

# BD/ TL/ SL

## de Inbetriebnahmeanleitung

Bremsenprüfstände und Prüfstraßen  
mit **Hauptschalterbox** und 150 KB Bus-  
Technik für Pkw, Transporter und LLKW

## en Installation instructions

Brake tester and test lanes  
with **main switch box** and 150 KB bus  
technology for passenger vehicles,  
transporters and light trucks

## es Instrucciones de instalación

Banco de pruebas de frenos  
y línea de comprobación con **caja de  
interruptor principal** y tecnología bus  
150 KB para vehículos, furgonetas,  
camiones ligeros y camiones

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# 1. Symbols used

## 1.1 In the documentation

### 1.1.1 Warning notices - Structure and meaning

Warning notices warn of dangers to the user or people in the vicinity. Warning notices also indicate the consequences of the hazard as well as preventive action. Warning notices have the following structure:

Warning symbol	<b>KEY WORD – Nature and source of hazard!</b> Consequences of hazard in the event of failure to observe action and information given. ➤ Hazard prevention action and information.
----------------	--

The key word indicates the likelihood of occurrence and the severity of the hazard in the event of non-observance:

Key word	Probability of occurrence	Severity of danger if instructions not observed
<b>DANGER</b>	<b>Immediate</b> impending <b>danger</b>	<b>Death</b> or <b>severe</b> injury
<b>WARNING</b>	<b>Possible</b> impending <b>danger</b>	<b>Death</b> or <b>severe</b> injury
<b>CAUTION</b>	Possible <b>dangerous situation</b>	<b>Minor</b> injury

### 1.1.2 Symbols in this documentation

Symbol	Designation	Explanation
!	Attention	Warns about possible property damage.
i	Information	Practical hints and other useful information.
1. 2.	Multi-step operation	Instruction consisting of several steps.
➤	One-step operation	Instruction consisting of one step.
⇨	Intermediate result	An instruction produces a visible intermediate result.
➔	Final result	There is a visible final result on completion of the instruction.

## 1.2 On the product

! Observe all warning notices on products and ensure they remain legible.

# 2. Notes

## 2.1 Applicability

These instructions are valid for BSA 42xx - 44xx and SDL4xx brake tester and test lanes with 150 KB bus technology started-up with Plug`n`Play technology.

- i 150 KB bus technology:
- Communication and power supply to the individual electronic system components.
  - Defining feature of the product series.
  - Also referred to as Bnet bus, Bnet field bus or Bnet technology.
  - See section Electrical installation.
  - See Service manual.

- i Plug`n`Play technology:
- Automatic start-up without service laptop or test lane PC.
  - See section Plug`n`Play.

! Start-up without Plug`n`Play:  
If start-up with Plug`n`Play is not possible, it must be carried out with the software program Bnet Tool.

- i Bnet Tool:
- See Service manual Bnet Tool.

## 2.2 Other applicable documentations#

Other applicable documentation

Type of document	Target group
User information	Users, service engineers
Product description	Users, service engineers
EC declaration of conformity	Users, service engineers
Operating instructions	Users, service engineers
Brief instructions	Users, service engineers
Planning folder	Users, service engineers
Test book	Users, service engineers
Installation instructions	Users, service engineers
Commissioning instructions	Service engineers
Service manual	Service engineers
Spare part list	Service engineers
Maintenance instructions	Service engineers

Tab. 1: Other applicable documentation for

## 3. Preparation for installation

### 3.1 Testing

#### 3.1.1 Scope of delivery

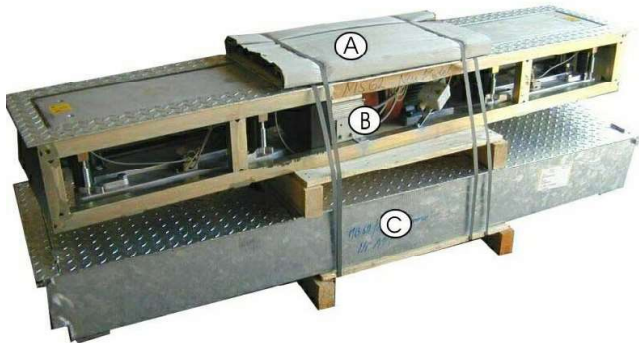



Abb. 1: Delivery of test devices of a test lane

- A Side slip tester
- B Suspension tester
- C Roller set (brake tester)




Abb. 2: Delivery accessories

- A Printer (optional), documents, accessories
- B Swivel arm (wall mounting), small parts
- C Analogue display

 Figures shown as an example.

1. Scope of delivery should be checked for completeness in accordance with the delivery note.
2. Scope of delivery from technical point of view (start-up, safety and function) must be checked for plausibility.


 Plausibility from technical point of view e.g.:

- Minimum standard scope of supply:  
Main switch box, 1 test device and 1 display.
- PC only in connection with converter box (serial interface or USB).
- Printer (without PC) only in conjunction with converter box printer (parallel interface).
- Emergency stop button (country-specific regulations and laws).

#### 3.1.2 Pit

##### Dimensions

➤ Check pit dimensions.

 Pit height:

- The two sides of the pit base should be even and the same height to each other in the overlay area of the test device.
- Check the height in at least all 4 corners.

Pit for the individual test devices:

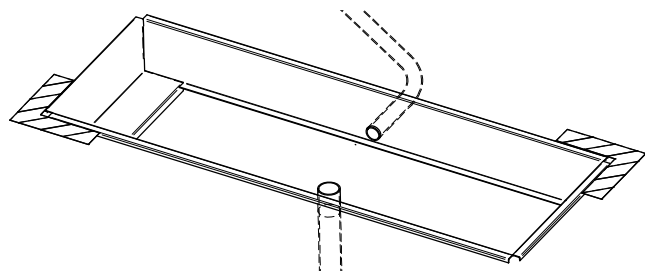


Abb. 3: Sample figure of a pit for an individual test device

Test device	Length	Width	Height
Roller set BSA 42xx - 434x	2380	670	260
Roller set BSA 436x	2980	670	280
Roller set BSA 44xx	2950	700	280
Roller set MB	2380	670	225
Suspension tester SDL 430 - 435	2360	440	280
Suspension tester SDL 49x	2350	820	286

Tab. 2: Pit dimensions (mm) individual test device

Pit for test lane:

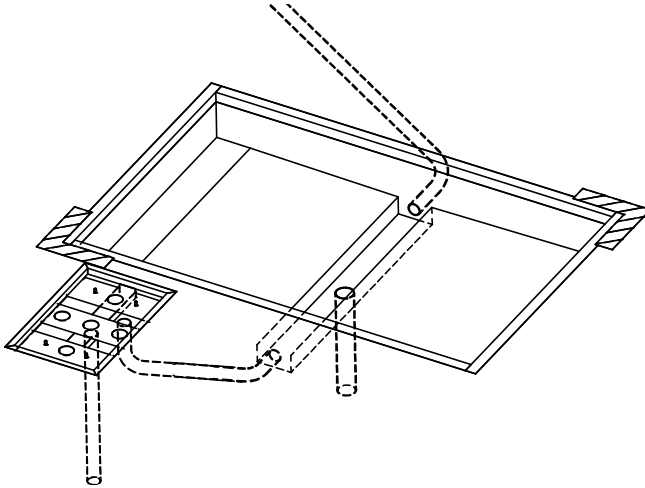


Abb. 4: Sample figure of a pit for a test lane

Test device	Length	Width	Height
Roller set BSA 43xx - 434x + Suspension tester SDL 430 - 435	2380	1155	280
Roller set BSA 43xx - 434x + Suspension tester SDL 49x	2350	1480	286

Tab. 3: Pit dimensions (mm) test lane

**i** The different lengths of the pit (installation frame) on test lanes are compensated for with the suspension testers SDL 430 - 435 or SDL 49x adapted cover plates on the roller set.

**i** Refer to the planning folders for further pit dimensions.

**i** Incorrect pit heights can be compensated for to a certain extent on the roller set. See the section Mechanical installation/ roller set/ height adjustment

**!** Incorrect pit dimensions must be corrected by the customer prior to start-up.

### Quality

➤ Check the quality of the pit:

1. Is edge protection or a an installation frame present?

Individual test device:

Test device	Edge protection	Installation frame
Roller set BSA 42xx - 434x	X	X
Roller set BSA 436x - 44xx	X	
Suspension tester SDL 49x	X	X

Tab. 4: Installation aid of the individual test devices

Test lane:

Test device	Edge protection	Installation frame/ mounting frame
Roller set BSA 43xx - 434x + Suspension tester SDL 430	X	X
Roller set BSA 43xx - 434x + Suspension tester SDL 435		X
Roller set BSA 43xx - 434x + Suspension tester SDL 49x	X	X
Side slip tester SDL 415		X
Side slip tester SDL 425		X
Side slip tester SDL 515 Standard		X

Tab. 5: Installation aid test lane

**!** When starting up the suspension tester, SDL 435 the installation frame or a customer-specific installation solution with a dual-T iron beam (IP B-beam) is essential for mounting the clamps.

**i** Clamp:  
See the section Mechanical installation suspension tester.

**!** The installation frame is essential when starting up the side slip tester.

2. Is the edge protection installed correctly?

**i** The edge protection must be completely concreted in around the pit. See planning folder.

3. Is the installation frame installed correctly?

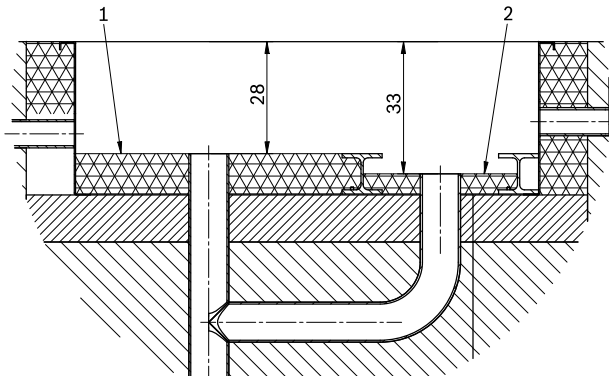


Abb. 5: Cross-section of the pit with concreted installation frame  
 1 Overlay area for roller set filled with concrete  
 2 Area filled halfway with concrete between the IPB beam for installation of the suspension tester

The installation frame must be completely concreted in around the pit and inside the frame in accordance with the planning folder.

4. Is the pit base concreted on a slight slope towards the middle?

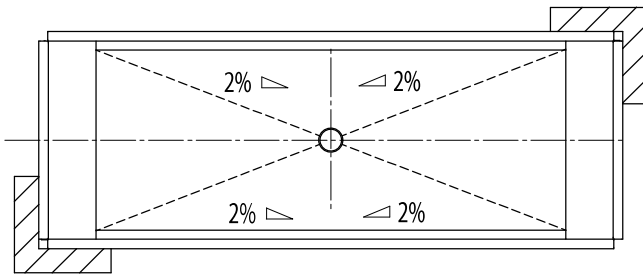


Abb. 6: Pit base with 2 % slope (not BSA 44xx)

The pit base must have a slight slope towards the middle. Refer to planning folder.

Test device	Slope pit base
Roller set BSA 42xx - 434x	2 %
Roller set BSA 436x	1 %
Roller set BSA 44xx	No slope

Tab. 6: Slope pit base

5. Are drain pipes present?

A drain pipe must be installed in every pit. Refer to planning folder.

Note on building regulation guidelines for water drainage.

6. Are cable conduits present?

Cable conduits must be installed between the pits, to the main switch box and, where necessary, to the display and/or PC cabinet. For position, diameter and quality see the planning folder.

7. Is a traction cable present in the cable conduit?

A traction cable for pulling through the power and Bnet bus cable should be laid in the cable conduits.

8. Is a power line present?

The power line to the main switch box must have been laid by the customer. See the section Electrical installation and planning folder.

9. Is a power fuse present?

The power fuse must have been installed by the customer prior to start-up. See the section Electrical installation and planning folder.

10. Are support strips present?



Abb. 7: Support strip for weigher sensors

For a roller set with weigher sensors (only for individual test devices), 2 T-beams must be concreted in on the pit base as support for the heads of the weigher sensors. Refer to planning folder.

If the support strips are missing, steel plates (with a thickness of at least 4 mm) can be laid in the corners of the pit during start-up. For the required height adjustment, see the section Mechanical installation/ roller set/ height adjustment

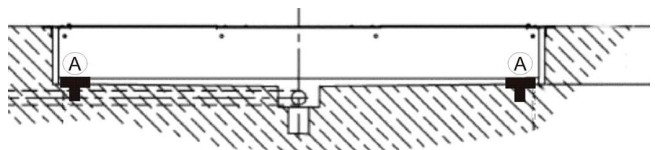


Abb. 8: Pit with support strips (A) for weigher sensors

### 3.2 Positioning

The test device (or the test lane) and its components should be positioned optimally in the workshop. Customer wishes, country-specific regulations, safety requirements, operation and technical requirements should be taken into account during this process.

Examples of optimal positioning:

#### 3.2.1 Test device with analogue display

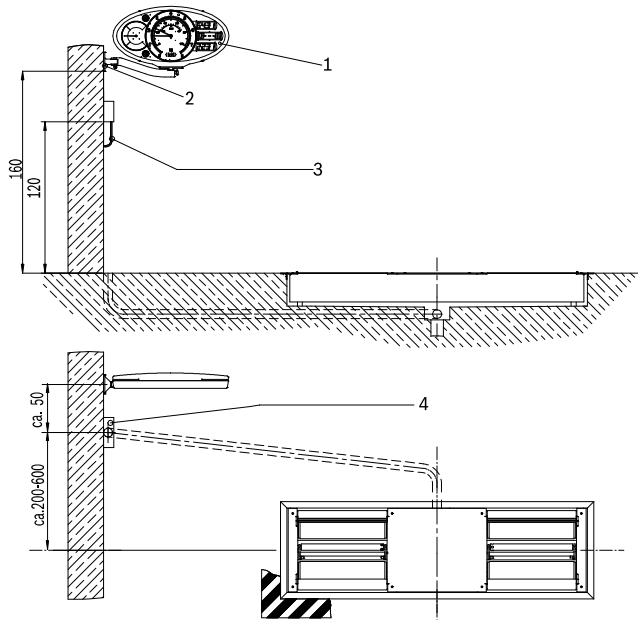


Abb. 9: Example for positioning an individual test device with analogue display

- 1 Analogue display
- 2 Wall mount
- 3 Line to the main switch box
- 4 Main switch box

#### 3.2.2 Test device with pedal force sensor

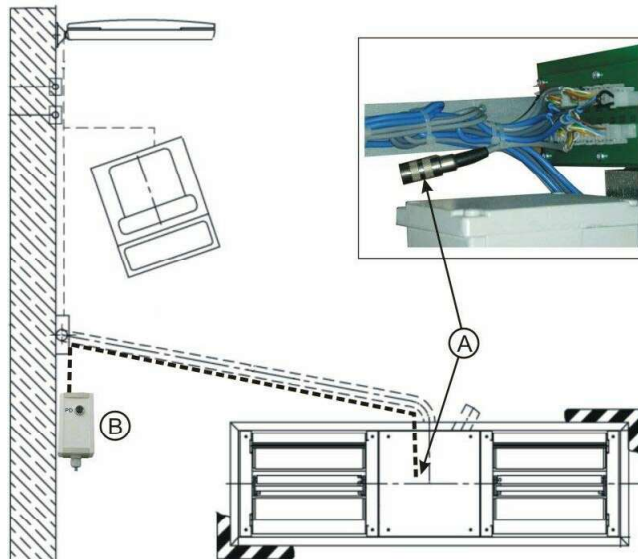


Abb. 10: Example for positioning and wiring the pedal force sensor

- A Cable connection pedal force sensor box on the power box in the roller set
- B Connection box for pedal force sensor

#### 3.2.3 Test lane with PC

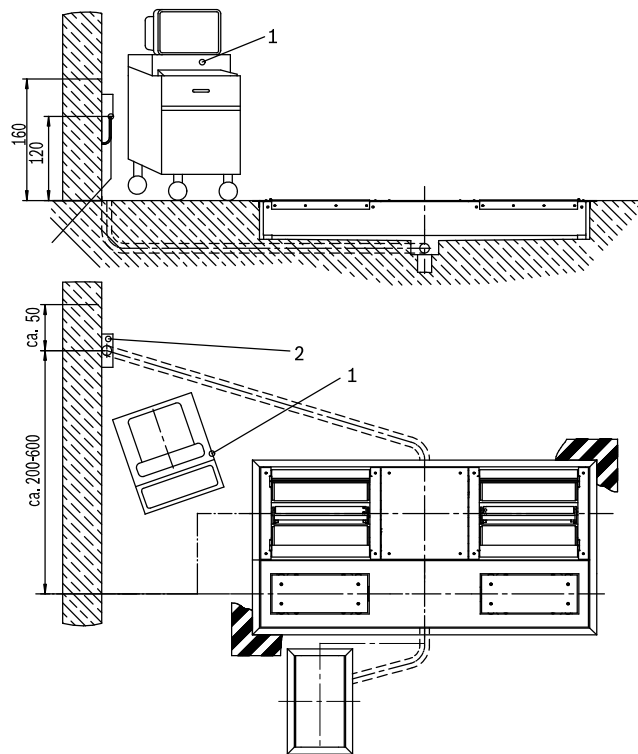


Abb. 11: Example for positioning a test lane with PC

- 1 PC cabinet
- 2 Main switch box

### 3.2.4 Test lane with PC and analogue display

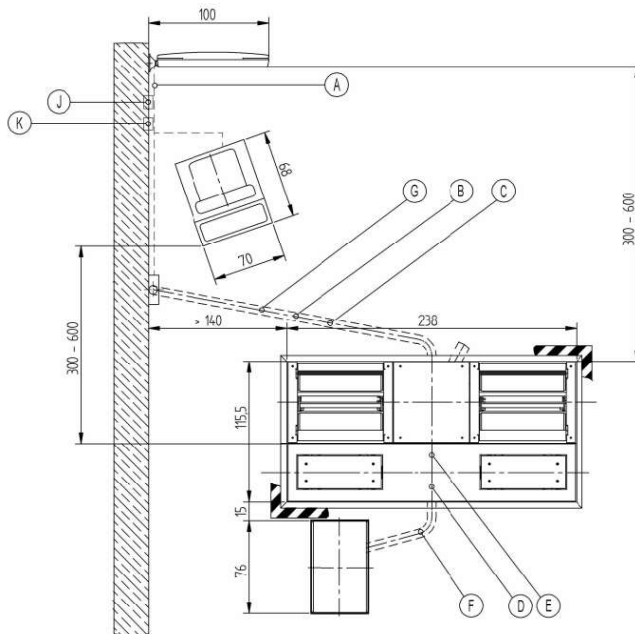


Abb. 12: Example for wiring and positioning a test lane with analogue display and PC

**A** Bnet field bus cable:

Connection main switch box <-> PC <-> analogue display

**B** Bnet field bus cable:

Connection main switch box <-> power box test device (e.g. roller set)

**C** Power cable (400 V or 230 V/ 3~):

Connection main switch box <-> connection box test device (e.g. roller set)

**D** Bnet field bus cable:

Connection power box test device (roller set) <-> power box test device (suspension tester)

**E** Power cable (400 V or 230 V/ 3~):

Connecting of connection box test device (roller set) <-> connection box test device (suspension tester)

**F** Sensor cable side slip tester

connection side slip tester <-> power box nearest test device (suspension tester or roller set)

**G** Supply cable fan (suspension tester SDL 435):

Connection main switch box <-> connection box cooling fans (suspension tester SDL 435)

**J** Socket (230 V/ 1 ~) for PC (comply with country-specific requirements)

**K** Network outlet (RJ 45) for CAT 5 network cables:

connection PC <-> customer network (workshop or office)

**i** Bus:

- Only use genuine cables from the manufacturer for the bus connection.
- Set the bus termination at the start and end of the bus connection.
- See the section Electrical installation/ bus cable

**i** Earthing:

- The test devices are earthed via the earthing braids in the power cable.
- The analogue display is earthed via an earthing cable from the main switch box.

**!**

Earthing is essential for stable operation of the electronics.



## 4. Mechanical installation

### 4.1 Roller set

#### 4.1.1 Height adjustment

##### Spacers

The height of the roller set can be adjusted by replacing spacers:

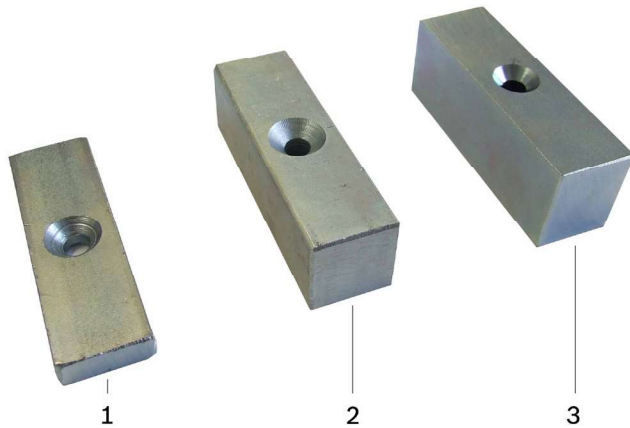


Abb. 13: Spacers with different heights mounted on the bottom of the roller set

- 1 Spacer height 10 mm  
(roller set BSA 42xx - 434x individual, = standard)
- 2 Spacer height 30 mm  
(roller set BSA 43xx - 434x with suspension tester SDL 430 - 435)
- 3 Spacer height 35 mm  
(roller set BSA 43xx - 434x with suspension tester SDL 49x)

Test device combination	Height	Spacer
Roller set BSA 42xx - 434x single	260 mm	10 mm
Roller set BSA 43xx - 434x with Suspension tester SDL 430 - 435	280 mm	30 mm
Roller set BSA 43xx - 434x with Suspension tester SAT 69x	286 mm	35 mm

- i** Height roller set BSA 42xx - 434x:
- The height of the roller set of 260 mm BSA 42xx - 434x is made up of the spacer 10 mm (mounted on the roller set as standard), the base frame and the cover plate.
  - This height corresponds to the specified dimension of the pit for installing the roller set as an individual test device.
  - In combination with a suspension tester SDL 430 - 435 (height 280 mm), height compensation is achieved by replacing the 10 mm spacer fitted as standard with the 30 mm version.
  - In combination with a suspension tester SDL 49x (height 286 mm), compensation is achieved by replacing the 10 mm spacer fitted as standard with the 35 mm version.

