

Operating Instructions

Control and Distribution Box

> 8150/5



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2 General Information

2.1 Manufacturer

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2.2 Operating Instructions Information

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 Subject to alterations.

3 Intended Use

The control and distribution boxes are explosion protected equipment, certified for use in hazardous areas of Zones 1, 2 and 21, 22. They are used together with the built-in components to control, switch and transfer electrical energy. The devices are intended only for fixed mounting.

4 General Safety Instructions

The devices must be used only for the permitted purpose. Incorrect or impermissible use or non-compliance with these instructions invalidates our warranty provision. Any alterations and modifications to the device impairing its explosion protection are not permitted. Use the device only if it is undamaged and clean.

WARNING

Installation, maintenance, overhaul and repair may only be carried out by appropriately authorised and trained personnel.

Observe the following information during installation and operation:

- ▶ Any damage can invalidate the explosion protection
- ▶ National safety regulations
- ▶ National accident prevention regulations
- ▶ National installation regulations (e.g. IEC/EN 60079-14)
- ▶ Generally recognized technical regulations
- ▶ Safety guidelines in these operating instructions
- ▶ Characteristic values and rated operating conditions on the rating and data plates
- ▶ Additional instruction plates fixed directly to the device




5 Conformity to Standards

The relevant standards are listed in the EC Declaration of Conformity.

6 Transport and Storage

- ▶ Transport and storage are only permitted in the original packing.

7 Assembling and Dismantling

	If the explosion protected equipment is exposed to the weather, it is advisable to provide a protective cover or wall.
	Dimensions and weight data as well as the location of fastening points are given in the enclosed mechanical assembly drawings.
	To avoid condensation inside of the enclosure, it is recommended to install a R. STAHL breather, Type 8162. Depending on the installation location, the degree of protection decreases according to IEC/EN 60529. For any installation position, the degree of protection is IP64, if the breather is installed downwards, it is IP66.

8 Technical Data

Marking	
Europe (ATEX)	
Gas explosion protection	⊕ II 2 G Ex d e ia/ib [ja/ib] ma mb q IIA, IIB, IIC T6, T5, T4 Gb
Dust explosion protection	⊕ II 2 D Ex tb IIIC IP66 T130°C, T95°C, T80°C Db
IECEX	
Gas explosion protection	Ex d e ia/ib [ja/ib] ma mb q IIA, IIB, IIC T6, T5, T4 Gb
Dust explosion protection	Ex tb IIIC IP66 T130°C, T95°C, T80°C Db
Certificates	
Europe (ATEX)	PTB 09 ATEX 1109
IECEX	IECEX PTB 09.0049
Electrical data	
Rated operational voltage	max. 1100 V AC / DC depending on explosion protected components used
Rated operational current	max. 630 A depending on explosion protected components used
Rated cross section	300 mm ² depending on explosion protected components used
Ambient conditions	
Ambient temperature	- 60 ... + 85 °C depending on explosion protected components used
Mechanical data	
Degree of protection	IP66 acc. to IEC/EN 60529 (depending on the built-in components used)
Material	
Enclosure	8150/5-.....-2....: stainless steel 1.4301 (AISI 304), brush finished 8150/5-.....-3....: stainless steel 1.4404 (AISI 316L), brush finished
Sealing gasket	Silicone, foamed
Mounting plate	sheet steel, galvanized
Wall thickness	
Enclosure cover	min. 2 mm
Mounting plate	3 mm
Flanges	
Standard	In the standard version, the enclosures are supplied without flanges.
Option	Depending on order requirements the enclosures can be installed on one or more sides with flanges; flange material: sheet steel, zinc-galvanized or stainless steel
Cover fixing	
Standard	with captive M6 stainless steel combo head screws
Option	with cover hinges
Cover screws tightening torque	4.5 Nm
Earth connection	M8 blind rivet nut (1x): at the outside of the enclosure M8 rivet nut (1x): on mounting plate M6 bolt (1x): additionally on enclosures with cover hinges

 **WARNING**

Powder coated enclosures must not be used in areas where intense electrostatic charging may occur.

9 Installation Conditions

Clearance and creepage distances

- ▶ When installing components the clearance and creepage distances between the individual components as well as between the components and the enclosure wall must be sufficiently dimensioned.
- ▶ The creepage distances between the components must be tested and observed acc. to the guidelines of the relevant operating instructions. The clearance distances, dependent on the rated operational voltage of the fitted terminals, must be complied with.
- ▶ On all devices the distance between enclosure cover and connection screws of the built-in components have to be observed (with the conductor connected): minimum the values of the required creepage distances, e.g. ≥ 14 mm at 1100 V.

