

SB356

3 609 929 B67/
2008-11

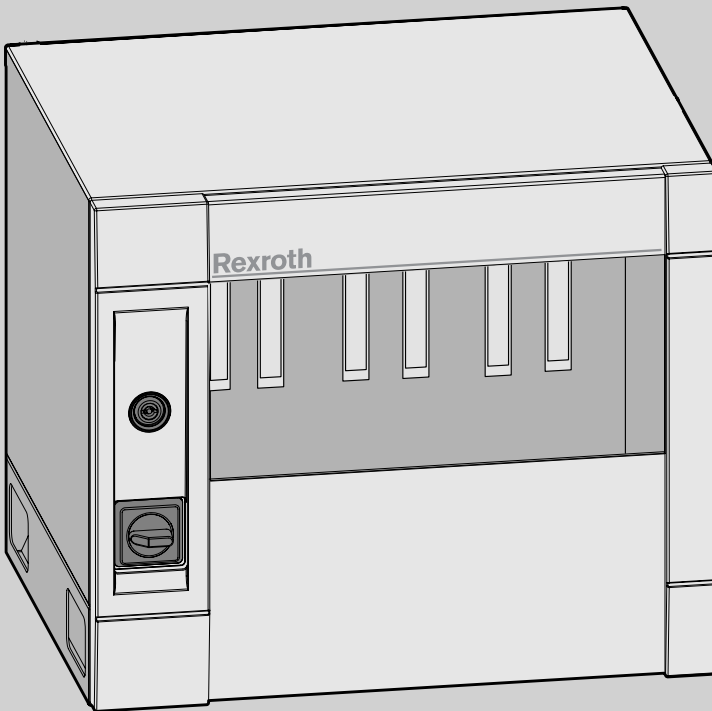


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The data specified above only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation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

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This document was written in German.

1 About this document

These instructions contain important information on the safe and appropriate assembly, transportation, commissioning, operation, maintenance, disassembly and simple troubleshooting of the SB356 system box.

Read these instructions completely, especially chapter "2 General safety instructions" on page 24, before working with the SB356 system box.

Related documents

The SB356 system box is a system component.

Also observe the instructions for the other system components.

Also observe the generally applicable, legal or otherwise binding regulations of European or national legislation and the rules for the prevention of accidents and for environmental protection applicable in your country.

2 General safety instructions

The SB356 system box has been manufactured according to the accepted rules of current technology. There is, however, still a danger of personal injury or damage to equipment if the following general safety instructions and the warnings before the steps contained in these instructions are not complied with.

- Read these instructions completely before working with the SB356 system box.
- Keep these instructions in a location where they are accessible to all users at all times.
- Always include the operating instructions when you pass the SB356 system box on to third parties.

Intended use

The SB356 system box is a component in terms of the machine directive 98/37/EC and is not a ready-for-use machine. The product is exclusively intended for being integrated in a machine or system or for being assembled with other components to form a machine or system. The product may be commissioned only if it is integrated in the machine/system for which it is designed and the machine/system fully complies with the EC machine directive. Observe the operating conditions and performance limits specified in the technical data.

The SB356 system box is a work appliance and not designed for private use.

Intended use includes having read and understood these instructions, especially the chapter "2 General safety instructions".

The system boxes are designed for use without a control cabinet in industrial environments and are in compliance with protection type IP54 when the door is closed.

Improper use

Any use of the SB356 system box other than described in chapter "Intended use" is considered as improper.

Personnel qualifications

Assembly, commissioning and operation, disassembly, service (including maintenance and repair) require basic electrical and mechanical knowledge, as well as knowledge of the appropriate technical terms. In order to ensure operating safety, these activities may therefore only be carried out by qualified technical personnel or an instructed person under the direction and supervision of qualified personnel.

Qualified personnel are those who can recognize possible hazards and institute 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 done. Qualified personnel must observe the rules relevant to the subject area.


Safety instructions in this document


In this manual, there are safety instructions before the steps whenever there is a danger of personal injury or damage to the equipment. The measures described to avoid these hazards must be observed.


