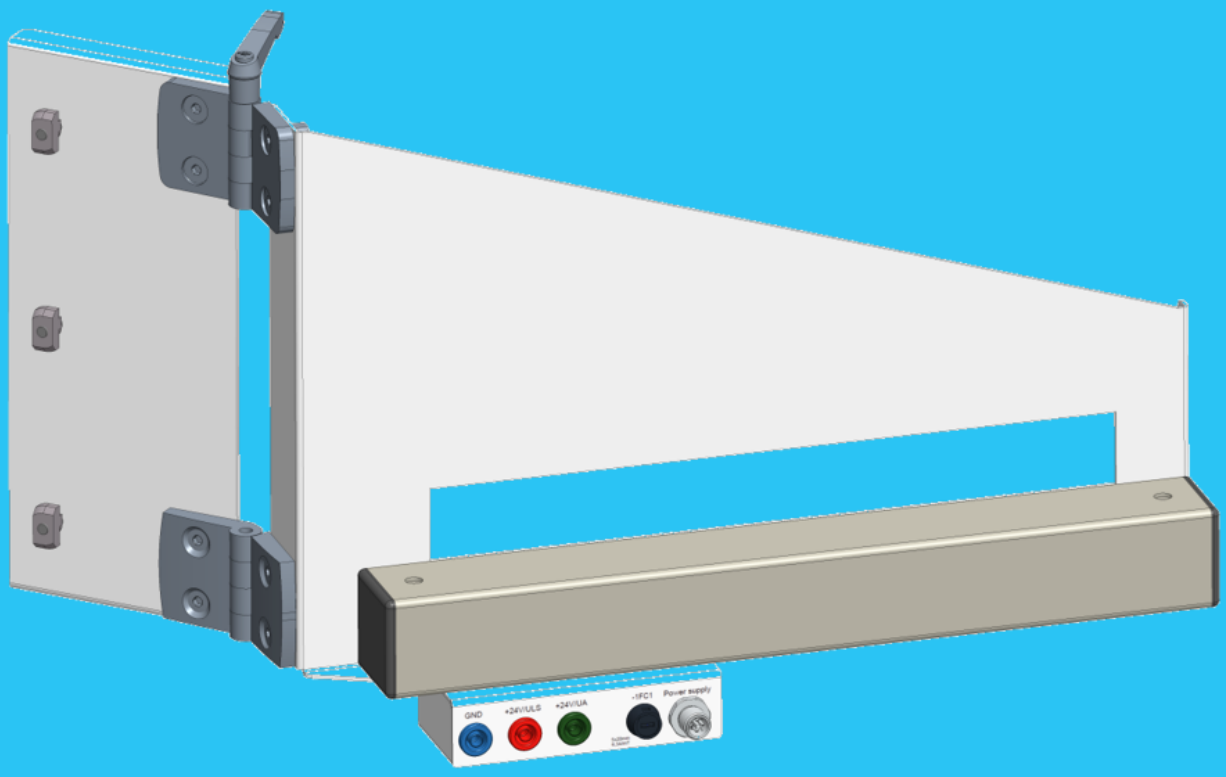
rexroth
A Bosch Company

Assembly instructions

Automax 100

Basic module TS-AC B2-M1-1X



DOK-SUPPL*-TS-AC B2-M1-ASRS-EN-P | 02.2021 | Bosch Rexroth AG

Impressum

The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

The original operating instructions were created in the German language.

Series Automax 100

Title Basic module TS-AC B2-M1-1X

Type of documentation Assembly instructions

Documentation type DOK-SUPPL*-TS-AC B2-M1-ASRS-EN-P

Material number R901543365

Purpose of the documentation
Primary information for use
Safety instructions
Commissioning
Operation
Handling
Technical setup

Change history

Edition	Version	Comment
DOK-SUPPL*-TS-AC B2-M1-ASRS-EN-P	02.2021	Repla. for ---

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Contents

1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- Material number of product: R901540862
- Basic module TS-AC B2-M1-1X

This documentation is intended for trainers, training participants, operators and the system end-user.
This documentation contains important information on how to assemble, transport, commission, operate, use, maintain and disassemble the basic module TS-AC B2-M1-1X safely and properly and to resolve simple faults independently.

▶ You should read this documentation thoroughly, and in particular the chapter „Safety instructions“ before working with the product.

1.2 Required and supplementary documentation

▶ The documents marked with a book symbol 🕮 are documentations of the systems/components that can be combined with this base module.

☞ The documentations can be ordered under the material number (document number) from your Bosch Rexroth sales representative. Alternatively, the documentations are available on the Bosch Rexroth website under the following link.

https://brmv2.kittelberger.net

Table 1: Required and supplementary documentation

	Title	Document number	Document type
🕮	Extension module TS-AC E2-M2-1X	R901540461	Operating instructions
🕮	Extension module TS-AC E2-M3-1X	R901540463	Operating instructions
🕮	Training system Hydraulik WS290	R961002837	Operating instructions
🕮	Basic module TS-AC B1-M3-1X [1)]	R901540437	Operating instructions

1) The basic module is still in planning phase. For information on the market launch, please contact your Bosch Rexroth sales representative

1.3 Illustration of information

Uniform safety instructions, symbols, terms and abbreviations are used so that you can quickly and safely work with your product using this documentation. For better understanding, they are explained in the following sections.

1.3.1 Safety instructions

In this documentation, safety instructions are included whenever sequences of actions are explained which bear the danger of personal injury or damage to property. The measures described for the hazard avoidance must be observed.
Safety instructions are set out as follows:

⚠ SIGNAL WORD

Type and source of danger
Consequences of non-compliance
- ▶ Hazard avoidance measures
- ▶ <List>

- **Warning sign:** Draws attention to the danger
- **Signal word:** Indicates the seriousness of the danger
- **Type and source of danger:** Designates the type and source of danger
- **Consequences:** Describes the consequences of non-compliance
- **Precautions:** Specifies how the danger can be prevented

Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, Signal word	Meaning
⚠ DANGER	Indicates a dangerous situation which may cause death or severe personal injuries if not avoided
⚠ WARNING	Indicates a dangerous situation which may cause death or severe personal injuries if not avoided
⚠ CAUTION	Indicates a dangerous situation which may cause minor to medium personal injuries if not avoided
NOTICE	Indicates damage to property: The product or the environment could be damaged

1.3.2 Symbols

The following symbols indicate notes which are not safety-relevant but increase the comprehensibility of the documentation.

Table 3: Meaning of Symbols

Symbol	Meaning
	If this information is not observed, the product cannot be optimally used and/or operated.
	Tip, general note, useful additional information
	Observe instructions on disposal and environmental protection
•	Enumeration
▶	Individual, independent action
1. 2. 3.	Numbered instruction: The numbers indicate that the actions must be carried out one after the other.
[▶**]	Indicates the page of a cross reference
„Text“	Indicates a cross reference in this document
http://	Indicates a cross reference in this document

1.3.3 Designations

The following designations are used in this documentation:

Table 4: Designations

Designation	Meaning
TS	Training system
Basic module	Basic module TS-AC B2-M1-1X
Extension modules	Various extension modules are available

1.3.4 Abbreviations

The following abbreviations are used in this documentation:

Table 5: Abbrevations

Designation	Meaning
BR	Bosch Rexroth
RD	Rexroth-document
DC	Direct current

Table 6: Generelly valid abbreviations

Abrevation	Unit	Meaning
U	V	Electrical voltage
I	A	Electric current intensity
U_{LS}	V	Supply voltage for logic and sensor (DC voltage)

Abrevation	Unit	Meaning
U_A	V	Supply voltage for actuators (DC voltage)
R	Ω	Electrical resistance
P	W	Electric power
F	Hz	Frequency
PE	---	Protective earthing
H	%	Air humidity
T	℃	Temperature
L_P	dB	Sound pressure level (according to ISO 11205)
NN	m	Height above sea level
B	mm	Width
H	mm	Height
T	mm	Depth
M	kg	Weight