### Weigher sensors

Weigher sensors:

Test device	Quantity	Fitting location
Roller set BSA 42xx - 436x	4	Corners
Roller set BSA 44xx	4	Front transverse to the direction of travel

Tab. 7: Quantity and installation location of weigher sensors

**i** Weigher sensors on the roller set are not required in a test lane. The suspension tester measures the weight.

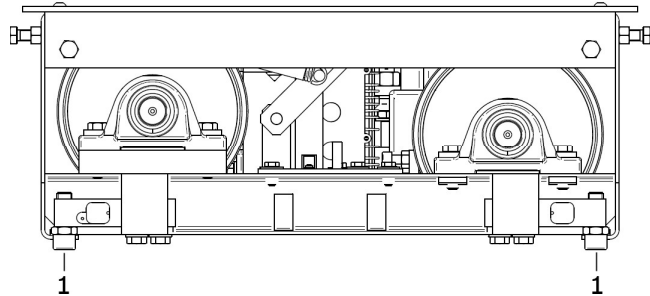


Abb. 14: Weigher sensors at the side BSA 42xx - 436x

1 Weigher sensors at the side

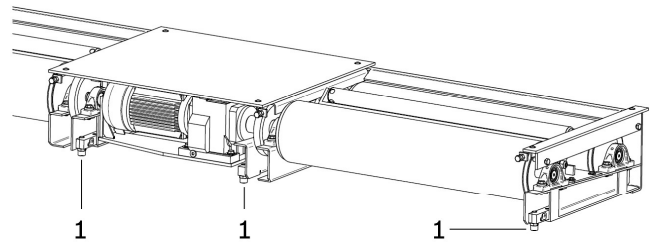


Abb. 15: Weigher sensors BSA 44xx transverse to test direction

1 Weigher sensors

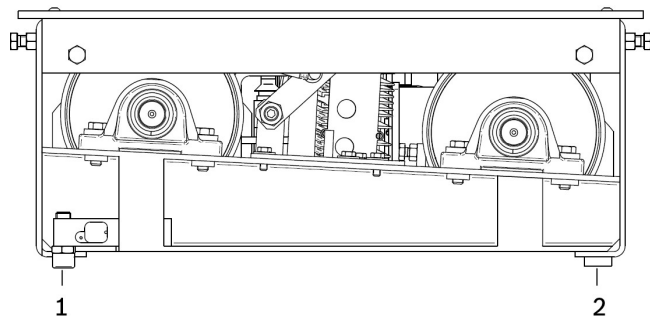


Abb. 16: Weigher sensor at the side BSA 44xx

1 Weigher sensor on the front side

2 Spacer 10 mm

**i** With the weigher sensors installed, the roller set BSA 42xx - 436x only lies on the pit base with the heads of the 4 adjusting screws.

**!** Always ensure that steel supports (support strips) are used for the weighing sensor adjusting screws with BSA 42xx - 44xx on the pit base.

Weigher sensor assembly:

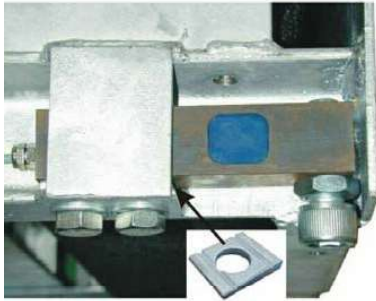


Abb. 17: Weigher sensor assembly



Abb. 18: Fixing material for weigher sensors

A Mounting bolts for weigher sensor

B Washers for mounting bolts

C Compensating wedges for sloping frame plate

D Adjusting screw with locknut

If the pit height is incorrect, smaller height adjustments are possible via the adjusting screws.

Torque of the screw connection:  
weigher sensor - frame = 85 Nm.  
Tighten the locknuts of the adjusting screws.

Larger height adjustments are possible using steel plates.



Abb. 19: Height adjustment for combination with suspension tester or transfer ramp as suspension tester replacement

If the roller set with weigher sensors is installed in combination with the suspension tester SDL 430 - 435 or transfer ramp as suspension tester replacement, the iron strips with a height of 10 mm and 20 mm must be mounted on the side of the pit to achieve adjustment to 280 mm.

#### 4.1.2 Cable conduit

➤ Pull the power and Bnet bus cable through the cable conduits in the base using a traction cable.

Cable feed:  
 - The cables should be pulled through before the test devices are inserted in the pit.  
 - Pulling through the cables after this has happened is extremely difficult due to the limited space available.

Power cable:  
 - Standard version:  
 1 cable 'off the reel' (15 m).  
 - Soft-starter and power section 230 V AC/ 5 Kw:  
 version: 2 cables (15 m) mounted on the motors.  
 - Suspension tester SDL 49x:  
 1 cable 'off the reel' (15 m).

Bnet bus cable:  
 - Standard version: 1 cable 'off the reel' (30 m).

LON bus cable:  
 - Standard version: 1 cable 'off the reel' (15 m).

Steering cable:  
 (Soft-starter and power section 230 V AC/ 5 Kw):  
 1 cable (15 m) mounted on the electronic box.

Pedal force sensor cable:  
 1 cable (15 m) mounted on the connection box pedal force sensor.

Pull-through direction:

Cable	Standard version	Soft-start version and power section 230 V AC/ 5 Kw
Power cable roller set	Unimportant	Pit -> main switch box
Cable suspension tester SDL 49x	Main switch box -> pit	Main switch box -> pit
Bnet bus cable roller set	Unimportant	
LON bus cable suspension tester SDL 49x	Unimportant	
Steering cable roller set	Not with standard	Electronic box -> power box
Pedal force sensor cable	Main switch box -> power box	Main switch box -> electronic box

Tab. 8: Pull-through direction

### 4.1.3 Lifting the roller set

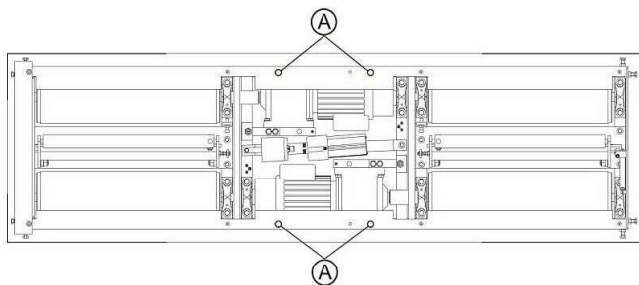




Abb. 20: Roller set without cover plate

A 4 threaded holes for eye-bolts in the middle cover plate area

1. Demount the cover plates on the top side of the roller set.
2. Mount 4 eye-bolts on the relevant threaded holes in the middle cover plate area.

 Ring bolts:  
Thread M 12

 Always screw the eye-bolts right into the thread.

3. Pull the cord through the eye-bolts and fix onto the lifting equipment or forklift.

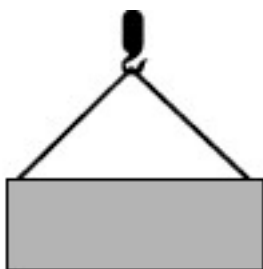






Abb. 21: Lifting the test device with lifting equipment or forklift


 The lifting equipment or forklift must be designed for a load of at least 600 kg.

 The tilt angle of the device must lie under 60°.


 Safety instructions for the lifting equipment and forklift must be complied with.

4. Lift the roller set carefully and insert in the centre (individual test device) of the pit.

 Take into account the driving direction of the roller set when lifting in.

 Danger of crushing. Always take into account the power and Bnet field bus cable when lifting in the roller set.

5. Check the level of the roller set to edge protection or installation frame.

 Include the height of the cover plates when checking.

6. Carry out height adjustment if necessary.
7. Remove the eye-bolts again.

#### 4.1.4 Pit assembly

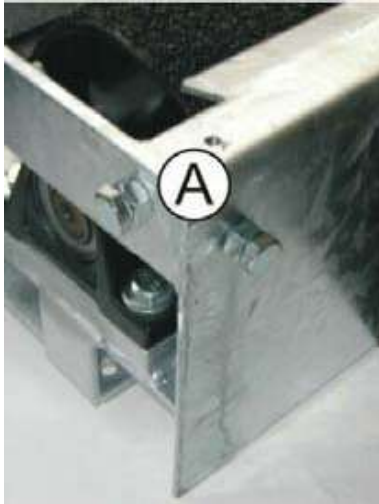




Abb. 22: Distance screws for centring the roller set

1. Align the roller set in the centre of the pit.

 The gap between the roller set and edge protection or installation frame should not be larger than 20 mm.

2. Check the level of the roller set.


 Test tool level:  
Spirit level, water level gauge, leveling device.

3. Centre and fix roller set with distance screws.

Gap dimension roller set <-> edge protection/ installation frame:

Roller set	Without weigher sensors	With weighing sensors
Gap		1 mm

Tab. 9: Gap dimension roller set


 Always take into account the gap dimension otherwise there is danger of incorrect measurement. For roller sets with weigher sensors there is no weighing function.

4. Secure the distance screws with nuts.

Locknut installation location:

Roller set	Without suspension tester SAT 69x	With suspension tester SDL 49x
Locknut installation location	Outside roller set frame	Inside roller set frame

Tab. 10: Locknut installation location

 Roller set is not fixed onto the pit base.

5. Check the gap dimension cover plates <-> edge protection/ installation frame by placing on the plates.

#### 4.2 Suspension tester

##### 4.2.1 Lifting the suspension tester

1. Remove the cover plates.

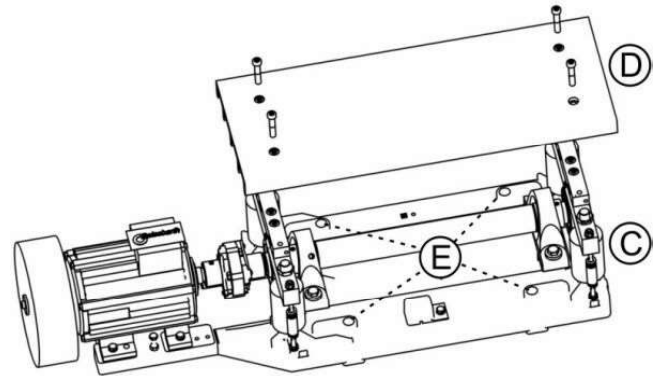


Abb. 23: Drive unit and swivel plate (suspension tester SDL 430)


C Drive unit

D Swivel plate


E 4 Assembly holes (for transport and mounting bolts)


2. For suspension testers, SDL 430 - 435 remove the swivel plates.

3. For suspension testers, SDL 430 - 435 loosen the transport screws.

 Transport screws:  
The transport screws fix the two drive units to the base frame of the suspension tester SDL 430 - 435.

4. For suspension testers, SDL 49x mount eye-bolts.

 Ring bolts:  
Thread M 12

 Always screw the eye-bolts right into the thread.

5. Pull the cord through the base frame with SDL 430 - 435 or through the eye-bolts with SDL 49x and fix on to the lifting equipment or forklift.

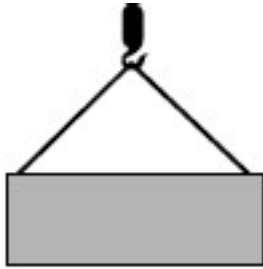




Abb. 24: Lifting the test device with lifting equipment and forklift


- ! The lifting equipment or forklift must be designed for a load of at least 600 kg.
- ! Safety instructions for the lifting equipment and forklift must be complied with.
- ! The tilt angle of the base frame must lie under 60°.
- ! For the SDL 430 - 435 , the drive units must not tilt within the base frame.

6. Lift the suspension tester carefully and place into the pit.


 Take into account the direction of travel of the suspension tester when lifting in. See Pit assembly.

7. Check the level of the suspension tester to edge protection or installation frame.

 Include the height of the cover plates when checking.

 Take into account that the cover plates overhang slightly on all sides.

8. Carry out height adjustment if necessary.

 For height adjustment, see Pit assembly.

9. Remove the eye-bolts again for the suspension tester SDL 49x.

#### 4.2.2 Pit assembly

! The suspension tester must be fixed to the pit base.

Fixing type:

Test device	Quantity	Fastenings
Suspension tester SDL 430	8	Impact dowel
Suspension tester SDL 430	4	Clamp
Suspension tester SDL 435	4	Clamp
Suspension tester SDL 49x	4	Impact dowel

Tab. 11: Fixing type suspension tester

! A compulsory fixing type is defined for the suspension tester SDL 435 and SDL 49x.

#### Impact dowel

1. Align the suspension tester to the centre.
2. Drill the holes for the impact dowels.

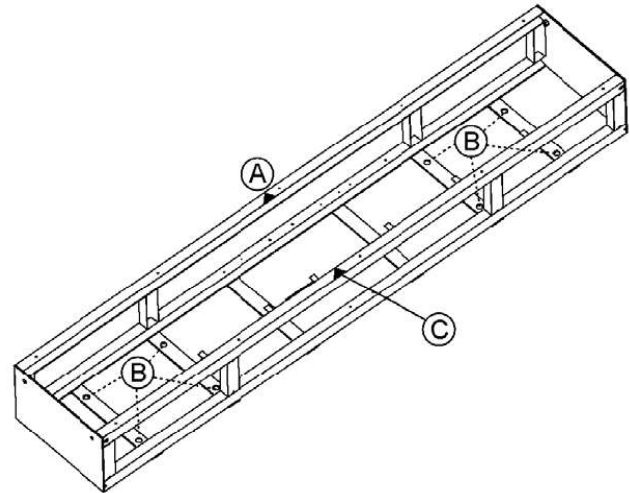


Abb. 25: Base frame suspension tester SDL 430 - 435  
 A and C Marking for testing direction (installation location)  
 B 8 holes for fixing onto the pit base

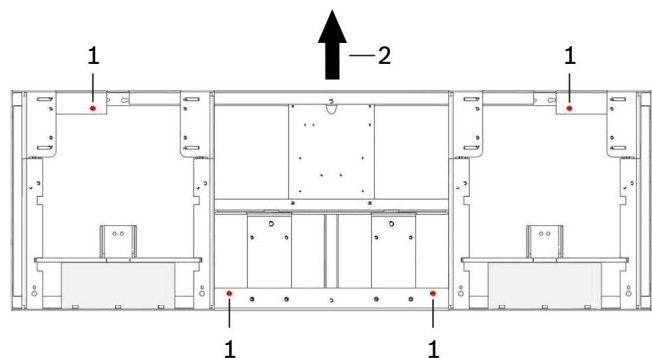


Abb. 26: Base frame suspension tester SDL 49x  
 1 Holes for fixing onto the pit base  
 2 Testing direction (installation location)

### Drilling template:

- Suspension tester SDL 430:  
Use the 8 mounting holes in the two drive units and the base frame as a template for the impact dowels.
- Suspension tester SDL 49x:  
Use the 4 mounting holes in the base frame as a template for the impact dowels.

### Impact dowel:

- Suspension tester SDL 430: FH II 18/100 B
- Suspension tester SDL 49x: MKT SZ B 15/45



Abb. 27: Screw anchor assembly set suspension tester SDL 430

A Various spacers (1 mm, 2 mm, 3 mm)  
for height adjustment

B Steel plates (motor support)

C Impact dowels

D Mounting bolts cover plate

E Spacers roller set <-> suspension tester SDL 430 - 435 \*

F Mounting bolt spacers

\* Older versions only.

### Height adjustment with different spacers.

3. Clean holes by blowing them out.

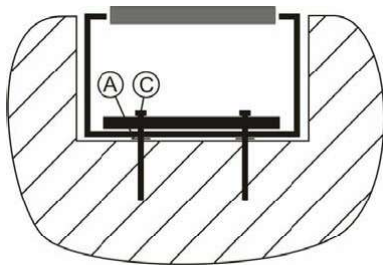


Abb. 28: Screw anchor attachment suspension tester SDL 430

A Various spacers (1 mm, 2 mm, 3 mm) for height adjustment

C Impact dowels

4. Insert impact dowels.

### Insert:

- Suspension tester SDL 430:  
Insert the screw anchors through the holes of the drive units, the base frame and the spacers into the drilled holes, hammer in if necessary.
- Suspension tester SDL 49x:  
Insert the screw anchors through the holes of the base frame into the drilled holes, hammer in if necessary.

5. Tighten up the mounting nuts of the impact dowels.

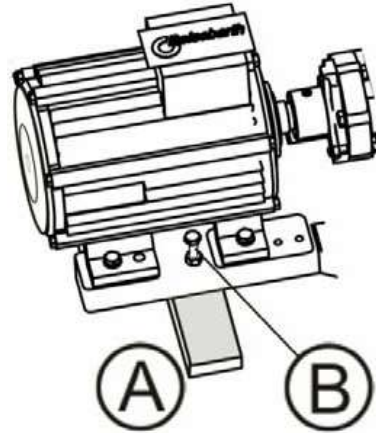


Abb. 29: Motor support suspension tester SDL 430

A Steel plate for the motor support at the cross brace  
of the base frame

B Adjusting screw with locknut

6. At the suspension tester SDL 430 check the motor support at the cross braces of the base frame and adjust as required.

### Motor support:

The motor should be located horizontally on the support, without tension.

7. At the suspension tester SDL 430 unscrew the distance bolts until they touch the roller set and the edge protection or the installation frame.
8. Tighten up the locknuts of the distance screws.
9. At the suspension tester SDL 430 install the swivel plates again and tighten them up with a torque wrench.

### Torque swivel plates: 65 Nm

## Clamp

! The specified type of attachment at the suspension tester SDL 435 is installation with clamps.

! When starting up the suspension tester, SDL 435 the installation frame or a customer-specific installation solution with a dual-T iron beam (IP B-beam) is essential for mounting the clamps.

! Attachment by clamping with a dual-T iron beam (IP B-beam)

1. Align the suspension tester to the centre.

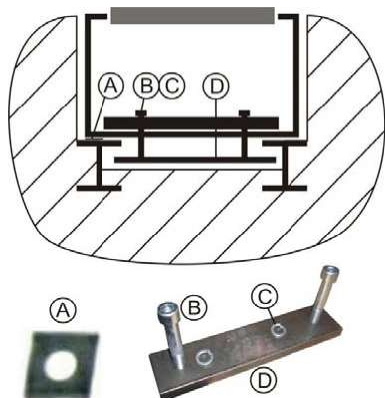


Abb. 30: Clamp fastening suspension tester SDL 435

A Various spacers (1 mm, 2 mm, 3 mm)  
for height adjustment  
B Mounting bolts  
C Threaded hole  
D Clamp with 2 threaded holes

2. Place the 4 clamps between the dual-T iron beams (IP B-beams).
3. Align the clamps in such a way that they are located underneath the mounting holes of the base frame and the drive units and underneath the upper T-part of the iron beam.
4. Put the mounting screws through the holes of the base frame and the drive units and tighten at the clamps.

## MB version

! Installation frame OEM:

- In the MB version of the installation frame there are 8 threaded bolts for the screwed connection of the suspension tester SDL 430 - 435.
- The impact dowels or clamps can be dispensed with.

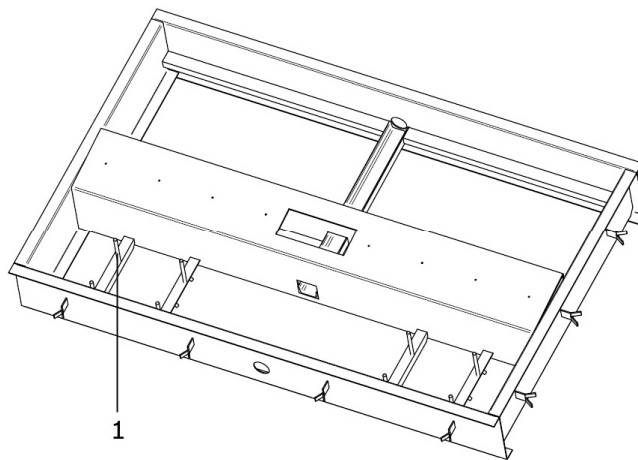


Abb. 31: Installation frame MB

1 Threaded bolt to attach the suspension tester SDL 430 - 435


- Attach and do up tightly the mounting nuts at the 8 threaded bolts.

## 4.3 Side slip tester


### 4.3.1 Versions


Side slip tester	Mechanism	Sensor
SDL	Ball bearings	Potentiometer
SDL 410	Balls	Potentiometer
SDL 415	Balls	DMS sensor
SDL 425	Balls	DMS sensor
SDL 515 Standard	Balls	Potentiometer
SDL 515 Wassergeschützt	Balls	DMS sensor


Tab. 12: Versions side slip tester

 Versions:  
Several versions exist as a result of variations and the construction time.

 SDL - SDL 415:  
The following version replaces its predecessor.

 SDL - SDL 410:  
For start-up refer to service manual.

 SDL 425:  
= Side slip tester with additional mechanical side slip compensation plate.

 The installation frame is essential when starting up the side slip tester.

### 4.3.2 SDL 415

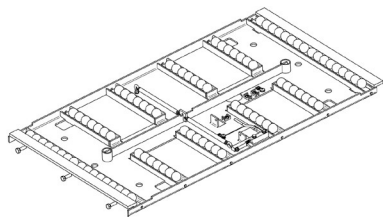


Abb. 32: Side slip tester SDL 415 without cover

1. Unscrew the 3 screws on the side at the cover of the side slip tester.
2. Lift off the cover.

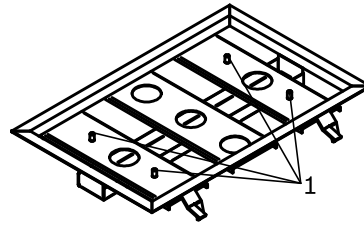




Abb. 33: Installation frame for side slip tester SDL 415


1 Threaded bolts for mounting side slip tester

3. Place the side slip tester with the holes on the installation frame with the 4 threaded bolts.

 Note the testing direction.

