



## Electronic relay module

Series 9174

– Save for future use! –



## Contents

1	General Information .....	3
1.1	Manufacturer .....	3
1.2	About these Manual .....	3
1.3	Further Documents .....	3
1.4	Conformity with Standards and Regulations .....	3
2	Explanation of the Symbols .....	4
2.1	Symbols in this Manual .....	4
2.2	Symbols on the Device .....	4
3	Safety .....	5
3.1	Intended Use .....	5
3.2	Personnel Qualification .....	5
3.3	Residual Risks .....	6
4	Transport and Storage .....	7
5	Product Selection and Project Engineering .....	8
6	Mounting and Installation .....	10
6.1	Mounting / Dismounting .....	10
6.2	Installation .....	11
7	Commissioning .....	12
8	Operation .....	12
8.1	Operation .....	12
8.2	Indications .....	12
8.3	Troubleshooting .....	12
9	Maintenance, Overhaul, Repair .....	13
9.1	Maintenance .....	13
9.2	Overhaul .....	13
9.3	Repair .....	13
10	Returning the Device .....	13
11	Cleaning .....	14
12	Disposal .....	14
13	Accessories and Spare Parts .....	14
14	Annex A .....	15
14.1	Technical Data .....	15
15	Annex B .....	18
15.1	Device Design .....	18
15.2	Dimensions / Fastening Dimensions .....	18

# 1 General Information

## 1.1 Manufacturer

R. STAHL Schaltgeräte GmbH  
Am Bahnhof 30  
74638 Waldenburg  
Germany

Phone: +49 7942 943-0  
Fax: +49 7942 943-4333  
Internet: r-stahl.com  
E-Mail: info@stahl.de

## 1.2 About these Manual

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

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Hardware version: A

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

## 1.3 Further Documents

- Cabinet installation guide
- Data sheet
- Operating instructions





For documents in further languages, see r-stahl.com.

## 1.4 Conformity with Standards and Regulations






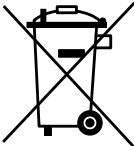
- Certificates and EU Declaration of Conformity: r-stahl.com.
- The device has IECEx approval. See IECEx homepage: <http://iecex.iec.ch/> to view the certificate.
- Further national certificates can be downloaded via the following link:  
<https://r-stahl.com/en/global/support/downloads/>.

EN 2 Explanation of the Symbols

2.1 Symbols in this Manual

Symbol	Meaning
	Tip for making work easier
 <b>DANGER!</b>	Dangerous situation which can result in fatal or severe injuries causing permanent damage if the safety measures are not complied with.
 <b>WARNING!</b>	Dangerous situation which can result in severe injuries if the safety measures are not complied with.
 <b>CAUTION!</b>	Dangerous situation which can result in minor injuries if the safety measures are not complied with.
<b>NOTICE!</b>	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>05594E00</small>	CE marking according to the current applicable directive.
 <small>02198E00</small>	Device certified for hazardous areas according to the marking.
 <small>15649E00</small>	Input
 <small>15648E00</small>	Output
 <small>11048E00</small>	Safety notes that must always be observed: The corresponding data and/or safety-related instructions contained in the manual must be followed for devices with this symbol!
 <small>20690E00</small>	Marking according to the WEEE directive 2012/19/EU

### 3 Safety

The device has been manufactured according to the state of the art of technology while observing recognised safety-related rules. When using the device, it is nevertheless possible for hazards to occur to the 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
  - while taking this manual into account

#### 3.1 Intended Use

The 9174 electronic relay module is an automation solution for hazardous areas of Zone 1, 2 and 22 and safe areas. The device is intended for installation in areas with a degree of pollution of 1 or 2.

The relay module uses an intrinsically safe activation signal to switch a resistive, capacitive or inductive Ex e load. It is an optional addition to the intrinsically safe digital outputs, e.g. for a remote I/O module. The relay module is not suited for switching loads with very high start-up currents, such as incandescent lamps.

"Intended use" includes complying with this manual, the operating instructions and the other applicable documents, e.g. the data sheet.

Any other use of the device is not intended.

#### 3.2 Personnel Qualification

Qualified specialist personnel are required to perform the tasks described in this manual. This primarily applies to work in the following areas:

- Product selection, project engineering
- 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

Despite the device's state-of-the-art design, explosion hazards cannot be entirely eliminated in hazardous areas.