2 Safety instructions

2.1 About this chapter

The product has been manufactured according to the generally accepted rules of technology. However, there is still the danger of personal injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- Read this documentation completely and thoroughly before working with the product. If you have not clearly understood the documentation in the available language, please contact your responsible Bosch Rexroth sales representative
- Keep this documentation in a location where it is accessible to all users at all times
- Always include the required documentation when you pass the product on to third parties
- The unobjectionable and safe operation of this device requires appropriate and proper transport, storage, assembly and installation as well as careful operation and maintenance

2.2 Intended use

Bosch Rexroth products are developed and produced according to the relevant state of the art. Before their delivery, they are checked for their operationally safe condition.
Before using the Bosch Rexroth products, the following prerequisites must be complied with in order to guarantee intended use of the products:

- Everyone who in any way deals with our products must read and understand the corresponding safety regulations and notes regarding the intended use
- Damaged or defective products must not be installed or commissioned

The product may be used as follows:

- As carrier system for extension modules of this series of training systems (Automax 100)
- For provision of supply voltage for extension modules of this series of training systems (Automax 100)
- For educational and commercial applications
- As training system

The product is not intended for private use.
Intended use also includes having read and understood this documentation completely, especially the chapter „Safety instructions“ and the chapter „General information on damage to property and damage to the product“.

2.3 Improper use

Any use deviating from the intended use is improper and thus not admissible.
Bosch Rexroth AG does not assume any liability for damage caused by improper use. The user assumes all risks involved with improper use.

Improper use of the product is defined as in particular:

- Exposure to operating conditions which do not satisfy the prescribed environmental conditions. Examples of prohibited operation include operation under water, under extreme temperature variations or extreme maximum temperatures

2.4 Qualification of personnel

2.4.1 General information

Basic mechanical and electric knowledge as well as knowledge of corresponding technical terms is required for assembly, commissioning, maintenance (incl. service, inspection,

repair) and disassembly. To ensure operational reliability, these activities may therefore only be performed by a qualified expert or an instructed person under the supervision of an expert. Experts are those who are able to recognize potential dangers and apply the appropriate safety measures due to their professional training, knowledge and experience, as well as their understanding of the relevant conditions pertaining to the work to be undertaken. An expert must observe the relevant specific professional rules.

2.4.2 Teaching

At this product, trainees may only work:
- Under direct supervision
- After being given appropriate instructions by an instructor or trained member of staff

2.4.3 Trained personnel

For the supervision during the exercises, trained personnel may also be used.
These are qualified people who were instructed and briefed in relation to:
- Tasks ordered
- Possible dangers in the event of improper use
- Safeguards and protective measures

2.5 General safety instructions

- Observe the valid regulations on accident prevention and environmental protection
- Observe the safety regulations and provisions of the country where the product is implemented/used
- Exclusively use Rexroth products in technically perfect condition
- Observe all notes on the product
- Persons permitted to assemble, operate, disassemble or maintain Rexroth products must not be under the influence of alcohol, other drugs or medication which can impair responsiveness when doing so
- Only use spare parts approved by the manufacturer in order to exclude hazards to persons due to unsuitable spare parts
- Comply with the technical data and environmental conditions specified in the product documentation

2.6 Product- and technology dependend safety instructions

2.6.1 Introduction

The following notes must be read before the first commissioning of the system to avoid physical injury and/or damage to property. These safety instructions must be observed at all times.
Do not attempt to install or commission this device without first reading all documentation provided with the system. Please contact your responsible Bosch Rexroth sales representative in case you are not provided with any user information.
If the device is resold, rented and/or passed on to others in any other form, these operating instructions must be handed over, as well.

2.6.2 Hazards by improper use

CAUTION

Risk of injury by improper handling!
Injury due to crushing, shearing, hitting or incorrect handling!

2.6.3 General informations

- In case of damage due to non-compliance with the warnings in these operating instructions, Bosch Rexroth AG will not accept any liability
- Before the commissioning, the operating, maintenance and safety instructions are to be read. If you have not understood the documentation in the available language, please contact your responsible Bosch Rexroth customer service
- The unobjectionable and safe operation of this device requires appropriate and proper transport, storage, assembly and installation as well as careful operation and maintenance
- You must observe the safety regulations and provisions of the country where the device is used
- The environmental conditions specified in the product documentation must be observed
- Technical data as well as connection and installation conditions are available in the product documentation and must imperatively be observed

2.6.4 Protection by means of protective extra low voltage (PELV) against electric shock

All connections and terminals at Rexroth products are protective extra low voltages which are designed in a contact-protected form according to the product standards.

WARNING

High electric voltage by incorrect connection!
Danger to life, risk of injury by electric shock!

- ▶ At all connections and terminals of this product, only devices, electric components and lines with protective extra low voltage (PELV) may be connected
- ▶ All power sources for protective extra low voltage must ensure secure separation from dangerous voltages. These include:
  - Accumulators
  - Safety transformers according to VDE 0551
  - Power sources with protection properties like functional low voltage with secure separation (PELV)

2.6.5 Protection during handling and assembly

⚠ CAUTION

Risk of injury by improper handling!
Bodily injury by bruising, shearing, cutting, hitting!
- ▶ Observe the general construction and safety regulations on handling and assembly
- ▶ Use suitable assembly and transport equipment
- ▶ Avoid jamming and bruising by appropriate measures
- ▶ If necessary, use suitable protective equipment (for example safety goggles, safety shoes, protective gloves)

2.7 Personal protective equipment

The personal protective equipment for users of the product consists of:
- Safety shoes during teaching

All parts of the personal protective equipment must be in full working order.

2.8 Obligations of the operator

2.8.1 General information

The operator of the product is to provide for personnel training on the following subjects on a regular basis:

- Observation and use of the operating instructions as well as the legal provisions
- Intended operation of the Bosch Rexroth product
- Observation of the instructions from the factory security offices as well as the operator's operating instructions
- Behavior in case of emergency

The operator has to guarantee the required prerequisites for the set-up and the installation of the product and provides for:
- Safe set-up by their personnel and/or the persons authorized by them
- Compliance with the accident prevention regulations (UVV)
- Compliance with the safety regulations of the professional unions as well as further internal and local requirements

He shall in particular make sure that the underground
- Is stable
- Is level and horizontal

The operator will instruct their employees and/or those of third-party companies on possible dangers at the place of installation.
The operator must provide adequate illumination around the area of installation of the product.

2.8.2 Safety signs

Depending on the installation conditions, warning notices may have to be attached at the installation place. The operator is responsible for affixing the safety signs.

Refer to the table below for a recommendation of the warning labels to be used.

Table 7: Prohibitory signs according to DIN EN ISO 7010 (2019)

Symbol	Description
	Open flames, fire, open ignition sources and smoking prohibited Registration number: P003
	Do not extinguish with water Registration number: P011

Table 8: Warning signs according to DIN EN ISO 7010 (2019)

Symbol	Description
	Warning! Obstacles on the floor Registration number: W007

Table 9: Mandatory signs according to DIN EN ISO 7010 (2019)

Symbol	Description
	Observe operating instructions Registration number: M002
	Wear safety footwear Registration number: M008
	Disconnect mains plug (before opening) Registration number: M006

2.9 Safety equipment

For protection of the product, the following safety equipment is used

- Safety socket
- Internal fuse protection of the supply voltage for extension modules

Safety sockets

To prevent short circuits, contact-protected safety sockets are used for voltage supply.

Fuse protection of supply voltage U_{LS} and U_A for extension modules

Fuse protection of voltages U_{LS} and U_A is ensured via micro-fuse. If the available current of the supply voltage is lower (< 6.3 A) than the trigger current of the micro-fuse, it is not triggered in case of error. This is the case if an external power supply unit with low power is used. Information on correct selection of the external power supply unit and replacement of the micro-fuse can be found in the technical data.

