

Turbine Check Meter

CM3

Instruction Manual

Bulletin MNF08001EN / DOK-347E Issue/Rev 1.3 (1/19)



Further documentation on this product:

Description	Order number
None	

Documentation on the Internet: http://info.smithmeter.com/literature/online_index.html

History

Revision	Date	Originator	Status	Description
Rev. 1.01	October 2014	TR1	Created	First edition
Rev. 1.10	January 2015	/ HS / jp /	WIP	Div. Modifications
Rev. 1.20	January 2016	/ JS / jp /	released	Div. Modifications
Rev. 1.30	January 2019	/ KB	released	Branding

Important

All information and technical specifications in this documentation have been carefully checked and compiled by the author. However, we cannot completely exclude the possibility of errors. TechnipFMC is always grateful to be informed of any errors.

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1 – General














1.1. Orientation aids for the manual

We have provided some orientation aids so that you can easily find the necessary information in this manual.

The information in this manual ranges from imperative safety procedures and standardized guidelines through to concrete handling procedures and advice. To differentiate these more easily, the information is marked with corresponding pictograms in front of the relevant text.

These are intended not just to draw particular attention to these passages, but also to make it easier to find the information you want. Therefore the pictograms are symbolic of the underlying textual content.

The following pictograms are used in this manual:

	Danger sign Danger of explosions caused by easily ignited gases and liquids here.
	Risk of operating fault Actions that may damage the equipment.
	Legal notice Actions that may have legal consequences.
	Working step Concrete action statements, e.g.: "Press the <Enter> key".
	Input necessary e.g. via numeric or function keys.
	Positive response message e.g. "The main menu now appears"
	Negative response message e.g. "If a fault message appears now..."
	Background information Short-tip, e.g. See more information in Chapter 3.
	Option Special case.
	Function Functional description.
	NOTE: Indicates a special situation.
	ATTENTION: Particular attention is to be paid.
	Battery disposal Ensure that all used batteries are disposed of via suitable disposal facilities.

1.2. Safety instructions



Caution:

This information must be carefully read and observed before operating the unit.

1.3. Notes on Ex-protection

**Caution:**

The CM3 are designed for flow measurements of flammable liquids (hazard classes AI and AIII) on tank trucks. Sparks and open flames must be strictly avoided.

The CM3 shall not be used for fuel delivery with delivery pumps.

1.3.1. Proper intended use



The CM3 is only to be used for delivery of low-viscosity petroleum products on tank trucks. The corresponding applicable safety regulations (e.g. Ex-protection) must be complied with.



Any form of use which exceeds the scope described above is deemed to be improper use; the manufacturer is not liable for damages resulting from such improper use.



Proper use also includes compliance with the conditions set out by the manufacturer with regard to operation, installation and maintenance.



The CM3 must only be operated, serviced and repaired by personnel who are familiar with the equipment and who have been trained regarding the dangers involved.



The CM3 must not be used for the discharge of fuel using a feed pump.



The manufacturer cannot be held liable for any damages arising as a result of unauthorized changes to the measuring systems.



The CM3 contains precision, high quality components. Therefore, mechanical influences which do not result from operation (e.g. through being dropped) must be avoided.



Measurements which are subject to mandatory W&M certification shall not be carried out with this device.

1.4. General application information



The CM3 has been designed for measurement of products discharge by gravity from tank trucks without a permanent measurement systems.



However, with measurement operation it must be taken into account that the CM3 is operated without a gas extractor, i.e. any air in the product is also metered with it.

1.4.1. Measurement at a splitted tank compartment



If a tank compartment volume must be splitted for multiple discharges, we recommend to start the measurement with a full compartment. This provides the best measurement result within the stated accuracy range.



The retained volume in the compartment can be calculated by the difference between the loaded volume and the discharged volumen.



When measuring the entire retained volume in a compartment there is a risk of air entering the discharge system. This air will be measured as discharged volume if flow is not interrupted.

2 – Fundamentals

2.1. Functional principle of the CM3



The liquid flowing through the impeller-type meter sets the impeller rotating.



The rotation speed is proportional to the flow volume.



The rotating movement of the impeller blades is transferred by a magneto-inductive sensor.



These signals are evaluated within the measuring electronics and displayed.