- ▶ Perform all work steps in hazardous areas with the utmost care at all times!
- ▶ Transport, store, plan, mount and operate the device in compliance with the technical data exclusively (see the "Technical data" chapter).

Possible hazards (residual risks) can be categorised according to the following causes:

##### **Mechanical damage**

The device can be damaged during transport, mounting or commissioning.

This kind of damage can, for example, render the device's explosion protection partially or fully ineffective. This may result in explosions causing serious or even fatal injury to persons in the vicinity.

- ▶ Only transport the device in special transport packaging that reliably protects the device from external influences. Observe the ambient conditions when selecting the transport packaging (see the "Technical data" chapter).
- ▶ Do not place any load on the device.
- ▶ Check the packaging and the device for damage. Report any damage to R. STAHL immediately. Do not commission a damaged device.
- ▶ Store the device in its original packaging in a dry place (with no condensation), and make sure that it is stable and protected against the effects of vibrations and knocks.
- ▶ Do not damage the device and other system components during mounting.

##### **Excessive heating or electrostatic charge**

An incorrect setup in the cabinet, operation outside of approved conditions or improper cleaning can cause the device to heat up severely or to become electrostatically charged, causing it to produce sparks. This may result in explosions causing serious or even fatal injury to persons in the vicinity.

- ▶ Operate the device only within the prescribed operating conditions (see the marking on the device and the "Technical data" chapter).
- ▶ Only line up or combine devices using the stipulated procedure.
- ▶ Install and set up the cabinet in such a way that all devices installed within it are always operated within the permissible temperature range (see cabinet installation guide).
- ▶ Clean the device only with a damp cloth.

**Improper mounting, 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 may result in explosions causing serious or even fatal injury to persons in the vicinity.

- ▶ Have mounting, installation, commissioning and maintenance work performed only by qualified and authorised persons (see Chapter 3.2).
- ▶ Prior to commissioning, check the mounting for correctness (see Chapter 7).
- ▶ Only mount the device on the NS 35/15 or NS 35/7.5 DIN rail in accordance with IEC/EN 60715.
- ▶ Only operate the device if the required specification is met (see the "Technical data" chapter).
- ▶ When used in Zone 1 or Zone 2, the device is to be installed in a protective enclosure or in a cabinet in accordance with IEC/EN 60079-7. This enclosure has a suitable degree of protection (at least IP54).
- ▶ For use in Zone 1 on the field enclosure, affix an information plate (in accordance with IEC/EN 60079-7): "Caution - Non-intrinsically safe circuits protected by internal IP 30 cover".
- ▶ When used in Zone 22 and in a safe area, the device is to be installed in a protective enclosure or in a cabinet in accordance with IEC/EN 60079-31. This enclosure has a suitable degree of protection (at least IP54).
- ▶ Before disconnecting or connecting an Ex e field circuit, de-energise it.
- ▶ Do not change or retrofit the device.
- ▶ Gently clean the device only with a damp cloth and without scratching, abrasive or aggressive cleaning agents or solutions.
- ▶ Electrical circuits with the "Ex i" type of protection can no longer be operated as circuits with this protection type after being operated with circuits with other types of protection.

## 4 Transport and Storage

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

## 5 Product Selection and Project Engineering



### **DANGER! Explosion hazard during operation without a back-up fuse!**

Non-compliance may result in serious or even fatal injury.

- ▶ Only plan and operate the device if the required specification is met (see the "Technical data" chapter).
- ▶ When using the 8560/51-4242 Ex e fuse, do not exceed a short-circuit current of 80 A.
- ▶ Use one fuse for each device.



### **DANGER! Explosion hazard due to modules overheating!**

Non-compliance may result in serious or even fatal injury.

- ▶ Ensure compliance with the maximum switching frequency, maximum capacitance, maximum inductance and characteristic of the connected binary output (see following tables and chapter "Technical Data").

#### **Maximum inductance of an ohmic circuit (conductor inductance)**

- ▶ Design the inductance of the conductor when switching ohmic loads as follows based on the switching current:

Maximum switching current [A]	Maximum inductance of the conductor
2	200 $\mu$ H
1	800 $\mu$ H
0.5	3 mH

Typical values: 0.6 mH/km. Ask the cable manufacturer for the exact specification.



Additional circuitry with a freewheeling diode is recommended. R. STAHL offers compatible accessories from Series 8453 (e.g. 145169 article number, SB 550 encapsulated diode for installation in Zone 1 or 2).