 The 4 threaded bolts must stay centered in the assembly holes.

4. Screw the 4 mounting nuts on the base frame and tighten-up with the torque wrench.

 Torque mounting nuts: 85 Nm

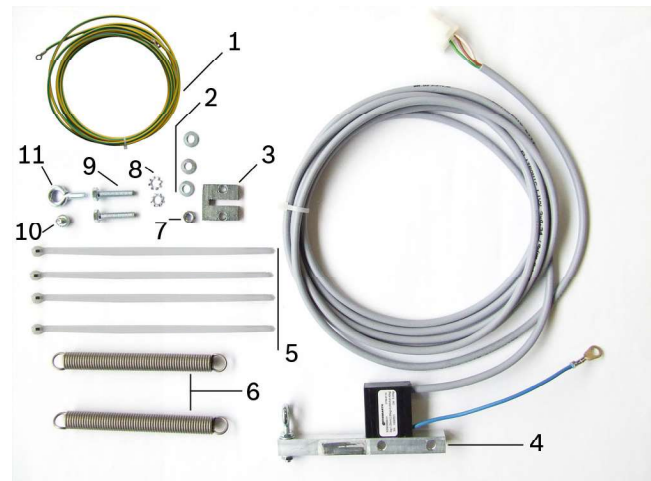


Abb. 34: Installation set SDL 415  
(side slip sensor = DMS sensor)

- 1 Earthing cable
- 2 Washers
- 3 Sheet metal gusset plate
- 4 Side slip sensor (DMS sensor)
- 5 Cable ties
- 6 Springs
- 7 Nut
- 8 Locking washer
- 9 Screw, long
- 10 Screw, short
- 11 Eye-bolt

5. Pull the sensor cable and earthing cable through the large hole in the middle of the side slip tester and through the cable conduit to the nearest test device (suspension tester or roller set).



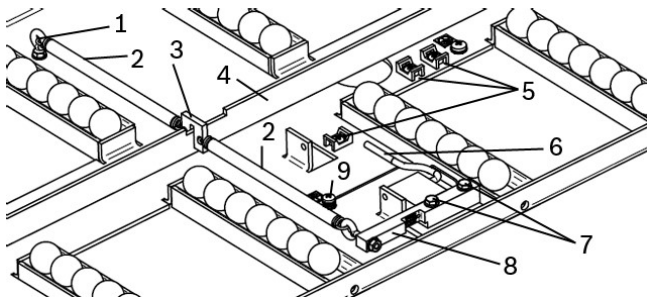


Abb. 35: Sensor installation side slip tester SDL 415

- 1 Mounting screw (for spring)
- 2 Spring
- 3 Sheet metal gusset plate
- 4 Leaf spring
- 5 Cable attachment
- 6 Sensor cable
- 7 Mounting screws (DMS sensor)
- 8 Side slip sensor (DMS sensor)
- 9 Mounting screws (for earthing cable DMS sensor)

6. Screw the side slip sensor to the base plate using hexagon bolt and serrated lock washers.
7. Suspend the spring into the eye-bolt of the side slip sensor and into the sheet metal gusset plate.
8. Place the sheet metal gusset plate on the leaf spring.
9. Screw the second eye-bolt to the base plate.
10. Suspend the second spring into the sheet metal gusset plate and the second eye-bolt.
11. Screw the earthing cable of the track sensor to the base plate.
12. Screw the earthing cable to the base plate.
13. Attach the cable with cable ties.
14. Reinstall the cover of the side slip tester.

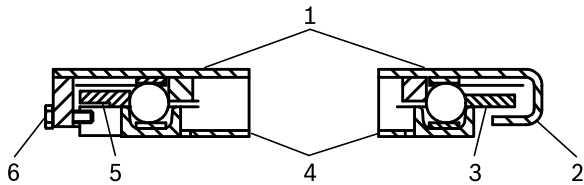


Abb. 36: Cover mounting side slip tester SDL 415

- 1 Cover
- 2 Bended cover end
- 3 Gib
- 4 Base frame
- 5 Retaining ledge
- 6 Retaining screw

! The cover must click in place into the leaf spring.

15. Mount the retaining screws.

ⓘ Size of the cover gap in the lengthways direction up to 0.5 mm.

16. Slide the cover in place up to the end stop to the left and right to check that it moves freely and swings into the middle position.

#### 4.3.3 CP 610

ⓘ For installation refer to base frame and cover mounting of side slip tester SDL 415:

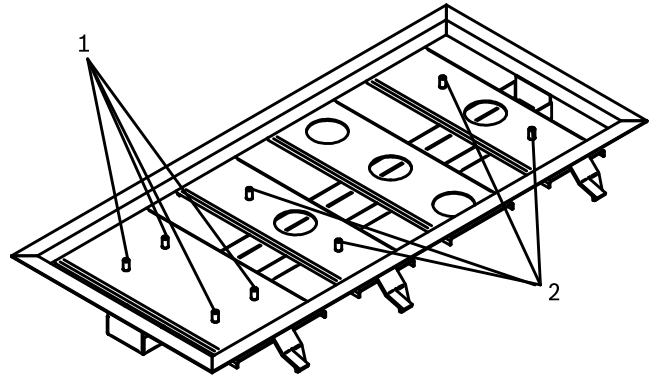


Abb. 37: Installation frame SDL 425

- 1 Threaded bolts for installing side slip compensation plate CP 610
- 2 Threaded bolts for installing side slip tester SDL 415

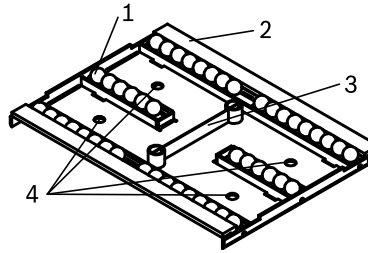


Abb. 38: Base frame side slip compensation plate CP 610

- 1 Balls
- 2 Cover gib
- 3 Leaf spring
- 4 Assembly holes

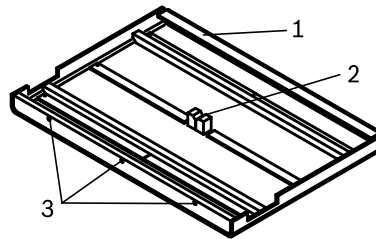


Abb. 39: Cover side slip compensation plate CP 610

- 1 Gib
- 2 Bracket for leaf spring
- 3 Threaded holes

#### 4.3.4 SDL 515 Standard

ⓘ The two side slip testers for transporters and light trucks are installed in the same way as for passenger vehicle side slip testers.

- SDL 515 Standard = SDL 410
- SDL 515 Wassergeschützt = SDL 415

## 4.4 Analogue display

### 4.4.1 Versions

- Depending on the version, various analogue displays are supplied:
- Of oval or rectangular shape.
  - With 1 or 2 scales at the braking force display.
  - With 1 or 2 pointers per scale.
  - Scale for braking force display up to 6, 8 or 12 KN.
  - For one or more test devices.
  - With vertical column or wall bracket.

### 4.4.2 Vertical column

- Depending on the version, the vertical column is round, rectangular or made of aluminium.

#### Vertical column aluminium

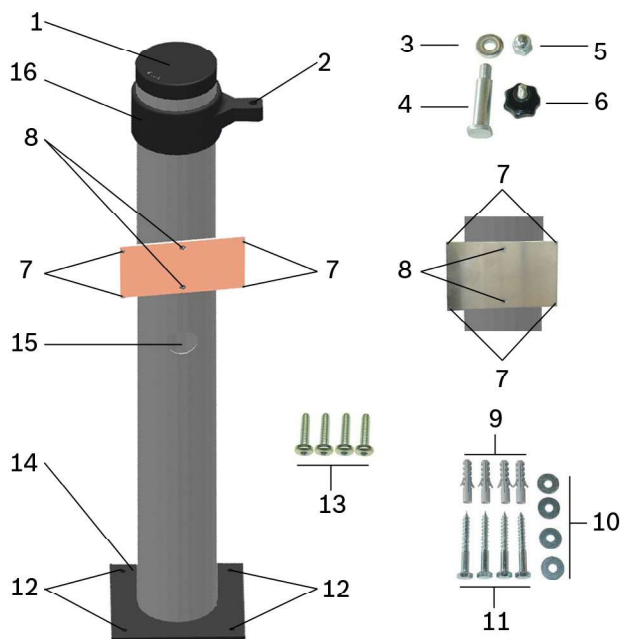


Abb. 40: Vertical column aluminium

- 1 Rubber cap
- 2 Hole (pin for swivelling arm)
- 3 Washer (bolt)
- 4 Bolt (wall mount at the swivelling arm)
- 5 Mounting nut (bolt)
- 6 Mounting bolts (swivelling arm at display)
- 7 Threaded holes  
(mounting bolts for main switch box)
- 8 Mounting bolts (mounting plate for main switch box)
- 9 Screw anchor (floor mounting of the vertical column)
- 10 Washers (floor mounting of the vertical column)
- 11 Mounting bolts (floor mounting of the vertical column)
- 12 Holes (mounting bolts for floor mounting)
- 13 Mounting bolts (base plate aluminium vertical column)
- 14 Hole (supply, power and Bnet cables to the main switch box and Bnet cable and earthing cable to the display)
- 15 Circlip with threaded hole (for fixing screw)

### Installation

- When using the aluminium vertical column the main switch box should be mounted at the column.

1. Attach the base plate to the aluminium vertical column with the 4 screws.
2. Install the rubber grommet in the cable hole at the vertical column.
3. When installing the main switch box at the vertical column pull the supply, power and Bnet bus cables out of the pit through the vertical column and the rubber grommet.
4. When installing the main switch box at the vertical column pull a second Bnet bus cable and the earthing cable through the rubber grommet and through the upper opening of the vertical column.
5. When installing without the main switch box at the vertical column pull the Bnet bus cable and the earthing cable from below through the vertical column.
6. Set up and align the vertical column over the cable conduit.
7. Drill the 4 holes for the screw anchors.

- Drilling template:  
Use the mounting holes in the base plate of the column as a drilling template.

8. Screw the vertical column to the floor.
9. Place the circlip for the swivelling arm on the column and fasten it in place at the desired height with the fixing screw.
10. Attach the swivelling arm to the circlip with the bolt.

- Swivelling arm:  
See Wall bracket middle.

11. Remove the cover from the rear of the analogue display.
12. Attach the display to the swivelling arm.

- Fastening of swivelling arm:  
See Wall bracket middle.

13. Pull the Bnet bus cable and the earthing cable from the upper opening of the column through the swivelling arm into the analogue display.
14. Place the rubber cap on the upper opening of the column.
15. Remove the cover of the box when installing the main switch box.
16. Screw the mounting plate for the box to the vertical column.
17. Mount the box on the plate.

**Vertical column round**

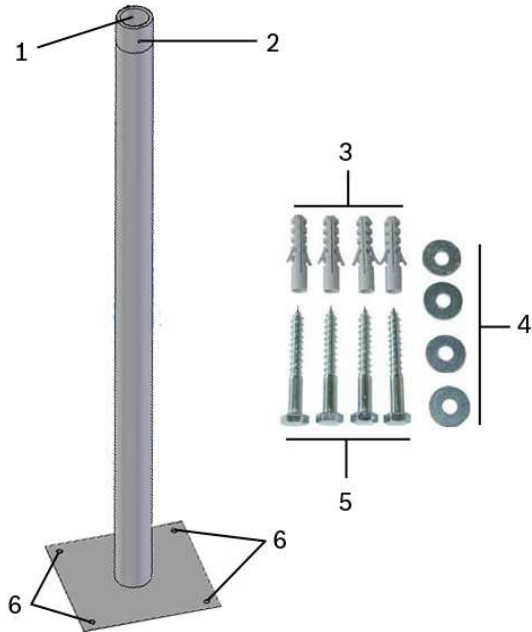


Abb. 41: Vertical column round

- 1 Cable bushing
- 2 Threaded hole (fixing screw display)
- 3 Screw anchor (floor mounting of the vertical column)
- 4 Washers (floor mounting of the vertical column)
- 5 Mounting bolt (floor mounting of the vertical column)
- 6 Holes (mounting bolts for floor mounting)

**Installation**

1. Pull the Bnet cable and the earthing cable from underneath through the vertical column.
2. Set up and align the vertical column over the cable conduit.
3. Drill the 4 holes for the screw anchors.



Drilling template:

Use the mounting holes in the base plate of the column as a drilling template.

4. Screw the vertical column to the floor.
5. Remove the cover from the rear of the analogue display.
6. Pull the Bnet bus cable and the earthing cable from underneath into the display.
7. Place the display in the upper opening of the column.
8. Install the fixing screw.

**Vertical column rectangular**

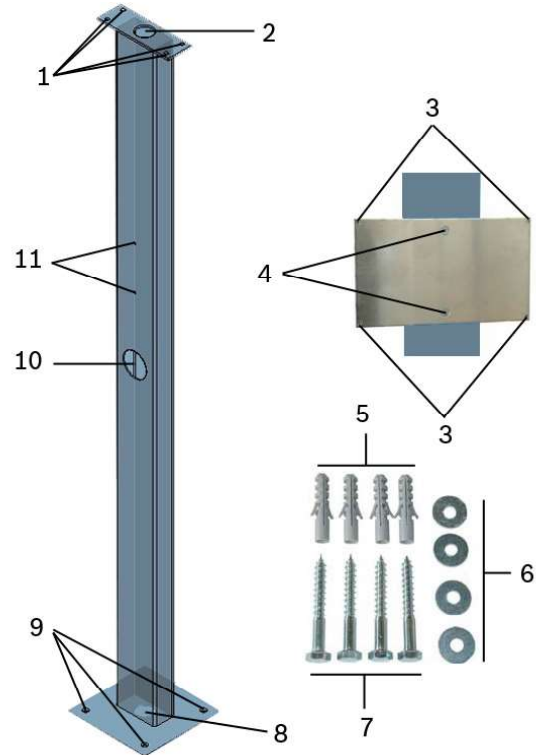




Abb. 42: Vertical column rectangular

- 1 Holes (mounting bolts for display)
- 2 Hole (Bnet cable and earthing cable to the display)
- 3 Threaded holes (mounting bolts for main switch box)
- 4 Mounting bolts (mounting plate for main switch box)
- 5 Screw anchor (floor mounting of the vertical column)
- 6 Washers (floor mounting of the vertical column)
- 7 Mounting bolts (floor mounting of the vertical column)
- 8 Hole (supply, power and Bnet cables to the main switch box and Bnet cable and earthing cable to the display)
- 9 Holes (mounting bolts for floor mounting)
- 10 Hole (supply, power and Bnet cables to the main switch box and Bnet cable and earthing cable to the display)
- 11 Threaded holes (mounting plate for main switch box)

## Installation


 When using the rectangular vertical column the main switch box should be mounted at the column.


1. When installing the main switch box at the vertical column pull the supply, power and Bnet bus cables out of the pit through the vertical column and the rubber grommet.
2. When installing the main switch box at the vertical column pull a second Bnet bus cable and the earthing cable through the rubber grommet and through the upper opening of the vertical column.
3. When installing without the main switch box at the vertical column pull the Bnet bus cable and the earthing cable from below through the vertical column.
4. Set up and align the vertical column over the cable conduit.
5. Drill the 4 holes for the screw anchors.


 **Drilling template:**  
Use the mounting holes in the base plate of the column as a drilling template.


6. Screw the vertical column to the floor.
7. Remove the cover from the rear of the analogue display.
8. Pull the Bnet bus cable and the earthing cable from underneath into the display.
9. Mount the display on the column with the 4 mounting bolts.
10. Remove the cover of the box when installing the main switch box.
11. Screw the mounting plate for the box to the vertical column.
12. Mount the box on the plate.

## 4.4.3 Wall bracket

 Various wall brackets are supplied, depending on the analogue display.

 Check the properties of the wall before mounting the wall bracket.

 **Loading scheme:**  
Refer to the planning folder

 If the structure or the material of the wall are not perfectly suitable for the use of screw anchors, then a vertical column must be used instead of a wall bracket.

### Wall bracket large

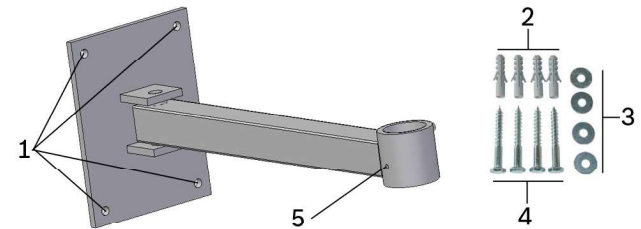



Abb. 43: Wall bracket large

- 1 Holes (wall mounting)
- 2 Screw anchors
- 3 Washers
- 4 Mounting bolts
- 5 Threaded hole (fixing screw)

## Installation

1. Drill the 4 holes for the screw anchors.

 **Drilling template:**  
Use the mounting holes in the wall mounting as a drilling template.

2. Install the wall mounting with 4 screws.
3. Pull the Bnet cable and the earthing cable from underneath through the swivelling arm of the wall bracket.
4. Remove the cover from the rear of the analogue display.
5. Pull the Bnet bus cable and the earthing cable from underneath into the display.
6. Place the display in the opening of the swivelling arm.
7. Install the fixing screw.

### Wall bracket middle

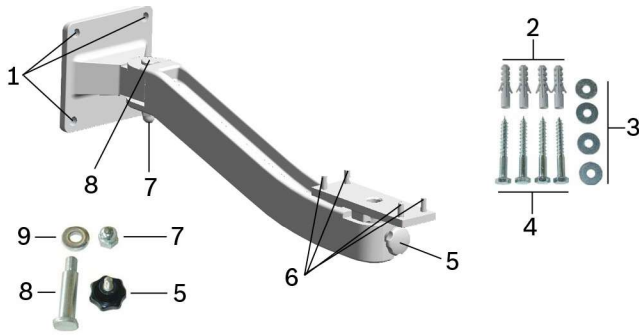



Abb. 44: Wall bracket middle

- 1 Holes (wall mounting)
- 2 Screw anchor
- 3 Washers
- 4 Mounting bolts
- 5 Threaded hole (fixing screw)
- 6 Mounting bolts (display)
- 7 Mounting nut (pin)
- 8 Pin (wall mount at the swivelling arm)
- 9 Washer (pin)

### Installation

1. Drill the 4 holes for the screw anchors.

 Drilling template:  
Use the mounting holes in the wall mounting as a drilling template.

2. Install the wall mounting with 4 screws.
3. Attach the swivelling arm to the wall mounting with the bolt.
4. Remove the cover from the rear of the analogue display.
5. Pull the Bnet cable and the earthing cable from underneath through the swivelling arm of the wall bracket.
6. Remove the cover from the rear of the analogue display.
7. Pull the Bnet bus cable and the earthing cable from underneath into the display.
8. Mount the display onto the swivelling arm.

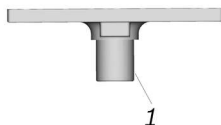



Abb. 45: Flange

- 1 Pin

 Before mounting the flange in the swinging arm, the pins are lubricated with multigrade grease.

### Wall bracket small

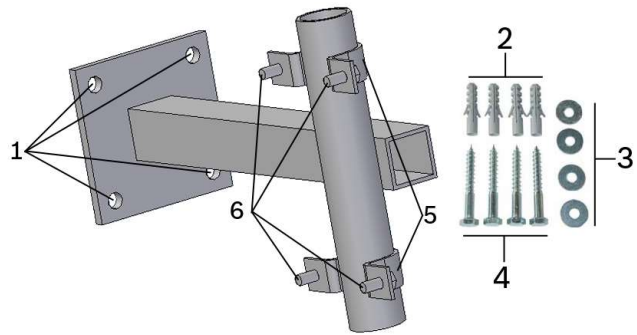



Abb. 46: Wall bracket small

- 1 Holes (wall mounting)
- 2 Screw anchor
- 3 Washers
- 4 Mounting bolts
- 5 Sheet metal gusset plates
- 6 Mounting bolts (display)

### Installation

1. Drill the 4 holes for the screw anchors.

 Drilling template:  
Use the mounting holes in the wall mounting as a drilling template.

2. Install the wall mounting with 4 screws.

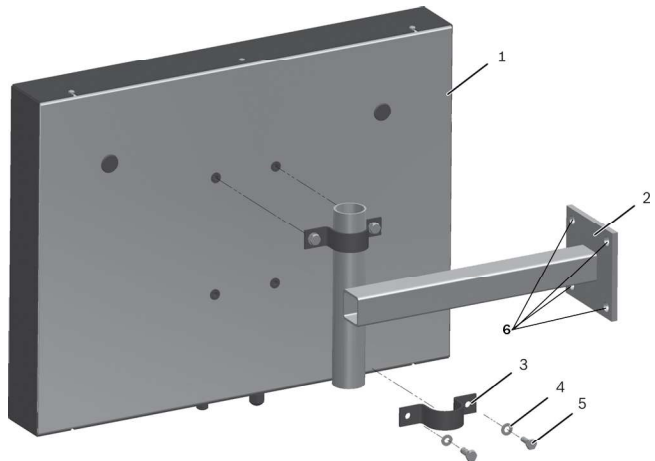



Abb. 47:

- 1 Cover (rear of the analogue display)
- 2 Wall mounting
- 3 Sheet metal gusset plate
- 4 Washer
- 5 Mounting bolt (analogue display)
- 6 Holes (wall mounting)


3. Mount the display onto the wall bracket with the two sheet metal gusset plates.

## 4.5 Main switch box

### 4.5.1 Vertical column mounting

 The main switch box can be mounted on the vertical column. See Analogue display / vertical column.

### 4.5.2 Wall mounting

 The main switch box should be installed right next to the roller set and the cable conduit, if at all possible on the driver side.

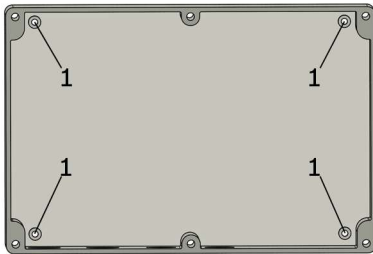




Abb. 48: Mounting the main switch box  
1 Holes (mounting bolts wall mounting)

1. Remove the cover of the main switch box.
2. Drill the 4 holes for the screw anchors.

 Drilling template:  
Use the mounting holes in the main switch box as a drilling template.