Safety instructions are set out as follows:

	 SIGNAL WORD
	Type of RISK!
	Consequences Precautions


- **Safety sign (warning triangle):** draws attention to the risk
- **Signal word:** identifies the degree of hazard
- **Type of risk:** identifies the type or source of the hazard
- **Consequences:** describes what occurs when the safety instructions are not complied with
- **Precautions:** states how the hazard can be avoided

	This warning symbol cautions against dangers to your health. Observe all the safety instructions that follow this symbol to avoid possible injuries or death.
---	---

	This warning symbol cautions against dangers to your health caused by electrical voltage or currents. Observe all the safety instructions that follow this symbol to avoid possible injuries or death.
---	--

 CAUTION
<p>CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment.</p>

WARNING!
<p>ATTENTION indicates a situation which, if not avoided, could result in minor or moderate damage to equipment.</p>

 NOTE!
<p>If this information is disregarded, the operating procedure may be impaired.</p>

Adhere to the following instructions

General instructions

Only accessories and add-on units that have been approved for use in Rexroth tightening systems may be used therein. Non-approved components may neither be added nor connected to the system. The same applies to cables and lines which belong to the Rexroth tightening system. Otherwise, functional and system safety is jeopardized.

Observe the regulations for accident prevention and environmental protection for the country where the product is used and at the workplace.

Exclusively use Rexroth products in good technical order and condition.

Check the product for visible defects, for example damage to the circuit board, components, housing, and plug connectors or missing screws.

Only use the product within the performance range provided in the technical data.

Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.

The warranty only applies to the delivered configuration.

The warranty will not apply if the product is incorrectly assembled or handled or not used as intended.

Do not expose the product to any mechanical loads under any circumstances. Never use the product as a handle or step. Do not place any objects on it.

During assembly

Make sure the relevant system component is not under pressure or voltage before assembling the product or when connecting and disconnecting plugs. Protect the system against being switched on.

Lay cables and lines so that they cannot be damaged, are in accordance with the bending radiuses, and no one can trip over them.

Before commissioning, make sure that all the connection gaskets and plugs are installed correctly to ensure that they are leakproof and fluids and foreign bodies are prevented from penetrating the product.

During commissioning

Let the product acclimate itself for several hours before commissioning, otherwise water may condense in the housing.

Make sure that all electrical connections are either used or covered. Commission the product only if it is installed completely.

During cleaning

Cover all openings with the appropriate protective equipment in order to prevent detergents from penetrating the system.

Never use solvents or aggressive detergents. Only clean the product using a slightly damp, lint-free cloth. Only use water to do this and, if necessary, a mild detergent.

Disposal

Dispose of the product in accordance with the currently applicable national regulations in your country.

3 Delivery contents

The delivery contents include:

- 1 SB356 system box
- 1 key
- 1 suspension rail
- 4 M8 DIN580 ring bolts
- 1 SB356 system box operating instructions

4 Product description

Performance description

The SB356 system box holds all the modules in the tightening system. A board at the back of the SB356 connects all the inserted modules and supplies them with the necessary voltages.

A maximum of 16 SB356 system boxes can be connected to each other. NK350/ NK350S and NKLxxx network couplers are required for this purpose. Further information can be found in the instruction manual for the NK350K350S network coupler (3 609 929 B69).

The motor contactors integrated in the servo amplifiers are operated centrally by switching the emergency OFF via the VM350 power supply module. Further information can be found in the instruction manual for the VM350 power supply module (3 609 929 B32).

Device description

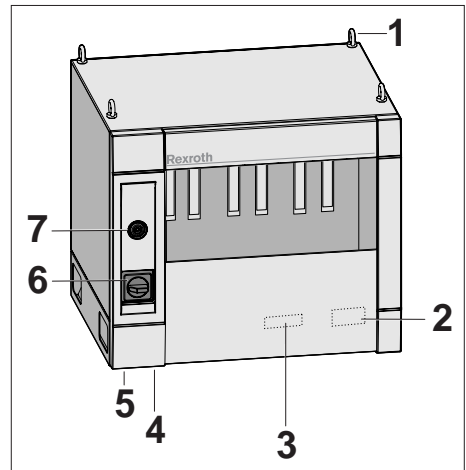


Fig. 1: View of SB356

Explanation of Fig. 1:

- 1 Ring bolts (not assembled, included with the system box)
- 2 Safety warning (visible when the door is open)
- 3 Label area (visible when the door is open)
- 4 Mains connection
- 5 Ground connection
- 6 Mains switch
- 7 Lock

Mains connection

Comprehensive information on the mains connection can be found in chapter "6 Assembly" on page 29.

