

Terminal Boxes

Series 8146/1,
Series 8146/2

– Save for future use! –



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1 General Information

1.1 Manufacturer

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1.2 About these Operating Instructions

- ▶ Read these operating instructions, especially the safety notes, carefully before use.
- ▶ Observe all other applicable documents (see also section 1.3).
- ▶ Keep the operating instructions throughout the service life of the device.
- ▶ Make the operating instructions accessible to operating and maintenance personnel at all times.
- ▶ Pass the operating instructions on to each subsequent owner or user of the device.
- ▶ Update the operating instructions every time you receive an amendment to them from R. STAHL.

ID-No.: 137189 / 8146619300
Publication Code: 2016-11-10·BA00·III·en·06

The original instructions are the German edition.
They are legally binding in all legal affairs.

1.3 Further Documents

- Data sheet
- EU Type Examination Certificate





For documents in additional languages, see www.stahl-ex.com.

1.4 Conformity with Standards and Regulations



- Certificates and EU Declaration of Conformity: www.stahl-ex.com.
- The device has IECEx approval. See IECEx homepage: <http://iecex.iec.ch/>

2 Explanation of the Symbols

2.1 Symbols in these Operating Instructions

Symbol	Meaning
	Tip for making work easier
 DANGER!	Dangerous situation which can result in fatal or severe injuries causing permanent damage if the safety measures are not complied with.
 WARNING!	Dangerous situation which can result in severe injuries if the safety measures are not complied with.
 CAUTION!	Dangerous situation which can result in minor injuries if the safety measures are not complied with.
NOTICE!	Dangerous situation which can result in material damage if the safety measures are not complied with.

2.2 Symbols on the Device

Symbol	Meaning
 <small>0158</small> <small>05594E00</small>	CE marking according to the currently applicable directive.
 <small>02198E00</small>	According to marking, device certified for hazardous areas.

3 Safety

The device has been manufactured to the state of the art while observing recognised safety-related rules. When using the device, it is nevertheless possible for hazards to occur to life and limb of the user or third parties or for the device, environment or material assets to be compromised.

- ▶ Use the device only
 - if it is not damaged
 - as intended, while remaining aware of safety and dangers
 - in accordance with these operating instructions.

3.1 Intended Use

The terminal boxes 8146/1 and /2 are used to distribute electric energy and / or electric signals in hazardous areas. They are explosion-protected equipment certified for use in hazardous areas of Zones 1, 2, 21 and 22.

The terminal boxes are manufactured in various sizes and can be combined to create larger distribution units. They must be installed so they are stationary.

Intended use includes observing these operating instructions and the other applicable documents, e.g. the data sheet. Any other use of the terminal boxes is not intended.

3.2 Personnel Qualification

Qualified specialist personnel are required to perform the activities described in these operating instructions. This primarily applies to work in the following areas:

- Product selection, project engineering and modification
- Mounting/dismounting the device
- Installation
- Commissioning
- Maintenance, repair, cleaning

Specialists who perform these tasks must have a level of knowledge that meets applicable national standards and regulations.

Additional knowledge is required for tasks in hazardous areas! R. STAHL recommends having a level of knowledge equal to that described in the following standards:

- IEC/EN 60079-14 (Electrical installations design, selection and erection)
- IEC/EN 60079-17 (Inspection and maintenance of electrical installations)
- IEC/EN 60079-19 (Equipment repair, overhaul and reclamation)

3.3 Residual Risks

3.3.1 Explosion Hazard

An explosion hazard cannot be entirely ruled out in hazardous areas despite the device having a state-of-the-art design.

- ▶ Perform all work steps in hazardous areas with the utmost care at all times!

Possible moments of danger (residual risks) can be categorised according to the following causes:

Mechanical damage

The device can be pressed or scratched during transport, mounting or commissioning, causing it to no longer be leak-tight. Such damage can, for example, render the device's explosion protection partially or fully ineffective. This can result in explosions causing fatal or severe injuries to persons.

- ▶ Observe the weight and the maximum load-bearing capacity of the device; see specifications on the packaging.
- ▶ Transport the device only in the original packaging or in equivalent packaging.
- ▶ Use transporting or lifting equipment which is suitable for the size and weight of the device and can reliably carry the weight of the device.
- ▶ Check the packaging and the device for damage. Report any damage to R. STAHL immediately.
- ▶ Store the device in the original packaging in a dry (no condensation) and stable position which is safe from vibrations.
- ▶ Do not damage the enclosure, built-in components or seals during mounting.

Excessive heating or electrostatic charge

Subsequently modifying the device, operating it outside of permitted conditions or failing to clean it properly can cause it to heat up excessively or to become electrostatically charged, causing it to produce sparks. This can result in explosions causing fatal or severe injuries to persons.

- ▶ Operate the device only within the prescribed operating conditions (see the type plate and the "Technical data" chapter).
- ▶ Only allow the manufacturer to paint the device and have this company coat it with special, conductive paint.
- ▶ Equip devices used outdoors in the elements with a protective roof or wall. Regularly inspect the device for a material change (plastic). If any changes are identified, test or replace the device.
- ▶ Do not paint the device. Have all repairs performed by the manufacturer.
- ▶ Comply with the area specification of EN IEC 60079-0 when fitting additional plastic adhesive labels.
- ▶ Clean the device only with a damp cloth.

Impairment of IP protection

When installed properly and completely, the device will have the required IP degree of protection. Making structural changes to the device or mounting it improperly can impair its IP protection. This can result in explosions causing fatal or severe injuries to persons.

- ▶ Only apply labels (on the outside) without drilling any additional holes.
- ▶ Only drill holes for cable glands exactly according to the instructions in the "Product selection, project engineering and modification" and "Mounting" chapters of these operating instructions. Consult with R: STAHL first if there are any discrepancies or uncertainties.
- ▶ Mount the device only in the prescribed mounting position. More detailed explanations of this can be found in the "Mounting" chapter.