Distance between connection parts for intrinsically safe and non-intrinsically safe circuits

- ▶ Partitions used to separate connection terminals shall extend to within 1.5 mm of the enclosure walls, or alternatively shall provide a minimum distance of 50 mm between the bare conducting parts of the connection terminals when measured in any direction around the partition.
- ▶ The minimum thickness of metal partitions must be 0.45 mm. They must be earthed and have sufficient strength and stiffness to ensure that they might not be damaged during connection work. Furthermore, the metal partitions must be equipped with appropriate current-carrying capacity in order to prevent a burn out or disconnection of the earth connection.
- ▶ The minimum thickness of nonmetallic, insulating partitions must be 0.9 mm. They must have an appropriate comparative tracking index (CTI) and must be supported in such a way that no deformation can occur.
- ▶ When fuses > 4 A are used, care must be taken to ensure that no inadmissible heating at the terminals of intrinsically safe circuits can occur.



Note for manufacture and operation:

The installation of the equipment with type of protection intrinsic safety "Ex i" must be carried out in such a way that the distances as well as the clearance and creepage distances between intrinsically safe and non-intrinsically safe circuits according to IEC/EN 60079-14 are observed.

Covers for combinations of non-intrinsically safe and intrinsically safe circuits

All live parts which are not acc. to "Ex i" protection must be equipped with an inner cover which meets a minimum degree of IP30 protection when the equipment is opened.

Intrinsically safe circuits

- ▶ In intrinsically safe circuits only insulated cables and conductors with a test voltage of at least 500 V AC and a minimum quality of H05 are permitted.
- ▶ Relating to insulation and separation of terminals and cables, it has to be observed that the insulation test voltage is the sum of the rated operating voltage of intrinsically safe and non-intrinsically safe circuits.

In the case of "intrinsically safe to earth" there is a minimum insulation voltage value of 500 V (otherwise double the rated operating voltage of intrinsically safe circuits).

In the case of "intrinsically safe to non-intrinsically safe" there is a minimum insulation voltage value of 1500 V (or double the rated operating voltage plus 1000 V).

Clearance and creepage distances of intrinsically safe components

The clearance and creepage distances between the blank, conductive parts of connection terminals of separated, intrinsically safe circuits to earthed or potential-free, conductive parts must be equal or larger than the values of IEC/EN 60079-11, table 5.

If separated, intrinsically safe circuits have to be considered, the safety distance between the blank, conductive parts of the outer connections must be as follows:

- ▶ minimum 6 mm between the separated, intrinsically safe circuits
- ▶ minimum 3 mm to the earthed parts, if a possible connection to earth has not been considered in the safety analysis

Terminal blocks in Ex e enclosure

- ✗ Terminal bridging is only permitted if original explosion-protected accessories are used.
- ✗ The partitions required for this purpose must be retrofitted if necessary.
- ✗ For additional splice protection use core end sleeves or cable lugs. The cross-section of the splice protection must match the conductor cross-section.

10 Installation

WARNING

- ▶ If the components are installed incorrectly, the explosion protection is not guaranteed.
- ▶ Observe the enclosed documents such as wiring diagrams.
- ▶ When installing additional components, make sure that these components have an "EC Type Examination Certificate" or "IECEX Certificate of Conformity".
When performing this type of device modification, the rating and data plates must be adapted correspondingly.

10.1 Opening and closing the enclosure.

- ▶ For the versions with screw-on cover loosen the screws on the enclosure cover.
- ▶ If available, observe the cover lock at the rotary actuator.



Rotary actuators installed on the cover may optionally have a cover lock.
In this case the cover can only be removed or closed in one certain position.

- ▶ Open and remove the enclosure cover carefully.
- ▶ To close the enclosure cover, proceed in the reverse order.
- ▶ Observe the specified tightening torque.

10.2 Cable Entries

WARNING

The cable entries must be installed according to the manufacturer specifications.

The following cable entries can be used to insert cables and conductors into enclosures:

- ✗ plastic or metal cable glands for permanently installed cable conductors
- ✗ plastic or metal cable glands with strain relief for conductors, that are not permanently installed

To seal unused openings

- ✗ plastic or metal stopping plugs can be used.