Label area

A label area that can be used to identify the unit is provided on the system box (unit number in circuit diagram). The individual slots for the tightening channels are identified by a label (SE1/2, LT1, etc.).

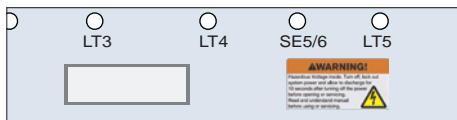


Fig. 2: Label area within the SB356

Safety warning

A safety warning is printed next to the label area. It warns against the high electrical voltages in the system box during operation and provides maintenance information (see “Disassembly and replacement” on page 39).

Ring bolts

They are used to fasten the system box when moving the box with a crane.

Lock

The lock is used to prevent the system box door from being opened.

Mains switch

The system box is switched on or off with the mains switch.

5 Transport and storage

For storing and transporting the product, always observe the ambient conditions specified in the technical data (see “Technical data” on page 41).

When transporting SB356 system boxes, suitable transport safety devices must be used depending on the position of transport.



6 Assembly

When installing the product, always observe the ambient conditions specified in the technical data (see “Technical data” on page 41).

Required tools

- Screwdriver

Assembling the SB356 system box

	 CAUTION
	<p>Risk of damage to persons and property!</p> <p>Assembly of the SB356 system box requires basic mechanical and electrical knowledge.</p> <ul style="list-style-type: none"> ▶ Only qualified personnel (see “Personnel qualifications” on page 24) are authorized to assemble the SB356 system box. ▶ Measures to prevent electrostatic discharge (ESD protection) must be undertaken to protect the module and system components during all assembly work. ▶ Observe the local, system-specific regulations and requirements; proper use of tools, lifting, and transport equipment; as well as the relevant standards, provisions, and accident prevention regulations.

The system boxes can either be fastened to walls or racks using the mounting brackets on the rear or placed on their bases. The installation position is horizontal. System boxes can be lined up side-by-side to form multi-channel tightening systems. System boxes can only be lined up on top of each other if a minimum distance of 300 mm is observed.

WARNING!

Always keep the air ways for cooling clear.



The lifting devices and fixtures for the system boxes must be designed to correspond to the weights of the boxes (see “Technical data” on page 41).

Four M8 DIN580 ring bolts are provided to assemble the SB356.

Assembly height

The mains isolation device (mains switch) must be installed at a height of 0.6 m to 1.9 m in accordance with EN60204-1. The assembly height for the system boxes must correspond to this requirement.

WARNING!

The system boxes must be bolted to the lift-out protection  (see following assembly graphic) to prevent the system box from being unintentionally lifted out of the suspension rail .

A suspension rail with the appropriate length is provided with the system box.

WARNING!

The system box may only be suspended using the suspension rail supplied!