Improper installation, commissioning, maintenance or cleaning

Basic work such as installation, commissioning, maintenance or cleaning of the device must be performed only in accordance with the valid national regulations of the country of use and only by qualified persons. Otherwise the explosion protection can be rendered ineffective.

This can result in explosions causing fatal or severe injuries to persons.

- ▶ Have mounting, installation, commissioning and maintenance performed only by qualified and authorised persons (see section 3.2).
- ▶ Only make changes to the device in accordance with the instructions in these operating instructions. Have R. STAHL or a test body (3rd party inspection) carry out acceptance.
- ▶ Perform maintenance and repairs on the device only using original spare parts and after consultation with R. STAHL.
- ▶ Gently clean the device only with a damp cloth and without scratching, abrasive or aggressive cleaning agents or solutions.
- ▶ Never clean the device with a strong water jet, e.g. using a high-pressure washer!

3.3.2 Risk of Injury

Falling devices or components

The heavy device or components can fall during transport and mounting, causing severe injury to persons in the form of bruises and contusions.

- ▶ Use transporting and lifting equipment suitable for the size and weight of the device when transporting and mounting it.
- ▶ Observe the weight and the maximum load-bearing capacity of the device; see specifications on the packaging.
- ▶ Use suitable mounting hardware for mounting.

Electric shock


During electric installation, operation and maintenance, there will at times be high voltages present at the device. Persons coming into contact with electric lines carrying excessively high voltage can suffer severe electric shocks and consequently injuries.


- ▶ Operate the device only on equipment with the internal voltage specified in the "Technical data" chapter.
- ▶ Connect electric circuits only to suitable terminals.

4 Transport and Storage

- ▶ Transport and store the device carefully and in accordance with the safety notes (see "Safety" section).

5 Product Selection, Project Engineering and Modification

-  **DANGER! Explosion due to subsequent, complete painting of the device!**
Non-compliance results in fatal or severe injuries.
 - ▶ Do not paint the device.
 - ▶ Have all repairs performed by the manufacturer.


-  **DANGER! Explosion due to defective sealing of the device!**
Non-compliance results in fatal or severe injuries.
 - ▶ Only apply labels (on the outside) without drilling any additional holes.
 - ▶ Only create additional drilled holes specifically in accordance with the instructions in the "Mounting" chapter. Consult R. STAHL in the event of deviations or uncertainties.
 - ▶ Equip the enclosure only with equipment (e.g. cable entries, stopping plugs, drain and breather valves) that is verifiably approved for use in hazardous areas. Examples: EU Type Examination Certificate or IECEx Certificate of Conformity
 - ▶ Seal any unused cable entries with the stopping plugs approved for the type of protection.
 - ▶ Seal all open drilled holes by means of suitable equipment.

When complying with the installation conditions and specifications on the type plate:

- ▶ Check whether enough cable entries are provided. Drill additional holes if necessary; see sections 5.1 to 5.2.
- ▶ Equip terminals and, if necessary, mount built-in components; see section 5.4.

The methods mainly considered for modification are subsequently machining or equipping the terminal box. In this case, the following possibilities are available:

- Additional through holes on the flange plate, either by R. STAHL or by the customer (section 5.1)
- Additional through holes in the enclosure, either by R. STAHL or by the customer (section 5.2)
- External attached components either by R. STAHL or by the customer (section 5.3)
- Internal built-in components either by R. STAHL or by the customer (section 5.4)

-  Acceptance of work performed in-house must be carried out in accordance with national regulations. Otherwise, you must have R. STAHL or a test body (3rd party inspection) (section 3.3.1) carry out acceptance. On request, R. STAHL can carry out this work if offered appropriate remuneration. If the work is carried out by R. STAHL, no additional acceptance is necessary.

5.1 Additional Through Holes in Flange Plates

5.1.1 Creation of Additional Drilled Holes and Through Holes by R. STAHL

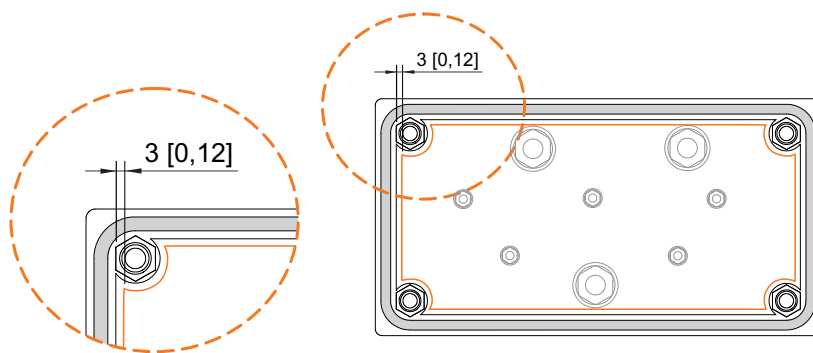
- ▶ Forward the following information to R. STAHL:
 - Type
 - Data sheet
 - Quantity, manufacturers and approvals of the components that are to be installed.

R. STAHL

- will check whether the components, drilled hole diameters, quantity and position correspond with the approval
- will create the drilled holes and through holes
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally installed.

5.1.2 Ascertaining the usable Area for Cable Entries in Flange Plates

All dimensions in mm [inches]



Collision frame and earth connection of flange plate

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- ▶ Select a space/area for the cable entry on the flange plate anywhere inside the collision frame (see thin line in figure). Ensure that screw connections made later do not go beyond this collision frame.

Observe the following conditions when doing so:

- ▶ Leave enough distance to the circumferential seal (min. 3 mm) (see detail in figure).