3. Install the box with 4 screws.

## 4.6 Soft-starter box

 The soft-starter box should be installed underneath the main switch box on the wall.

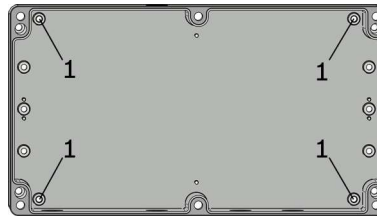




Abb. 49: Mounting soft-starter box (QD-3020)


1. Remove the cover of the soft-starter box.
2. Drill the 4 holes for the screw anchors.

 Drilling template:  
Use the mounting holes in the main switch box as a drilling template.


3. Install the box with 4 screws.


## 4.7 Box power section 230 V AC/ 5 kW

 The box for the power section 230 V AC/ 5 kW QD-3030 is mounted in the same way as the soft-starter box.

 The power section is used for the combination supply 230 V AC with 5 kW motors in the roller set.

## 4.8 Converter boxes

 Converter box PC  
(serial interface RS 232 at COM 1 or USB):  
Install the box as close as possible to the PC cabinet.

 Converter box printer (parallel interface LPT 1):  
Install the box as close as possible to the printer cabinet.

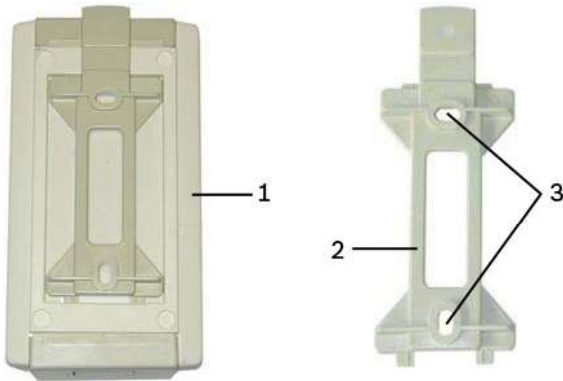



Abb. 50: Converter box with wall mount


1 Converter box  
2 Wall mount  
3 Holes (mounting bolts wall mounting)


1. Drill the 2 holes for the screw anchors.

 Drilling template:  
Use the mounting holes in the wall mount as a drilling template.

2. Install the wall mount with 2 screws.

## 4.9 Pedal force sensor box

 Mounting position:  
Mount the box as close as possible to the roller set and cable conduit.

 Mounting see Converter boxes.

## 4.10 Printer cabinet

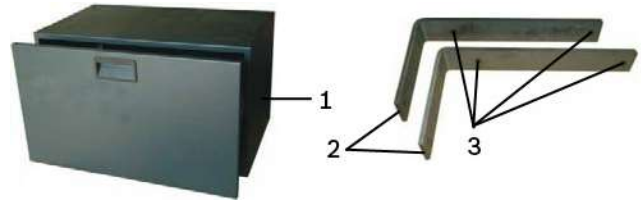



Abb. 51: Printer cabinet with wall mount

1 Printer cabinet  
2 Wall mount  
3 Holes (mounting bolts printer cabinet)

1. Fasten the wall mount to the printer cabinet.

2. Drill the mounting holes.

 Drilling template:  
Use the mounting holes in the wall mount as a drilling template.

3. Fix the mounting to the wall.

## 5. Electrical installation

### 5.1 To be provided by the customer

#### 5.1.1 Power supply

Power supply:

Device	Power supply at: 3 x 230 V AC / (50–60 Hz)	Power supply at: 3 x 400 V AC / (50–60 Hz)
BSA 42xx Motor 2,0 kW	17,0 A	9,8 A
BSA 43xx - 434x - BSA 436x Motor 3,7 kW	27,6 A	15,4 A
BSA 43xx - 434x - BSA 436x Motor 5,0 kW	48 A	27,7 A
BSA 44xx Motor 3,7 kW	28,8 A	16,8 A
SDL 430 Motor 2,5 kW	11,4 A	6,6 A
SDL 435 V 1 Motor 2,5 kW	11,4 A	6,6 A
SDL 435 V 2 Motor 3,0 kW	14,2 A	8,2 A

Tab. 13: Power supply to be provided by the customer

#### 5.1.2 Fuses

Fuses:

Device	Fuse at: 3 x 230 V AC / (50–60 Hz) / C 3-pin	Fuse at: 3 x 400 V AC / (50–60 Hz) / C 3-pin
BSA 42xx Motor 2,0 kW	3 x 20 A	3 x 20 A
BSA 43xx - 434x - BSA 436x Motor 3,7 kW	3 x 32 A	3 x 20 A
BSA 44xx Motor 3,7 kW		
BSA 43xx - 434x - BSA 436x Motor 5,0 kW	3 x 50 A	3 x 32 A
SDL 430 Motor 2,5 kW		
SDL 435 V 1 Motor 2,5 kW	3 x 20 A	3 x 20 A
SDL 435 V 2 Motor 3,0 kW		
SDL 49x Motor kW	2 x 10 A	2 x 10 A

Tab. 14: Fuses to be provided by the customer

#### Circuit breaker

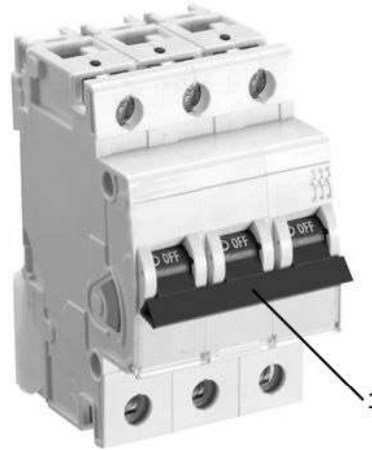


Abb. 52: Circuit breaker 3-pole characteristics "C"  
1 3-pole switch

! Fusing of the supply line:

- The supply line must be fused with a 3-pole circuit breaker (= automatic cutout) with trigger characteristics "C".
- A single circuit breaker may not be used.
- Failure to comply with this can lead to damage to the unit.



3-pole circuit breaker:

The 3 phases are switched on and off simultaneously.



Characteristics "C" = for high currents when switching on.

#### 5.1.3 Supply line

Supply line:

Fuses [A]	Supply line [mm <sup>2</sup> ]
10	1,5
20	2,5
32	6
50	10

Tab. 15: Supply line to be provided by the customer



Supply line to be provided by the customer must have been laid already up to the main switch box.



## 5.2 Connect the power supply cable

### 5.2.1 Cable

- !** Power supply cable:
- The power supply cable may only be connected by a trained electrician.
  - Fit the solid and stranded cables with ferrules.
  - Comply with the legal and country-specific regulations and stipulations.

Power supply cable:

Voltage	Phases/ cores	Neutral	Earthing
230 V AC	3		1
400 V AC	3	1	1

Tab. 16: Cores of the power supply cable

### 5.2.2 Main switch box



Abb. 53: Main switch box (VPC-5060)

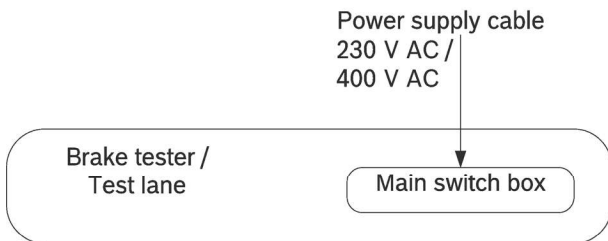


Abb. 54: Cabling scheme supply line to the main switch box

**i** The power supply to the brake test stand / test lane is done via the main switch box.



Abb. 55: Rotary handle main switch

1. Remove the rotary handle of the main switch.

2. Remove the cover of the main switch box.



Abb. 56: Protective cover supply line

**i** Protective cover supply line:  
The cover is at the main switch above supply line connections L 1 - L 3.

3. Pull off the protective cover for the supply line at the main switch.
4. Undo the left-hand cable gland (PG) and feed the supply cable through.
5. Feed the supply cable into the box.
6. Connect the cores of the supply in accordance with the illustration.
7. Replace the protective cover for the supply line at the main switch.
8. Tighten up again the cable gland (PG).

### Power supply: 3 x 400 V AC

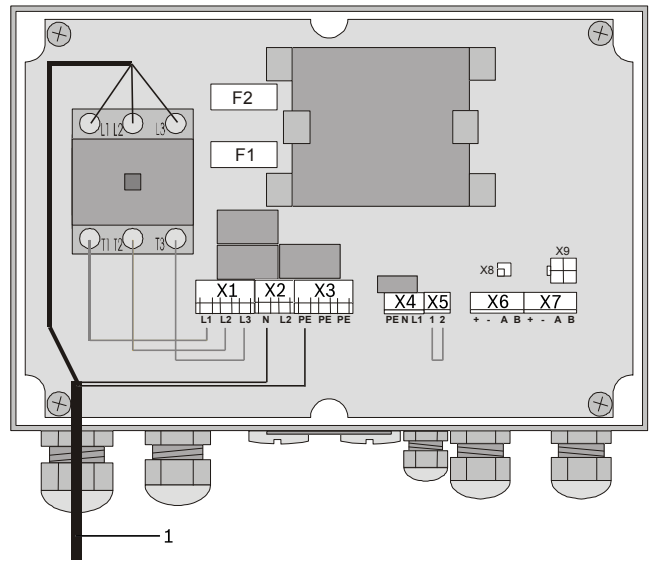


Abb. 57: Main switch box (VPC-5060) with power supply 400 V  
1 Supply line 3 x 400 V AC

Cores	Connection	Terminal
3 x phases (L 1, L 2, L 3)	Main switch	L 1, L 2, L 3
1 x neutral conductor (N)	X 2	N
1 x earthing conductor (PE)	X 3	PE

Tab. 17: Connection supply line 3 x 400 V AC

**Power supply: 3 x 230 V AC (motor: 2.0–3.7 kW)**

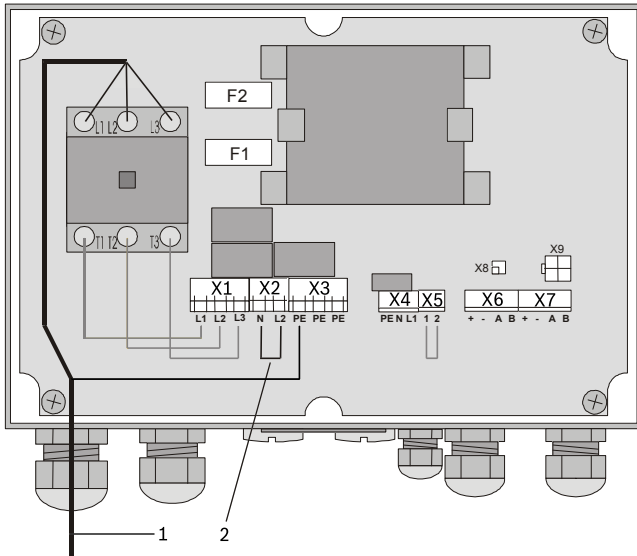


Abb. 58: Main switch box (VPC-5061) with power supply 230 V (for brake tester with motors 2.0–3.7 kW)

- 1 Supply line 3 x 230 V AC
- 2 Cable link X 2

Cores	Connection	Terminal
3 x phases (L 1, L 2, L 3)	Main switch	L 1, L 2, L 3
1 x earthing conductor (PE)	X 3	PE

Tab. 18: Connection supply line 3 x 400 V AC

**Power supply: 3 x 230 V AC (motor: 5.0 kW)**

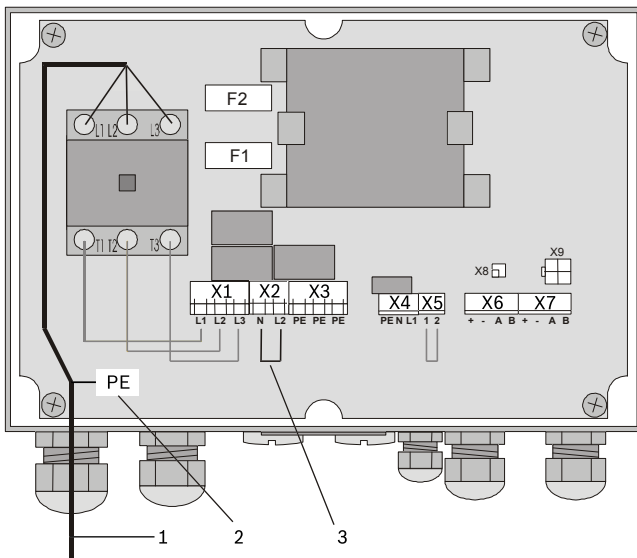


Abb. 59: Main switch box (VPC-5063) with power supply 230 V (for brake tester with motors 5.0 kW)

- 1 Supply line 3 x 230 V AC
- 2 Luster terminal (in-line)
- 3 Cable link X 2

Cores	Connection	Terminal
3 x phases (L 1, L 2, L 3)	Main switch	L 1, L 2, L 3
1 x earthing conductor (PE)	X 3	Luster terminal (in-line)

Tab. 19: Connection supply line 3 x 400 V AC

**5.3 Connect the emergency stop button**

**5.3.1 Button external**



Abb. 60: External emergency stop button

1. Shorten the cable to the correct length.
2. Fit the cable with ferrules.
3. Connect the cable to the emergency stop button.
4. Lead the cable to the main switch box.

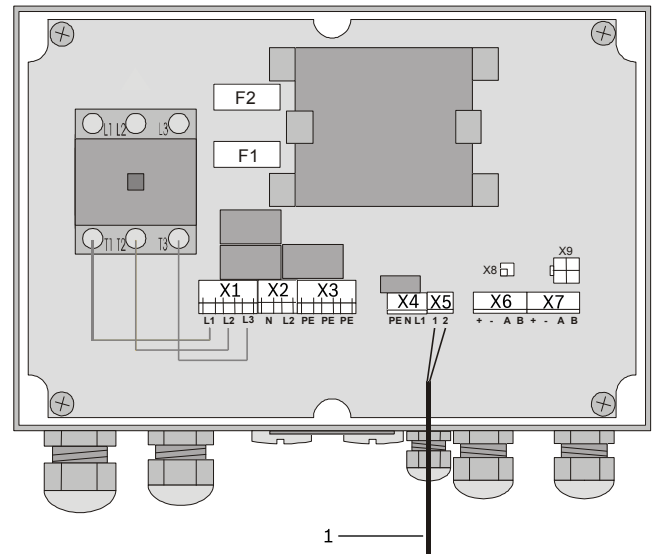


Abb. 61: Main switch box (VPC-5070) with emergency stop button  
1 Cable for emergency stop button (instead of cable link at X 5)

Cores	Connection	Terminal
2 x	X 5	1 - 2

Tab. 20: Connection cable for external emergency stop button

5. Undo the small cable gland (PG).
6. Feed the emergency stop button cable through.
7. Feed the supply cable into the box.
8. Connect the cores of the cable in accordance with the illustration.
9. Tighten up again the cable gland (PG).

### 5.3.2 Button in main switch box



Abb. 62: Main switch box (VPC-5070) with built-in emergency stop button

1 Built-in emergency stop button

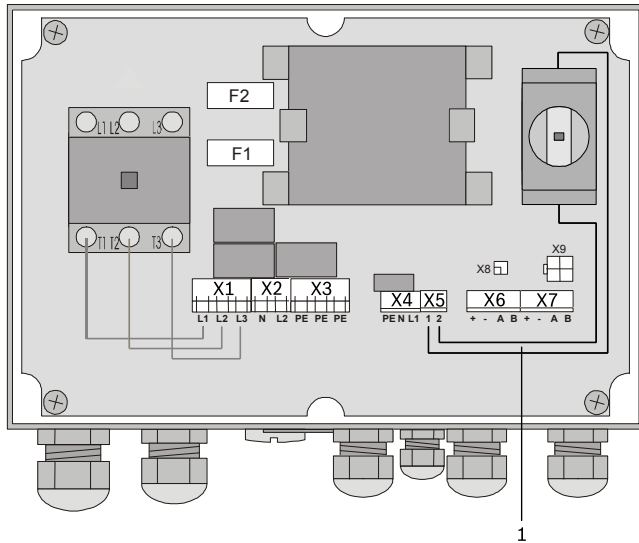


Abb. 63: Main switch box (VPC-5070) with emergency stop button  
1 Cable for emergency stop button (instead of cable link at X 5)

Cores	Connection	Terminal
2 x	X 5	1 - 2

Tab. 21: Connection cable for internal emergency stop button

### 5.4 Fuses main switch box

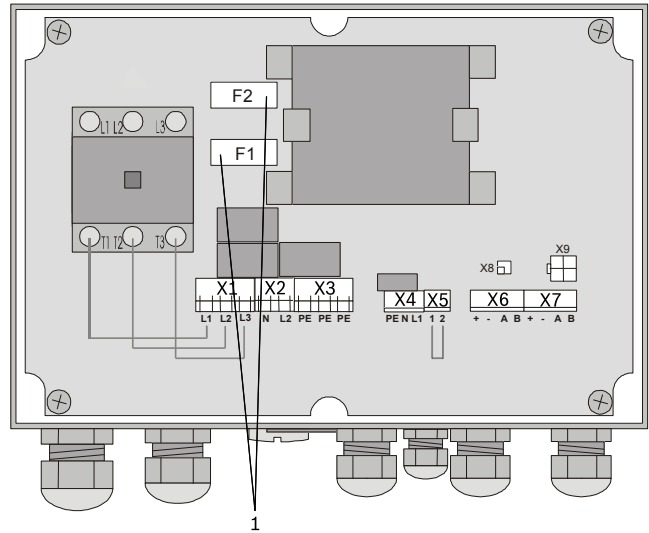


Abb. 64: Main switch box with microfuses

1 Microfuses F 1 and F 2 (2 x 5 A) or (2 x 10 A)

Unit	Fuses 2 x 5 A	Fuses 2 x 10 A
Roller set	X	
Roller set with suspension tester SDL 430 - 435	X	
Roller set with suspension tester SDL 49x		X

Tab. 22: Microfuses main switch box

➤ Check the fuses in the main switch box.

**i** 10 A fuses at suspension tester SDL 49x:  
During the Installation of the suspension tester SDL 49x the 5 A microfuses that are supplied as standard must be replaced by 10 A fuses.

## 5.5 Connect the power supply cable

### 5.5.1 Cable

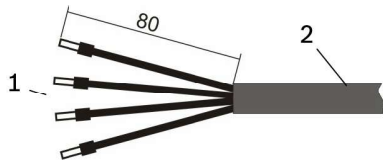


Abb. 65: Connectorize the power supply cable

1 Cores without cable sheath and with ferrules  
2 Cable sheathed

1. Shorten the cable to the correct length.
2. Remove the cable sheath over a length of 80 mm at the end of the cable.
3. Fit the cable with ferrules.

### 5.5.2 Connection variations



Refer also to the circuit diagrams in the Appendix.

#### Motor control standard

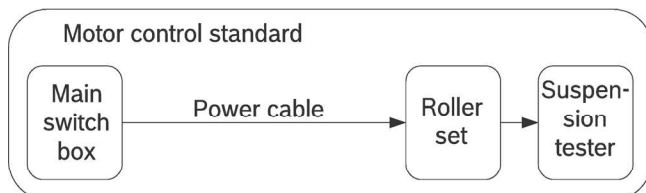


Abb. 66: Motor control standard with suspension tester SDL 430 - 435

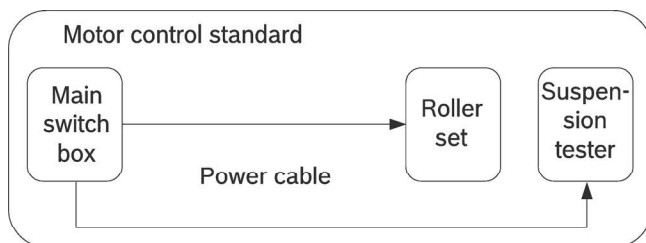


Abb. 67: Motor control standard with suspension tester SDL 49x



Sequence test devices:

- The sequence of the test devices (roller set and suspension tester) can be as desired.
- The power supply cable from the main switch switch box is connected first to the nearest device and then looped through to the next one.
- The suspension tester SDL 49x is connected directly to the main switch box.
- The side slip tester does not require a power supply cable.

#### Motor startup with soft-starter box

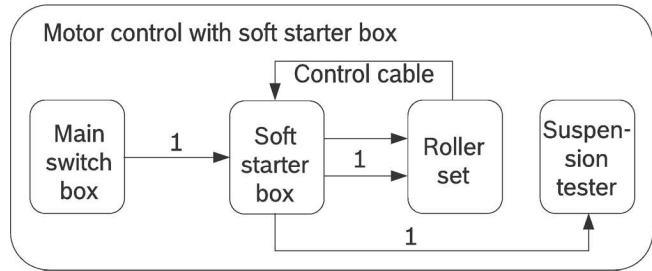


Abb. 68: Motor control with soft-starter box with suspension tester SDL 430 - 435

1 Power supply cable

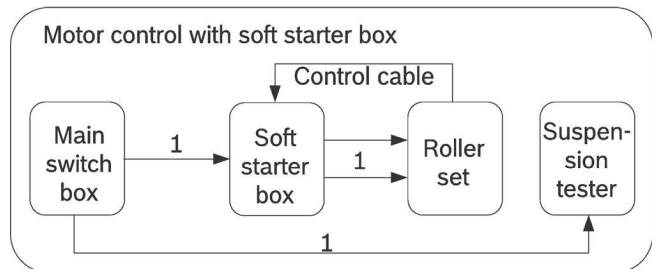


Abb. 69: Motor control with soft-starter box with suspension tester SDL 49x

1 Power supply cable

#### Motor startup with power section 230 V AC / 5 kW

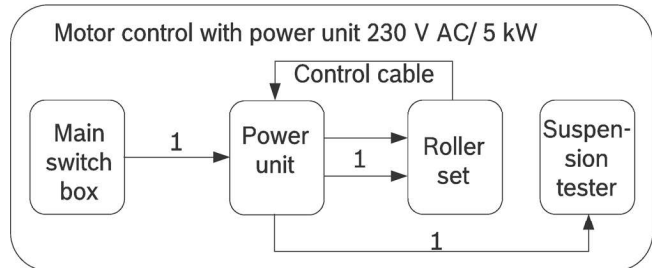


Abb. 70: Motor control with power section 230 V AC / 5 kW with suspension tester SDL 430 - 435

1 Power supply cable

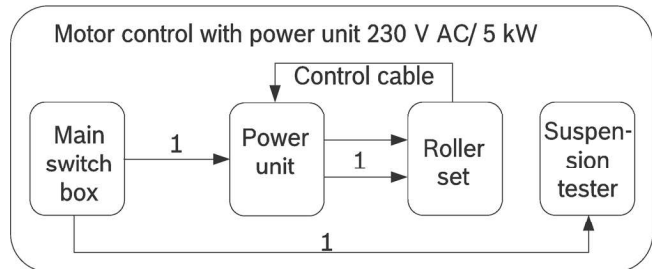


Abb. 71: Motor control with power section 230 V AC / 5 kW with suspension tester SDL 49x

1 Power supply cable

### 5.5.3 Main switch box

1. Undo the second cable gland (PG) from the left and feed the power supply cable through.
2. Feed the cable into the box.
3. Connect the cores of the supply in accordance with the illustration.
4. Tighten up again the cable gland (PG).