The momentary flow rate in l/min and the total discharged volume in litres can be displayed. In addition a non-resettable totaliser is provided.

2.2. Initial operation



The CM3 is factory tested and calibrated.



The device must be fitted with suitable couplings to connect to the discharge system of the tank truck.



IMPORTANT:

Before operating the device for the first time, read the instructions for use carefully and follow them.

2.3. Measurement operation

2.3.1. Coupling / uncoupling



Connect the CM3 to the discharge coupling on the tank truck.



Orientate the CM3 so that the display can be read easily.



Make sure that the gaskets in the couplings are in good condition to prevent leakages.

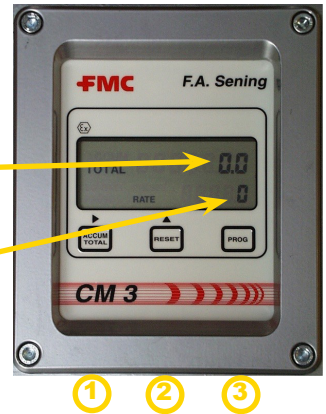
2.3.2. Controls



The CM3 is shipped from the factory fully operational. For operation only the display panel and the three keys on the operating panel are relevant.

2.3.2.1. Display

- ▶ Two values are shown on the display.
- ▶ The **upper** value is the discharged in litres (total).
- ▶ The **lower** value (smaller figures) indicates the momentary flow rate in litres per minute (l/min).
- ▶ The right key (PROG) is only used for programming the CM3. Since this procedure is carried out by the manufacturer, this key has no significance for the operation of the CM3.
- ▶ The device has no ON/OFF switch. It always remains ready for operation. The current consumption is minimised by an internal circuit for maximum battery lifetime.



2.3.2.2. Keypad

- ▶ The CM3 has a total of three keys.
- ▶ **1** Pressing the **left key (ACCUM. TOTAL)** displays the total „accumulated“ discharge volume on the upper display in litres. This value is only visible while the key is pressed. This value is not resettable.
- ▶ **2** The **central key (RESET)** is used for zeroing the display. Once the key is pressed, the CM3 display is set to zero.
- ▶ **3** The **right key (PROG)** is only used for programming the CM3. Since this procedure is carried out by the manufacturer, this key has no significance for the operation of the CM3.
- ▶ The device has no ON/OFF switch. It always remains ready for operation. The current consumption is minimised by an internal circuit for maximum battery lifetime.

2.3.3. Maintenance procedure

Measurement with the CM3 shall be carried following this procedure:

- ☞ **Step 1:**
Check the interior for contamination or damage.
 - ▶ The impeller must turn easily and then stop abruptly.
- ☞ **Step 2:**
Check the display; the upper and lower displays must indicate zero.
 - ▶ If the upper display indicates a value,
 - ▶ press the <RESET> key.
 - ▶ The display should now indicate zero.



Step 3:

Connect the CM3 to the discharge coupling on the vehicle.

- ▶ Couple the discharge hose to the meter and the filling nozzle ().
- ▶ The measurement process can now be started.



Step 4:

After discharge remove the product hose and disconnect the CM3 from the discharge coupling. Place the device safely in its storage location.



Be sure that that no fuel flows into the environment.