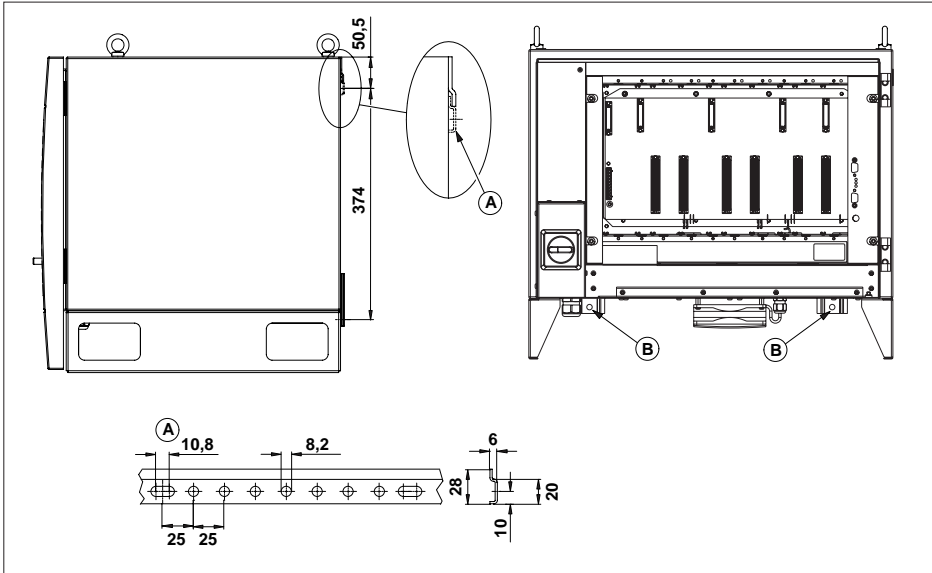


Fig. 3: Assembly graphic with suspension rail (A) and lift-out protection (B)

Inserting the modules

Insert the individual modules (SE352(M), KE350(G IL), LTU350/1, LT35x, NK350(S)) in the SB356 as shown in Fig. 4.

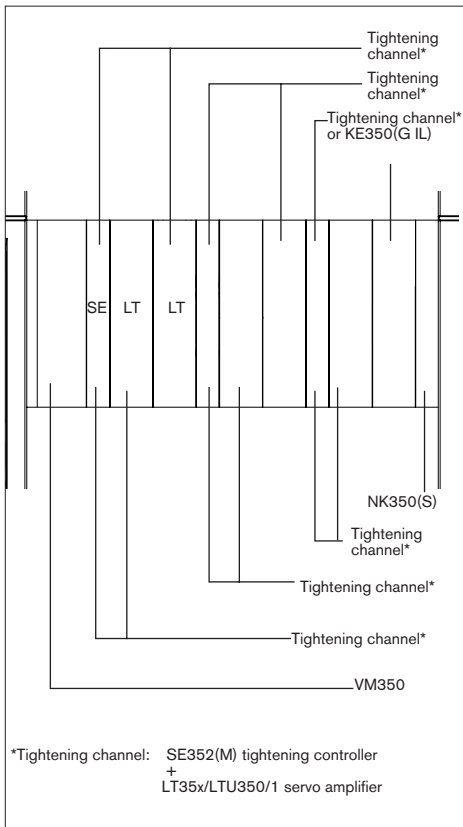


Fig. 4: SB356 slots for individual modules

Slots 1-6 in the system box can be equipped with a tightening channel (LT35x, LTU350/1, SE352(M)). The KE350(G IL) must be inserted in the KE slot (on the right of the system box). If several system boxes are networked via a NK350(S) network coupler, the KE350(G IL) must be inserted in the system box, which also contains the NK350S network coupler.

A maximum of one KE350(G IL) and 40 tightening channels can be operated in one tightening system.

The outer right slot is intended exclusively for the NK350(S) network coupler.

Slide the individual modules along the upper and lower guides.


The modules should be completely inserted into the SB356 and secured with the knurled bolts.


For safety reasons and EMC regulations, close off unoccupied slots using dummy panels.

Mains connection

The power connections have been designed according to requirements for category 3 overvoltage.

⚠ CAUTION	
	Risk of damage to persons and property!
	The system box may only be operated in grounded networks. Operation in networks that have not been directly grounded (IT networks) is not permitted, as air paths and creepage distances in the module may be overloaded.

	⚠ CAUTION
	<p>Risk of damage to persons and property!</p> <p>Solely permissible protective measure in accordance with EN 50 178: protective grounding. Each supply cable on the system box must have a PE wire. In addition, a PE wire with a minimum cross-section of 10 mm² Cu must be connected at the X1N3.1/ X1N3.2 interface underneath the system box (Fig. 5).</p>

	⚠ CAUTION
	<p>Risk of damage to persons and property!</p> <p>Dangerous shock currents due to insufficient PE wire connections! The PE wire connections may not be adversely affected by mechanical, chemical or electrochemical influences. The connection must be permanent.</p>