3 General information on damage to property and damage to the product

⚠ CAUTION

Risk of injury due to incorrect assembly!
Damage to property
- Observe the safety instructions in chapter “Assembly” as of page [▶21]

NOTICE

Danger due to improper handling!
Damage to property
- The product may only be operated according to the intended use

NOTICE

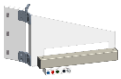
Energized system!
Damage to property
- Do not remove any electric connections as long as the training system and the exercise setup are connected to the power supply
- Make sure that suitable external voltage supply (power supply unit) is available

The warranty only applies to the supplied configuration.
The claim to warranty expires if the product is assembled, commissioned and operated incorrectly, as well as used and/or handled improperly.

4 Scope of delivery

In the following table, all components included in the standard scope of delivery of the basic module TS-AC B2-M1-1X are listed.
The term „not included in the scope of delivery“ exclusively refers to this table.
Irrespective from this, device sets including this extension module may also include additional components.

Table 10: Scope of delivery

Quantity	Mat.-No.:	Designation
1	R901540862 	Basic module TS-AC B2-M1-1X Attachment type for workstation WS290
1	R901540035 	Connection cable TS-AC GMOD TYPE3 M12 power line with 2-colour safety laboratory socket (4 mm) in blue and red
1	---	Master sheet / Scope of delivery
1	R901543365 	DOK-SUPPL*-TS-AC B2-M1-ASRS-EN-P Assembly instructions (English)
1	R901543367 	DOK-SUPPL*-TS-AC B2-M1-ITRS-DE-P Assembly instructions (German)

4.1 Delivery conditions

On delivery, the product is ready for operation. For operation, a suitable voltage source is required. For further specifications and details on connection, refer to the following chapters.

5 About this product

5.1 Performance description

The modular automation system of Bosch Rexroth was developed for basic and advanced training in the field of control technology. It supports the imparting of practical skills and knowledge in this field.

5.2 Product description

The basic module TS-AC B2-M1-1X was developed for attachment to the workstation WS290 of the product range of the Bosch Rexroth Academy. It serves as module carrier and basis for the various extension modules of the Automax 100 modular automation system. Combination of the workstation with the Automax 100 automation system enables practical simulation of complex industrial applications.

Further information can be found online under:
https://www.boschrexroth.com/de/de/training-und-training-systeme

The following figure illustrates the basic module TS-AC B2-M1-1X with blurred extension module (TS-AC E2-M3-1X, M.-No.: R901540133), installed at workstation WS290.

The extension module in the figure serves for illustration of the attachment of an extension module at the basic module. However, it is not included in the scope of delivery.

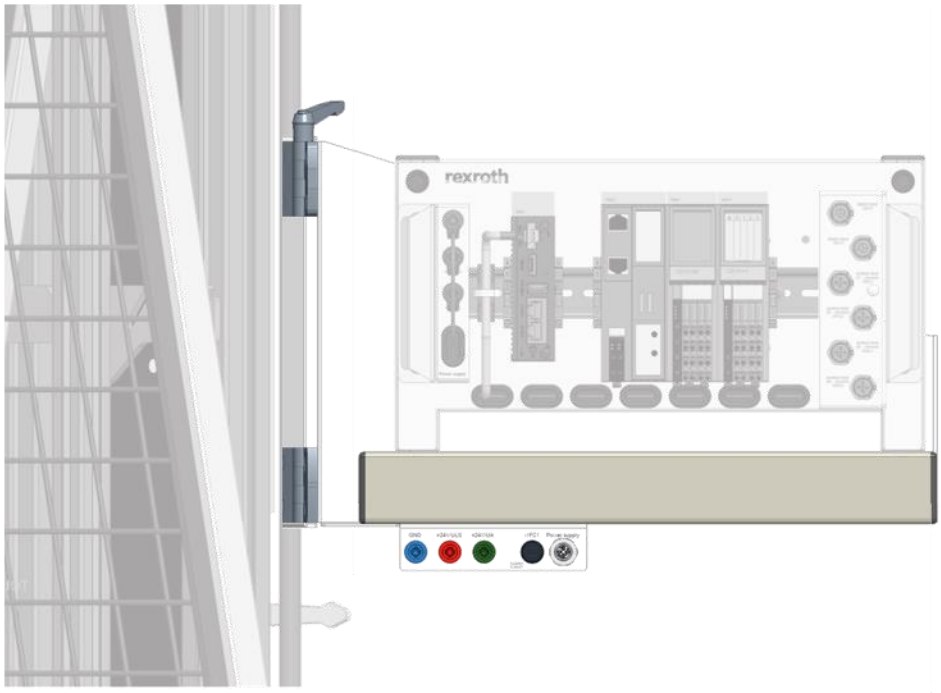


Fig. 1: Basic module TS-AC B2-M1-1X with extension module

5.2.1 Front side with operating equipment

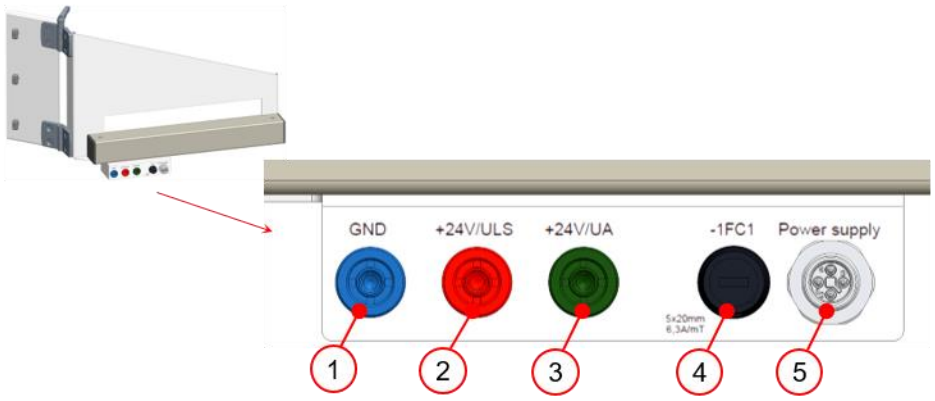
The front of the basic module includes various safety test sockets, a device fuse and a plug-in connector.
Voltage supply is established via the provided connection cable and the plug-in connector. Voltage supply to the extension modules is established via the safety sockets. The following components are available:

- One red safety socket for sensors and logics -> U_{LS} voltage

- One green safety socket for actuators -> U_A voltage
- One blue safety socket for 0V -> Ground

Connection is realized according to the color.

In this basic module, the U_A voltage is internally bridged with the U_{LS} voltage and protected via the device fuse. For this reason, the connection cable only has two safety plugs. One red for DC +24 V and one blue for 0 V (GND) voltage.



1	Safety socket (GND)	4	Device fuse (5x20 mm)
2	Safety socket (+24 V/U_{LS})	5	Connector (Power supply)
3	Safety socket (+24 V/U_A)		

Fig. 2: Operating equipment on front plate

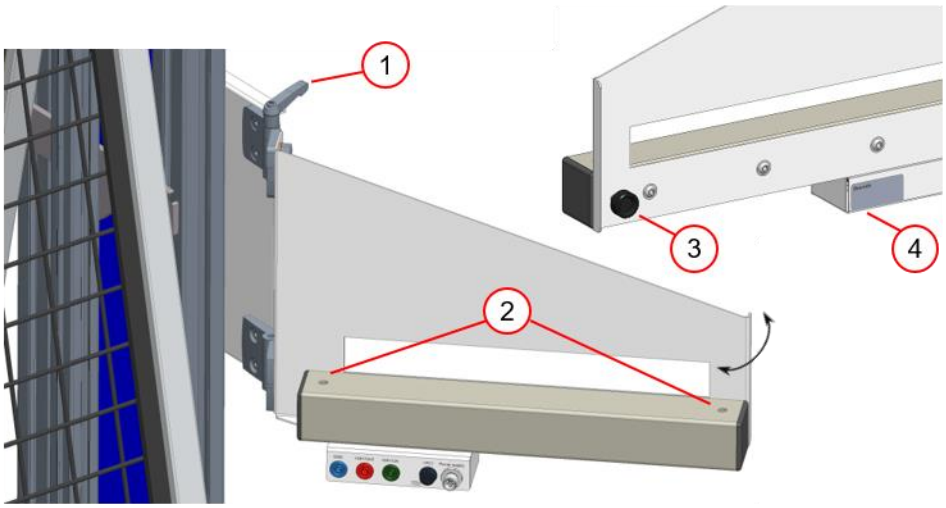
For voltage supply, an external power supply unit with DC 24 V and 6.5 A (not included in the scope of delivery) should be used.
The power supply units or control units available for the workstations can be used.