#### **Maximum capacitance of a resistive circuit (conductor capacitance)**

- ▶ The maximum capacitance of the conductor is limited to 220 nF. This results in a typical conductor length of 1 km.



**Maximum switching frequency based on the inductive load**

► Select the maximum switching frequencies based on the inductive or capacitive load.

Inductive load [H]	Max. switching current		
	0.5 A	1 A	2 A
	Switching frequency [Hz]	Switching frequency [Hz]	Switching frequency [Hz]
15	0.067	–	–
10	0.100	–	–
5	0.200	–	–
3	0.333	0.083	–
2	0.500	0.125	–
1	1.000	0.250	–
0.5	2.000	0.500	–
0.4	2.500	0.625	0.125
0.2	5.000	1.250	0.250
0.1	5.000	2.500	0.500
0.05	5.000	5.000	1.000
0.02	5.000	5.000	2.500
0.01	5.000	5.000	5.000

**i** Additional circuitry with a freewheeling diode is recommended. R. STAHL offers compatible accessories from Series 8453 (e.g. 145169 article number, SB 550 encapsulated diode for installation in Zone 1 or 2).

**Maximum switching frequency based on the capacitive load**

Capacitive load	30 $\mu$ F	100 $\mu$ F	470 $\mu$ F	1000 $\mu$ F	2000 $\mu$ F	4700 $\mu$ F
Switching frequency	$\leq 30$ Hz	$< 10$ Hz	$< 2$ Hz	$< 1$ Hz	$< 0.5$ Hz	$< 0.2$ Hz

**i** The maximum capacitance of 4700  $\mu$ F must not be exceeded.

## 6 Mounting and Installation

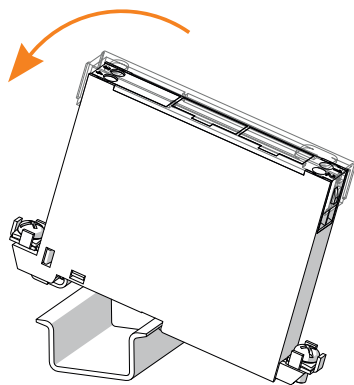
### 6.1 Mounting / Dismounting

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

#### 6.1.1 Mounting / Dismounting on Top Hat Rail

##### Mounting

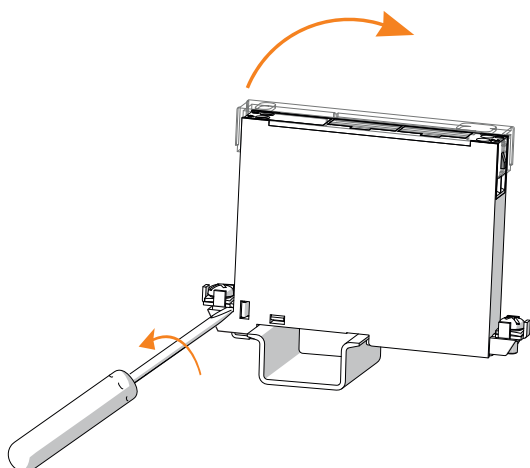
- i** Only mount the device on DIN rails that correspond to IEC/EN 60715.



- ▶ Position the device on the DIN rail. Mount the cut-out of the enclosure must be positioned on the outside edge of the DIN rail.
- ▶ Engage the device on the DIN rail.
- ▶ When swivelling the device onto the DIN rail, make sure that it is not set at an angle.

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##### Dismounting



- ▶ Pull out the base bolt slightly using a screwdriver.
- ▶ Swivel out the device.

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## 6.2 Installation

- i** Operation under difficult conditions, in particular on ships, requires additional measures to be taken for correct installation, depending on the operating location. Further information and instructions on this can be obtained from your regional sales contact upon request.

### 6.2.1 Ex i Connection (Terminal 3, 4)

**!** **DANGER! Explosion hazard due to exposed or incorrectly installed conductors at the Ex i terminal!**

Non-compliance may result in serious or even fatal injury.

- ▶ Do not exceed the length to be stripped (5 to 7 mm)!
- ▶ Carefully and securely attach the core end sleeve.
- ▶ Insert stripped wires into the terminal entirely.