5.1.3 Creation of Additional Drilled Holes and Through Holes by the Customer

- ▶ Modify the device carefully and only in accordance with the safety notes (see "Safety" section).
- ▶ Calculate the usable area, see section 5.1.2.
- ▶ Create additional through holes by lasing or punching (drilling, hole cutting).
- ▶ When punching and cutting, make sure that the outer surfaces of the enclosure remain flat and undamaged (without cracks).
- ▶ Determine the core hole diameter for threads. Do not use an NPT thread!
- ▶ When determining the through holes, observe the mounting distances.
- ▶ Adjust the hole diameters to the dimensions of the built-in parts or their seals.
- ▶ ONLY use built-in components with flat seal (gasket).
- ▶ Observe section 5.3 when subsequently equipping components!

5.2 Additional Through Holes in the Enclosure with an internal Brass or Flange Plate

i Terminal boxes which the customer wants delivered without drilled holes are generally marked as empty enclosures with the corresponding type plate (marking in accordance with EN IEC 60079-7 and EN IEC 60079-0, as incomplete equipment "U" inside the enclosure).

5.2.1 Creation of Additional Drilled Holes and Through Holes by R. STAHL

- ▶ Give the following information to R. STAHL:
 - Enclosure side
 - Type
 - Data sheet
 - Quantity, manufacturers and approvals of the components that are to be installed.

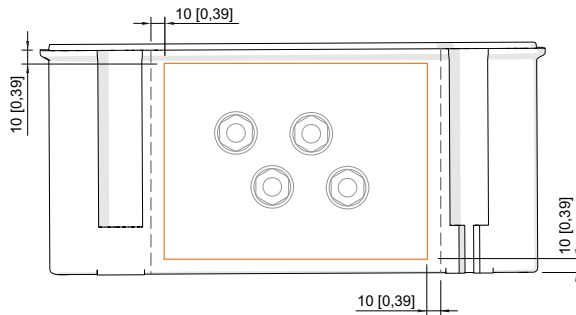
R. STAHL

- will check whether the components, drilled hole diameters, quantity and position correspond with the approval
- will create the drilled holes and through holes
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally installed.

5.2.2 Creation of Additional Drilled Holes and Through Holes by the Customer

- ▶ Modify the device carefully and only in accordance with the safety notes (see "Safety" section).
- ▶ Calculate the usable area for built-in components, see sections 5.1.2 and 5.2.2.
- ▶ Create additional through holes by lasing or punching (drilling, hole cutting). When doing so, maintain a distance of min. 10 mm to the rim of the enclosure (see figure).

All dimensions in mm [inches]



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- ▶ When punching and cutting, make sure that the outer surfaces of the enclosure remain flat and undamaged (without cracks).
- ▶ When determining the through holes, observe the mounting distances.
- ▶ Adjust the hole diameters to the dimensions of the built-in parts or their seals.
- ▶ ONLY use built-in components with flat seal (gasket).
- ▶ Observe section 5.3 when subsequently equipping components!

5.2.3 Creation of Additional Drilled Holes and Through Holes in the Enclosure with Flange Plate by R. STAHL

- ▶ Give the following information to R. STAHL:
 - Enclosure side
 - Type
 - Data sheet
 - Quantity, manufacturers and approvals of the components that are to be installed.

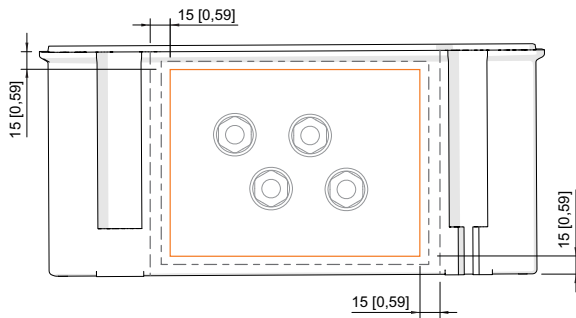
R. STAHL

- will check whether the components, drilled hole diameters, quantity and position correspond with the approval
- will create the drilled holes and through holes
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally installed.

5.2.4 Creation of Additional Drilled Holes and Through Holes in the Enclosure with Flange Plate by the Customer

- ▶ Modify the device carefully and only in accordance with the safety notes (see "Safety" section).
- ▶ Calculate the usable area for built-in components, see sections 5.1.2 and 5.2.2.
- ▶ Select a space/area for the cable entry on the flange plate anywhere inside the collision frame (see thin line in figure). Ensure that screw connections made later do not go beyond this collision frame. Leave enough distance (min. 15 mm) to the circumferential frame (see the figure for the "Collision frame" section).

All dimensions in mm [inches]



- ▶ When punching and cutting, make sure that the outer surfaces of the enclosure remain flat and undamaged (without cracks).
- ▶ When determining the through holes, observe the mounting distances.
- ▶ Adjust the hole diameters to the dimensions of the built-in parts or their seals.
- ▶ ONLY use built-in components with flat seal (gasket).
- ▶ Observe section 5.3 when subsequently equipping components!

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5.3 External Attached Components (Cable Entries, Stopping Plugs, Breathers)

- i** Drilled holes and through holes are generally already equipped with the components intended for the application ex-factory.
If customers intend to carry out equipping themselves, dust and transport protection is applied to the openings in the enclosure (adhesive tape with a warning note or plastic caps) ex-factory.

5.3.1 Fitting of Attached Components by R. STAHL

- ▶ Give the following information to R. STAHL:
 - Type
 - Data sheet
 - Quantity, manufacturers and approvals of the components that are to be attached.
 - Type of protection

R. STAHL

- will check whether the components, quantity and position correspond with the approval
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally attached.

5.3.2 Fitting of Attached Components by the Customer

Selecting material

It is advisable to use the following materials when equipping the terminal box:

Cable entry

- for electric lines which are permanently installed: Plastic or metal cable entries for electric lines which are permanently installed
- for electric lines which are not permanently installed: Plastic or metal cable entries with strain relief.