2.4. Storage

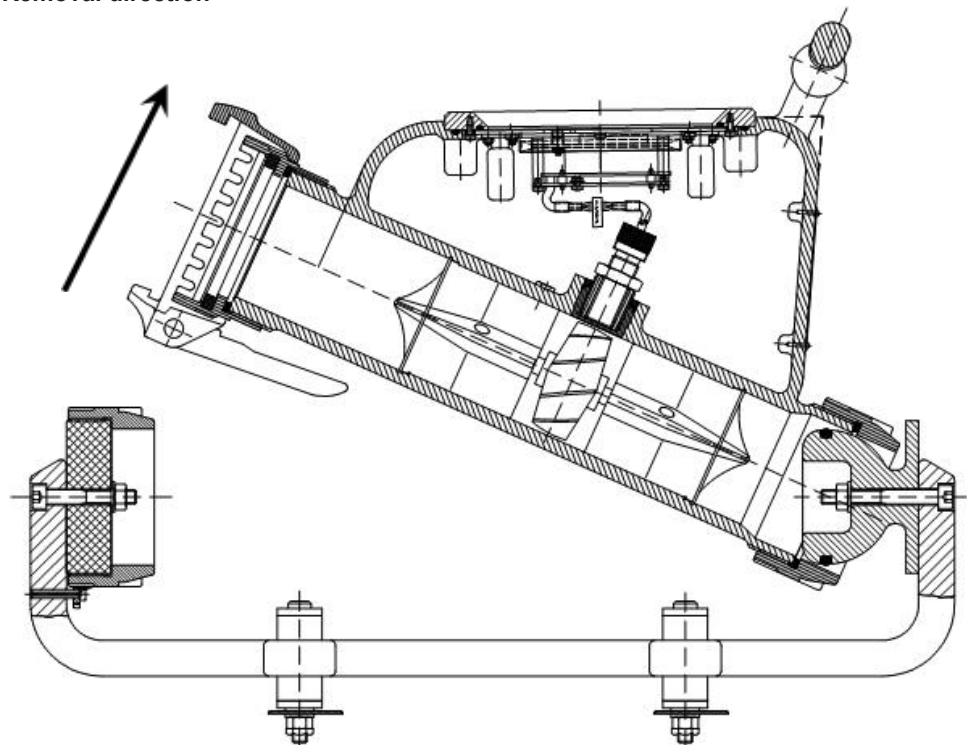
2.4.1. Storage bracket in the vehicle

The CM3 should be stored in a special vibration-absorbing storage device on the tank truck.



Storage device example for model CM3:

Removal direction



2.4.2. Removal from the holder CM3-AV



Loosen the coupling on MK CM3; while you hold the CM3 with the other hand firmly at the handle.



Slide the CM3 on the bearing pin back and turn it at the same time by about 45°.



Now the CM3 can be removed from the mandrel.

3 – Maintenance



The CM3 has been designed for minimum requirements. Each time the meter is used, it must be checked whether the meter impeller wheel turns easily.



Lubrication of the impeller bearing is provided by the measured fluid. Therefore never blow out the CM3 with compressed air. Damage to the bearing may occur.

3.1. Battery replacement

When the battery service life expires, after about 2 years, this is indicated on the display with low bat.



The batteries must be replaced when the low bat indication appears in the display.



Important:

The CM3 is a so-called intrinsically safe component and is approved with regard to the explosion protection. Therefore only genuine replacement batteries must be used.



The voltage supply for the CM3 is provided by two batteries. **Only one battery must be replaced at a time, because otherwise all the settings will be deleted.**



Unscrew the four mounting screws on the membrane keypad to change the batteries.



Then remove the membrane keypad and place it on a clean surface.



The connecting lead to the sensor is of sufficient length and does not need to be removed.



Now pull off the connecting lead between the battery and electronics.



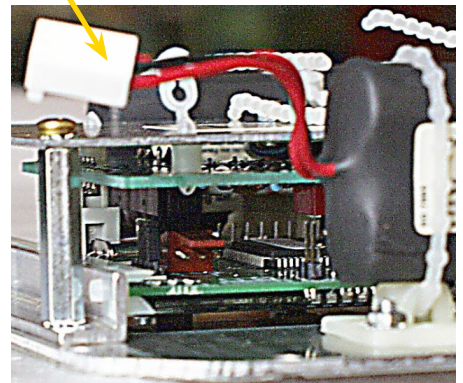
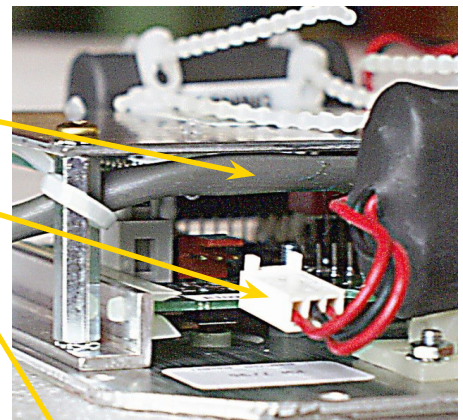
Fit the new battery.



Ensure that the batteries are firmly mounted with the appropriate cable ties.



If the cable ties are not pulled tight, damage may occur later in operation.