**!** **DANGER! Explosion hazard due to bounce when connecting/disconnecting conductors at the Ex i terminal (terminal 3, 4)!**

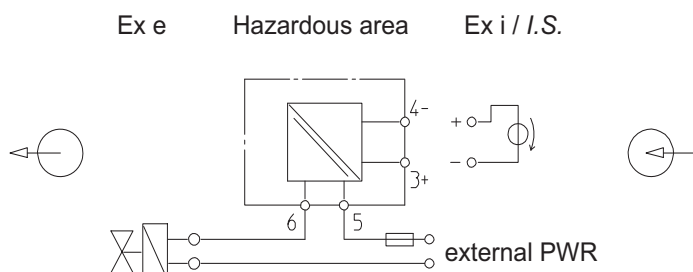
Non-compliance may result in serious or even fatal injury.

- ▶ Before work on terminal 3 or 4, de-energise the Ex e electrical circuit.
- ▶ Install warning labels on the wires connected to terminals 3 and 4 and in the vicinity of the terminals for the connected device.
- ▶ Guide the conductor all the way to the stop in the clamping unit. Make sure that the stripped part of the wire does not extend beyond the blue terminal enclosure.
- ▶ Tighten the terminal screw counterclockwise. Tightening torque of 0.5 to 0.6 Nm.

### 6.2.2 Ex e Connection (Terminal 5, 6)

- ▶ Comply with stipulated stripping length (10 mm).
- ▶ Guide the conductor all the way to the stop in the clamping unit. Make sure that the stripped part of the wire does not extend beyond the green terminal enclosure.
- ▶ Lightly pull on the wires to check that they are secure.
- ▶ To remove the wire, guide the screwdriver into the cut-out next to the wire and turn the screwdriver in the direction of the wire. At the same time, lightly pull on the wire until it disconnects from the terminal.

### 6.2.3 Schematic Diagrams



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## 7 Commissioning

Before commissioning, carry out the following checks:

- Mounting and installation of the device according to regulations.
- Correct, secure connection of the cables.
- No damage to the device or the cables.
- The screws are securely fastened to the terminals.  
Correct tightening torque: 0.5 to 0.6 Nm.

▶ Do not commission the device until it has been successfully tested.

## 8 Operation

### 8.1 Operation

▶ For device operation, observe the information in the "Intended Use" and "Commissioning" chapters.

#### Mode of operation

An intrinsically safe digital output activates the intrinsically safe input of the relay module. The relay module switches concurrently with the electronic Ex e output. Since the relay module is based on an electronic switch, mechanical wear can be prevented. The switching state is indicated by an LED.

### 8.2 Indications

The corresponding LEDs on the device indicate the operating state of the device (see also the "Intended Use" and "Device Design" chapters).

LED	Colour	LED "OFF"	LED "ON"
Switching state Ex e output	yellow	Output contact open	Output contact closed

### 8.3 Troubleshooting

Error	Cause of error	Troubleshooting
The device does not switch the load. Despite being activated, the yellow LED remains off	Polarity reversed for control	Check the control system for correct polarity

If the error cannot be eliminated using the specified procedures:

▶ Contact R. STAHL Schaltgeräte GmbH.

For rapid processing, have the following information ready:

- Type and serial number of the device
- Purchase information
- Error description
- Intended use (in particular, input and output wiring)

## 9 Maintenance, Overhaul, Repair

- ▶ Comply with the applicable national standards and regulations in the country of use, e.g. IEC/EN 60079-14, IEC/EN 60079-17, IEC/EN 60079-19.

### 9.1 Maintenance

Check the following points in addition to the national regulations:

- Whether the clamping screws holding the electrical lines fit securely
- Whether the device enclosure and/or protective enclosure has/have cracks or other visible signs of damage
- Whether the permissible temperatures are complied with
- Whether the parts are securely fastened
- Ensure it is being used as intended

### 9.2 Overhaul

- ▶ Perform maintenance on the device according to the applicable national regulations and the safety notes in this manual ("Safety" chapter).

### 9.3 Repair

- ▶ Repair work on the device must be performed only by R. STAHL.

## 10 Returning the Device

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

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

- ▶ Contact customer service personally.

or

- ▶ Go to the [r-stahl.com](http://r-stahl.com) website.
- ▶ Under "Support" > "RMA", select "RMA -REQUEST".
- ▶ Fill out the form and send it.  
You will automatically receive an RMA form via email. Please print this file off.
- ▶ Send the device along with the RMA form in the packaging to  
R. STAHL Schaltgeräte GmbH (refer to chapter 1.1 for the address).