Sealing unused entries

- Use plastic or metal stopping plugs according to the type of protection.

Drainage and pressure equalisation (prevention of the vacuum effect)

- Plastic or metal breather valves.

- ▶ Equip the device carefully and in accordance with the safety notes (see "Safety" section).
- ▶ Observe the specifications on the type plate of the device for the selection and operating temperature of the components and seals.
- ▶ Calculate the usable area for attached components; see sections 5.1.2 and 5.2.2.
- ▶ Adjust the hole diameters of drilled holes to the dimensions of the built-in parts or their seals!
- ▶ The use of attached components with flat seal (gasket) is preferred.

5.4 Internal Built-In Components (Conductors, Terminals, Fuses)

Ascertaining the maximum number of conductors

i Heat develops in every terminal box due to contact resistance at the terminals and the cables installed in the enclosure. In order to ensure that the maximum permissible temperatures of a terminal box are not exceeded, care should be taken that the current load of the circuits installed in the terminal box does not exceed certain values!

5.4.1 Ascertain the Number of Conductors using the Table from the EU Type Examination Certificate

- ▶ Refer to the specifications in the EU Type Examination Certificate for the maximum permitted number of conductors in relation to the current load and conductor cross-section.

Taking enclosure 8146/1061 as an example: The maximum permitted number of conductors can be ascertained using the following table.

8146/1061								
[A] ^{*)}	1.5	2.5	4	6	10	16	25	35
3								
6								
10	53							
16	18	35	137					
20	7	20	39					
25		9	22	43				
35			6	17	42			
50				2	13	35		
63					4	16	57	
80						6	18	64
100							7	17
125								6
160								
200								
225								
250								

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*) Current, **) conductor cross-section

Explanations of the table:

Each inserted conductor and each internal connection conductor must be counted. Jumpers and protective conductors are not considered conductors.

Non-critical area (light area of the table)

The light area is non-critical in terms of heating up the enclosure. Circuits classified as being in this area can be incorporated in the enclosure in any number.

Critical (inscribed area of the table)

The part of the table shows the maximum permissible number of conductors considering the cross-sections of the conductors and the continuous current loading. When using this table, simultaneous factors and load factors may be accounted for. Mixed arrangements with circuits of different cross-sections and currents are possible; in this case the proportion of the loading from the individual circuits should be taken into account. If a terminal box is fully loaded according to the criteria in the dark part of the table, then any number of circuits from the non-critical (light part of the table) may be added.

Dangerous (dark area of the table)

Terminal boxes which are designed according to this area require an additional temperature-rise test.

Example calculation (general):

Cross-section [mm ²]	Current [A]	Number of conductors	Proportion
2.5	20	8 (of 20)	= 40 %
4	25	6 (of 22)	= 27 %
6	35	4 (of 17)	= 24 %
			= 91 % < 100 %

- ▶ Ensure that operating temperatures of the terminal box and the selected electric lines (in particular low temperatures) match.

5.4.2 Additional Terminals

Fitting of additional terminals by R. STAHL

- ▶ Forward the following information to R. STAHL:
 - Type
 - Manufacturer
 - Data sheet
 - Quantity
 - Enclosure size

R. STAHL

- will check whether the terminal type, quantity, cross-section and current load correspond with the approval
- will check whether the enclosure size, drilled holes and through holes are sufficient
- will install the terminals
- will, if necessary, create required drilled holes and fit required cable entries
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data, such as current or conductor cross-section, has changed.

Fitting of additional terminals by the customer

- ▶ Modify the device carefully and only in accordance with the safety notes (see "Safety" section).
- ▶ Ascertain additional terminal points, terminal type, quantity, cross-section and current load.
- ▶ Check whether type plate data is changed as a result of subsequently equipping (cross-section, voltage, current, etc.).
- ▶ Check whether enough space and fastening options are available for equipping.

i Subsequent equipping is not permitted if the installation conditions are not complied with!

5.4.3 Fuses

i Installing, modifying or retrofitting fuses is only permitted to be performed by R. STAHL!

When fitting fuses, the ambient temperature values for the following temperature classes apply:

Fuse current value	Temperature class
≤ 4 A	T6
> 4 A to ≤ 5 A	T5
> 5 A to ≤ 6.3 A	T4

When fitting fuses, the ambient temperature values for areas with dust explosion hazard for the following max. permissible surface temperatures apply:

Fuse current value	Ambient temperature (Ta)	Max. permissible surface temperature
≤ 4 A	≤ 40 °C	T80°C
≤ 4 A	≤ 56 °C	T95°C
≤ 5 A	≤ 46 °C	T95°C
≤ 6.3 A	≤ 70 °C	T130°C

6 Mounting and Installation

6.1 Mounting / Dismounting, Operating Position

- ▶ Mount the device carefully and only in accordance with the safety notes (see "Safety" section).
- ▶ Read through the following installation conditions and assembly instructions carefully and follow them precisely.

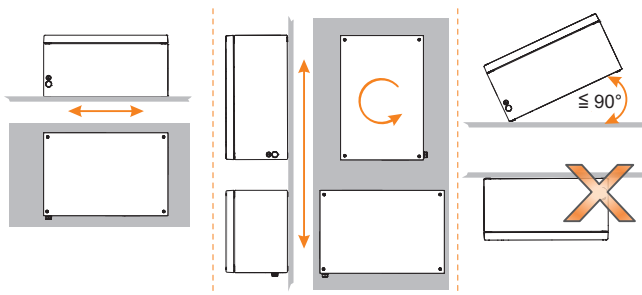
6.1.1 Operating Position



DANGER! Explosion due to incorrect mounting position!

Non-compliance results in fatal or severe injuries.