Make sure that these components have an "EC Type Examination Certificate", respectively an "IECEX Certificate of Conformity". The IP degree of protection stated on the rating plate has to be observed.

10.3 Making of Additional Through Holes

If additional through holes are required, e.g. for installing cable entries, breathing glands or other parts, the following has to be considered:

- ▶ Additional through holes can be laser-cut or punched.
- ▶ While punching please make sure that the surfaces remain even.
- ▶ When determining the through holes please consider the installing distances.
- ▶ Adjust hole diameter to the dimensions of the built-in parts or their seals.
- ▶ Do not damage circumferential sealing lips.

10.4 Usable Area for Cable Entries

The usable area for cable entry installation is calculated as follows:

(Length of enclosure inner wall - 2x10 mm*) x (Height of enclosure inner wall - 2x10 mm*)

2x10 mm* = circumferential rim of enclosure inner wall

Attention

- ▶ Take the measurements on the face surface of the enclosure inner wall, not on the enclosure outer wall.
- ▶ Consider the positions of the blind rivet nuts to avoid damage.

The required space for the built-in part results from:

The width across corners of the cable entry plus space requirement for the used tool.

Calculation of the usable area

Usable area minus the area, which is required for the built-in parts. The following chart shows an example of the space requirements for R. STAHL cable entries.

	Cable entry thread diameter (≤ mm)							
	≤ 12 mm	≤ 16 mm	≤ 20 mm	≤ 25 mm	≤ 32 mm	≤ 40 mm	≤ 50 mm	≤ 63 mm
Space requirement per pc.	315 mm ²	495 mm ²	685 mm ²	990 mm ²	1560 mm ²	2420 mm ²	3425 mm ²	5160 mm ²

Calculation example

X Dimensions of enclosure inner wall: 297 mm (Side D) x 122 mm (Side C)

X Desired cable entries: M25 (15 pc), M32 (7 pc)

Usable area

$(297 \text{ mm} - 2 \times 10 \text{ mm}^*) \times (122 \text{ mm} - 2 \times 10 \text{ mm}^*) = 28254 \text{ mm}^2$

2x10 mm* = circumferential rim of enclosure inner wall

Required area for cable entries

Qty.	Type	Area	
15 pc	M20	15 x 685 mm ²	10275 mm ²
7 pc	M32	7 x 1560 mm ²	10920 mm ²
			21195 mm ²
			required area for cable entries
			28254 mm ²
			usable area
			7059 mm ²
			remaining usable area

The area for the cable entries must be smaller than the calculated usable area. If this is not the case, a larger enclosure must be chosen.

10.5 Electrical connection

⚠ WARNING

Observe the data of the terminal manufacturer, for example the tightening torque.

- ▶ The conductor must be carefully connected.
- ▶ Do not damage the conductor (nicking) when removing the insulation.
- ▶ When removing the insulation, make sure that the conductor insulation reaches right up to the clamping points.
- ▶ Select suitable cables to be used and appropriate way of leading them to ensure that the maximum permitted conductor temperature and the maximum permitted surface temperature is not exceeded.
- ▶ The permitted ambient temperature at the built-in devices and components must not be exceeded.

10.6 Earth connection

- ▶ A protective conductor is always required.
- ▶ The external protective conductor connection is designed for cable lugs.
- ▶ The cable must run near to the enclosure.
- ▶ All blank, non-live metal parts have to be included into the protective conductor system, regardless of the rated operational voltage.
- ▶ Neutral conductors are considered to be live conductors. They have to be installed accordingly.
- ▶ Inactive metal parts are insulated acc. to EN 61439-1/ IEC 61641 and are not connected to earth.



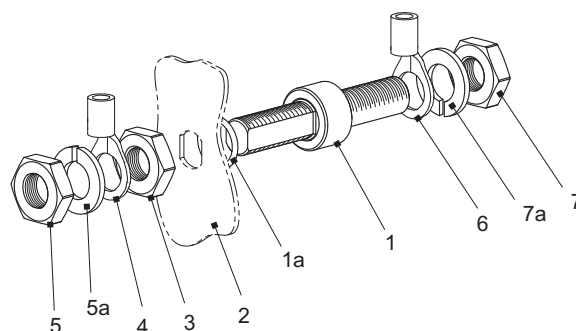
The data for potential equalization (PA), potential earth (PE) in intrinsically safe circuits are given in the documentation of the associated equipment.