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4 – Technical data

4.1. CM3

Type examination certificate No.	BVS 04 ATEX E 188 IECEX BVS xxxxxxxxxxxxxx
Operating temperature:	- 20 °C to + 60 °C
Marking:	[Ex] II 2 G Ex ia IIB T3/T4
Permissible pressure:	10 bar
Dimensions:	Depending on product variant
Material (in medium contact):	Aluminium; stainless steel
Weight:	approx. 8 kg, depending on product variant
Measurement range:	250 - 2000 l/min
Measurement accuracy:	+/- 5 % in above measurement range at viscosities between 0.6 and 5 mm ² /s
Liquids:	Low-viscosity petroleum products; (gasoline, kerosene and diesel)
Dimensions (incl. Halterung):	170 mm wide; 400 mm high; 500 mm long
Voltage supply:	Two lithium batteries (***)
Battery service life:	about 2 years
Display:	LCD display
Total:	7 -figure display; 10 mm high
Accumulated total: (Akkum. Totals)	see above
Flow rate:	4-figure display; 8,5 mm high
Splash-proof:	Conforming to IP 65

*** As a substitute may be used only explosion-proof batteries type xxxxx. Refer to the Note: battery change ().

4.2. Repairs and replacement parts



Repairs to the impeller or the electronics must only be carried out by the manufacturer. Replacing the internal electronics requires a re-calibration of the measuring element.



Only replacement parts from F. A. Sening must be used: An overview of the available replacement parts is given in the Replacement Parts Drawing:

- CM3 / 51.250223 (see page 18) and for
- CM3 AV / 51.250243 (see page 19).

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5 – Address and contact details

Our service department will be happy to assist and can be contacted as follows:

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Regentstrasse 1
D-25474 Ellerbek

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E-Mail: info.ellerbek@technipfmc.com
Web: http://info.smithmeter.com/literature/online_index.html

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6 – Appendix – drawings and approvals

6.1. Drawings

Drawings	No.	Page
Turbine Check Meter - CM3	51.250223	19
Holder – CM3-AV	51.250243	20
Turbine Check Meter model CM3-E		
Turbine Check Meter model CM3-K3		
Turbine Check Meter model CM3-K4		
Holder CM3-AVK4		
Certificates		
KEMA_Certificate_Of_Conformity_CM3	KEMA	

Documentation and drawings as PDF files on the Internet:
http://info.smithmeter.com/literature/online_index.html

6.1.1. 51.250223 – Turbine check meter – CM3

Der CM3 darf nur in der Aufnahmeeinrichtung, vibrationsicher (Teile-Nr. CM3-AV) gelagert werden.

Die Gesamtabmaße einschließlich Aufnahmeeinrichtung, vibrationsicher (ab Tankwagenwand) betragen:
 Länge : ca. 515mm
 Breite : ca. 165mm
 Höhe : ca. 365mm

The CM3 may only be installed on the vehicle using the holder (Part-No.: CM3-AV) as specified by the manufacturer.

The total measures including the holder are:
 Length : ca. 515mm
 Width : ca. 165mm
 Height : ca. 365mm