- ▶ Mount the device only on the floor or wall, not overhead or in a free-standing position.
- ▶ Mount the device torsion-free only on a level surface.
- ▶ Mount the device using the mounting straps. Refer to the dimensional drawing for the dimensions of the mounting holes.



Alignment of enclosure depending on mounting type:

- For vertical mounting: any alignment
- For horizontal mounting: cover on top
- Hanging position/overhanging cover is not permitted!

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6.1.2 Environmental Installation Conditions

- ▶ Provide a protective roof or wall if the explosion-protected device is exposed to weather.
- ▶ Equip explosion-protected electric equipment with a breather and drain valve in order to prevent the vacuum effect. Observe the correct mounting orientation (bottom) when doing so. See also section 6.1.1
- ▶ Do not create any cold bridges (risk of condensation). If necessary, mount the enclosure with a clearance to reduce condensation in the enclosure to a minimum.

6.2 Installation

i Operation under difficult conditions, such as on ships or in strong sunlight, requires additional measures to be taken for correct installation, depending on the place of use. Further information and instructions on this can be obtained from your regional sales contact on request.

⚠ DANGER! Explosion due to excess heating inside the enclosure!

Non-compliance results in fatal or severe injuries.

- ▶ Ensure that distances between Ex e electric circuits and Ex i electric circuits comply with standards (EN IEC 60079-11).
- ▶ Select suitable conductors that do not exceed the permitted heating temperature within the enclosure.
- ▶ Pay attention to the specified cross-sections.
- ▶ Attach the core end sleeves properly.

⚠ DANGER! Explosion due to improper installation!

Non-compliance results in fatal or severe injuries.

- ▶ Install the device carefully and only in accordance with the safety notes ("Safety" section).
- ▶ The installation steps stated below must be carried out very precisely.

i The necessary technical details/data on electric installation can be found in the following documents:

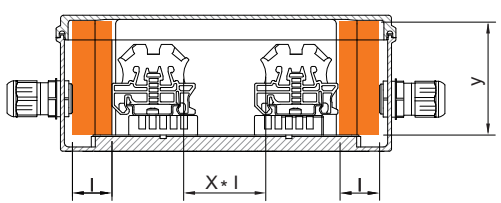
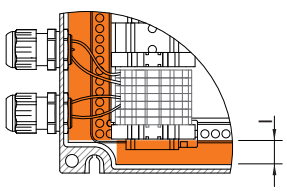
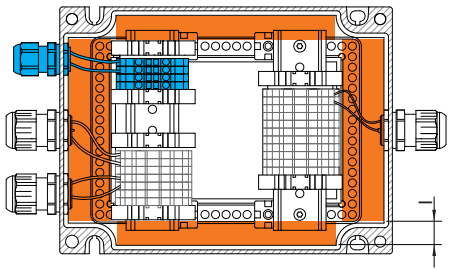
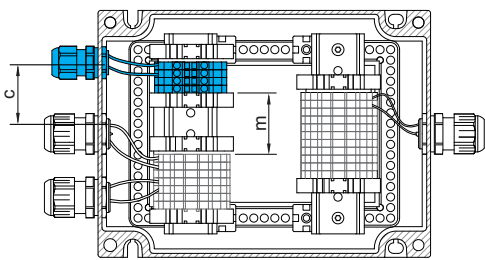
- ▶ "Technical data" chapter in these operating instructions
- ▶ Documentation and data sheets provided by the terminal manufacturers
- ▶ Documentation and data sheets of the installed devices (e.g. for specifications on equipotential bonding, earthing and intrinsically safe circuits)

6.2.1 Conductor Connection

- ▶ Select suitable conductors that do not exceed the permitted heating temperature within the enclosure.
- ▶ Ensure that conductors have the specified cross-sections.
- ▶ Guide the conductor insulation so that it reaches the terminals.
- ▶ Do not damage the conductor when stripping the insulation (e.g. by denting it).
- ▶ Attach the core end sleeves properly.
- ▶ If the system is equipped with all possible terminals and live conductors, and the maximum current load has been reached, ensure that the length of a conductor from the screw connection to the terminal point does not exceed the diagonal planes of the enclosure.

6.2.2 Installation Conditions

Installation conditions for creepage distances and clearances

 <p>18591E00</p>	<p>$l =$ Minimum distance from the enclosure in accordance with EN IEC 60079-7 standard (table)</p> <p>$y =$ Clearance</p> <p>$X =$ Factor in accordance with EN IEC 60079-7 depending on conductor cross-section</p>
 <p>18590E00</p>	<p>$X * l =$ Minimum distance</p>
 <p>18592E00</p>	
 <p>18593E00</p>	<p>$m =$ 50 mm distance between Ex e and Ex i terminal blocks</p> <p>$c =$ 8 mm distance between Ex e and Ex i cable lines</p>

Distances, creepage distances and clearances

- ▶ When installing components, the creepage distances and clearances between the individual components, as well as between the components and the enclosure walls, must be sufficiently dimensioned. Observe the values from the EN IEC 60079-7 standard (table) when doing so.
- ▶ Check the creepage distances of the components and comply with them in accordance with the specifications in the respective operating instructions.
- ▶ The clearance distances, depending on the rated operational voltage of the fitted terminals, must be complied with.
- ▶ Observe the distance between the enclosure cover and connection screws of the built-in components (with the conductor connected): at least the value of the required clearances.

Distance between the connecting units for intrinsically safe and non-intrinsically safe circuits

- ▶ Mount partitions used to separate connection terminals at least 1.5 mm from the enclosure walls, or alternatively ensure a minimum distance of 50 mm between the uncoated conducting parts of the connection terminals (when measured in any direction around the partition)
- ▶ Make sure that metallic partitions
 - are at least 0.45 mm thick
 - are earthed
 - are sufficiently strong and rigid
 - have sufficient current carrying capacity.
- ▶ Make sure that non-metallic, insulating partitions
 - are at least 0.9 mm thick
 - have an appropriate comparative tracking index (CTI)
 - are reinforced to prevent deformation.
- ▶ When using fuses > 4 A, implement additional design measures to prevent impermissible heat-up at the terminals of the intrinsically safe circuits.