## 11 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 corrosive cleaning agents or solvents.

## 12 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.

## 13 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).

## 14 Annex A

### 14.1 Technical Data

#### Explosion Protection

##### Global (IECEX)

Gas and dust	IECEX BVS 17.0050X Ex eb mb [ib Gb] IIC T4 Gb [Ex ib Db] IIIC
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##### Europe (ATEX)

Gas and dust	BVS 17 ATEX E 057 X ⊕ II 2 G Ex eb mb [ib Gb] IIC T4 Gb ⊕ II (2) D [Ex ib Db] IIIC
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#### Certifications and certificates

Certificates	IECEX, ATEX
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#### Safety data

Max. voltage $U_i$	28 V
Max. current $I_i$	150 mA
Max. power $P_i$	780 mW
Internal capacitance $C_i$	1.2 nF
Internal inductance $L_i$	negligible
Safety-related maximum voltage	253 V
Nominal current	
Device	2 A
Note	See chapter 5 in the manual for additional specifications
Back-up fuse	
Rated operational current	3.15 A
Breaking capacity	> 1500 A at 250 V
Recommended type (Zone 1)	8560/51-4242
Recommended type (non-Ex)	Littelfuse 215 series T3, 15 A

## Technical Data

### Electrical data

Galvanic separation	
acc. to standard	EN 60079-11
Input to output	1500 V AC
Auxiliary power	none
Max. power dissipation	1.42 W
Ex i input	
Switching level for ON / OFF	
ON	14 to 28 V
Note	Switching level = output voltage of binary output - internal resistance of binary output x 15 mA $\geq$ 14 V
OFF	0 to 5 V
Input current for ON	> 15 mA
Rise time output current DO for 15 mA	$\leq$ 2.5 ms
Input current for OFF	< 2 mA
Ex e output	
Max. voltage	31.2 V DC
Max. current	2 A
Reverse polarity protection	yes
Voltage drop	< 0.5 V
Max. leakage current	0.25 mA
Max. switching frequency	
Duty factor	30 to 70 %
Resistive load	30 Hz
Capacitive load	See chapter 5 in the manual
Inductive load	See chapter 5 in the manual
Note	Please observe the specifications in chapter 5 in the manual
Electromagnetic compatibility	Tested to the following standards and regulations: EN 61326-1 Use in industrial environment; NAMUR NE 21



**Technical Data****Ambient conditions**

Ambient temperature	-20 to +65 °C
Storage temperature	-40 to +80 °C
Maximum relative humidity	≤ 95 %
Use at the height of	< 2000 m

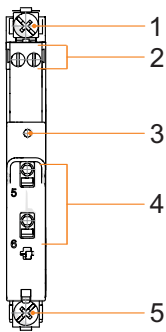
**Mechanical data**

Ex i connection	
Version	screw terminal
Terminals	2 terminals (cage terminals) each max. 1.5 mm <sup>2</sup> stranded / solid wire
Ex e connection	
Version	spring clamp terminal
Connection single-wire	
Rigid	0.2 to 4 mm <sup>2</sup>
Flexible	0.2 to 2.5 mm <sup>2</sup>
Flexible with core end sleeve	0.25 to 1.5 mm <sup>2</sup>
Mounting type	on DIN rail (NS35/15, NS35/7.5)
Mounting orientation	horizontal or vertical
Degree of protection	
Enclosure	IP40
Terminals 3,4 (Ex i)	IP20
Terminals 5,6 (Ex e)	IP30
Enclosure material	polyamide 6GF

For further technical data, see [r-stahl.com](http://r-stahl.com).

## 15 Annex B

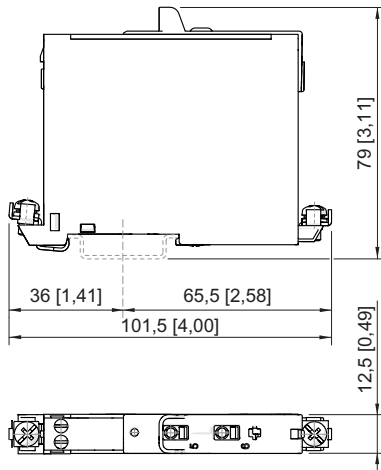
### 15.1 Device Design

	#	Device component	Description
	1	Screw terminal	Non-functional
	2	Blue terminals 3, 4	Ex i connection terminals for connecting the intrinsically safe control system
	3	Yellow LED	Indication of the switching state
	4	Black terminals 5, 6	Ex e connection terminals for connecting the load to be switched
	5	Screw terminal	Non-functional

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### 15.2 Dimensions / Fastening Dimensions

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



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