To improve user friendliness, the basic module can be swiveled. For this, the locking lever must be released by counter-clockwise rotation.
For connection of the extension modules, two guide bores are in place.
The extension modules are secured by a knurled screw.

Function of the locking lever

The top hinge is fitted with a locking lever with detent function.
The threaded insert is connected to the handle by means of a splined coupling and can be removed. By lifting of the handle, the splined coupling is released and the locking lever can be swiveled to the best position for operation. The handle is locked, when it is "let go".

In the following figure, individual details are described.



1	Locking lever	3	Knurled screw
2	Guide bores	4	Type plate

Fig. 3: Product details

5.2.2 Dimensional sheet

The following figure illustrates the dimensions of the basic module TS-AC B2-M1-1X.

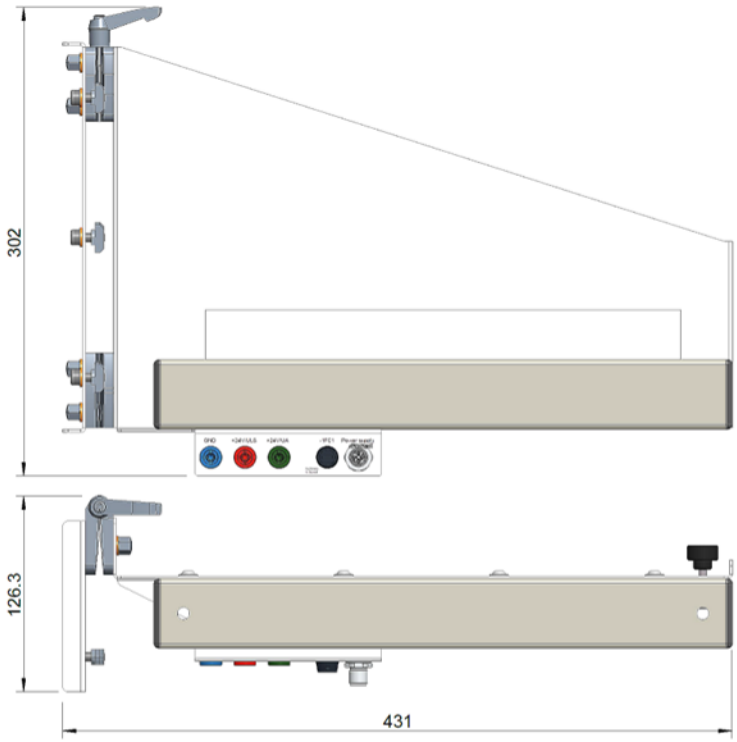


Fig. 4: Dimension sheet of the basic module TS-AC B2-M1-1X (in mm)

5.3 Product identification

5.3.1 Type code

☞ The figure illustrates the general structure of the type code. For the latest information on the available versions, please consult your sales representative.

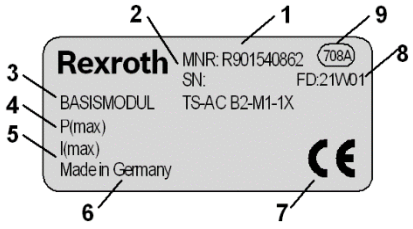
Table 11: Type code

Type designation	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Example.	**B**	**A**	**S**	**I**	**C**		**M**	**O**	**D**	**U**	**L**	**E**								**T**	**S**	**-**	**A**	**C**		**B**	**2**	**-**	**M**	**1**	**-**	**1**	**X**									
	①																			②			③			④			⑤			⑥									

①	**Product:** BASIC MODULE = BASIC MODULE
②	**System:** TS = Training system
③	**Series/construction type:** AC = Automation component
④	**Version:** B1 = Standalone, 2 slots B2 = Attachment type, 1 slot
⑤	**Option:** M1 = DC 24 V distribution M2 = Network, DC 24 V distribution M3 = 1x emergency stop, 1x switch, 3x push button, 24 V distribution
⑥	**Type:** 1X = Type 1

5.3.2 Type plate

The information on the type plate is further described below.



1	Material number	6	Country of manufacturing
2	Serial number	7	CE marking
3	Device type	8	Production week, 21W02 refers to, e.g., year 2021, week 02
4	Technical data (opt.)	9	Factory ID
5	Technical data (opt.)		

Fig. 5: Type plate (device)

6 Transport and storage

6.1 Transporting the product

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions“ as of page [▶5] in these operating instructions must always be observed!

WARNING

Risk of injury, potential property damage during transport due to improper handling!
Risk of injury, property damage
- Do not walk or stand under suspended loads
- Always lift or carry the extension module separately
- Wear safety shoes

For transport of the basic module, observe its protection class IP20 according to DIN EN 60529.
Protection class IP20 means:
2 – protected against ingress of foreign particles >12.5 mm diameter
0 – not protected against ingress of water (humidity)

Prevent increased vibrations and shocks during transport and transport the product inside a packaging that protects it against dust and humidity.

6.2 Storing the product

NOTICE

Risk of damage caused by humidity and dampness!
Damage to property
- Protect the extension module from humidity by covering it
- Storage only in rain-protected, dry rooms
- Protect the extension module against strong temperature variations to prevent the formation of condensation water and corrosion

The basic module must be stored in its original packaging in a dry, dust-protected and vibration-free environment and protected from light and direct sunlight.

Table 12: Storage specification

Designation	Unit	Value
Storage temperature range	℃	-25 to +70
Relative air humidity	%	max. 90
No condensation	---	---

Designation	Unit	Value
No ice formation/icing	---	---
No occurrence of saline mist	---	---

6.2.1 Storage time

Independent from the storage duration, the function is maintained if additional measures are taken and observed for commissioning. However, no additional rights can be claimed under guarantee.

6.2.1.1 Cables and plug

Table 13: Storage time for cables and plug-in connectors

Storage time / months			Measures for commissioning
>1	>12	>60	
■	■	■	Visual inspection of all parts for damage
	■	■	Check of electric contacts for corrosion
		■	Visual inspection of the cable sheath, do not use the cable in case of any irregularities (compressions, kinks, decolonization)

7 Assembly

7.1 Unboxing the product

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions“ as of page [▶5] in these operating instructions must always be observed!

CAUTION

Danger due to parts falling out!
If the packaging is opened improperly, parts may fall out and cause damage or injuries.
- Put the packaging for unpacking on level, bearing ground
- Use personal protective equipment

CAUTION

Danger due to sharp and pointed packaging components
In case of improper handling, sharp and pointed parts of the packaging may cause injuries.
- Open the packaging using suitable aids
- Do not use sharp blades. Internal parts might be damaged

For unpacking of the device, proceed as follows:

- Carefully remove the basic module TS-AC B2-M1-1X from its packaging
- Remove all remaining packaging

Keep the original packaging during the guarantee period of the device for proper packaging and return in case of any guarantee claims.

Damage caused during transportation and defects shall be promptly recorded with a photo and reported in writing to the Bosch Rexroth customer service by way of a notification of claim.

Disposal of packaging material:
The packaging material has been selected for environmental compatibility. Dispose of the packaging material in accordance with the national regulations in your country and/or your company-internal specifications/procedures.

7.2 Installation conditions

The basic module TS-AC B2-M1-1X is intended for use in office, laboratory, training and instruction environments. The admissible environmental conditions are listed in the following table.