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

- ▶ Equip all live parts which are not acc. to "Ex i" protection with an inner cover which meets at least the degree of protection IP30 when the equipment is open.

Intrinsically safe circuits

- ▶ In intrinsically safe circuits, use only insulated cables and conductors with a test voltage of at least 500 V AC and a minimum quality of H05.
- ▶ Calculate the insulation test voltage for the insulation and separation of terminals and conductors from the sum of the rated operational voltages of intrinsically safe and non-intrinsically safe circuits.
 - In case of "intrinsically safe to earth", there is a minimum rated insulation voltage value of 500 V (otherwise, double the value of the rated operational voltage of intrinsically safe circuits).
 - In the case of "intrinsically safe to non-intrinsically safe", there is a minimum rated insulation voltage value of 1500 V (otherwise, double the rated operational voltage plus 1000 V).

Clearance and creepage distances of intrinsically safe components

- ▶ Make sure that the creepage distances and clearances between the uncoated, conductive parts of connection terminals of separated, intrinsically safe circuits to earthed or potential-free, conductive parts is equal or greater than the values of EN IEC 60079-11, Table 5.
- ▶ For separated, intrinsically safe electric circuits, set up a safe distance between the uncoated, conductive parts of external connections, which meets the following requirements:
 - minimum 6 mm between the separated, intrinsically safe circuits
 - minimum 3 mm to earthed parts if possible connection to earth has not been considered in the safety analysis.

7 Commissioning

Before commissioning, carry out the following checks:

- ▶ Check the enclosure for damage.
- ▶ Check that mounting and installation have been performed correctly. When doing so, check whether all covers and partitions for live parts have been installed and fastened.
- ▶ Make sure that all openings/drilled holes in the enclosure are sealed with permissible components. Dust and transport protection (adhesive tape or plastic caps) fitted at the factory must be replaced with certified components.
- ▶ Make sure that seals and sealing systems are clean and undamaged.
- ▶ If necessary, remove foreign bodies.
- ▶ If necessary, clean the connection chamber.
- ▶ Check whether all prescribed tightening torques have been observed.

8 Maintenance and Repair

- ▶ Observe the relevant national regulations in the country of use, e.g. EN IEC 60079-14, EN IEC 60079-17, EN IEC 60079-19.

8.1 Maintenance

Check the following points in addition to the national regulations:

- whether the clamping screws holding the cables are securely seated,
- whether the device enclosure and/or protective enclosure have cracks or other visible signs of damage
- compliance with the permitted temperatures,
- the screws and nuts are securely fastened.

8.2 Maintenance

- ▶ Perform maintenance on the device according to the applicable national regulations and the safety notes in these operating instructions ("Safety" section).

8.3 Repair

- ▶ Perform repairs to the device only using original spare parts and after consulting with R. STAHL.

9 Returning the Device

- ▶ Only return or package the devices after consulting R. STAHL!
Contact the responsible representative at R. STAHL for this.

R. STAHL's customer service is available to handle returns if repair or service is required.

 Only return or package the devices after contacting and consulting R. STAHL!

- ▶ Contact customer service personally.

or

- ▶ Go to the www.stahl.com website.
- ▶ Select "Downloads" > Customer service > "RMA Request".
- ▶ Fill out the form.
Wait for confirmation. R. STAHL's customer service will contact you.
You will receive an RMA slip after speaking with customer service.
- ▶ Send the device along with the RMA slip in the packaging to
R. STAHL Schaltgeräte GmbH (refer to Section 1.1 for the address).

10 Cleaning

- ▶ Check the device for damage before and after cleaning it. Take damaged devices out of operation immediately.
- ▶ To avoid electrostatic charging, the devices located in hazardous areas may only be cleaned using a damp cloth.
- ▶ When cleaning with a damp cloth, use water or mild, non-abrasive, non-scratching cleaning agents.
- ▶ Do not use aggressive detergents or solvents.
- ▶ Never clean the device with a strong water jet, e.g. using a high-pressure washer!

11 Disposal

- ▶ Observe national and local regulations and statutory regulations regarding disposal.
- ▶ Separate materials when sending them for recycling.
- ▶ Ensure environmentally friendly disposal of all components according to the statutory regulations.

12 Accessories and Spare Parts

NOTICE! Malfunction or damage to the device due to the use of non-original components.
Non-compliance can result in material damage.

- ▶ Use only original accessories and spare parts from R. STAHL Schaltgeräte GmbH (see data sheet).

13 Annex A

13.1 Technical Data

Explosion Protection

Global (IECEX)

Gas and dust	IECEX PTB 06.0046 Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb Ex tb IIIA, IIIB, IIIC, T80°C, T95°C, T130°C Db IP66
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Europe (ATEX)

Gas and dust	PTB 01 ATEX 1016 ⊕ II 2 G Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb ⊕ II 2 D Ex tb IIIA, IIIB, IIIC T80°C, T95°C, T130°C Db IP66
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Certifications and certificates

Certificates	IECEX, ATEX, China (China-Ex), Brazil (INMETRO), Canada (CSA), Kazakhstan (TR), Korea (KCs), Russia (TR), Taiwan (ITRI), Ukraine (TR), Belarus (TR), USA (UL)
Ship approval	GL, RS

Technical Data

Electrical data

Rated operational voltage	max. 1100 V AC / DC (depending on the terminal type and the Ex components used)
Rated operational current	max. 500 A (depending on the terminal type and the Ex components used)