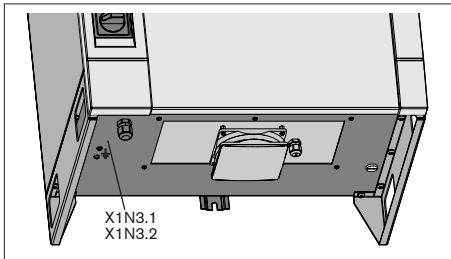




Fig. 5: X1N3.1/X1N3.2 PE wire connection

	⚠ CAUTION
	<p>Risk of damage to persons and property!</p> <p>To ensure potential equalization for all system components, the system boxes, as well as the tightening spindles' carrying plate and the workpiece, must be adequately grounded.</p>

i NOTE!
<p>If several system boxes are connected together, the PE wire can be looped from one system box to another.</p>

	⚠ CAUTION
	<p>Risk of damage to persons and property!</p> <p>Residual currents from the intermediate circuit and the mains filter could disable residual-current-operated protected devices (RCDs). For this reason, the system box may not be operated on RCDs!</p>

The mains connection is via the screw terminals on the mains switch (Fig. 6).

The cable fitting (\varnothing 8 mm - 13 mm) is located in the system box base (Fig. 5). The SB356 mains connection must be 3-phase ($\geq 4 \times 2.5 \text{ mm}^2$) and include a PE wire.

To avoid short circuits and ground faults, a 3-phase fuse must be provided.

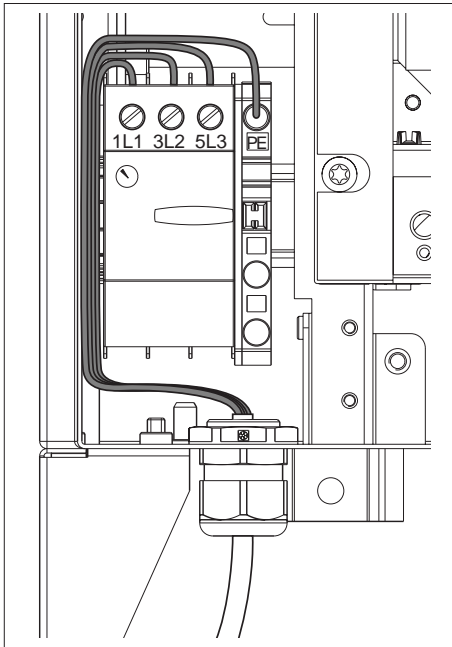


Fig. 6: Mains connection terminals

Table 1: Mains connection terminals

Signal	Description/ function	Voltage/ current
PE	PE wire	PE potential
1L1	L1 mains connection	380-500 V~ 4.6-3.5 A
3L2	L2 mains connection	
5L3	L3 mains connection	

i NOTE!

The user is responsible for selecting suitable mains connection cables.

Voltage selection

The voltage selection terminals in the SB356 make it possible to operate the system box in a voltage range of 380 V to 500 V. The system box is set to 400 V on delivery (Fig. 7).

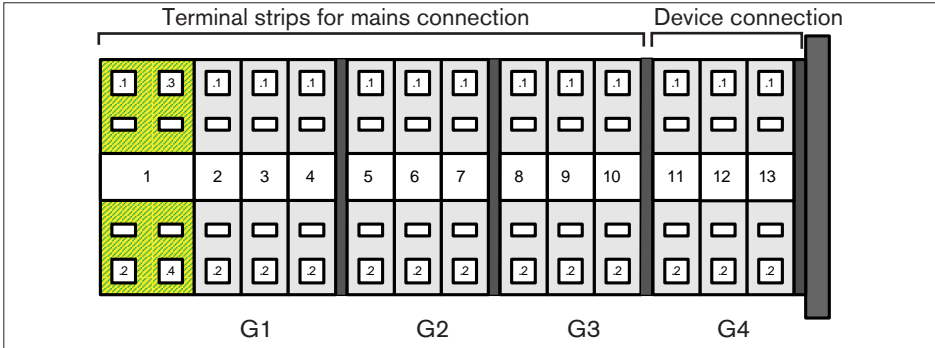


Fig. 7: X1N4 voltage selection terminals (SB356) with connection groups G1, G2, G3