PE/PA connection for cable cross-section of up to 25mm²

Assembly 0245:

internal
connection

external
connection



07855E00

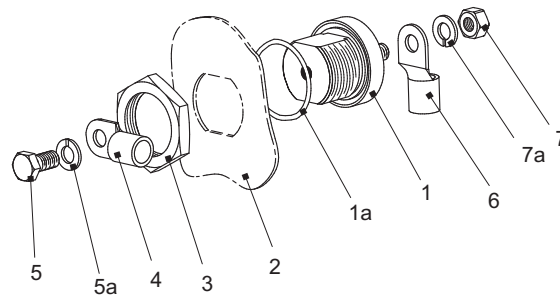
- ▶ Insert the earth bolt (1) and the sealing ring (1a) into a suitable bore of the enclosure wall (2) and fasten it by means of a hexagon nut (3).
- ▶ Put the inner PE cable lug (4) onto the earth bolt (1) and fasten it by means of the lock washer (5a) and hexagon nut (5).
- ▶ Put the external PE cable lug (6) onto the earth bolt (1) and fasten it by means of the lock washer (7a) and hexagon nut (7).

PE/PA connection for cable cross-section of up to 70 mm² (M8) and 120 mm² (M10)

Assembly 0238:

internal
connection

external
connection



12780E00

- ▶ Insert the earth bolt (1) and the sealing ring (1a) into a suitable bore of the enclosure wall (2) and fasten it by means of a hexagon nut (3).
- ▶ Put the inner PE cable lug (4) onto the earth bolt (1) and fasten it by means of the lock washer (5a) and hexagon nut (5).
- ▶ Put the external PE cable lug (6) onto the earth bolt (1) and fasten it by means of the lock washer (7a) and hexagon nut (7).

10.7 Wiring

⚠ WARNING

- ▶ If the components are installed incorrectly, the explosion protection is not guaranteed.
- ▶ The required clearance and creepage distances must be adhered to.
- ▶ After connecting the cables, fasten the mounting rail or elements properly.

Internal wiring

The following cables can be used for the internal wiring:

Type	Temperature class	Conductor cross-section
H07G	T5 / T6	≥ 0.5 mm ² , Cu
H05V2	T6	
or similar types		

External wiring

- ▶ Lead the connecting cable through the cable entries into the enclosure.
- ▶ Make sure that the cable diameter matches the clamping cross-section of the cable entries.
- ▶ Tighten the hexagon nut of the cable entries. Make sure that the tightness of the enclosure and the strain relief protection at the connection points are provided.
- ▶ For tightening torques refer to the operating instructions of the components.

Lay the cables in the connection chamber in such a way that

- ✗ The minimum permissible bending radii for the respective conductor cross-section must not be less than the specified minimum.
- ✗ the conductor insulation is not damaged because of sharp-edged or movable metal parts.

Connect electrically

- ▶ Open the enclosure.
- ▶ Lay the connecting cables in such a way that the minimum permissible bending radii are less than the specified minimum.
- ▶ Connect the protective conductor.
- ▶ Remove loose metal particles, pollution and traces of moisture.
- ▶ Close the enclosure carefully after completing the work.
- ▶ Run insulation test according to IEC/EN 61439-1.

After completing the electric installation, the following operations must be performed:

- ▶ Fastening of the protection against accidental contact.
- ▶ Setting of the tripping devices to the nominal value.
- ▶ Visual inspection for the presence of loose metal particles, soiling and traces of moisture.

11 Putting into Service**⚠ WARNING**

The devices must be operated only in completely closed enclosures.



For unused enclosure holes use R. STAHL stopping plugs, for example, Series 8290, for unused cable entries use R. STAHL plugs, e.g. Series 8161.

Before putting into service

- ▶ Make sure that the device is not damaged.
- ▶ Make sure that the device is installed correctly.
- ▶ Remove any foreign objects from the device.
- ▶ Check the tightening torques.
- ▶ Check if all covers and partitions on live parts are in place and have been fixed.

Back-up fuse

- ▶ Secure the system by means of the specified electric back-up fuse.
- ▶ Ensure sufficient short-circuit current at the mains connection (connection point) for reliable triggering of the fuse.

12 Maintenance, Overhaul and Repair

 **WARNING**

▶ Do not open when live!

▶ Do not open when non-intrinsically safe circuits are live!