#### Motor control standard and soft-start

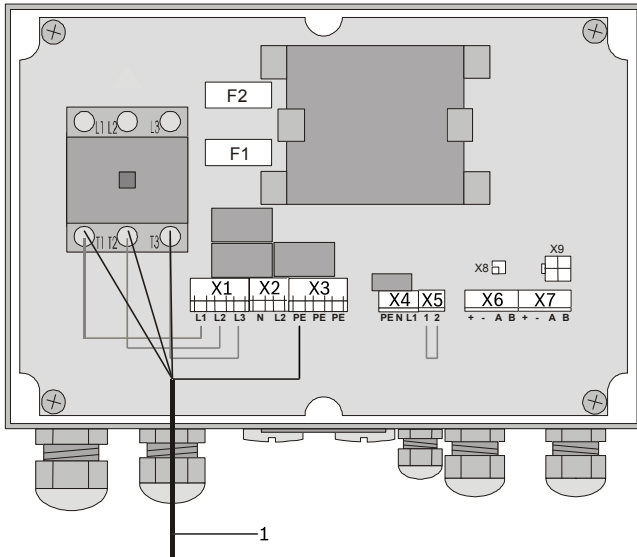


Abb. 72: Main switch box with power supply cable for roller set BSA 42xx - 44xx, suspension tester SDL 430 - 435, or soft-starter box

1 Power supply cable

Cores	Connection	Terminal
3 x phases (L 1, L 2, L 3)	Main switch	T 1, T 2, T 3
1 x earthing conductor (PE)	X 3	PE

Tab. 23: Connection supply line 3 x 400 V AC

### Motor control with power section 230 V AC / 5 kW

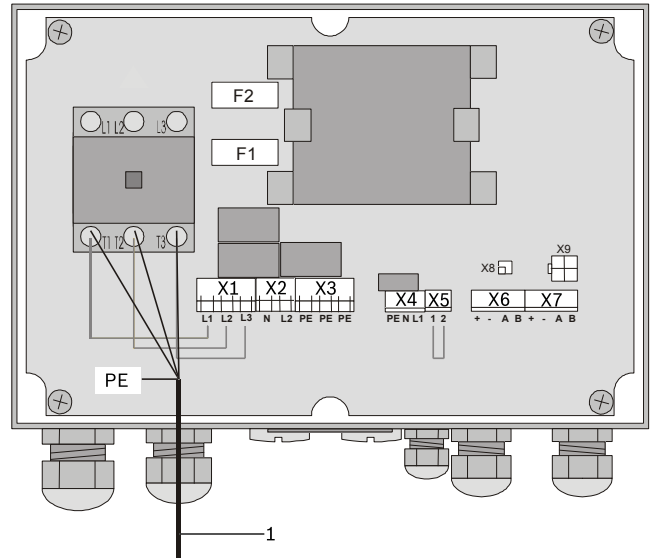


Abb. 73: Main switch box with power supply cable for roller set with power section 230 V AC / 5 kW

1 Power supply cable

Cores	Connection	Terminal
3 x phases (L 1, L 2, L 3)	Main switch	T 1, T 2, T 3
1 x earthing conductor (PE)	PE	Luster terminal (in-line)

Tab. 24: Connection supply line 3 x 230 V AC

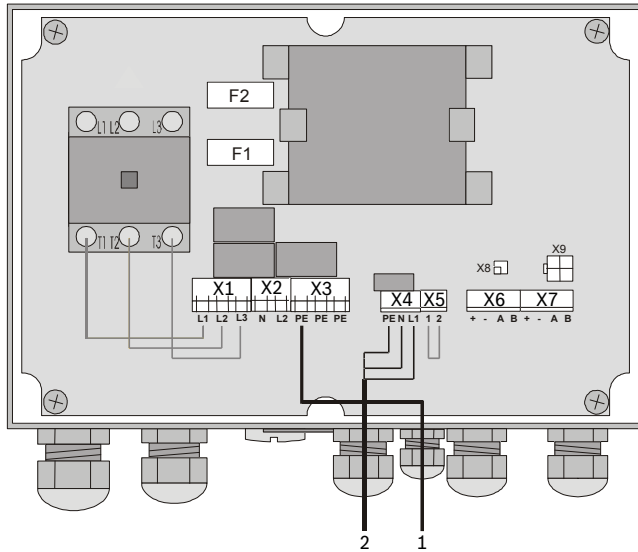
**Power supply cable suspension tester SDL 49x**


Abb. 74: Main switch box with power supply and earthing conductor cable for suspension tester SDL 49x

1 Earthing cable (LON USB box)

2 Power supply cable (power supply box)

Cores	Component	Connection	Terminal
Earthing conductor (PE)	LON USB box	X 3	PE
Phase (L 1)	Power supply box	X 4	L 1
Neutral conductor (N)			N
Earthing conductor (PE)			PE

Tab. 25: Connection supply line 1 x 230V AC and earthing cable

**Power supply cable fan suspension tester SDL 435**

! Only affects suspension tester SDL 435 version 1.

i Fan for suspension tester:

- In the suspension tester SDL 435 version 1 there is permanent ventilation of the motors after switching on at the main switch box.
- In suspension tester SDL 435 version 1 the fan is connected directly to the main switch box by a separate cable.

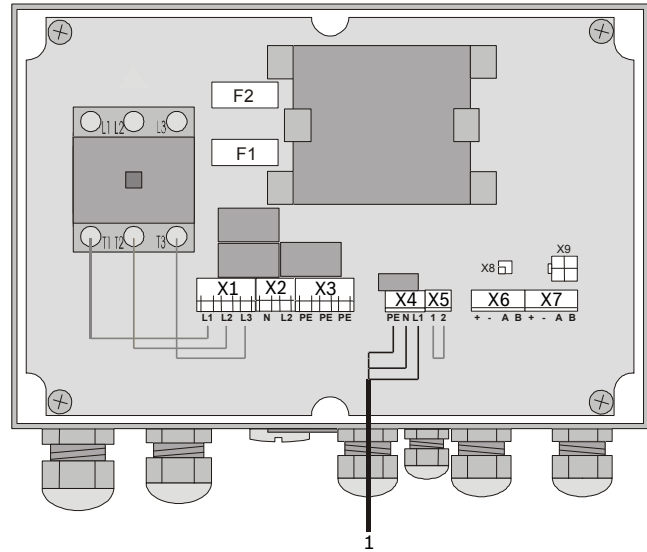


Abb. 75: Main switch box with power supply cable for fan for suspension tester SDL 435

1 Power supply cable

Cores	Connection	Terminal
Phase (L 1)	X 4	L 1
Neutral conductor (N)		N
Earthing conductor (PE)		PE

Tab. 26: Connection supply line 1 x 230V AC

## 5.5.4 Roller set

### Motor control standard

- i** Standard:
- The motor control (power section) is in the roller set.
  - 1 The power cable from the main switch box is connected in the roller set
  - Connection in the connection box.
  - The suspension tester SDL 430 - 435 is connected from the roller set by 1 power supply cable.
  - Suspension testerSDL 49x at the main switch box.

1. Remove the cover of the connection box in the roller set.
2. Undo the cable gland (PG) and feed the cable through.
3. Guide the cable into the box.
4. Connect the cable to the luster terminals in accordance with the illustration.
5. Connect a further power supply cable for the suspension tester SDL 430 - 435 in accordance with the illustration and bring it on further to the suspension tester.
6. Install the cover of the connection box.

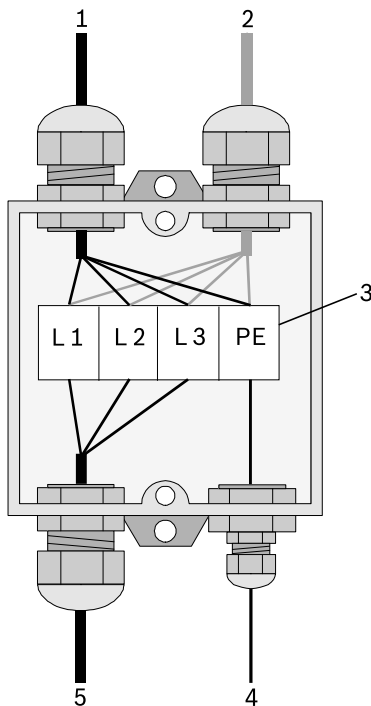


Abb. 76: Connection box in roller set (1st test device)

- 1 Power supply cable main switch box  
 2 Power supply cable of next test device  
 (suspension tester SDL 430 - 435)  
 3 Luster terminal  
 4 Earthing cable PE roller set  
 5 Power supply cable motor control

### Motor control soft-start

- i** Soft-start:
- The motor control is in an external box (soft-starter box).
  - Two power supply cables (motor left and right) are required.
  - The two cables have already been connected to the roller set and must be connected in the external box.
  - Suspension tester SDL 430 - 435 is connected in the external box.
  - Suspension testerSDL 49x at the main switch box.

### Motor control power section 230 V AC / 5 kW

- i** Power section 230 V AC / 5 kW
- See Motor control soft-start
  - Difference: Instead of the soft-starter box the box for the power section 230 V AC / 5 kW.

## 5.5.5 Suspension tester

### Suspension tester SDL 430

1. Remove the cover of the connection box in the suspension tester.
2. Undo the cable gland (PG) and feed the cable through.
3. Guide the cable into the box.
4. Connect the cable to the luster terminals in accordance with the illustration.
5. Install the cover of the connection box.

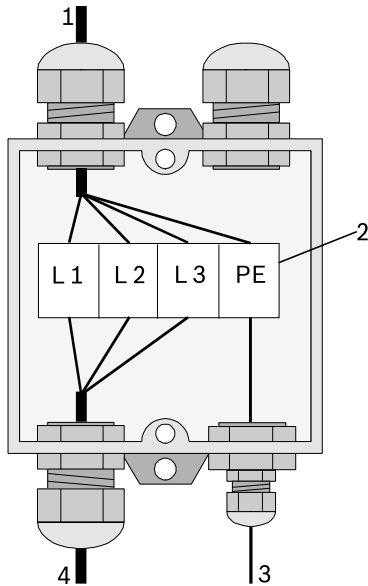



Abb. 77: Connection box in suspension tester (2nd test device)

- 1 Power supply cable main switch box
- 2 Luster terminal
- 3 Earthing cable PE roller set
- 4 Power supply cable motor control

### Suspension tester SDL 435

 Power supply cable see Suspension tester SDL 430.

### Suspension tester SDL 49x

1. Remove the cover of the power box.
2. Undo the right-hand cable gland (PG) and feed the supply cable through.
3. Feed the cable into the box.
4. Connect the cores of the supply in accordance with the illustration.
5. Tighten up again the cable gland (PG).

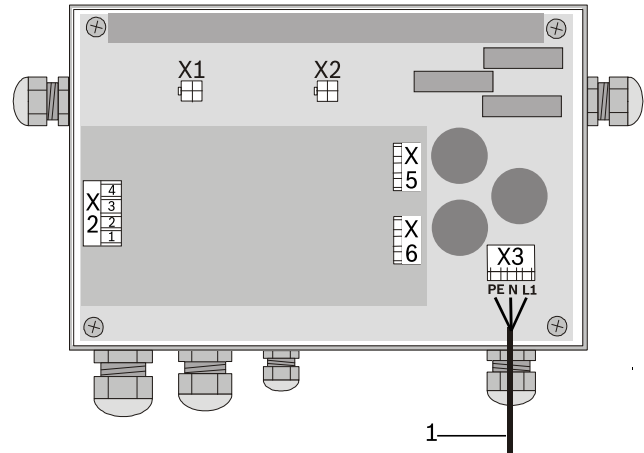


Abb. 78: Power box with power supply cable for suspension tester SDL 49x

- 1 Power supply cable

Cores	Connection	Terminal
Phase (L 1)	X 3	L 1
Neutral conductor N	X 3	N
Earthing cable (PE)	X 3	PE

Tab. 27: Connection power supply cable



### 5.5.6 Soft-starter box 400 V AC

**!** Only applicable to 5 kW motors in the roller set with a voltage of 3 x 400 V AC.

#### Motor startup

**i** Direct startup:  
When starting up directly the inrush current can correspond to the initial starting current of the motor, which can be as much as ten times that of the nominal rated current. For that reason direct starting up of the motor is not permitted as such for motors with a higher power (residential or industrial areas). The utility company can forbid the direct switching in of the load in the case of a rating of >4 kW (depending on the country).

**i** Star-delta startup:  
Start-delta switching only reduces the inrush current if the motor is started up without load. Here the inrush current is reduced to around a third of the initial starting current. Switching over from star to delta switching may only be done once the motor has come up to speed.

**i** Electrical soft-starting:  
The motor voltage is modified by a three-phase AC controller with phase-controlled modulation in such a way that it rises continuously from a (low) starting value up to the full mains voltage. This ensures safe starting of the motor.

**i** Implementation for brake tester:  
Phase-controlled modulation is used for the 5 kW motors of the brake tester. The technical implementation is done through soft-start modules. Product advantages: Effective reduction of the torque and inrush current – and thus also reduced wear.

#### Mode of functioning

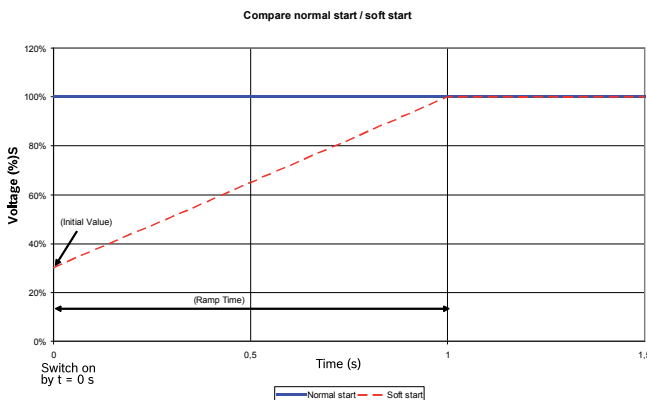


Abb. 79: Function scheme soft-starter

**i** In a normal start the motors are started without any delay with 100% of the voltage and rating. The inrush current and torque are not reduced, the local power supply network is hit by voltage spikes.

**i** The soft-start module reduces the inrush current to a preset starting value, e.g. 30% of the inrush current. Subsequently the inrush current is reduced continuously to 100% within a preset time span. This reduces the torque exerted on the motor components so that the amount of mechanical stress is reduced.

**i** Overall, the soft-start module works like a filter module:

- Input 100% voltage,
- output "SOFT" % voltage.

#### Connection scheme

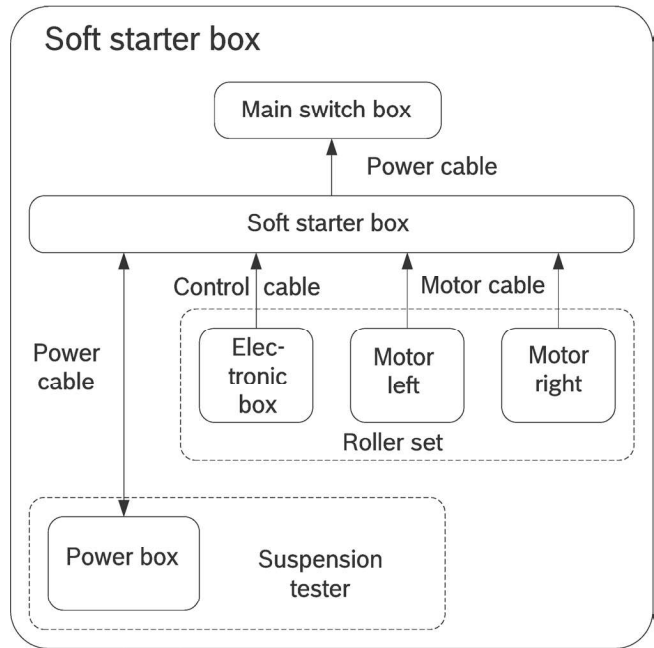


Abb. 80: Connection scheme soft-starter box

**Power supply cable to the main switch box**

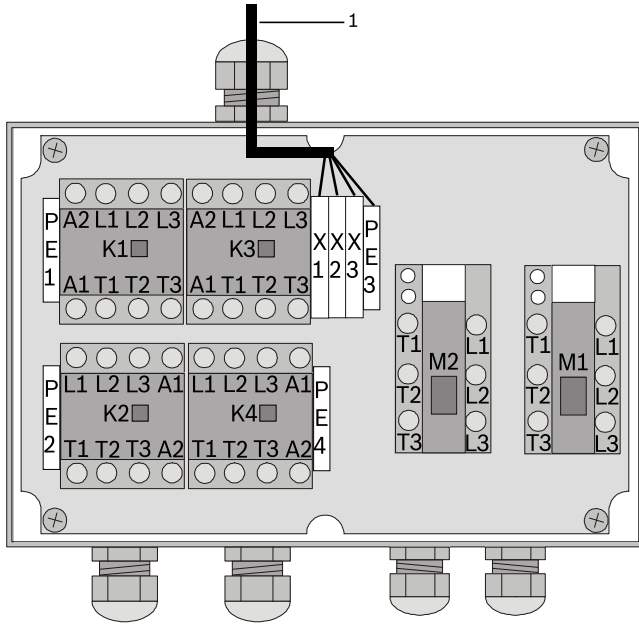


Abb. 81: Soft-starter box (QD-3020) with power supply cable to the main switch box  
1 Power supply cable

No.	Core	Terminal soft-starter box
1	L 1	X 1
	L 2	X 2
	L 3	X 3
	PE	PE 3

Tab. 28: Connection power supply cable from the main switch box



**Power cable:**

- The power supply cable to the main switch box has already been connected to the soft-starter box at the factory.
- Cable length 3 m.
- Power 3 x 400 V AC.

**Motor cable from the roller set**

1. Loosen the nuts of the PG cable gland.
2. Guide the two motor cables through the nuts of the PG cable gland and into the box as per the illustration.
3. Connect the cores of the cables as per the illustration and the table.
4. Tighten up the nuts of the PG cable gland.

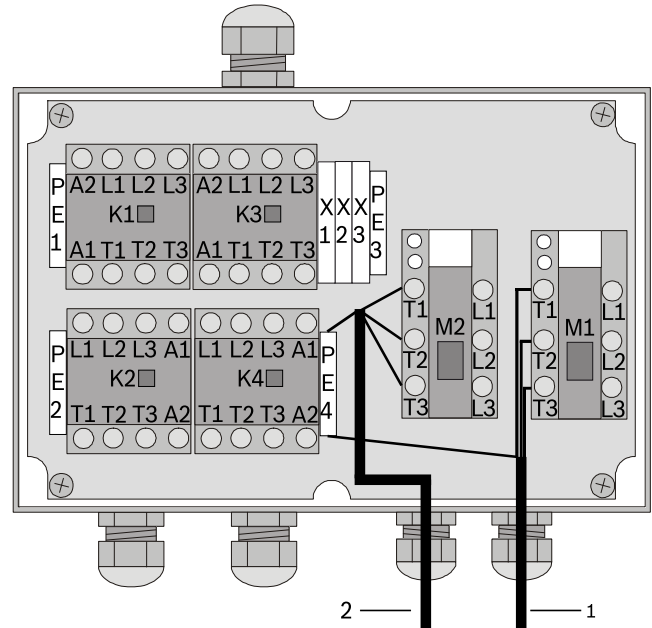


Abb. 82: Soft-starter box (QD-3020) with 2 motor cables to the roller set

- 1 Motor cable left-hand motor M 1
- 2 Motor cable right-hand motor M 2

No.	Core	Terminal soft-starter box	Terminal motor
1	L 1	T 1 (M 1)	U (M 1)
1	L 2	T 2 (M 1)	V (M 1)
1	L 3	T 3 (M 1)	W (M 1)
1	PE	PE 4	PE (M 1)
2	L 1	T 1 (M 2)	U (M 2)
2	L 2	T 2 (M 2)	V (M 2)
2	L 3	T 3 (M 2)	W (M 2)
2	PE	PE 4	PE (M 2)

Tab. 29: Connection motor cable from the roller set



**Motor cables:**

- The two motor cables to the soft-start have already been connected in the roller set to the motors at the factory.
- Cable length 15 m.
- Power 3 x 400 V AC.

**Control cable from roller set**

1. Loosen the nut of the left-hand PG cable gland.
2. Guide the control cable through the nuts of the PG cable gland and into the box as per the illustration.
3. Connect the cores of the cable as per the illustration and the table.
4. Tighten up the nut of the PG cable gland.