Table 14: Installation conditions

Designation		Unit	Value
Min. operating temperature		℃	0
Max. operating temperature		℃	+40
Place of installation		---	Closed room
Ambient temperature		℃	+0 to +40
Max. relative air humidity		%	90 at 20 ℃
Max. installation height		m	3000 above sea level
Voltage supply	Voltage (DC)	V	24 (±10%)
	Max. current consumption [1)]	A	0 [1)]
A-weighted continuous sound level (at workplace of operating personnel)		dB	0

1) Current consumption of basic module without connected extinsion module

7.2.1 Installation position

The installation position is defined by the required WS290 workstation (not included in the scope of delivery).
In addition, make sure to provide sufficient working space and sufficient storage space for e.g. technical documents or training materials.

7.3 Required accessories

WARNING

High electric voltage by incorrect connection!
Danger to life, risk of injury by electric shock!

- At all connections and terminals of this product, only devices, electric components and lines with protective extra low voltage (PELV) may be connected
- All power sources for protective extra low voltage must ensure secure separation from dangerous voltages. These include:
  - Accumulators
  - Safety transformers according to VDE 0551
  - Power sources with protection properties like functional low voltage with secure separation (PELV)

For voltage supply, an external power supply unit with DC 24 V and 6.5 A (not included in the scope of delivery) should be used.
The power supply units or control units available for the workstations can be used.

Optional power supply unit

For voltage supply of the basic module, also power supply units of other suppliers can be used. The following table provides the specifications to be met by a power supply unit of another supplier.

Table 15: Power supply unit specification

Designation	Designation	Unit	Value
Input data	EN61000-3-2 (PFC standard)	---	complied with
	AC input voltage	V	100-240 [1)]

Designation	Designation	Unit	Value
	AC input frequency	Hz	50-60 [1)]
Output data	DC output voltage	V	24 / ±10%
	Output current	A	6.5 [2)]
	Output power	W	156 [2)]

1) Input voltage and input frequency depend on the power supply ratings of the respective country. For this reason, they may deviate from the specified values.
2) For operation of the basic module up to its performance limit, the specified values are recommended by Bosch Rexroth.

Compliance with national regulations and standards is within the responsibility of the operator. Bosch Rexroth AG does not assume any liability for damage caused by use of power supply units from other suppliers. The operator assumes all risks involved with the use of power supply units from other suppliers.

Table 16: Accessories required for assembly

Symbol	Wrench size in mm	Designation
	5	Hexagon socket wrench

7.4 Assembling the product

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions“ as of page [▶5] in these operating instructions must always be observed!

NOTICE

In case of damage, wear and/or contamination of the safety socket, functional safety of the plug-in connection can be no longer ensured!
Risk of damage of basic module TS-AC B2-M1-1X, malfunction!
- Check the safety sockets by visual inspection for wear and contamination
- Remove any contamination on surfaces

NOTICE

Incorrect handling during connection or disconnection can cause damage at the safety socket or the safety plug. In case of damaged parts, functional safety of the plug-in connection can be no longer ensured!
Risk of damage at basic module TS-AC B2-M1-1X, property damage, malfunction!
- Before connection, make sure that
  - Plugs and socket are not broken, cracked or deformed
  - Contact pins are not bent, broken or corroded
- Make sure that plug and socket are not jammed and can be connected without force

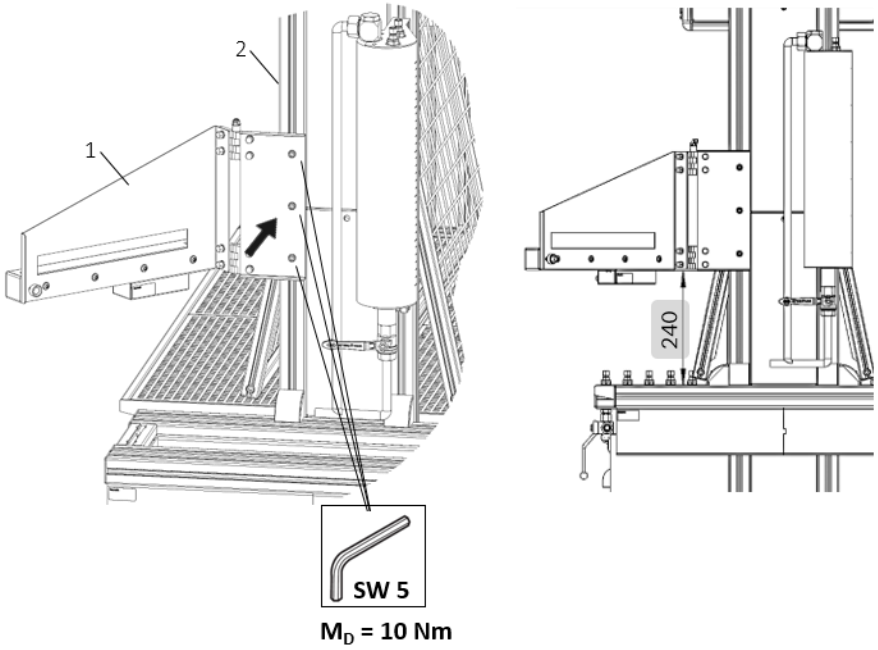
NOTICE

Irregularities, variations, faults, defects during assembly or test!
Risk of damage at extension module TS-AC B2-M1-1X, malfunction!

- Do not put the extension module into operation or take it out of operation without undue delay
- Determine the cause and remedy the defect. If this is not possible, inform the Bosch Rexroth customer service

7.4.1 Assembly at workstation WS290

In the following figure, assembly at the workstation WS290 is illustrated. The dimensions 240 mm correspond to the recommended installation height.
For secure attachment, the specified tightening torque (10 Nm) for the mounting screws should be observed.



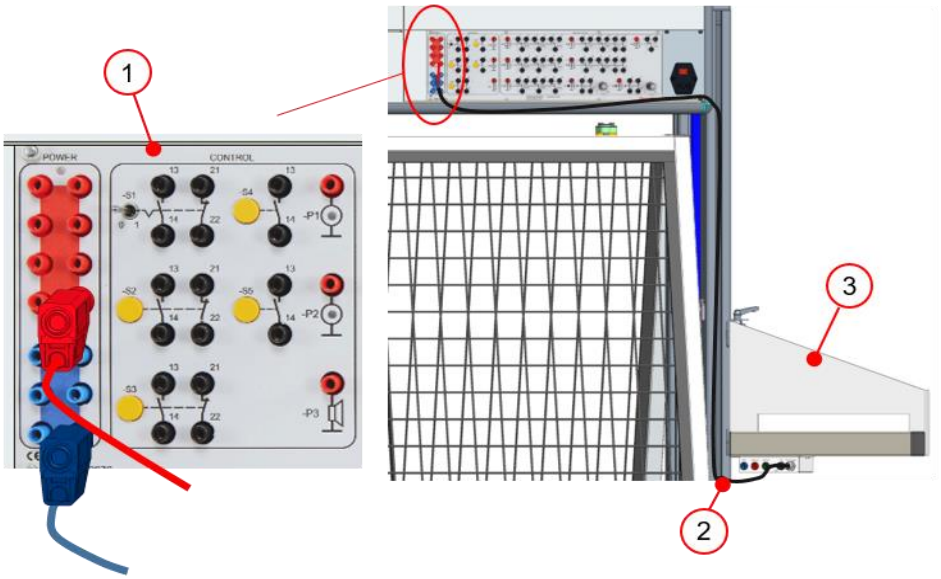
1 Basic module TS-AC B2-M1-1X 2 Workstation WS290

Fig. 6: Assembly at workstation WS290

7.4.2 Connecting the power supply

In the example, voltage supply is realized via control unit TS-EC-E-CR, with material no. R961009676 (not included in the scope of delivery). It is installed in the assembly carrier of workstation WS290.
For power supply, the connector plug (M12) of the connection cable must be connected to the integrated socket of the basic module. The two safety plugs of the connection cable are connected to the respective safety sockets of the control unit TS-EC-E-CR. Correct color assignment must be ensured. This means, that the red plug is connected to the red socket and the blue plug to the blue socket.