Table 2: Voltage selection terminals

	Pin	Signal	Description/ function	Voltage/ current
	1	PE	PE wire	PE potential
G1	2	L1	L1 mains connection	380 V~ - 415 V~/4.6 A
	3	L2	L2 mains connection	380 V~ - 415 V~/4.6 A
	4	L3	L3 mains connection	380 V~ - 415 V~/4.6 A
G2	5	L1	L1 mains connection	440 V~ - 480 V~/3.9 A
	6	L2	L2 mains connection	440 V~ - 480 V~/3.9 A
	7	L3	L3 mains connection	440 V~ - 480 V~/3.9 A
G3	8	L1	L1 mains connection	500 V~/3.5 A
	9	L2	L2 mains connection	500 V~/3.5 A
	10	L3	L3 mains connection	500 V~/3.5 A
G4	11	L1	L1 device connection	230 V~/7.5 A
	12	L2	L2 device connection	230 V~/7.5 A
	13	L3	L3 device connection	230 V~/7.5 A

The X1N4 interface partitions represent a logical separation of the 3 possible mains connection groups (G1 to G3). A screwdriver with a 2 mm blade can be used as a wiring tool.

WARNING!

Only the voltage selection terminals for the G1, G2 and G3 groups are intended for assignment of the mains connection. The device connection may not be assigned.

WARNING!

Only the connections of one group may be used. Do not use more than one group at the same time.

Failure to adhere to this may lead to the destruction of the device.

WARNING!

As the pin assignment (Table 2) indicates, the mains must always be connected to the upper terminal strip.

The lower terminal strip must remain fully wired.

Power switch

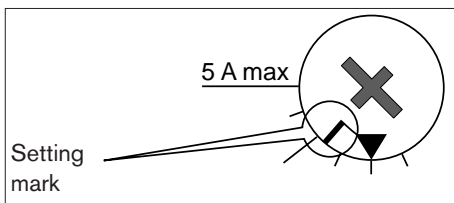


Fig. 8: Power switch

On the SB356, the trigger behavior of the Q0 power switch must be assigned as follows:

Table 3: Trigger behavior of power switch

Voltage		Power setting on Q0
380 V	Group 1 (G1)	5.0 A
400 V		4.8 A
420 V		4.5 A
440 V	Group 2 (G2)	4.3 A
460 V		4.1 A
480 V		4.0 A
500 V	Group 3 (G3)	3.8 A

Mains connected loads (nominal values)

The required connected load of the SB356 system box depends on the number and size of the tightening channels to be operated. As, however, an SB356 must always be considered as fully equipped, we recommend configuring the connected load for a fully equipped SB356 system box (see chapter "15 Technical data").

If the SB356 system box is not fully equipped and fused and it is certain that they will not be retrofitted with additional tightening channels, the mains connected load can be configured in accordance with Table 4.

Tab. 4: 3-phase connection

	Number of LT35x in SB356					
	1*	2	3	4	5	6
LT353 with EC302	500 VA	700 VA	900 VA	1050 VA	1200 VA	1350 VA
LT353 with EC303	600 VA	950 VA	1250 VA	1500 VA	1750 VA	2000 VA
LT354 with EC304	700 VA	1200 VA	1700 VA	2100 VA	2500 VA	-
LT355 with EC305	1200 VA	1800 VA	2500 VA	-	-	-

Equipping the system boxes

A tightening channel consists of the following components:

- Stationary tightening spindle or ErgoSpin hand-held nutrunner with connection cable
- Controller
- Servo amplifier

If the appropriate control and servo components are installed, both stationary tightening spindles and ErgoSpin hand-held nutrunners can be connected to and operated on the SB356 system box. Mixed operation of stationary tightening spindles and ErgoSpin hand-held nutrunners on an SB356 is possible at any time.

The maximum permissible peak current for up to six tightening channels in the system box is 140 ampere. This is why you may only install components with a power consumption that does not exceed a total of 140 ampere.