Exception: Devices with intrinsically and non-intrinsically safe circuits marked with "NON-INTRINSICALLY SAFE CIRCUITS PROTECTED BY INTERNAL IP30 COVER" may be opened while energized!

The following details must be checked during maintenance:

- ✗ Cables are held securely in place by the clamping points.
- ✗ Compliance with the permitted temperatures (acc. to IEC/EN 60079 et seqq.)
- ✗ Damage to the enclosure and sealing gaskets.

13 Inspections / Maintenance Checklist


Inspection schedule for Ex "d", "e" und "n"
(D = Detailed inspection, C = Close inspection, V = Visual inspection)

Check the following:		Type of protection "d"			Type of protection "e"			Type of protection "n"													
		Grade of inspection																			
		D	C	V	D	C	V	D	C	V											
A	Devices																				
1	Equipment corresponds to EPL/zone requirement of the installation site	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
2	Equipment group is correct	x	x		x	x		x	x		x	x									
3	Temperature class of the equipment is correct	x	x		x	x		x	x		x	x									
4	Electric circuit designation of the equipment is correct	x			x			x			x										
5	Electric circuit designation of the equipment is available	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
6	Enclosure, windows and glass-to-metal seals and/or joints are okay	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
7	There are no unauthorised modifications	x			x			x			x										
8	There are no visible unauthorised modifications			x	x			x	x					x	x						
9	Screws, cable entries (direct and indirect) and blind plugs are correct, complete and tight.																				
	- Physical inspection	x	x		x	x		x	x		x	x									
	- Visual inspection			x				x					x								
10	Joint faces are clean and undamaged, seals (if any) are okay	x																			
11	Joint widths are within the allowed limit values	x	x																		
12	Rated value, type and arrangement of the lamps are correct	x			x			x			x										
13	Electrical connections are tight and fixed properly				x			x			x										
14	Condition of the enclosure seal is okay				x			x			x										
15	Fracture-proof encapsulation and hermetically sealed devices are undamaged										x										
16	Restricted breathing enclosure is okay										x										
17	Motor fans have sufficient clearance to enclosure and/or covers	x			x			x			x										
18	Breathing and draining devices are okay	x	x		x	x		x	x		x	x									
B	Installation																				
1	Appropriate cable and conductor types are used	x			x			x			x										
2	There is no visible damage to cables and wires	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
3	Sealing of trunking, channels, pipes and/or conduits is okay	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
4	Sealing devices and terminal sleeves are correctly filled	x																			
5	The conduit system and the interface with mixed system are not damaged	x			x			x			x										
6	Earth connections, including any supplementary potential equalisations are satisfactory (for example, connections are properly fixed and conductor cross-sections are sufficient).																				
	- Physical inspection	x			x			x			x										
	- Visual inspection		x	x				x	x				x	x							
7	Fault loop impedance (TN systems) or earthing resistance (IT systems) is sufficient	x			x			x			x										
8	Insulation resistance is sufficient	x			x			x			x										
9	Automatic electrical protective devices respond within the allowed limit values	x			x			x			x										
10	Automatic electrical protective devices are set correctly (auto-reset not possible)	x			x			x			x										
11	Special operating conditions (if applicable) are observed	x			x			x			x										
12	Cables and/or wires not in use are correctly terminated	x			x			x			x										
13	Obstructions adjacent to flameproof joints are in accordance with IEC 60079-14	x	x	x																	
14	Installations with variable voltage/frequency are in accordance with documentation	x			x			x			x										
C	Environmental effects																				
1	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
2	No undue accumulation of dust or dirt	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
3	Electrical insulation is clean and dry				x			x			x										
NOTE 1 General: Equipment with both types of protection "d" and "e" is checked using a combination of both columns.																					
NOTE 2 Item B7 and B8: When using electrical test equipment, take into account that there could be an explosive atmosphere in the vicinity of the equipment.																					