The following figure illustrates the electrical connection.

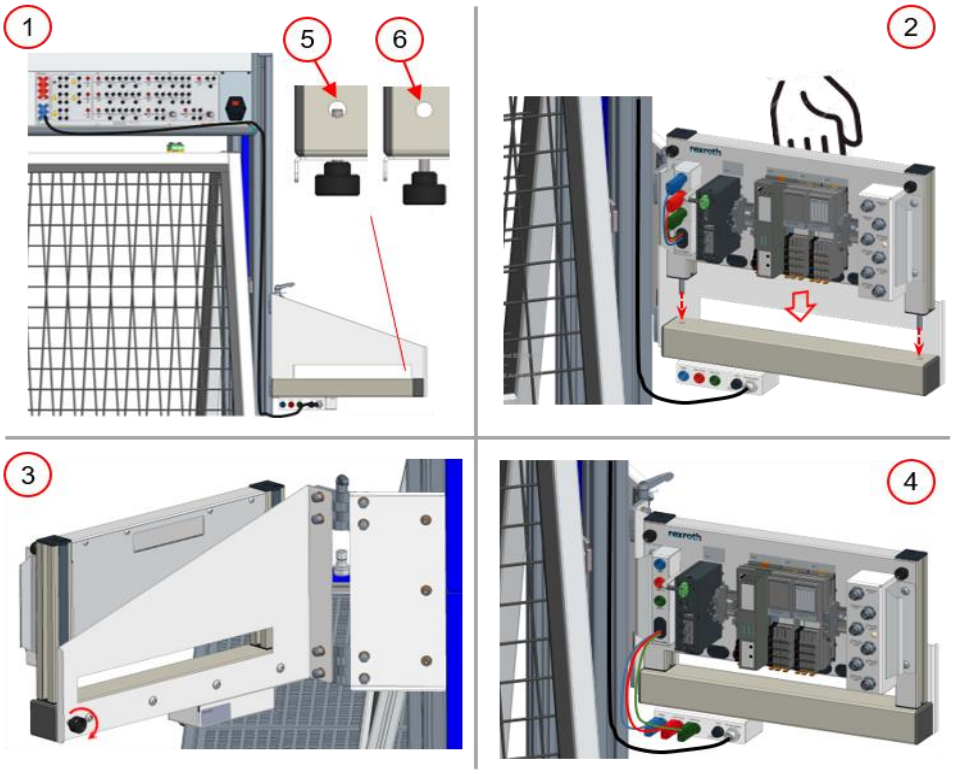


1 Control unit TS-EC-E-CR
2 Connection cable TS-AC GMOD TYPE3
3 Basic module TS-AC B2-M1-1X

Fig. 7: Electrical connection

7.4.3 Assembly of extension module

Below, assembly and electrical connection of the extension module (TS-AC E2-M3-1X, R901540133) are described in 4 steps.
Deviating from this, a different extension module can be used.



1 Step 1
2 Step 2
3 Step 3
4 Step 4
5 Guide bore is blocked
6 Guide bore is free

Fig. 8: Assembly of extension module TS-AC E2-M3-1X

Step 1
Loosen the knurled screw at the basic module. Rotate the knurled screw in counter-clockwise direction until the guide bore is free, see ⑥.

Step 2
Plug the extension module on the basic module. For connection, ensure that the guide pins are not jammed inside the guide bores.

☞ For better handling, the recessed grip on the rear of the extension module should be used.

Step 3
Attach the extension module with the knurled screw.

Step 4
Plug the three safety plugs according to their colors (red, blue, green) into the 3 respective safety sockets of the basic module.

☞ If the cable length is too short, there is remaining length inside the housing. Carefully pull the remaining cable length out of the housing.

Assembly is completed.

8 Commissioning

The commissioning of the base module TS-AC B2-M1-1X is dependent on which expansion module is operated on it. For detailed information on startup, refer to the operating manual of the expansion module is used. See chapter „Required and supplementary documentation“ as of page [▶1]

9 Operation

The commissioning of the base module TS-AC B2-M1-1X is dependent on which expansion module is operated on it. For detailed information on startup, refer to the operating manual of the expansion module is used. See chapter „Required and supplementary documentation“ as of page [▶1]

10 Maintenance and repair

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions“ as of page [▶5] in these operating instructions must always be observed!

DANGER

Working in the area of live parts is life-threatening!
Danger to life due to electrical voltage!
- Work on the electrical system may only be carried out by qualified electricians. Electrician's tools (VDE tools) are absolutely necessary
- Do not disconnect or connect connectors under voltage

Maintenance and cleaning must be carried out by qualified personnel. Information can be found in chapter „Qualification of personnel“ as of page [▶5]. To ensure trouble-free operation of the basic module, a visual inspection for loose objects and visible damage should be performed before use.

For repair, please contact Bosch Rexroth customer service.

10.1 Cleaning and care

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions” as of page [▶5] in these operating instructions must always be observed!

WARNING

Material damage possible during cleaning processes due to improper handling!
Risk of injury, damage to property
- Disconnect the basic module from the supply voltage before carrying out any cleaning work
- Do not use corrosive or aggressive cleaning agents
- Do not use scouring pads or abrasive fleece to clean the painted surfaces
- Make sure that no liquid enters the housing

It goes without saying that you should clean and maintain the basic module regularly. How often you need to clean depends primarily on your work and environment. Only clean the basic module with suitable tools. Disconnect the extension module from the voltage supply of the external power supply unit before cleaning.

For cleaning of the basic module, observe the following points:

- With minor contamination (e.g. with dust), it is sufficient to wipe the component with a microfiber cloth
- For more stubborn contamination, use a damp cloth
- Do not use solvents or aggressive cleaning agents which may damage the painted surfaces
- Ensure that no liquids enter the housing through the ventilation slots
- Do not use compressed air for cleaning

10.2 Maintenance

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
▶ Chapter „Safety instructions" as of page [▶5] in these operating instructions must always be observed!

To keep the basic module TS-AC B2-M1-1X in an operational condition, all electrical equipment must be checked for defects or wear at regular intervals. Any defects or deficiencies identified must be corrected immediately.
ATTENTION! Maintenance and repair work may only be performed by qualified personnel. Information on this can be found in the chapter „Qualification of personnel" starting on page [▶5]. Only original spare parts may be used to eliminate defects and faults.

If in doubt, please contact our Service and Support. Contact persons and addresses can be found in the chapter „Service and support" starting on page [▶44].

11 Disassembly and replacement

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions" as of page [▶5] in these operating instructions must always be observed!

CAUTION

Risk of injury due to improper handling!
Physical injury due to crushing, shearing, cutting, pushing or improper handling!
- Observe the general setup and safety instructions for handling and assembly
- Prevent entrapment and crushing by taking suitable precautions
- If necessary, use suitable protective equipment (for example safety shoes, protective gloves ...)

CAUTION

Material damage due to improper handling!
Proper handling can lead to damage or device defect!
- Disconnect the basic module from the supply voltage before carrying out any extension or conversion work
- Make sure that the polarity of the connections is correct. Observe color coding!
- Carry out extension and conversion work without mechanical force

NOTICE

Do not touch electrostatically sensitive components or connection points!
Property damage
- Observe the ESD protection measures
- Do not touch connection points

The conversion is basically carried out in the reverse order to the expansion of the system. See chapter „Extension and modification" as of page [▶37].

ATTENTION! Modification work may only be carried out when the equipment is de-energized.