Temperaturbereich:
-20°C bis +60°C

Temperature range:
-20°C to +60°C

Medium berührte Werkstoffe:
Aluminium
rostfreier Stahl
PN10

Medium touched materials:
Aluminium
Stainless steel
PN10

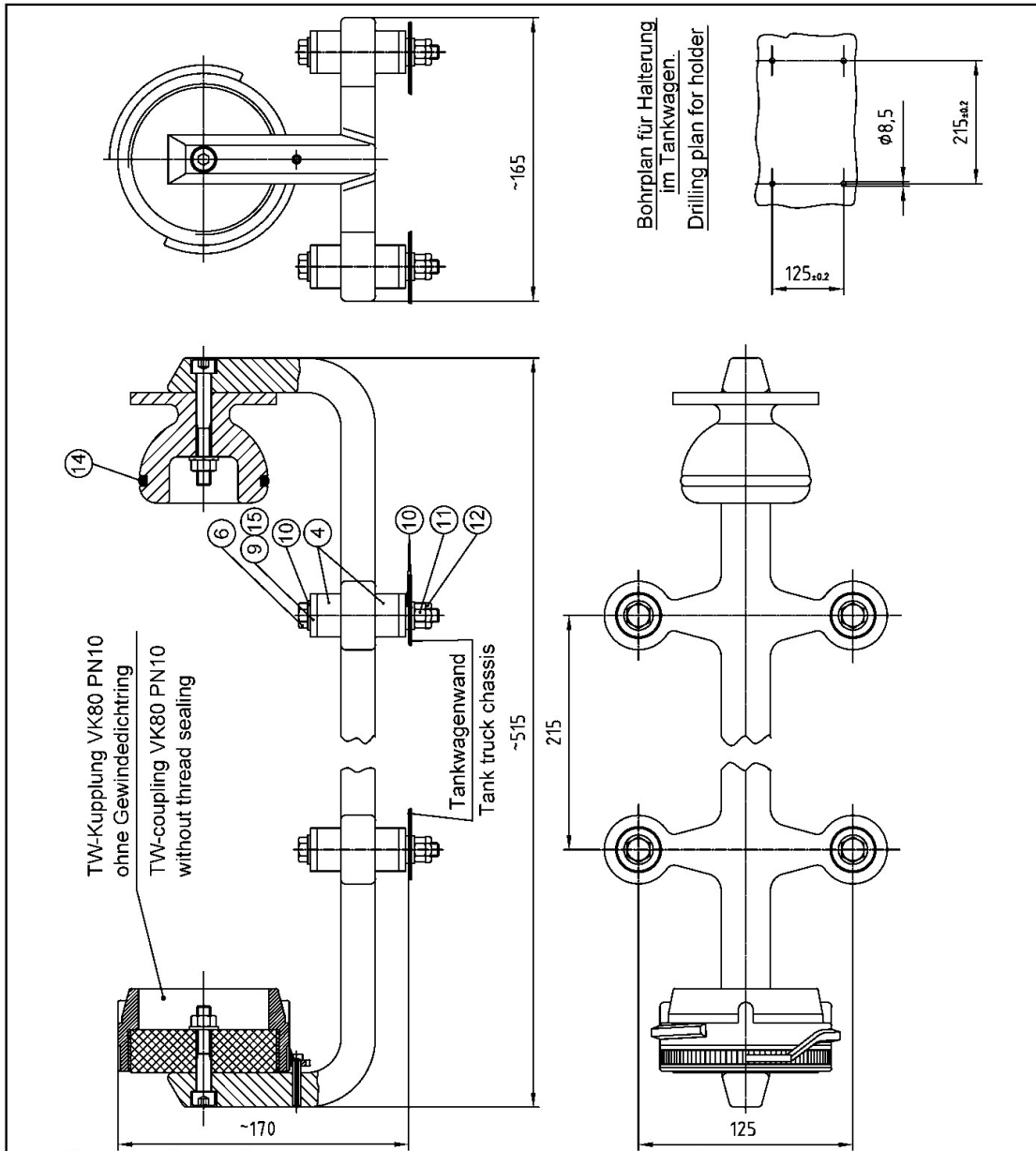
20	6000291	1	O-Ring 77x1,5	O-ring 77x1,5
18	CS-BAT-36INT	1	Batterie 3,6V für CM3	Battery 3,6V for CM3
16	5300240	1	TW-Kupplung VK80 PN10 mit Gewindedichtring	TW-coupling VK80 PN10 with thread sealing
15	5300239	1	TW-Kupplung MK80 PN10 mit Gewindedichtring und Flachdichtung	TW-coupling MK80 PN10 with thread sealing and flat sealing
14	6000250	1	O-Ring 170x2,5	O-ring 170x2,5
10	4100126	4	Zylinderschraube M6x16	Head cap screw M6x16
Pos./Item	Teile-Nr./Part-No.	Stück/Quant.	Benennung	Description

Turbinenzähler CM3
Turbine Check Meter CM3

FMC Technologies F.A. Sening GmbH
D-25474 Ellerbek, Germany

Weight : 8,0 kg	Date : 25.01.1996	Name : Rehpenning
Changed: FCN No. 2102.06	Date	Name RL
Part-No. CM3		Drawing No.: 51.250223
		Rev. A

