



Operating Instructions

Control and Distribution Box

> G145/5



1 Contents

1	Contents	2
2	General Information	2
3	Intended Use	2
4	General Safety Instructions	3
5	Conformity to Standards.....	3
6	Transport and Storage	3
7	Assembling and Dismantling	3
8	Technical Data.....	4
9	Installation Conditions.....	5
10	Installation.....	5
11	Putting into Service	11
12	Maintenance, Overhaul and Repair.....	12
13	Accessories and Spare Parts	12
14	Disposal.....	12

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 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 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 correct functionality
- National safety regulations
- National accident prevention regulations
- National installation regulations (e.g. IEC/EN 61439)
- 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

Further documents can be downloaded via the following link:
<http://www.r-stahl.com/downloads/certificates.html>.

6 Transport and Storage

Transport and storage are only permitted in the original packing.

7 Assembling and Dismantling

- If the 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 e.g. a R. STAHL breather, Type 8162.

8 Technical Data

The technical data (e.g. IP protection, the maximum ambient temperature and the rated voltages) depend on the enclosure and on the components, which are built in. The maximum power loss of the built-in equipment must be considered.

Electrical data

Rated operational voltage
 Rated operational current
 Rated cross section

depending on the components used, e.g. max. 1100 V AC / DC
 depending on the components used, e.g. max. 630 A
 depending on the components used, e.g. 300 mm²

Ambient conditions

Ambient temperature

depending on the components used, e.g. - 60 ... + 85 °C

Mechanical data

Degree of protection

depending on the Installation equipment and the Control devices used
 e.g. IP66 acc. to IEC/EN 60529

Size of Enclosure

according to the type code: G145/5* - W - H - D - *
 Width, Height and Depth (in mm) are given in 4 digits

Material

Enclosure

Material (M) according to the type code: G145/5M-****_****_****_*
 1 = steel
 2 = stainless steel 1.4404
 3 = moulded material
 4 = stainless steel 1.4301

Selection of the enclosure or the cabinet depends on the intended use.
 Here are some examples for enclosures and cabinets...

Type	Description	Manufacturer
8125/-	Empty enclosure	R. STAHL
8146/-	Empty enclosure	R. STAHL
8150/0	Empty enclosure	R. STAHL
HEX e/_***	Empty enclosure	Häwa
34-**-**_**	Empty enclosure	Rose
26-**-**_**	Empty enclosure	Rose
KEL 93**_****	Empty enclosure	Rittal
SE 8, TS 8	Enclosure system	Rittal
... and much more from any manufacturer.		

Sealing gasket

depending on the enclosure used, e.g. silicone (foamed)

Mounting plate

depending on the enclosure used, e.g. sheet steel (galvanized)

Wall thickness

Enclosure cover

depending on the enclosure used, e.g. 2 mm

Mounting plate

depending on the enclosure used, e.g. 3 mm

Flanges

Depending on order requirements the enclosures can be installed on one or more sides with flanges; flange material: e.g. sheet steel, zinc-galvanized or stainless steel

Cover fixing

e.g. with captive M6 stainless steel combo head screws or with cover hinges

Cover screws tightening torque

e.g. 4.5 Nm

Earth connection

e.g. M8 blind rivet nut (1x): at the outside of the enclosure
 M8 rivet nut (1x): on mounting plate
 6 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.

10 Installation

⚠ WARNING

- If the components are installed incorrectly, the functionality is not guaranteed.
- Observe the enclosed documents such as wiring diagrams.

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's 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. The IP degree of protection of these components has to be observed.

Some examples for possible cable glands are listed in chapter 10.6.

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 for example at R. STAHL type 8150

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

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

Remark

See also the enclosures' operating instructions for allowed positions of cable entries.

10.5 Built-in components

The selection of the Built-in components depends on the intended use. Here are some examples for enclosures and cabinets...

Type	Description	Manufacturer
9002/**-***-***-**1	Safety barrier type 9002	R. STAHL
9185/1*-**-10	Fieldbus Isolating Repeater	R. STAHL
9441/12-0*-*0, 9444/12-11	CPU and Power Module	R. STAHL
9475/*2-0*-*1	Digital Output Module Relay	R. STAHL
ET-**6-A	Panel PC	R. Stahl HMI Systems
MT-**6-A-*-*	Operator Interface	R. Stahl HMI Systems
Proximitors 3300XL	Modular System	Bently Nevada
KJ1710X1-BA1	Ex-enlargement adaptor	Fisher-Rosemount Inc
QUINT-DIODE/40	Redundancy Module	Phoenix Contact
QUINT-PS/1AC/24DC/5/CO	Power supply	Phoenix Contact
QS3.241-A1; QS5.241-A1	AC/DC power supplies	PULS GmbH
7MH4 ***	SIMATIC ET 200SP	Siemens AG
TEF 9206...	Enclosure Heater	Tranberg
2000	Terminal blocks	Wago
AKZ, AKE	Feed-through terminal	Weidmüller
... and much more from any manufacturer.		