Total power consumption (tightening spindles + ErgoSpin) \leq 140 A



Table 5 shows an overview of the power consumption of tightening spindles and ErgoSpin hand-held nutrunners.



Table 5: Tightening channel power consumption

Servo amplifier	Tightening spindle	Power consumption
LT355	Size 5	45 A
LT354	Size 4	28 A
LT353	Size 3	14 A
	Size 2	7 A
Servo amplifier	ErgoSpin hand-held nutrunner	Power consumption
LTU350/1	ESA220S ESA150S ESA100S ESV146 ESV073	50 A
	ESA075... ESA065... ESA056... ESA040... ESV050 ESV025 ESM025 ESM035	33 A
	ESA030...	18 A
	ESA013... ESA005... ESV012 ESV005 ESM012...	11 A

7 Commissioning

	 CAUTION
	<p>Risk of damage to persons and property!</p> <p>Commissioning of the SB356 system box requires basic mechanical and electrical knowledge.</p> <ul style="list-style-type: none"> ▶ Only qualified personnel (see "Personnel qualifications" on page 24) are authorized to commission the system.

	 CAUTION
	<p>Danger to life due to insufficient emergency OFF equipment!</p> <p>Emergency OFF equipment must be functioning and within reach in all system modes. Release of the emergency OFF equipment may not result in an uncontrolled system restart!</p> <ul style="list-style-type: none"> ▶ Always check the emergency OFF chain before switching on the system! ▶ Further information on the emergency OFF can be found in the instruction manual for the VM350 power supply module (3 609 929 B32).

	 CAUTION
	<p>Overheating of the SB356 system box and its components!</p> <p>Damage to the system box and its components from overheating</p> <ul style="list-style-type: none"> ▶ Always keep the air ways for cooling the SB356 system box clear.

1. Connect the PE wire.
2. Open the SB356 if it is locked.
3. Remove both covers (A) and (B) by loosening the six screws:

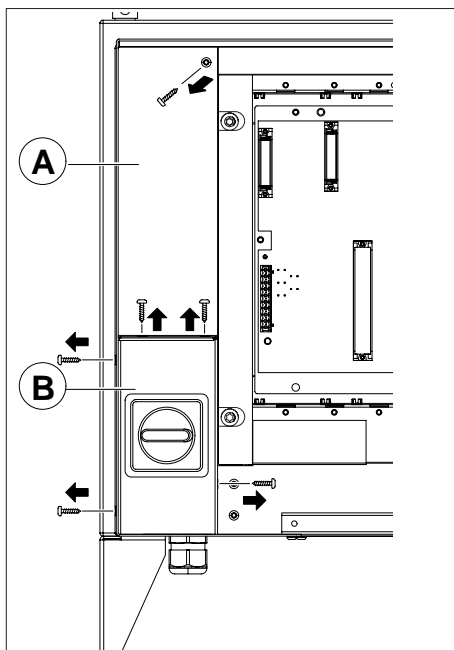




Fig. 9: Removing the cover

4. Select the voltage (factory setting: 400 V).
5. Set the Q0 power switch to the appropriate position (see Table 3).

6. Close the covers which were previously opened.
7. Connect to the mains.
8. Insert the NK350/ NK350S network coupler (if used).
9. Insert the modules.
10. Close any unoccupied slots with an appropriate dummy panel (see Table 6).
11. Lay all the connection cables through the cable duct strip.
12. Check that all the connection lines and modules are properly connected.
13. Switch the SB356 on at the power switch.
14. Check that the emergency OFF circuit is functioning correctly before commissioning the tightening system.
15. Configure, program and parameterize the tightening sequences with the BS350 operating system.

8 Operation

 CAUTION

<p>Any dirt or liquids penetrating the device lead to malfunctions!</p> <p>Failure to adhere to this may lead to personal injury or and damage to equipment caused by contamination. The interior of the system boxes have been designed in compliance with degree of pollution 2 (equivalent to HD 625.1 and EN 50178).</p> <p>► Ensure that the doors are always closed when operating the SB356 system box.</p>



Operation is not necessary while the system is running.