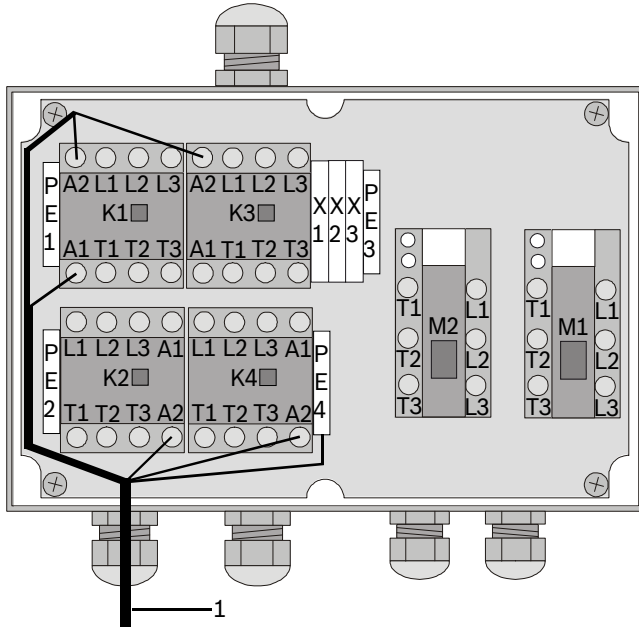


Abb. 83: Soft-starter box (QD-3020) with control cable to the roller set  
1 Control cable

No.	Core	Terminal soft-starter box
1	Brown	A 1 (K 1)
	White	A 2 (K 1)
	Green	A 2 (K 2)
	Yellow	A 2 (K 3)
	Grey	A 2 (K 4)
	Black	PE 4 (K 4)

Tab. 30: Connection control cable from electronics box



Control cable:

- The control cable to the soft-starter box has already been connected in the roller set to the electronics box at the factory.
- Cable length 15 m.
- Power 1 x 24 V DC.

**Motor cable to the suspension tester**



Connection only applicable for suspension tester SDL 430 - 435.

1. Loosen the nut of the 2nd PG cable gland from the left connection.
2. Guide the motor cable through the nut of the PG cable gland and into the box as per the illustration.
3. Connect the cores of the cable as per the illustration and the table.
4. Tighten up the nut of the PG cable gland.

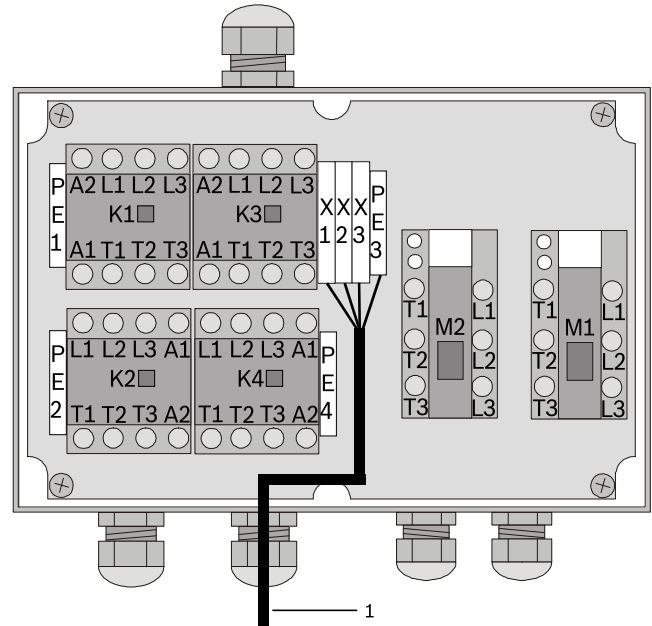


Abb. 84: Soft-starter box (QD-3020) with motor cable to the roller set  
1 Motor cable

No.	Core	Terminal soft-starter box
1	L 1	X 1
	L 2	X 2
	L 3	X 3
	PE	PE 3

Tab. 31: Connection motor cable to the suspension tester



Motor cables:

- The motor cable is supplied loose "off the reel".
- Cable length 15 m.
- Power 3 x 400 V AC.

**Settings at the soft-start module**

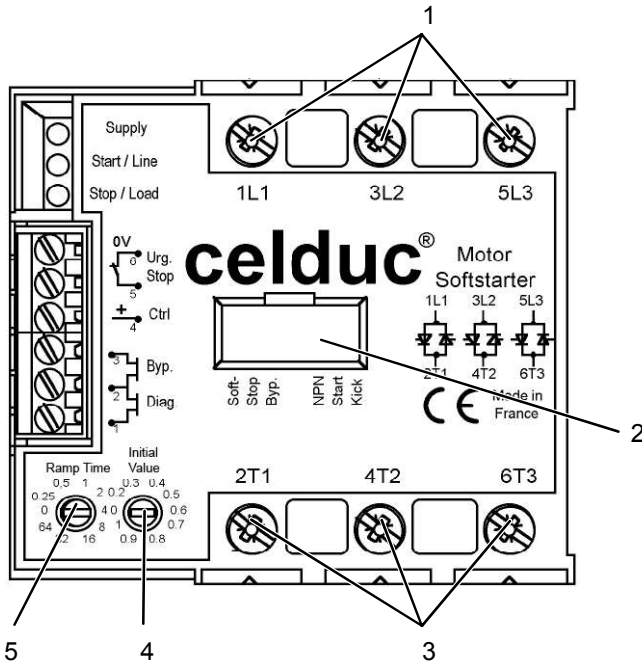


Abb. 85: Soft start module model Celduc

- 1 Connections L 1, L 2, L 3 (from contactors K 1 - K 4)
- 2 DIP switches (under the cover)
- 3 Connections T 1, T 2, T 3 (for motor cables M 1 and M 2)
- 4 Potentiometer for setting "Initial Value"
- 5 Potentiometer for setting "Ramp Time"

**Settings at soft-start module:**

- Initial Value: Voltage value (in percent) at which the soft-start module of the motor starts up.
- Ramp Time: Time from the starting of the motor until a voltage or amperage of 100% is reached.

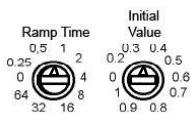


Abb. 86: Potentiometers for "Ramp Time" and "Initial Value"

1. Check the settings:
  - Potentiometer "Ramp Time" = 1.
  - Potentiometer "Initial Value" = 0.3.

**!** The arrow symbols at the adjusting screws and not the notches must point to the selected values.

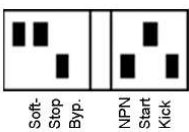


Abb. 87: DIP switches

2. Remove the cover of the DIP switches.
3. Check the settings as per the illustration.

**5.5.7 Box power section  
230 V / 400 V AC / 5 kW**

**!** Only applicable to 5 kW motors in the roller set with a voltage of 3 x 230 V AC or 3 x 400 V AC.

**i** Larger contactors are required for 5 kW motors than for 3.7 kW motors. The contactors are located in an external box.

**Connection scheme**

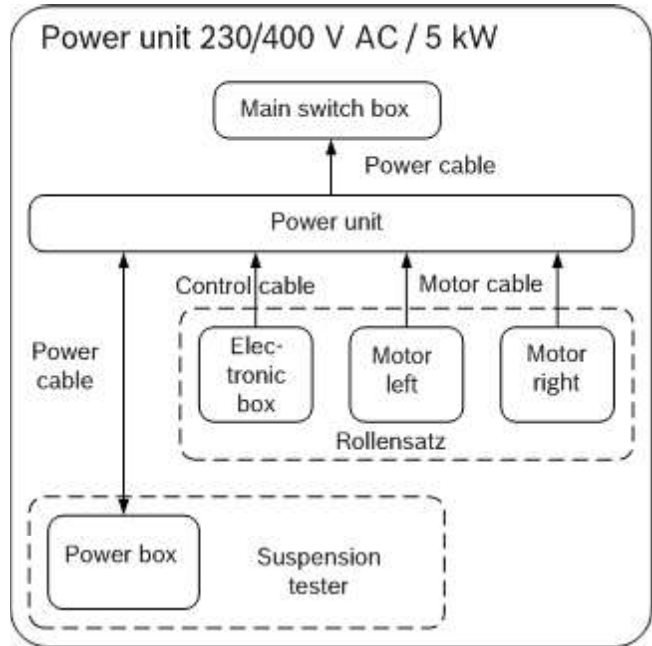


Abb. 88: Connection scheme power section 230 V / 400 V AC / 5 kW

**Selection of voltage class**

- ! Before operating the power unit the voltage class must be selected.
- ! The main switch box must be turned off during work on the power unit.
- i The factory default selection is for 3 x 400 V AC transformer primary voltage.
- ! For a line voltage of 3 x 230 V AC the transformer primary voltage selection must be changed.

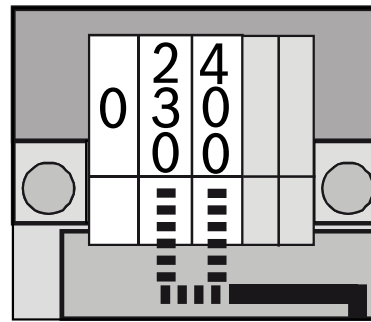


Abb. 90: Section at the transformer terminals

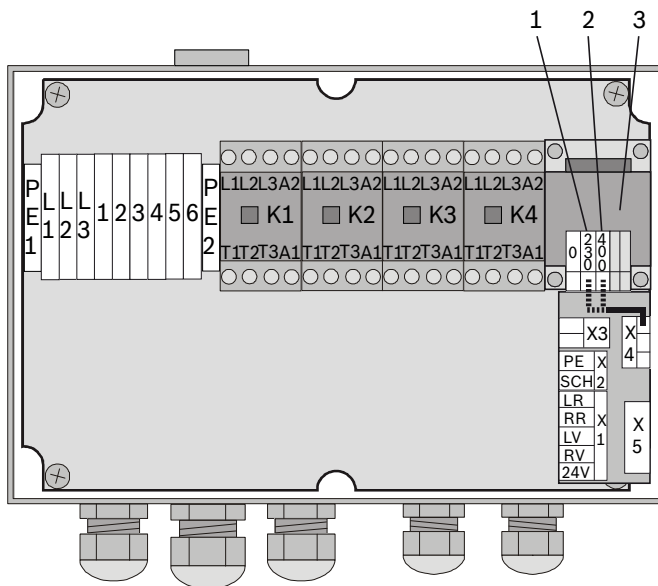


Abb. 89: Power section 230 V / 400 V AC / 5 kW (QD-3030)  
Selection voltage class

- 1 Terminal 230 V Primary voltage
- 2 Terminal 400 V Primary voltage (Factory setting)
- 3 Transformer

i Transformer connection for 230 V AC line voltage.:

1. Remove red wire from terminal 400 V
2. Connect the red wire to terminal 230 V.

i For more information about connecting the power section see the Installation instructions.

➔ Changing of the voltage selection is completed.

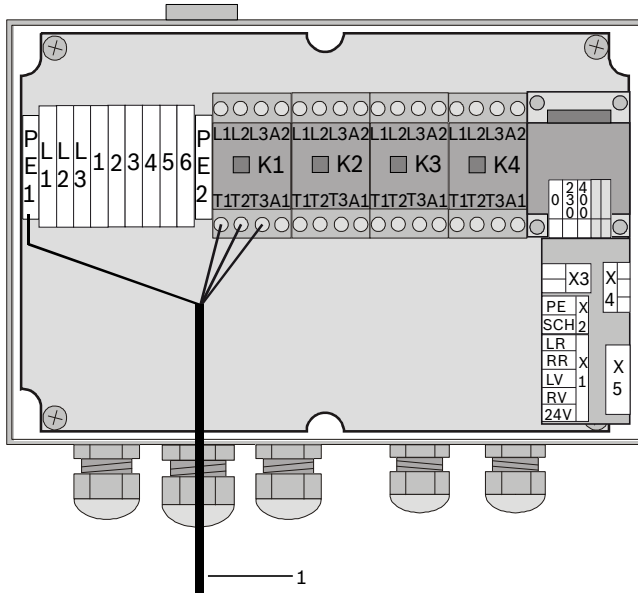
**Power supply cable to the main switch box**


Abb. 91: Power section 230 V / 400 V AC / 5 kW (QD-3030) with power supply cable to the main switch box

1 Power supply cable

No.	Core	Terminal power splitter
1	L 1	T 1 (K 1)
	L 2	T 2 (K 1)
	L 3	T 3 (K 1)
	PE	PE 1

Tab. 32: Connection power supply cable from the main switch box



Power cable:

- The power supply cable to the main switch box has already been connected to the power section at the factory.
- Cable length 3 m.
- Power 3 x 230 V AC or 3 x 400 V AC.

**Motor cable from the roller set**

1. Loosen the nuts of the middle PG Cable gland.
2. Guide the two motor cables through the nuts of the PG cable gland and into the box as per the illustration.
3. Connect the cores of the cables as per the illustration and the table.
4. Tighten up the nuts of the PG cable gland.

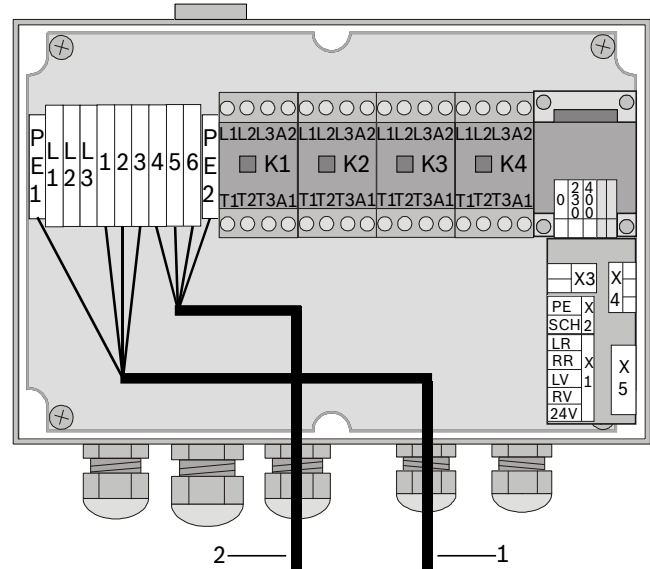


Abb. 92: Power section 230 V / 400 V AC / 5 kW (QD-3030) with 2 motor cables to the roller set

- 1 Motor cable left-hand motor M 1
- 2 Motor cable right-hand motor M 2

No.	Core	Terminal power splitter	Terminal motor
1	L 1	1 (M 1)	U (M 1)
1	L 2	2 (M 1)	V (M 1)
1	L 3	3 (M 1)	W (M 1)
1	PE	PE 1	PE (M 1)
2	L 1	4 (M 2)	U (M 2)
2	L 2	5 (M 2)	V (M 2)
2	L 3	6 (M 2)	W (M 2)
2	PE	PE 2	PE (M 2)

Tab. 33: Connection motor cable from the roller set



Motor cables:

- The two motor cables to the power section have already been connected in the roller set to the motors at the factory.
- Cable length 15 m.
- Power 3 x 230 V AC or 3 x 400 V AC.

**Control cable from roller set**

1. Loosen the nut of the right-hand PG cable gland.
2. Guide the control cable through the nuts of the PG screw connection and into the box as per the illustration.
3. Connect the cores of the cable as per the illustration and the table.
4. Tighten up the nut of the PG cable gland.

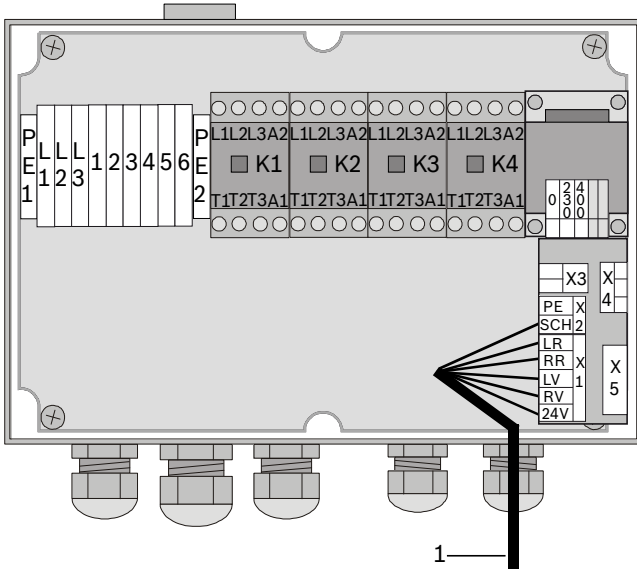


Abb. 93: Power section 230 V / 400 V AC / 5 kW (QD-3030) with control cable to the roller set

1 Control cable

No.	Core	Terminal power splitter
1	Brown	+ 24 V DC (X 1)
	Green	RV (X 1)
	White	LV (X 1)
	Grey	RR (X 1)
	Yellow	LR (X 1)
	Shielding	SCH (X 2)

Tab. 34: Connection control cable from electronics box



Control cable:

- The control cable to the power section has already been connected in the roller set to the electronics box at the factory.
- Cable length 15 m.
- Power 1 x 24 V DC.

**Motor cable to the suspension tester**



! Connection only applicable for suspension tester SDL 430 - 435.

1. Loosen the nut of the left-hand PG cable gland.
2. Guide the motor cable through the nut of the PG cable gland and into the box as per the illustration.
3. Connect the cores of the cable as per the illustration and the table.
4. Tighten up the nuts of the PG cable gland.

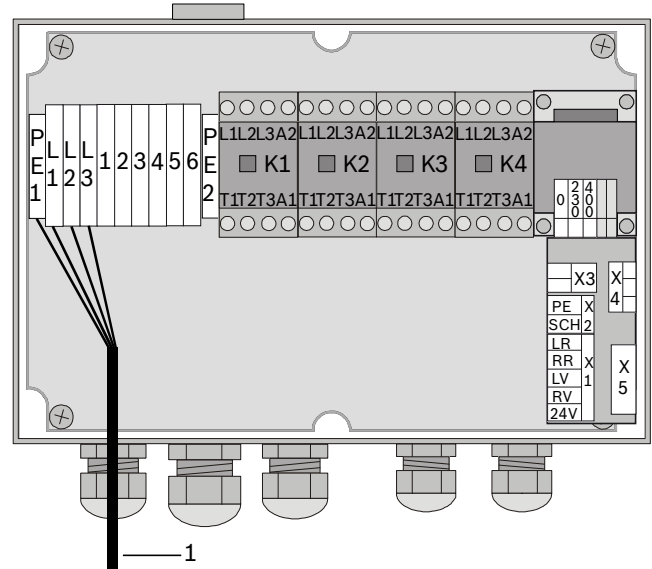


Abb. 94: Power section 230 V / 400 V AC / 5 kW (QD-3030) with motor cable to the suspension tester

1 Motor cable

No.	Core	Terminal power splitter
1	L 1	L 1
	L 2	L 2
	L 3	L 3
	PE	PE 1

Tab. 35: Connection motor cable to the suspension tester



Motor cables:

- The motor cable is supplied loose "off the reel".
- Cable length 15 m.
- Power 3 x 230 V AC or 3 x 400 V AC.

## 5.6 Connect the bus cable

### 5.6.1 Bus systems

- Two bus systems are used:
- Bnet bus
  - LON bus

### 5.6.2 Bnet bus

#### Description

Name Bnet = Beissbarth Network.

Bus type: Arcnet bus

#### Function

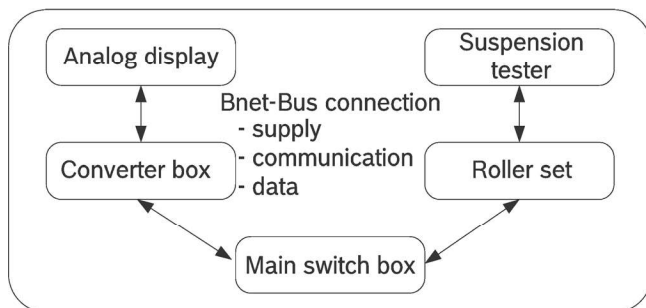


Abb. 95: Bnet bus connection

- The Bnet bus connects all the subscribers to the:
- Power supply.
  - Communication and for data transfer.

#### Voltage

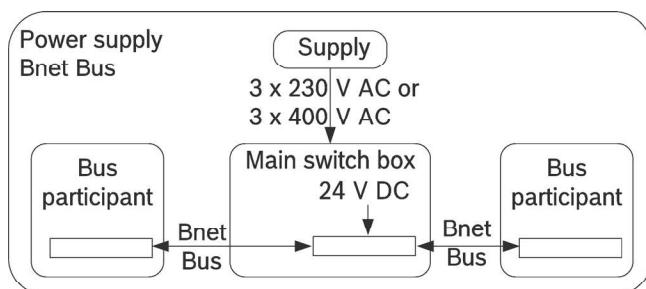


Abb. 96: Supply voltage Bnet bus

- Bus voltage:
- The voltage of 24 V DC is generated in the main switch box and fed into the bus.
  - All the electronics (= PCBs and sensors, exception suspension tester SDL 49x and PC) of the system are supplied with the voltage.

#### Participants

Subscribers of the Bnet bus are:

Participants	Function
Main switch box	Power supply
"Intelligent" power box in the roller set	Control roller set
Electronics box in the roller set	Control roller set
"Intelligent" power box in the suspension tester	Control suspension tester
Analogue display	Control display
Converter box printer	Control printer with analogue display
Converter box PC	Interface bus system and electronics in the PC

Tab. 36: Subscribers Bnet bus

- Number of subscribers:
- Minimum 3 subscribers: Main switch box, test device (roller set or suspension tester) and display (analogue or PC).
  - Maximum 11 subscribers.


- Side slip tester:
- The side slip tester is not a bus subscriber.
  - It is connected as a "sensor" to the nearest Bnet bus test device = suspension tester (only SDL 430 - 435) or roller set.

- Connection box pedal force sensor:
- The pedal force sensor is not a bus subscriber.
  - It is connected as a "sensor" to the roller set.

- Suspension tester SDL 49x:
- The suspension tester SDL 49x is not a Bnet bus subscriber.
  - It is connected via the LON bus.





**Cable**

 Bnet bus cable:  
"off the reel", unshielded, 15 m long, 4-core

Core colour	Function
Brown	+ (24 V DC)
White	- (GND)
Green	A (send data)
Yellow	B (receive data)

Tab. 37: Bnet bus cable

 Maximum 130 m bus cable length.