12 Disposal

For the disposal, comply with the following instructions:

1. Disassemble the extension module into its individual components in order to recycle them
2. Separate the materials, e.g.:
   - Steel
   - Aluminium
   - Non-ferrous metal
   - Electronic waste
   - Plastic

12.1 Environmental protection

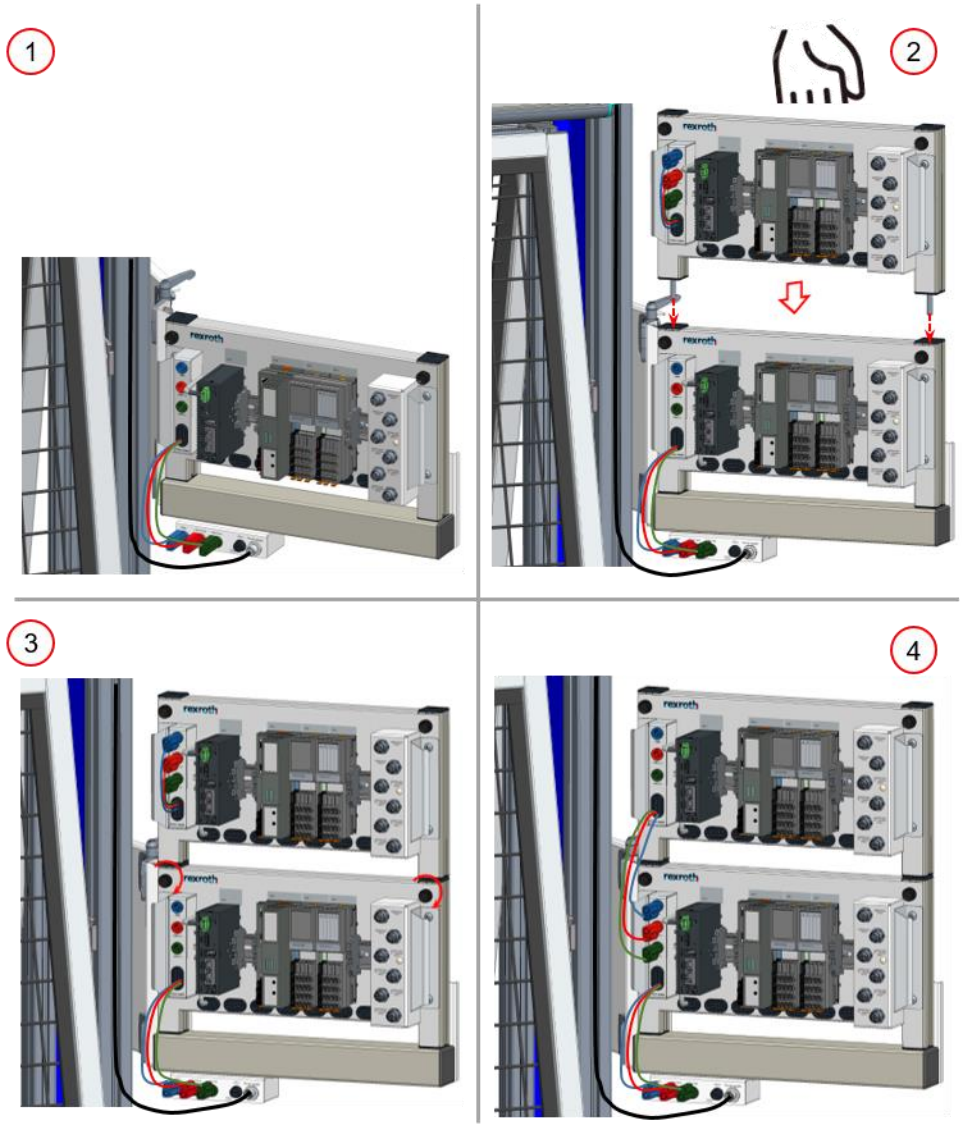
NOTICE
Careless disposal of the product and the packaging material may lead to environmental pollution. Illegal waste disposal can lead to criminal charges and fines ▶ Dispose of the product and the packaging material in accordance with the applicable national regulations in your country

13 Extension and modification

13.1 Extending the product

In the following configuration example, extension and electrical connection are described in 4 steps. Alternatively, other extension modules of this series of training systems can be used.

☞ Attention! This basic module is designed for stacking of 2 extension modules.



1 Step 1
2 Step 2
3 Step 3
4 Step 4

Fig. 9: Extending the basic module

Step 1

The condition is, that an extension module has already been installed at the basic module and that the electrical connection has been established as described in chapter „Assembly“ as of page [▶21].

Step 2

Screw out the two knurled screws at the extension module until the guide bores are free. Plug the new extension module on the one already in place. For connection, ensure that the guide pins are not jammed inside the guide bores.

Step 3
Attach the extension module with the two knurled screws. Afterwards, pull the three safety plugs (of the top extension module) out of their parking position.

Step 4
Plug the three safety plugs according to their colors (red, blue, green) into the three respective safety sockets of the lower extension module.

☞ If the cable length is too short, there is remaining length inside the housing. Carefully pull the remaining cable length out of the housing.

Ensure correct polarity, color coding of sockets and plugs.

13.2 Modifying the product

Extension modules can be removed and replaced as described for „Assembly“ or „Extending the product“. For removal, simply proceed in reverse order.

14 Troubleshooting and fault rectification

DANGER

Compromising of the training system, individual components or other assets. Risk for safe operation of the training system!
Risk of injury or death for operator or third
- Chapter „Safety instructions“ as of page [▶5] in these operating instructions must always be observed!

DANGER

Working in the area of live parts is life-threatening!
Danger to life due to electrical voltage!
- Work on the electrical system may only be carried out by qualified electricians. Electrician's tool (VDE tool) is absolutely necessary
- Do not disconnect or connect connectors under voltage

CAUTION

Material damage due to improper handling!
Proper handling can lead to damage or device defect!
- Ensure correct polarity of connections. Observe the color coding!
- Any troubleshooting and measures in case of faults must be carried out without any mechanical force.

NOTICE

Do not touch electrostatically sensitive components or connection points!
Property damage
- Observe the ESD protection measures
- Do not touch connection points

Table 17: Troubleshooting measures

Fault	Cause of error	Measures
No function of basic module	The external power supply unit is not connected to any voltage supply	Connect the external power supply unit to a suitable supply network. ATTENTION! The specification of the input voltage of the used external power supply unit must be observed.
	No voltage supply	Check the output voltage (DC 24 V) of the external power supply unit by means of a multimeter. As necessary, check the fuse protection of the output voltage of the external power supply unit. If the power supply unit has a main switch, check if it is activated.
	Device fuse defective at basic module	Check the micro-fuse on the front of the basic module (5x20 mm / 6.3 A).

In case of any problems identifying the cause of the error, please contact Bosch Rexroth service and support.

Contact information can be found in chapter „Contact addresses“ as of page [▶44].

15 Technical data

Table 18: Technical data on basic module TS-AC B2-M1-1X

Designation		Unit	Value
Total weight		kg	2.6
Dimensions	Depth	mm	126.3
	Width	mm	431
	Height	mm	302
Current consumption [1)]		A	0
Min. operating temperature		℃	0
Max. operating temperature		℃	+40
Place of installation		---	Closed room
Ambient temperature		℃	0 to +40
Max. relative air humidity		%	90 at 20°C
Max. installation height		m	3000 above sea level
Protection class			IP20
Supply voltage / external power supply unit	Voltage (DC)	V	24 (±10%)
	Current	I	6,5 [2)]
	Module fuse protection	A	6,3 [3)]
A-weighted continuous sound level (at workplace of operating personnel)		dB	0

1) Current consumption of the basic module without extension module and connected actuator.

2) Recommended by Bosch Rexroth for operation of the basic module up to its performance limits. Alternatively, a power supply unit with lower output power can be used. ATTENTION! For this, the total power from basic module, extension module and actuators to be connected must be determined.