10.6 Installation equipment and Control devices

The selection of the Installation equipment and Control devices depends on the intended use. Here are some examples for enclosures and cabinets...

Type	Description	Manufacturer
8003/1.2 + /1.4	Push button for panel mounting	R. Stahl
8013/3.1 + /3.3	Indicating light for panel mounting	R. Stahl
8162/1	Breathing gland	R. Stahl
8292/1	Stopping plug	R. Stahl (CMP)
8455/2	Potentiometer for panel mounting	R. Stahl
8523/8-**-**	Motor protection circuit-breaker	R. Stahl
8604/1	Rotary actuator	R. Stahl
BA328E	Digital Indicator	BEKA associates Ltd
SS2K**	Cable glands	CMP
321, 321R	Cable glands	Hawke International
HSK	Cable glands	Hummel AG
PD-E4	Blanking Element / Stopping plug	Redapt Ltd.
EMSKE	Cable glands	WISKA
... and much more from any manufacturer.		

10.7 Electrical connection

⚠ WARNING

Observe the data of the terminal, 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.

10.8 Earth connection

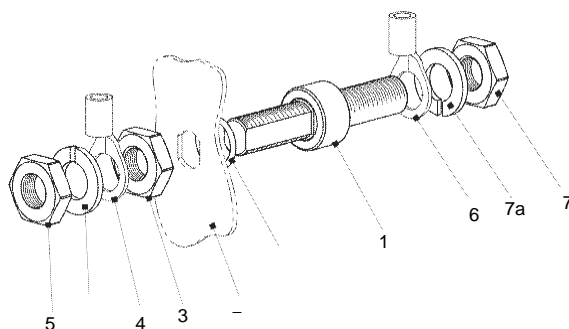
- A protective conductor is always required.
- The external protective conductor connection is designed for cable lugs.
- The cable must run near to the enclosure.
- All blank, non-live metal parts have to be included into the protective conductor system, regardless of the rated operational voltage.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

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

Assembly 0245:

internal
connection

external
connection



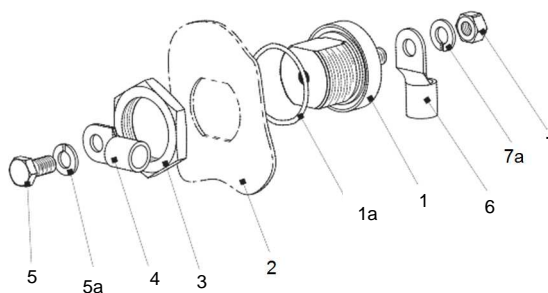
- Insert the earth bolt (1) and the sealing ring (1a) into a suitable bore of the enclosure wall (2) and fasten it by means of a hexagon nut (3).
- Put the inner PE cable lug (4) onto the earth bolt (1) and fasten it by means of the lock washer (5a) and hexagon nut (5).
- Put the external PE cable lug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

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

Assembly 0238:

internal
connection

external
connection



- 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).

10.9 Wiring

⚠ WARNING
<ul style="list-style-type: none"> If the components are installed incorrectly, the functionality is not guaranteed. 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	*	$\geq 0.5 \text{ mm}^2, \text{ Cu}$
H05V2	*	
or similar types		

* Choose cables according to the ampacity and the temperature in your application.

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

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 61439 et seqq.)
- Damage to the enclosure and sealing gaskets.

13 Accessories and Spare Parts

WARNING

Use only original accessories and spare parts.

14 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):* **G145/*****

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) / Directive(s) / Directive(s)		Norm(en) / Standard(s) / Norme(s)
Bis/Until/Jusque 2016-04-19:	Ab/From/De 2016-04-20:	EN 61439-1:2011 EN 61439-2:2011
2006/95/EG: Niederspannungsrichtlinie <i>2006/95/EC: Low Voltage Directive</i> <i>2006/95/CE: Directive Basse Tension</i>	2014/35/EU: <i>2014/35/EU:</i> <i>2014/35/UE:</i>	
Bis/Until/Jusque 2016-04-19:	Ab/From/De 2016-04-20:	EN 61439-1:2011 EN 61439-2:2011
2004/108/EG: EMV-Richtlinie <i>2004/108/EC: EMC Directive</i> <i>2004/108/CE: Directive CEM</i>	2014/30/EU: <i>2014/30/EU:</i> <i>2014/30/UE:</i>	
Produktnormen nach RoHS-Richtlinie (2011/65/EU): <i>Product standards according to RoHS Directive:</i> <i>Normes des produit pour la Directive RoHS:</i>		EN 50581:2012

Waldenburg, 2016-01-27

Ort und Datum
Place and date
Lieu et date

i.V.


 Holger Semrau
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Director R&D Switchgear
Directeur R&D Appareillage

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 J.-P. Rückgauer
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