6.1.2. 51.250243 – Holder – CM3-AV



15	250261	4	Rohr 10x1	Pipe
14	6000265	1	O-Ring 59,69x5,33 FPM	O-ring
12	4200105	4	Sicherungsmutter M8	Self locking counter nut
11	4200040	6	Sechskantmutter M8	Hexagon nut
10	4300005	14	Scheibe A8,4	Washer
9	4300166	8	Scheibe 10,5x25x4	Washer
6	4100195	4	Sechskantschraube M8x75	Hexagon head screw
4	250244	8	Dämpfungspuffer	Damping buffer
Pos./ Item	Teile-Nr./ Part-No.	Stück/ Quant.	Benennung	Description

ALL TOLERANCED DIMENSIONS ARE FOR INSTALLATION ONLY.
ALL OTHER DIMENSIONS ARE FOR REFERENCE ONLY.

FMC Technologies
F.A. Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

Method 1 Method 3	Date / Datum	Name	Item name / Benennung	
	Drawn 16.11.1995	Rehpenning	Aufnahmeeinrichtung / Holder for CM3	
Checked			made for / zugehörig zu vibrationssicher / vibration-proof	
Scale / Maßst. 1:5	Item-No. / Teile-Nr.	Drawing No. / Zeichnungs-Nr.	Rev.	Sheet / Blatt
Size / Format ISO - A4	CM3-AV	250243_51	00A.01	1 of / von 1
Weight / Gewicht kg				

6.2. Declaration of Conformity – EU



F.A. Sening GmbH
Ellerbek, Germany

1 **EU - Konformitätserklärung**
2 *EU - Declaration of Conformity*

Der Hersteller / The Manufacturer

F.A. Sening GmbH, Regentstraße 1, 25474 Ellerbek

erklärt hiermit, das der Gegenstand der nachfolgenden Erklärung die einschlägigen
Rechtsvorschriften zur Harmonisierung in der Union erfüllt:
declare herewith that the object of the declaration described below is in conformity with the relevant Union harmonisation legislation:

3

(A) **Richtlinie 94/9/EU** (bis 19. April 2016) und **Richtlinie 2014/34/EU** (ab 20. April 2016)
: Directive 94/9/EC (until April 19th, 2016) and Directive 2014/34/EU (from April 20th, 2016)

Produktbezeichnung: <i>Product:</i>	Zündschutzart: <i>Type of protection:</i>	EG – Baumusterbescheinigung <i>EC – Type Test Approval</i>
CM3	II 2 G Ex ia IIB T4	BVS 04 ATEX E 188

einschließlich aller Ergänzungen / including all supplements

4

In der gelieferten Ausführung den folgenden Sicherheitsanforderungen entspricht (entsprechen):
Corresponds to the following safety requirements in the delivered implementation:

5

Grundlegende Normen: EN 60079-0; EN 60079-1
Basic standards:

6

Angewandte harmonisierte Normen, insbesondere:
Applied harmonized standards, in particular:

7

Andere angewandte Bestimmungen / EU-Richtlinien:
Other applied regulations / EU-Directives:

8

Benannte Stelle / Produktionsüberwachung: PTB (0102)
Notified Body Production control

9

Prüfungen/Überwachung/Kontrollen während der Fertigung: Hersteller
Examination/inspection/tests during manufacturing: Manufacturer

10

Die zugehörige Betriebsanleitung enthält wichtige sicherheitstechnische Hinweise und Vorschriften für die
Aufstellung, Inbetriebnahme, Wartung und Instandhaltung der (s) Gerät(es).
*The appropriate operator's manual contains important safety technical notes and regulations for the installation, placing into
operation, maintenance and maintenance of the equipment.*

11

(B) **Richtlinie 2004/108/EU** (bis 19. April 2016) und **Richtlinie 2014/30/EU** (ab 20. April 2016)
: Directive 2004/108/EC (until April 19th, 2016) and Directive 2014/30/EU (from April 20th, 2016)

Zur Beurteilung des Erzeugnisses hinsichtlich der Elektromagnetischen Verträglichkeit wurden die
folgenden Vorschriften angewendet:
For verification of conformity with the protection requirements the following standard was applied:

12

Grundlegende Norm: EN61000-6-3
Basic standard:

13

Ort und Datum: Ellerbek, 07.01.2016
Location and date

Geschäftsführer
General Manager

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The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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