Table 6: Dummy panels

Type	Dummy panel for	Order number
BP351	Servo amplifier	3 608 878 058
BP352	Controller and servo amplifier	3 608 878 060

9 Maintenance and repair

Cleaning and care

	 CAUTION
	<p>Any dirt or liquids penetrating the device lead to malfunctions!</p> <p>Safe function of the SB356 system box is no longer ensured.</p> <ul style="list-style-type: none"> ▶ Always ensure absolute cleanliness when working on the SB356 system box.

Maintenance

The SB356 system box is maintenance-free if used as intended.

Spare parts

Please refer to the address directory under www.boschrexroth.com and in chapter "16 Service and sales" on page 42 for the addresses of our foreign subsidiaries.

10 Decommissioning

For details on how to disassemble or replace the SB356 system box, please refer to chapter "11 Disassembly and replacement" on page 39.



11 Disassembly and replacement

Required tools

- Screwdriver

Disassembling

Follow the warnings imprinted on the SB356:

	 WARNING
	<p>Dangerous internal voltage!</p> <ul style="list-style-type: none"> ▶ Before opening the device or performing maintenance work, make sure that the device is not under voltage, protect it against being switched on again, and allow for a 10 second discharging time. ▶ Read the manual before using the system or performing maintenance work.





SE 5/6	LT 5
!WARNING!	
<p>Hazardous Voltage inside. Turn off, lock out system power and allow to discharge for 10 seconds after turning off the power before opening or servicing. Read and understand manual before using or servicing.</p>	
	

Fig. 10: Imprint on the SB356

	⚠ CAUTION
	<p>Damage to the SB356 system box or tightening system if plug-in connections are connected or disconnected while under voltage!</p> <p>► First switch off the system at the power switch and then at the mains or pre-fuse. Allow for a minimum discharging time of 10 seconds.</p>

	⚠ CAUTION
	<p>Risk of damage to persons and property!</p> <p>► First switch off the system at the power switch and then at the mains or pre-fuse before working on the terminals. Allow for a minimum discharging time of 10 seconds.</p> <p>► Check that the terminals are not under voltage.</p>

	⚠ CAUTION
	<p>Risk of damage to persons and property!</p> <p>► Once the device has been switched off, it cannot be switched back on again until at least 30 seconds have elapsed.</p>

Proceed as follows to disassemble the SB356 system box:

1. First switch off the system at the power switch and then at the mains or pre-fuse. Allow for a minimum discharging time of 10 seconds.
2. Loosen the main power lines from the system box.
3. Loosen the knurled bolts on the front for all components and remove them.
4. Mount dummy panels, if necessary.

12 Disposal

Environmental protection

Careless disposal of the SB356 system box could lead to pollution of the environment.

Therefore, dispose of the device in accordance with the currently applicable regulations in your country. You can also send the device to Bosch Rexroth for disposal.

13 Extension and conversion

Do not convert the SB356 system box.

14 Troubleshooting

Malfunctions and information on errors are displayed in the tightening system via the BS350.

If you are not able to remedy an occurring defect, please contact one of the addresses that you can find under www.boschrexroth.com or in the address directory in chapter "16 Service and sales" on page 42.

15 Technical data

Table 7:

Designation	SB356
Order number	0 608 830 251
Input voltage	3 x 400 V \pm 10%, 50 - 60 Hz (380 V to 500 V) ^a
Peak power	10000 VA
Nominal power	2500 VA
Protection class	Protection class I
Max. permissible altitude for use	2000 amsl (an isolating transformer is recommended at altitudes above 2000 amsl).
Operation at altitudes over 1000 m amsl	Due to low air pressure, a reduction in nominal power of approx. 1% per 100 m altitude can be expected at heights above 1000 m amsl.
Permissible ambient temperature	45 °C
Permissible relative humidity during operation	20 % to 90 %, non-condensing
Permissible storage temperature	-20 °C to 70 °C
Permissible relative storage humidity	20 % to 95 %
Protection type	IP 54
Dimensions with base (W x H x D)	600 mm x 510 mm x 470 mm
Weight (empty/fully equipped)	55 kg/75 kg

- a Adjustable
Subject to alterations.