximum frequency f_{\max} :	100 Y / 100 Δ	Hz
Permissible period of operation below f_{\min} :	60	s

The maximum overload period and the permissible period for operation below f_{\min} are based on a 10-minute time interval.

The torque as a function of frequency follows from the permissible continuous-current limit.

The continuous-current limit of the frequency converter has to be adjusted as a function of the frequency in compliance with the graph below:



Setting parameters for continuous-current limit of the frequency converter between 5 Hz and 100 Hz

All other settings have to be selected as required for the drive conditions.

Special conditions

Group operation of the motor is not accepted.

Motors of this type may only be operated with converters that meet the requirements defined above under "converter settings".

The rated current of the frequency converter may as a maximum be two times the rated motor current.

The current monitoring device for the frequency converter must record the r.m.s. machine current at a tolerance of $\pm 5\%$ based on the rated motor current.

Before starting the system, due care must be taken that no converter-induced overvoltage with peaks greater than 1556 V ($2 \cdot \sqrt{2} \cdot 550\text{ V}$) can occur at the terminals of the electric machine.

Test report PTB Ex 07-37125

Zertifizierungsstelle Explosionsschutz
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Braunschweig, October 04, 2007


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