Inspection schedule for Ex "i"

Check the following:		Grade of inspection		
		Detailed inspection	Close inspection	Visual inspection
A	Equipment			
1	Circuit and/or equipment documentation is appropriate to zone classification	x	x	x
2	Installed equipment corresponds to the equipment specified in documentation - only applicable for stationary equipment	x	x	
3	Category and group of electric circuit and/or equipment are correct	x	x	
4	Temperature class of the equipment is correct	x	x	
5	Installation is clearly labelled	x	x	
6	There are no unauthorised modifications	x		
7	There are no visible unauthorised modifications		x	x
8	Safety barriers, relays and other energy limiting devices correspond to the certified type, are installed in accordance with the requirements of the certificate and are securely earthed if necessary.	x	x	x
9	Electrical connections are fixed properly	x		
10	Printed circuit boards are clean and undamaged	x		
B	Installation			
1	Cables are installed in accordance with the documentation	x		
2	Cable screens are earthed in accordance with the documentation	x		
3	No obvious signs of damage on cables and wires	x	x	x
4	Sealing of trunking, channels, pipes and/or conduits is satisfactory	x	x	x
5	Point-to-point connections are all correct	x		
6	Earth continuity is satisfactory (for example, the connections are fixed properly and the conductor cross-sections are sufficient)	x		
7	Earth connection maintain the type of protection	x	x	x
8	The intrinsically safe circuit is isolated from the earth or grounded at one point only (refer to documentation)			
9	Separation is maintained between intrinsically-safe and non-intrinsically safe circuits in common distribution boxes or relay cubicles	x		
10	If applicable, short-circuit protection of the power supply is in accordance with the documentation	x		
11	Special operating conditions (if applicable) are observed	x		
12	Cables and/or wires not in use are correctly terminated	x	x	x
C	Ambient conditions			
1	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	x	x
2	No undue accumulation of dust and dirt	x	x	x

14 Accessories and Spare Parts

 WARNING
<ul style="list-style-type: none"> ▶ Use only original R. STAHL accessories and spare parts. ▶ When installing additional components ensure that these components have an "EC Type Examination Certificate" or "IECEx Certificate of Conformity".

15 Disposal

The national waste disposal regulations have to be observed.

EG/EU-Konformitätserklärung
EC/EU Declaration of Conformity
Déclaration de Conformité CE/UE



R. STAHL Schaltgeräte GmbH • Am Bahnhof 30 • 74638 Waldenburg, Germany
 erklärt in alleiniger Verantwortung, *declares in its sole responsibility, déclare sous sa seule responsabilité,*

dass das Produkt: **Steuer- und Verteilerkasten**
that the product: Control and Distribution box
que le produit: Equipement de commande et de dérivation

Typ(en), type(s), type(s): **8150/5-****_****_***_******

mit den Anforderungen der folgenden Richtlinien und Normen übereinstimmt.
is in conformity with the requirements of the following directives and standards.
est conforme aux exigences des directives et des normes suivantes.

Richtlinie(n) <i>Directive(s)</i> <i>Directive(s)</i>	Norm(en) <i>Standard(s)</i> <i>Norme(s)</i>
2014/34/EU ATEX-Richtlinie 2014/34/EU ATEX Directive 2014/34/UE Directive ATEX	EN 60079-0:2012+A11:2013 EN 60079-1:2014 EN 60079-5:2015 EN 60079-7:2015 EN 60079-11:2012 EN 60079-18:2015 EN 60079-28:2007 EN 60079-31:2014

Kennzeichnung, marking, marquage: II 2(1) G Ex db eb ia [ia Ga] Ib [Ib] ma mb op pr op is qb
 IIA, IIB, IIC T6...T3 Gb 0158
 II 2 D Ex tb IIIC IP66 T80 °C...T130 °C Db

EG/EU-Baumusterprüfbescheinigung: **PTB 09 ATEX 1109**
EC/EU Type Examination Certificate: (Physikalisch-Technische Bundesanstalt,
Attestation d'examen CE/UE de type: Bundesallee 100, 38116 Braunschweig, Germany)

Produktnormen nach Niederspannungsrichtlinie: EN 61439-1:2011
Product standards according to Low Voltage Directive: EN 61439-2:2011
Normes des produit pour la Directive Basse Tension:

2014/30/EU EMV-Richtlinie 2014/30/EU EMC Directive 2014/30/UE Directive CEM	EN 61439-1:2011 EN 61439-2:2011
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2011/65/EU RoHS-Richtlinie 2011/65/EU RoHS Directive 2011/65/UE Directive RoHS	EN 50581:2012
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Waldenburg, 2016-04-20

Ort und Datum
Place and date
Lieu et date

i.V.
 Holger Semrau
 Leiter Entwicklung Schaltgeräte
Director R&D Switchgear
Directeur R&D Appareillage

i.V.
 Jürgen Freimüller
 Leiter Qualitätsmanagement
Director Quality Management
Directeur Assurance de Qualité