3) Micro-fuse 5 mm x 20 mm, 6,3 A version mT (G fuse insert according to IEC 127-2-2)

16 Appendix

16.1 Electrical circuit diagram

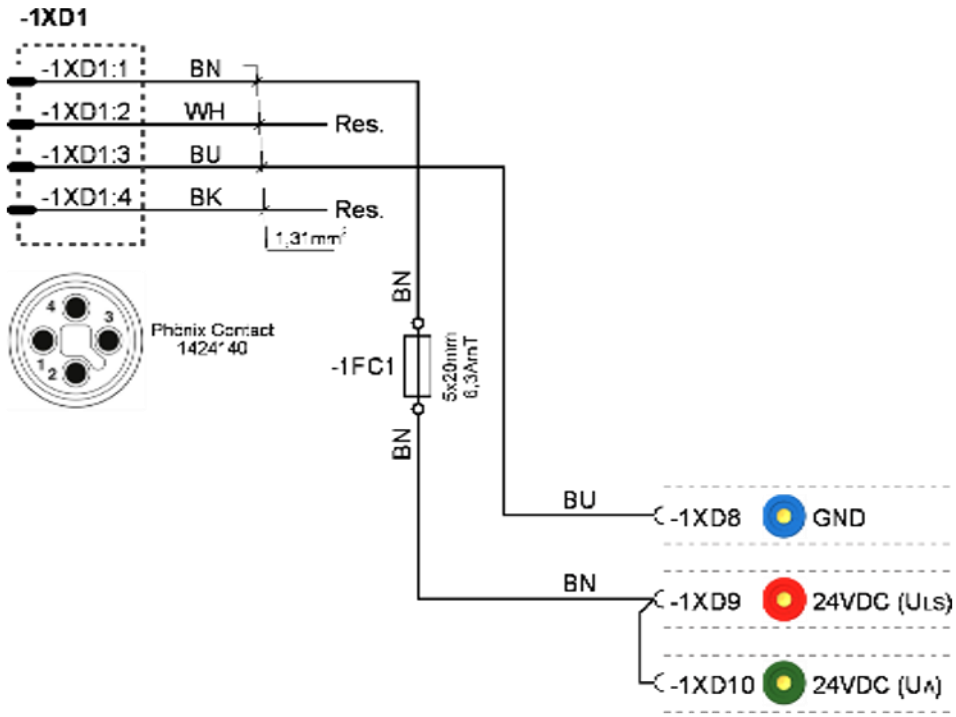


Fig. 10: Electrical circuit diagram

16.2 Contact addresses

16.2.1 Service and support

Our customer service helpdesk at our headquarters in Lohr am Main, Germany, are always glad to help you. Outside of our helpdesk hours, our customer service can be directly contacted under the German service hotline.

	Helpdesk	Service-hotline Germany	Service-hotline Worldwide
Time	Mo.-Fr.: 7-18 Uhr	Mo.-Fr.: 18-7 Uhr Sa.-So.: 0-24 Uhr	Outside of Germany, please first contact your next representative. For the hotline number, please refer to our sales contacts online.
Phone	+49 (0) 9352 40 50 60	+49 (0) 171 333 88 26 oder +49 (0) 172 660 04 06	
Fax	+49 (0) 9352 40 49 41	---	
E-Mail	service.svc@boschrexroth.de	---	
Internet	http://www.boschrexroth.com Under this address, you will also find additional information on service, repair (e.g. delivery addresses) and training.		

Preparation of information

For quick and efficient support, please provide us with the following information:

- Detailed description of the fault and conditions
- Information on the type plate of the concerned products, particularly type codes and serial numbers
- Contact phone/fax numbers and e-mail address in case of any open questions.

16.2.2 Contact for product support and repair

If you need any support for commissioning of your training system, please contact your sales representative or the following contact. Your request will be forwarded directly to the competent position.

Bosch Rexroth AG

Bosch Rexroth Academy
Bahnhofplatz 2
97070 Würzburg
Germany
Phone: +49 (9352) 18-1920
e-Mail: training@boschrexroth.de
http://www.boschrexroth.de/training

Or the respectively competent sales representatives.
Addresses can be found online at:
http://www.boschrexroth.com

16.3 Declaration of conformity

Declaration of conformity (German original)

rexroth
A Bosch Company

EU-Konformitätserklärung - *Original*
EC declaration of conformity

Dok.-Nr. / *Doc. No.*: DCA-DE_000208
Datum / *Date*: 02.2021

- ☐ nach Maschinenrichtlinie 2006/42/EG / *in accordance with Machinery Directive 2006/42/EC*
- ☐ nach Niederspannungsrichtlinie 2014/35/EU / *in accordance with Low Voltage Directive 2014/35/EU*
- ☐ nach EMV-Richtlinie 2014/30/EU / *in accordance with EMC Directive 2014/30/EU*
- ☐ nach Druckgeräte-Richtlinie 2014/68/EU / *in accordance with Pressure Equipment Directive 2014/68/EU*
- ☐ nach ATEX-Richtlinie 2014/34/EU / *in accordance with ATEX Directive 2014/34/EU*
- ☒ nach RoHS-Richtlinie 2011/65/EU / *in accordance with RoHS Directive 2011/65/EU*
- ☐

Hiermit erklärt der Hersteller, / *The manufacturer*

Bosch Rexroth AG
Academy
Bahnhofplatz 2
97070 Würzburg, Deutschland

dass das nachstehende Produkt / *hereby declares that the product below*

Bezeichnung / *Name*:	BASISMODUL TS-AC B2-M1-1X
Funktion / *Function*:	Trainingssystem für Aus- und Weiterbildung im Bereich der Automatisierung
Materialnummer / *Material number:*	R901540862
Baujahr / *Year of construction:*	ab 2021

in Übereinstimmung mit oben genannte(n) Richtlinie(n) entwickelt, konstruiert und gefertigt wurde. / *was developed, designed and manufactured in compliance with the above-mentioned directive(s).*

Die alleinige Verantwortung für die Ausstellung dieser EU-Konformitätserklärung trägt der Hersteller. / *This EC declaration of conformity is issued under the sole responsibility of the manufacturer.*

Angewandte harmonisierte Normen / *Harmonized Standards applied:*

Norm / *Standard*	**Titel / *Name***	**Ausgabe / *Issue***
DIN EN IEC 63000	Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe (IEC 63000:2016)	05 2019

Angewandte nationale Normen und technische Spezifikationen: / *National Standards and Technical Specifications applied:*

Norm / *Standard*	**Titel / *Name***	**Ausgabe / *Issue***
EN ISO 12100	Sicherheit von Maschinen –Allgemeine Gestaltungsleitsätze – Risikobeurteilung und Risikominderung	11 2010

Nachfolgende Person ist bevollmächtigt, die relevanten technischen Unterlagen zusammenstellen: / *The individual below is authorized to compile the relevant technical files:*

Name: / *Name:* Stohl
Anschrift: / *Address:* siehe Hersteller / view manufacturer

Weitere Erläuterungen / *Further explanations:*

Die Montage- und Installationshinweise gemäß Produktdokumentation sind zu beachten. / *The assembling and installation instructions according to the manual have to be followed.*

Würzburg	, 02.2021	i.V. pki, BOSCH, DE, N, O, norbert.leidl Digitally signed by pki, BOSCH, DE, N, O, norbert.leidl Date: 2021.02.15 14:26:53 +01'00' Norbert Leidl, DC/SSD3	i.V. pki, BOSCH, DE, B, E, Betulio.Rojas Digital unterschrieben von pki, BOSCH, DE, B, E, Betulio.Rojas Datum: 2021.02.15 14:34:05 +01'00' Betulio Rojas, DC/SSD4
Ort / *Place*	Datum / *Date*	Leiter / *Head* (Name, Abt.)	Leiter / *Head* (Name, Abt.)

Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.
We reserve the right to make changes to the content of the EC Declaration of Conformity. Current issue on request.

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Fig. 11: Declaration of conformity

17 Alphabetical index

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http://www.boschrexroth.com/academy

R901543365 (Version: 02.2021, EN Print)
Replace for Version: ---

DOK-SUPPL*-TS-AC B2-M1-ASRS-EN-P