Ambient conditions

Ambient temperature	-60 to +100 °C (depending on the Ex components used)
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Mechanical data

Degree of protection	IP66 acc. to IEC/EN 60529
Material	
Enclosure	Polyester resin, glass-fibre-reinforced, dark grey, similar to RAL 7024 Impact resistance ≥ 7 J Surface resistance $\leq 10^9 \Omega$ Flame-resistant according to IEC/EN 60695, UL 94, ASTM D635
Seal	Standard: foamed silicone Special: PU, foamed (-20 to +80 °C)
Flanges	
Standard	In the standard design, the enclosures are supplied without flanges.
Option	Depending on order, the enclosures can be fitted on one or more sides with flanges; flange material: polyester resin, glass-fibre-reinforced
Cover lock	with captive M6 stainless steel combo head screws according to the specifications of the terminal block manufacturers

Technical Data

Connection
cross-section
Terminals

Rated cross section that can be used, max. 300 mm².
The maximum number of terminals for the respective enclosure size is indicated in the EU Type Examination Certificate.

Mounting / Installation

Connection

According to the order directly to the fitted components or to the terminal blocks.
The rated operational voltage, the rated operational current and the rated cross section depend on the terminal type used and the explosion protected components.

Explosion Protection

		Version as cable end box		
Version		8146/1000-C923	8146/1093-C924	8146/1000-C958
Global (IECEx)				
Gas and dust		IECEx PTB 06.0046 Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb Ex tb IIIA, IIIB, IIIC, T80°C, T95°C, T130°C Db IP66	IECEx PTB 06.0046 Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb Ex tb IIIA, IIIB, IIIC, T80°C, T95°C, T130°C Db IP66	IECEx PTB 06.0046 Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb Ex tb IIIA, IIIB, IIIC, T80°C, T95°C, T130°C Db IP66
Europe (ATEX)				
Gas and dust		PTB 01 ATEX 1016 ⊕ II 2 G Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb ⊕ II 2 D Ex tb IIIA, IIIB, IIIC T80°C, T95°C, T130°C Db IP66	PTB 01 ATEX 1016 ⊕ II 2 G Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb ⊕ II 2 D Ex tb IIIA, IIIB, IIIC T80°C, T95°C, T130°C Db IP66	PTB 01 ATEX 1016 ⊕ II 2 G Ex d e ia/ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb ⊕ II 2 D Ex tb IIIA, IIIB, IIIC T80°C, T95°C, T130°C Db IP66
Certifications and certificates				
Certificates		IECEx, ATEX, China (China-Ex), Brazil (INMETRO), Canada (CSA), Kazakhstan (TR), Korea (KCs), Russia (TR), Taiwan (ITRI), Ukraine (TR), Belarus (TR), USA (UL)		
Ship approval		GL, RS		

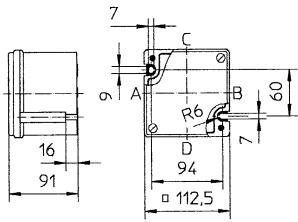
Technical Data			
	Version as cable end box		
Version	8146/1000-C923	8146/1093-C924	8146/1000-C958
Electrical data			
Rated operational voltage	max. 690 V AC	max. 690 V AC	max. 690 V AC
Rated current depending on the temperature class	400 A / T5 315 A / T6	355 A / T5 315 A / T6	160 A / T5 125 A / T6
Ambient conditions			
Ambient temperature	-30 to +50 °C (T6 315 A) -30 to +65 °C (T5 315 A) -30 to +50 °C (T5 400 A)	-30 to +40 °C (T6 315 A) -30 to +55 °C (T5 315 A) -30 to +45 °C (T5 355 A)	-30 to +55 °C (T6 125 A) -30 to +40 °C (T5 125 A) -30 to +45 °C (T5 160 A)
Mechanical data			
Degree of protection	IP66	IP66	IP66
Terminals	12 stud terminals M12 185 mm ² ; 4 PE stud terminals 185 mm ²	6 stud terminals M12 185 mm ² ; 2 PE stud terminals 185 mm ²	8 line-up terminals 70 mm ²
Internal wiring	Copper bar 20 x 10 mm (Cu-ETP R300)	Copper bar 20 x 10 mm (Cu-ETP R300)	Cable NSGAFöu 70; 70 mm ²
Cable entry	brass plate with 2 x M75	brass plate with 2 x M75	brass plate with 2 x M75
Mounting / Installation			
Cable entries	Standard: In polyamide, Series 8161 Special: In metal	Standard: In polyamide, Series 8161 Special: In metal	Standard: In polyamide, Series 8161 Special: In metal

For further technical data, see www.stahl-ex.com.

14 Annex B

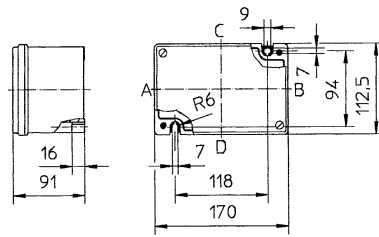
14.1 Dimensions / Fastening Dimensions

Dimensional drawings (all dimensions in mm [inches]) – Subject to modifications

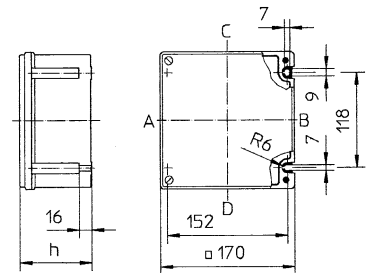


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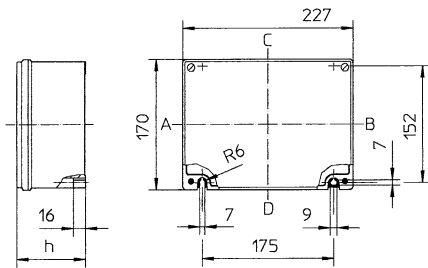
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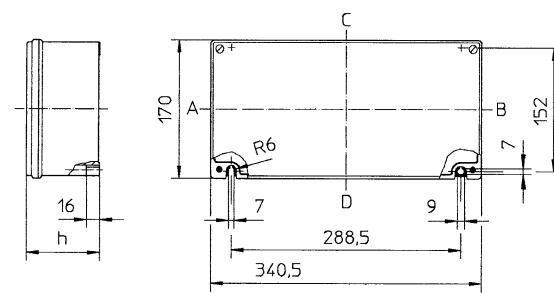
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8146/05.