-  Cabling principle of bus network:
- All subscribers must be connected with the bus cable.
  - The bus cable is looped through to the next subscriber.
  - It does not matter in which order the subscribers are connected to one another.
  - The bus must have a starting and an end subscriber.

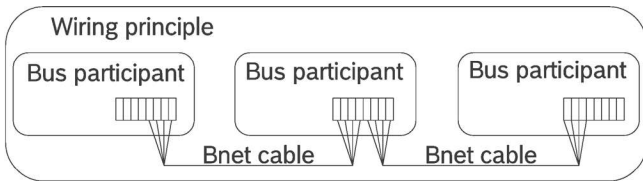



Abb. 97: Bnet bus cabling principle

 Star or ring cabling (without a starting and end point) is not permitted.

 Connectorizing:

1. Cut up and cut to length the cables according to the Bnet bus subscribers and local circumstances.
2. Connectorize the cable as shown in the illustration.

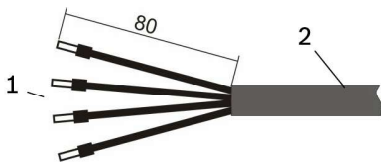


Abb. 98: Connectorizing Bnet bus cable  
1 Cores with ferrules  
2 Cable sheath

**Connection**

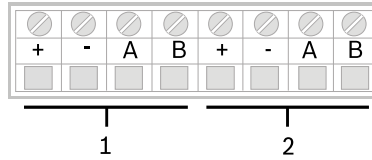



Abb. 99: Connection strip Bnet cable for main switch box and analogue display

- 1 Cable input Bnet bus cable
- 2 Cable output Bnet bus cable optional (to the next subscriber)

-  Connection strip:
- Each bus subscriber has a connection strip (2 x 4-pole) for the Bnet cable.
  - Only 4 poles are occupied for the starting and end subscribers.
  - With all other subscribers 8 poles are used to allow the cable to be looped through to the next subscriber.

**Main switch box**

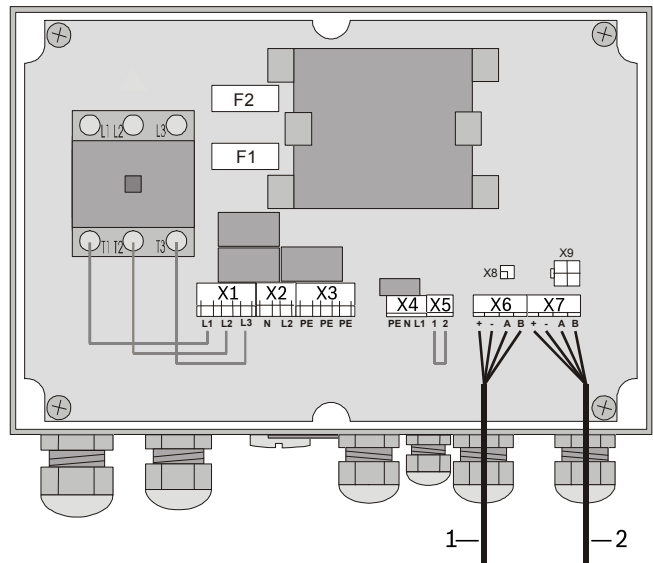


Abb. 100: Main switch box connection Bnet bus cable

- 1 Cable input
- 2 Cable output optional (to the next subscriber)

No.	Core	Plug	Terminal
1	Brown	X 6	+
	White		-
	Green		A
	Yellow		B
2	Brown	X 7	+
	White		-
	Green		A
	Yellow		B

Tab. 38: Main switch box connection Bnet bus cable

**Power and electronics box**

1. Connect the bus cable as per the illustration.
2. If required, connect the bus cable for additional subscribers.

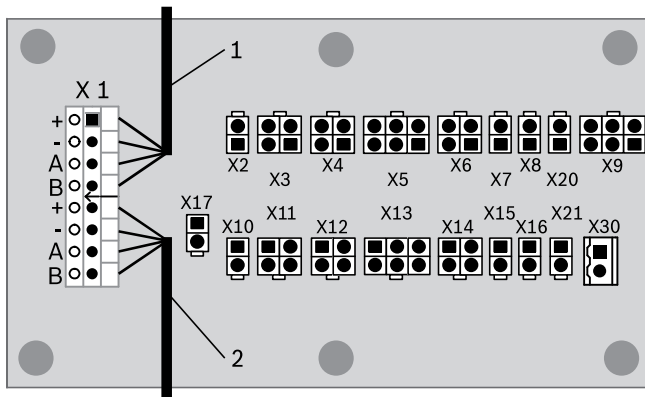


Abb. 101: Power and electronics box connection Bnet bus cable  
 1 Cable input  
 2 Cable output optional (to the next subscriber)

No.	Core	Plug	Terminal
1	Yellow	X 1	B
	Green		A
	Brown		+
	White		-
2	Yellow	X 1	B
	Green		A
	Brown		+
	White		-

Tab. 39: Power and electronics box connection Bnet bus cable

**Analogue display**

1. Connect the bus cable as per the illustration.
2. If required, connect the bus cable for additional subscribers.

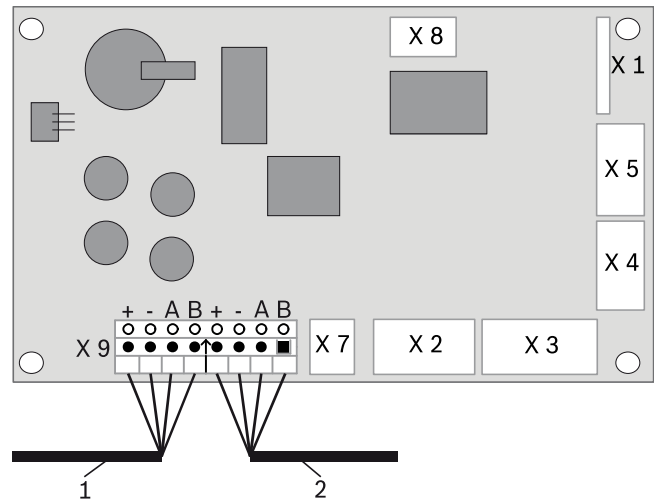


Abb. 102: Analogue display connection Bnet bus cable  
 1 Cable input  
 2 Cable output optional (to the next subscriber)

No.	Core	Plug	Terminal
1	Brown	X 9	+
	White		-
	Green		A
	Yellow		B
2	Brown	X 9	+
	White		-
	Green		A
	Yellow		B

Tab. 40: Analogue display connection Bnet bus cable

**Converter boxes**



Abb. 103: Converter box (here for printer)

**ii** Bus cable connection by a plug.

1. Connect the plug as per the illustration.



Abb. 104: Pin connections plug

Core colour	Plug
Brown	1
White	2
Green	3
Yellow	4

Tab. 41: Pin connections plug for Bnet bus cable

2. Mount the cable ties to relieve the strain.
3. Assemble the plug as per the illustration.
4. Screw the plug to the converter box.
5. Install additional plugs as required.

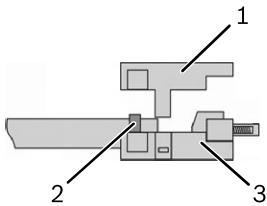


Abb. 105: Plug assembly

- 1 Housing upper part
- 2 Cable ties
- 3 Housing lower part

**ii** Cable tie mounting:

Insert the nodes of the cable tie into the housing parts so that they snap into place when assembled.

**Termination**



Termination of the bus network:

- The starting and end points of the network must be defined by a terminating resistance.
- Since the subscriber sequence in the network can be selected as desired, each subscriber has a configurable terminating resistance.



Termination principle:

- The termination must be configured on the PCB for each subscriber.
- The termination must be activated for the starting and end subscribers.
- With all other subscribers, where the bus cable loops through to the next, the termination must be deactivated at the PCB.



Activation type:

The terminating resistance is activated by means of jumpers:

- Term. ON: 1 - 2
- Term. OFF: 3 - 4

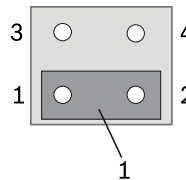


Abb. 106: Plug strip activation terminating resistance

1 Jumper

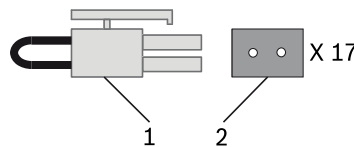


Abb. 107: Plug with cable link

1 Plug

2 Socket X 17 (connecting PCB power and electronics box)

Bus participants	Termination activation
Main switch box	Jumper
"Intelligent" power box	Plug with cable link
Electronics box	Plug with cable link
Analogue display	Jumper
Converter boxes	Jumper

Tab. 42: Termination bus subscribers

### Main switch box

- Set the jumpers according to the connection situation and the illustration.

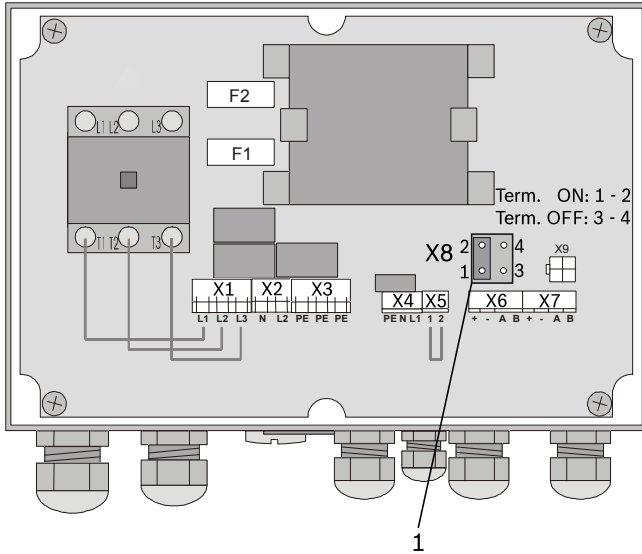


Abb. 108: Main switch box termination by jumper  
1 Termination activated (1-2)

No.	Slot	Termination active
1	X 8	Jumper connected to 1 - 2

Tab. 43: Termination for power and electronics box

### Power and electronics box

- Set the plug with a cable link according to the connection situation and the illustration.

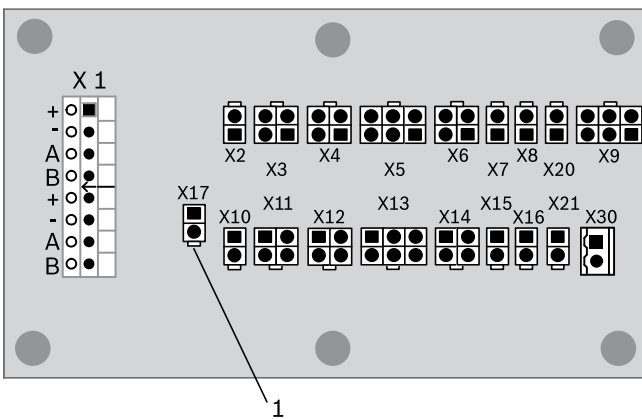


Abb. 109: Power and electronics box  
Termination by plug with cable link  
1 Slot X 17 (termination active with plug)

No.	Slot	Termination active
1	X 17	Plug with cable link connected

Tab. 44: Termination for power and electronics box

### Analogue display

- Set the jumper according to the connection situation and the illustration.

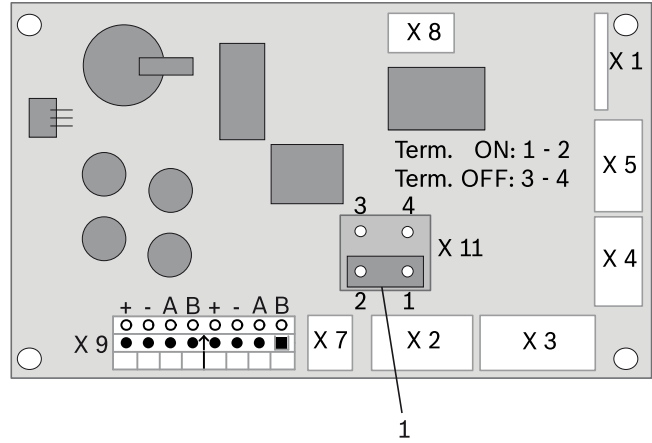


Abb. 110: Analogue display termination by jumper  
1 Termination activated (1-2)

No.	Slot	Termination active
1	X 11	Jumper connected to 1 - 2

Tab. 45: Termination for power and electronics box

### Converter boxes

- Set the jumpers according to the illustration.

- ⚠ **Marking:**  
There is no marking on the PCBs of the converter boxes regarding termination.

### Box PC (USB)

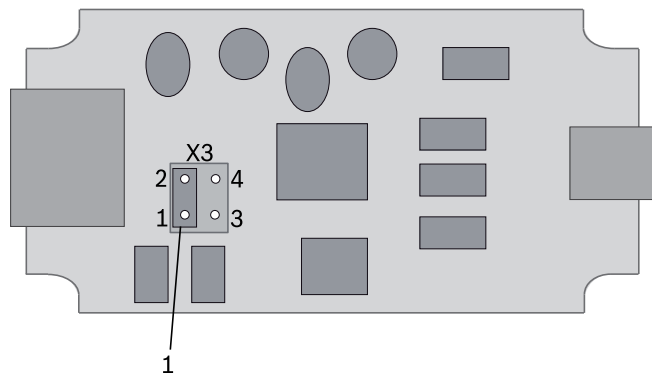


Abb. 111: Termination converter box PC (USB)  
1 Termination activated (1-2)

No.	Slot	Termination active
1	X 3	Jumper connected to 1 - 2 (left side)

Tab. 46: Termination for converter box USB

**Box PC (RS 232)**

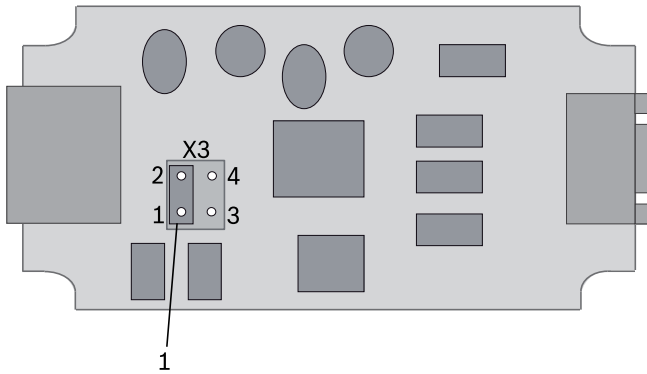


Abb. 112: Termination for converter box PC (RS 232)  
1 Termination activated (1-2)

No.	Slot	Termination active
1	X 3	Jumper connected to 1 - 2 (left side)

Tab. 47: Termination for converter box PC (RS 232)

**Box printer (Centronics)**

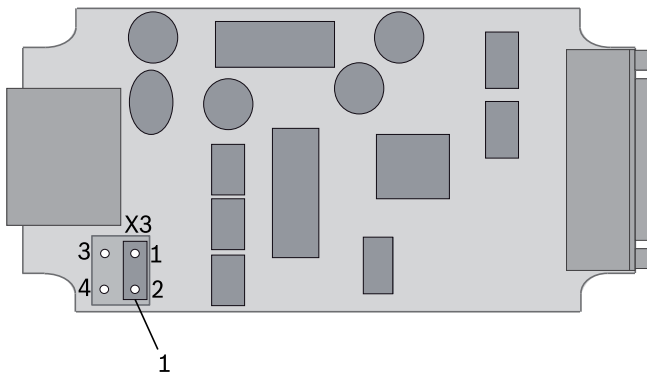




Abb. 113: Termination for converter box printer (Centronics)  
1 Termination activated (1-2)

No.	Slot	Termination active
1	X 3	Jumper connected to 1 - 2 (right side)

Tab. 48: Termination for converter box printer (Centronics)

 The jumpers for the converter boxes are set at the factory to activated termination (= pins 1-2).

**Example**

 Cabling and termination example:

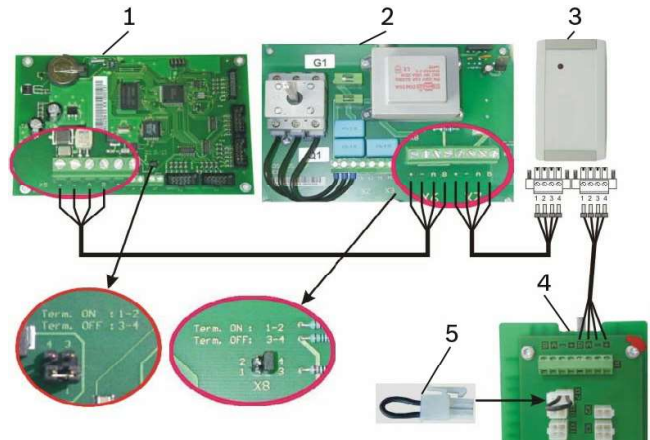


Abb. 114: Example for Bnet bus cabling and termination

No.	Bus participants	Bus cable	Bus termination
1	Analogue display	Start point	ON (1 - 2)
2	Main switch box	Looped through	OFF (3 - 4)
3	Converter box PC	Looped through	OFF (3 - 4)
4	Power box	End point	ON (connected to X 17)
5	Plug with bridge cable		

Tab. 49: Example for Bnet bus cabling and termination

### 5.6.3 LON bus

! Connect **LON bus** only suspension tester SAT 69x **version 1**.

! In suspension tester SAT 69x **LON bus** and **data cable serial not be used simultaneously**.

! Suspension tester SAT 69x can be operated only with PC.

#### Description

- ii LON bus:
- Name LON = Local Operating Network.
  - The bus is used to control the suspension tester SDL 49x via a PC.
  - Devices or components in the bus are designated as nodes.
  - Power supply: 24 V DC.

- ii Version 1:
- USB BOX for LON bus
  - USB cable (PC <-> USB box)
  - LON bus cable (USB box <-> power box)
  - Power socket for USB box

#### Cable scheme

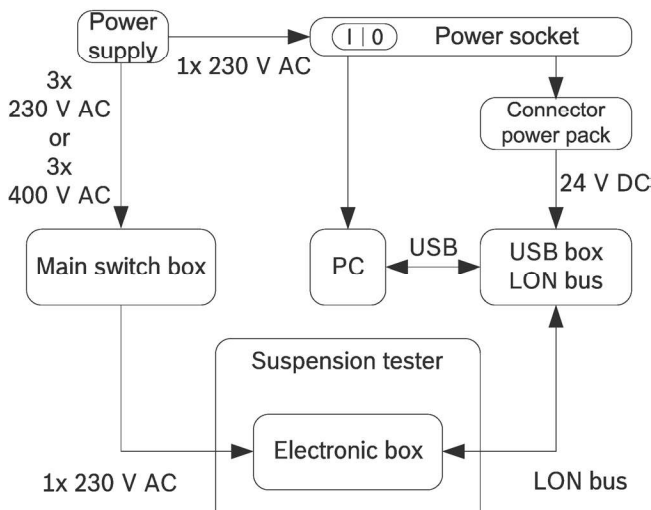


Abb. 115: Cable scheme suspension tester SDL 49x version 1

#### Bus cable

ii LON bus cable: = four cable cores are used:

Core colour	Function	Plug terminal
White / green	Send data	1
Green	Receive data	2
White/ brown	+ 24 V DC	3
Brown	Earth	4

Tab. 50: LON bus cable

#### Bus termination

ii The LON bus works with 2 subscribers:  
Power and USB box.  
Termination must be activated for both subscribers.

Bus participants	Type of termination
Power box	Connection resistance
USB box	Jumper on board

Tab. 51: Termination bus subscribers

**Power box**

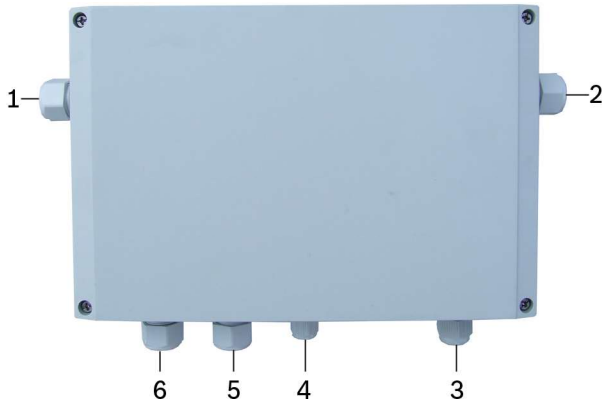


Abb. 116: Power box suspension tester SDL 49x

- 1 Motor cable right
- 2 Motor cable left
- 3 Power cable (power supply 230 V AC)
- 4 Dummy plug
- 5 Sensor cables left and right
- 6 LON bus cable

1. Undo the cable gland (PG) and feed the LON bus cable through.
2. Feed the cable into the box.
3. Connect the cable cores as per the illustrations.
4. Tighten up again the cable gland (PG).
5. Connect the cable cores of the bus terminating resistances as per the illustrations.
6. Fit the power box cover.