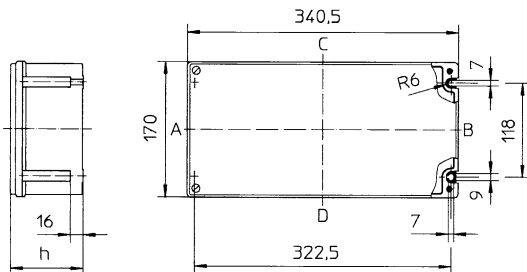
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8146/06.



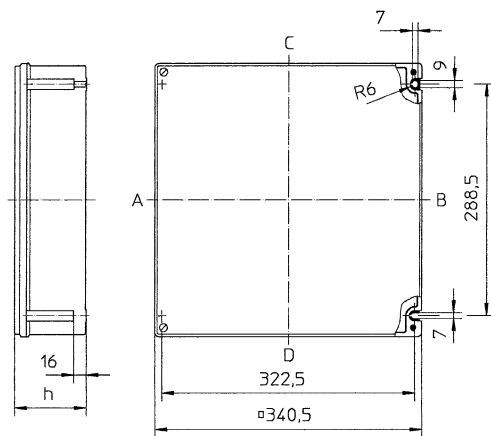
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8146/07.



04306E00

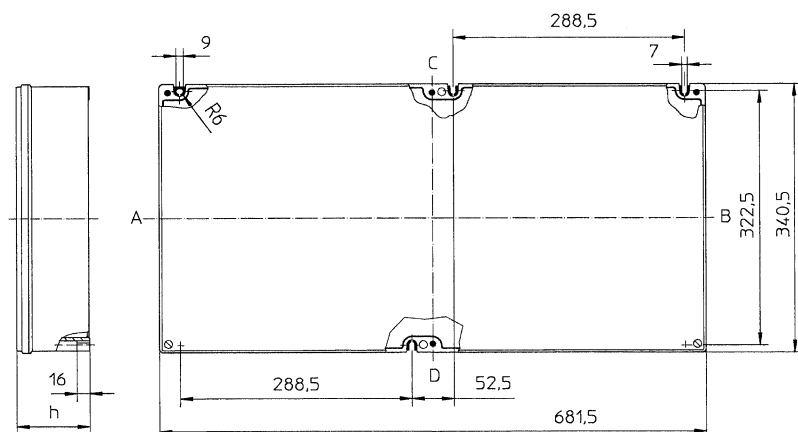
8146/S7.



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8146/08.

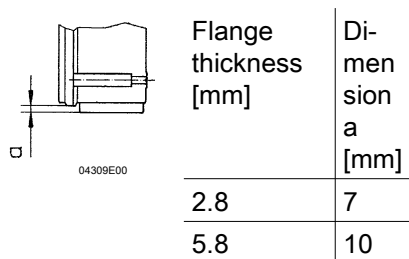
Dimensional drawings (all dimensions in mm [inches]) – Subject to modifications



04308E00

8146/.09.

Enclosure	Enclosure height h				
	8146/...1 91 mm	8146/...2 131 mm	8146/...3 150 mm	8146/...5 190 mm	8146/...6 230 mm
8146/.03.	X	-	-	-	-
8146/.04.	X	-	-	-	-
8146/.05.	X	X	-	-	-
8146/.06.	X	X	-	-	-
8146/.07.	X	X	X	X	-
8146/.S7.	X	-	X	-	-
8146/.08.	X	X	X	X	X
8146/.09.	X	X	X	X	-

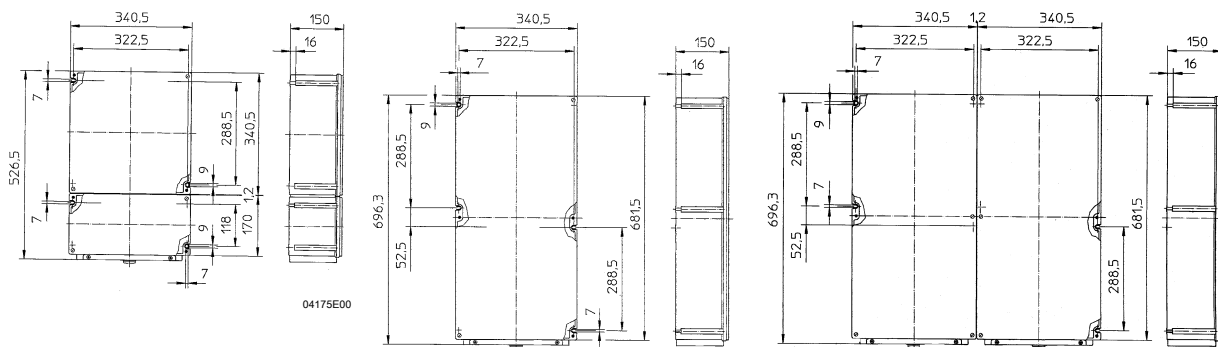


Additional dimension for flange mounting

X ... available version

Version as cable end box

Dimensional drawings (all dimensions in mm [inches]) – Subject to modifications



8146/1000-C958

8146/1093-C924

8146/1000-C923