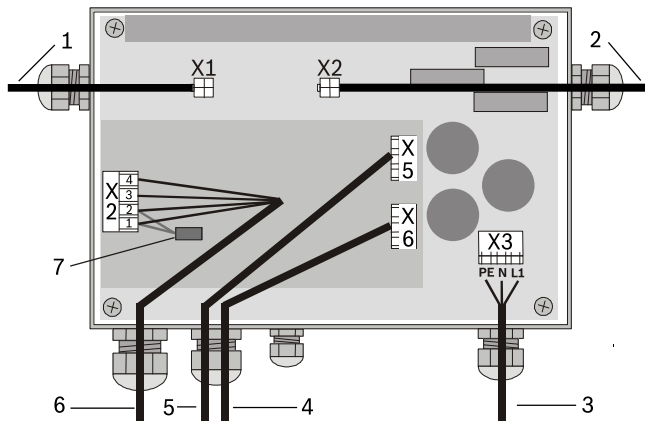


Abb. 117: Power box suspension tester SDL 49x with power and sensor board

No.	Cable	Plug Power board	Plug Sensor board
1	Motor cable right	X 1	
2	Motor cable left	X 2	
3	Power cable	X 3	
4	Sensor cable right		X 6
5	Sensor cable left		X 5
6	LON bus cable		X 2
7	Bus terminating resistor		

Tab. 52: Connection cable in the power box

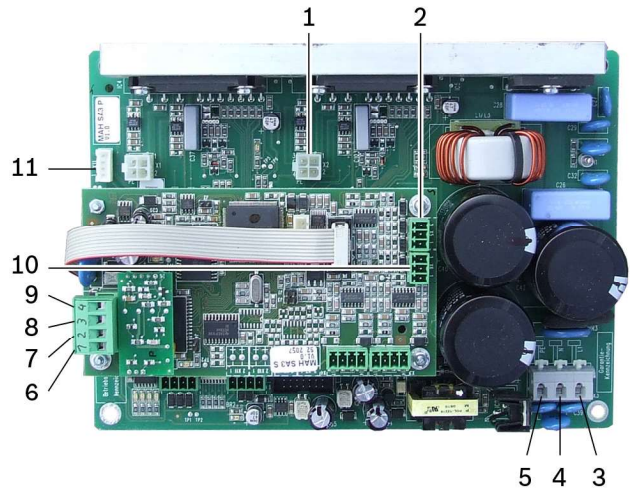


Abb. 118: Power and sensor board in the power box of the suspension tester SDL 49x

No.	Cable	Core
1	Motor cable left	1 - 3
2	Sensor cable right	1 - 3
3	Power cable	L 1
4	Power cable	N
5	Power cable	PE
6	LON bus cable	White/green
	Cable bus terminating resistor	Yellow
7	LON bus cable	Green
	Cable bus terminating resistor	Black
8	LON bus cable	White/brown
9	LON bus cable	Brown
10	Sensor cable right	1 - 3
11	Motor cable right	1 - 3

Tab. 53: Connection cable at the power and Sensorplatine

### Connection LON bus in the power box

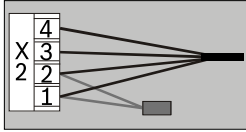


Abb. 119: Connection LON bus and terminating resistance at X 2.

Terminal	Cable	Core
1	LON bus (send data)	White/ green
1	Terminating resistor	Yellow
2	LON bus (receive data)	Green
2	Terminating resistor	Black
3	LON bus (+ 24 V DC)	White/ brown
4	LON bus (earth)	Brown

Tab. 54: Connection LON bus and terminating resistance at X 2

### Terminating resistance in the power box



Abb. 120: LON bus terminating resistance in the power box

1 Cable yellow

2 Cable black

3 Terminating resistor LON bus

### LON-USB box

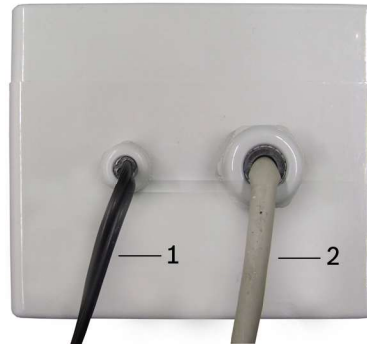


Abb. 121: LON-USB box left-hand side

1 Cable wall power supply

2 LON bus cable



Abb. 122: LON-USB box right-hand side

1 Connection USB cable

1. Remove the cover of the LON-USB box.
2. Undo the right-hand cable gland (PG), feed the LON bus cable an the earthing cable (main switch box) through.
3. Feed the cable into the box.
4. Fix the Lon bus cable shield at shield mounting.
5. Connect the cores of the LON bus cable.
6. Fix earthing cable at shroud.
7. Tighten up again the cable gland (PG).
8. Undo the left-hand cable gland (PG) and feed the cable from the plug power section through.
9. Feed the cable into the box.
10. Connect the cores of the cable.
11. Tighten up again the cable gland (PG).



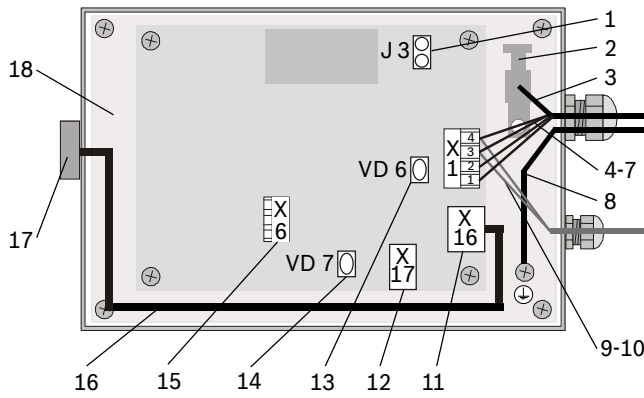


Abb. 133: LON bus box suspension tester SDL 49x

No.	Designation	Colour	Plug, Terminal, jumper, LED
1	Jumper bus termination		J 3
2	Shield mounting LON bus cable		Shroud
3	Shield LON bus cable		Shroud
4	LON bus cable power (GND)	Brown	X 1 Terminal 4
5	LON bus cable power (+ 24 V DC)	White/ brown	X 1 Terminal 3
6	LON bus cable data (receive)	Green	X 1 Terminal 2
7	LON bus cable data (send)	White/ green	X 1 Terminal 1
8	Earthing cable (GND)	Yellow/ green	Shroud
9	Cable wall power supply (GND)	Black	X 1 Terminal 4
10	Cable wall power supply (+ 24 V DC)	Black	X 1 Terminal 3
11	USB socket		X 16
12	Connecting socket wall power supply (optional)		X 17
13	LED status data transfer (USB)		VD 6
14	LED status power (5 V DC)		VD 7
15	Dongle noise simulation		X 6
16	USB cable		X 16
17	USB socket		Box housing
18	Shroud		Box housing

Tab. 62: LON bus PCB in the USB box

LED	Function	Status
Data transfer (USB)	No connection	Off
	Connection USB cable	Flashing briefly
	User software active, connection OK	On
	User software active, data transfer OK	Flashing
Power (5 V DC)	No 24 V DC power through wall power supply	Off
	Power through power supply unit, internal 5 V DC present	On

Tab. 63: LED Status bus subscribers

Jumper J 3	Status termination
Not set	Off = terminating resistor not active
Set	ON = terminating resistor active

Tab. 64: Termination by jumper J 3

10. Check the jumper positions.

! The bus terminating resistance must be activated.

### Noise simulation

- i SDL 495:
  - The suspension tester SDL 495 has the additional function of noise simulation.
  - The additional function is activated by a dongle.



Abb. 134: Dongle for additional function noise simulation

- i Dongle noise simulation:
  - The dongle is on the PCB in the LON USB box at slot X 6.

- Check whether the dongle has been plugged into the LON-USB box of the suspension tester SDL 495.
- Fit the cover.
- Plug the USB cable into the box.

### USB connection PC

! Only plug the USB cable into the PC when requested to do so during software installation.

- i Software installation PC see Installation Instructions Software.

## 5.7 Connect the data cable

! Connect cable only suspension tester SAT 69x **version 2**.

! In suspension tester SAT 69x **LON bus** and **data cable serial** not be used **simultaneously**.

! Suspension tester SAT 69x can be operated only with PC.

### Description

- Version 2 = data cable serial.
- Use = steering suspension tester -> PC.
- PC = 1 COM port 9 pin required.
- PC Software installation -> installation instructions Software.

### Cable scheme

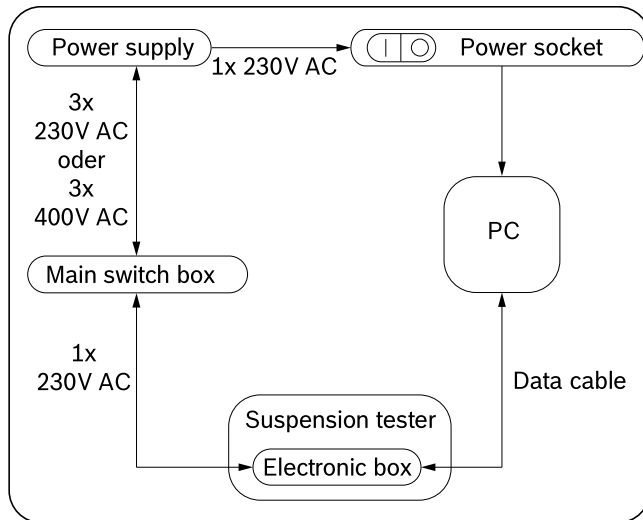


Abb. 123: Cable scheme suspension tester SDL 49x Version 2

### Data cable

- Connection PC <-> power box
- Length = 15 m
- Connection PC serial -> RS 232 receptacle
- Connection electronic box -> 4 pin plug
- Cable assignment = 3 cores

Core colour	Plug terminal
White	1
Yellow	2
-	3
Brown	4

Tab. 55: Data cable serial

### Power box

1. Undo the left cable gland (PG).
2. Feed the data cable through the gland.
3. Feed the cable into the box.

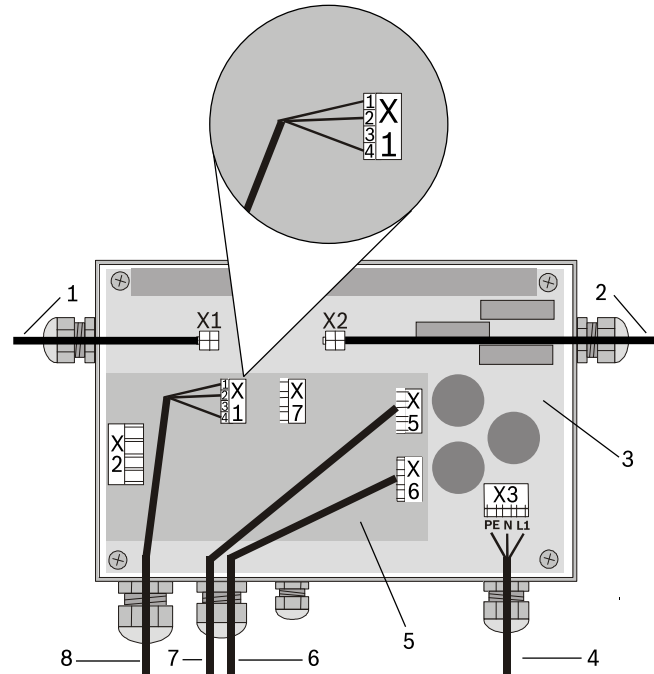


Abb. 124: Power box suspension tester SDL 49x with power and sensor board

No.	Cable/ Board	Receptacle Power board	Receptacle Sensor board
1	Motor cable right	X 1	
2	Motor cable left	X 2	
3	Power board	√	
4	Power cable	X 3	
5	Sensor board		√
6	Sensor cable right		X 6
7	Sensor cable left		X 5
8	Data cable serial		X 1

Tab. 56: Connection data cable serial in power box

4. Connect the cable on receptacle X1 of sensor board.
  5. Tighten up again the cable gland (PG).
  6. Fit the power box cover.
- ➔ Connecting data cable completed.

### 5.8 Configuring analog display

➤ Plug the jumpers according to the connection situation and the illustration:

❗ The print on the motherboard slot X 1002 (12 V / 24 V) has been mixed up. Observe graphics and tables below.

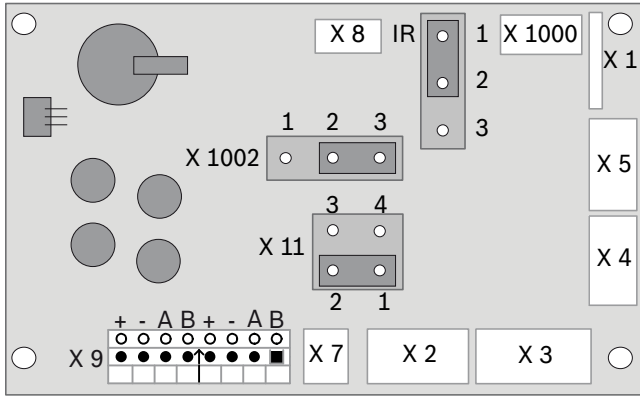


Abb. 125: Motherboard jumper

Slot	Jumper	Result
IR sensor	1 - 2 plugged	Truck (external)
	2 - 3 plugged	Passenger car (internal)
X 1002	1 - 2 plugged	Passenger car (24 V)
	2 - 3 plugged	Truck (12 V)
X 11	1 - 2 plugged	Termination activated
	3 - 4 plugged	Termination deactivated

Tab. 57: Motherboard jumper

➔ Configuration of analog display completed.

### 5.9 Connect the earthing cable

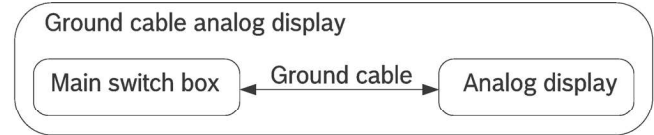


Abb. 126: Earthing cable for analogue display

ⓘ Earthing cable:  
"off the reel", 15 m in length.

1. Cut the earthing cable to length.
2. Connectorize the cable.
3. Connect the cable to the main switch box as per the illustration.

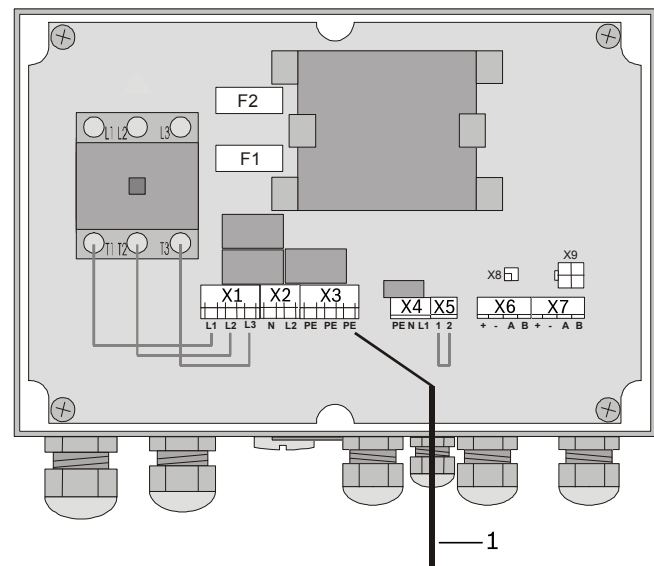


Abb. 127: Main switch box with earthing cable for analogue display  
1 Earthing cable

Core	Connection	Terminal
Earthing cable (PE)	X 3	PE

Tab. 58: Connection earthing cable

- Screw the cable to the threaded bolt of the analogue display as per the illustration.

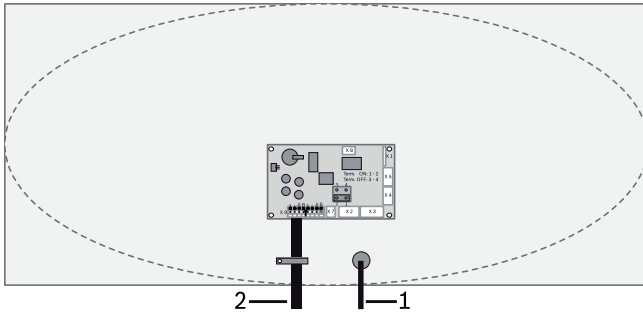


Abb. 128: Analogue display with earthing cable from the main switch box

- Earthing cable
- Bnet bus cable

Core	Connection	Terminal
Earthing cable (PE)	Threaded bolt	PE

Tab. 59: Connection earthing cable

## 5.10 Connect the side slip sensor cable

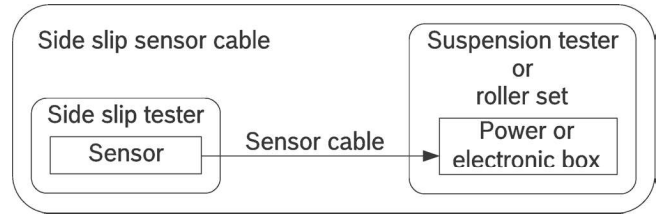


Abb. 129: Sensor cable side slip tester to the roller set

- Guide the sensor cable of the side slip tester to the suspension tester SDL 430 - 435 or roller set.
- Plug the cable into the power or electronics box.

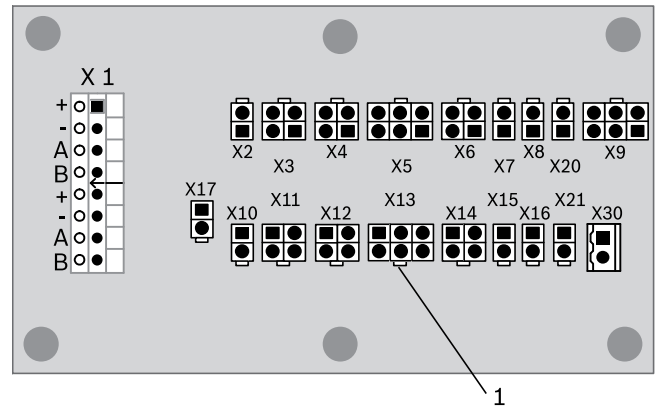


Abb. 130: Connection board of power or electronics box

- Connection side slip sensor at slot X 13

Core	Connection
Side slip sensor cable	X 13

Tab. 60: Connection side slip sensor cable in power or electronics box

### 5.11 Connect the pedal force sensor cable

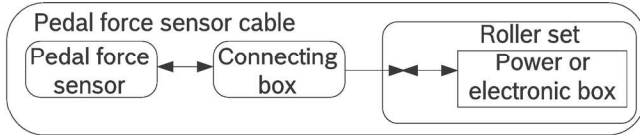


Abb. 131: Sensor cable pedal force to the roller set

1. Guide the cable from the connection box to the roller set.
2. Connect the cable with the adapter cable and plug it into the power or electronics box.

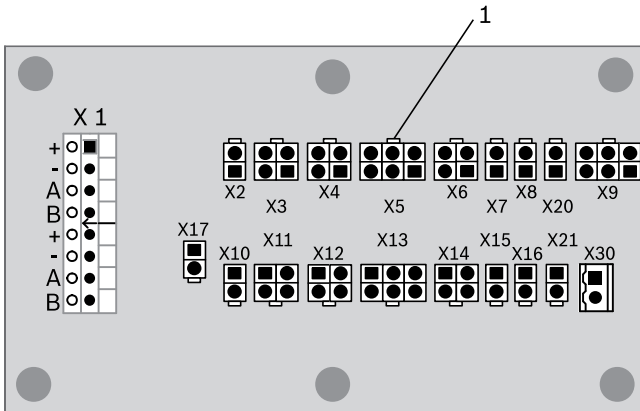


Abb. 132: Connection board of power or electronics box

1 Connection pedal force sensor cable at slot X 5

Core	Connection
Adapter cable for pedal force sensor	X 5

Tab. 61: Connection adapter cable for pedal force sensor in power or electronics box

### 5.12 Safety notes

The area must be permanently cordoned off or a hazard warning provided in the form of coloured marks on the floor. Permanent, conspicuous hazard warning markings (DIN 4844) are to be made on pit edges.




**Risk of injury in the area of the test roller!**

- Before actuating the master switch, make sure there is no-one in the area of the set of rollers.







## 6. Start-up

### 6.1 Installation checklist

-  Installation checklist:  
Before switching the system on for the first time, check that all the required installation steps have been carried out.
1. Has the installation of all the components been completed?
  2. Has the correct circuit breaker (characteristics C) been provided?
  3. Has the required cable link (terminal X 2) in the main switch box been set for a power supply of 230 V AC?
  4. Has the cable link (terminal X 5) been removed when using an emergency stop button and the button connected instead?
  5. Have the two 5 A microfuses in the main switch box been replaced by 10 A fuses when using the suspension tester SDL 49x?
  6. Has the power supply cable been looped through with all 3 phases from the main switch box up to the connecting socket of the first test device (BSA 42xx - 44xx), from there to the box of the second device (SDL 430 - 435)?
  7. Has the power supply cable of the suspension tester SDL 49x been connected to terminal X 4 in the main switch box?
  8. If using the soft-starter box, have the two power supply cables of the brake tester (BSA 43xx - 44xx) been connected to this box?
  9. If using the soft-starter box, has the power supply cable of the suspension tester (SDL 430 - 435) been connected to this box?
  10. Have the earthing cables been connected to all components with metal frames?
  11. Has the sensor cable of the side slip tester been connected to terminal X 13 of the power or electronics box of the following test device (SDL 430 - 435 or BSA 43xx - 44xx)?
  12. Have all Bnet and LON bus-capable components been connected with the respective bus cable?
  13. Do the Bnet and the LON bus have start and end points?
  14. Has bus termination been activated at the start and end points of the Bnet and LON bus and deactivated for all components in between?
  15. Is the colour coding of the Bnet and LON bus cable the same at the respective bus-capable components?
  16. Have the cable cores been properly connected at the plug terminal for the converter boxes?

### 6.2 Plug`n`Play

#### 6.2.1 Function

-  "Plug and Play" allows for Bnet bus-capable components starting up without a PC and software.
-  The following actions are carried out automatically for Bnet bus-capable devices when starting up with Plug`n`Play:
- Searching for components.
  - Configuration of the hardware.
  - Calibration of the test devices (a value from experience is used for side slip testers).
  - Creation of the test programs.
  - Configuration of the test programs.
  - Creation of the test lanes.
  - Configuration of the test lanes.
  - Display of error messages (as required).
-  Test program:
- Test programs define individually the test sequence, operation and test properties of a test device (for Plug`n`Play standard defaults).
  - There must be at least one test program per test device.
  - Test programs for multiple test devices can be combined into test lanes.
-  Production software (= firmware):  
The appropriate software is installed during the production of Bnet-capable components:
- Analogue display with 1 or 2 braking force scales.
  - Roller sets BSA 42xx or BSA 43xx - 44xx (low/high test speed, with/without electromagnetic brake, with/without reversal of direction).
  - Suspension tester SDL 430 or SDL 435 (with/without flywheel).
  - Converter box printer with language German or English.
-  Plug`n`Play label:
- Each Bnet-capable component marked with a Plug`n`Play sticker after the installation of the production software.
  - The background colour and the date of the label inform about the software version (not about the device type or version).
  - Each new software version is given a new background colour and a new date.
-  Installation CD:  
The production software is not on the installation CD for brake tester and test lanes.

### 6.2.2 Prerequisite

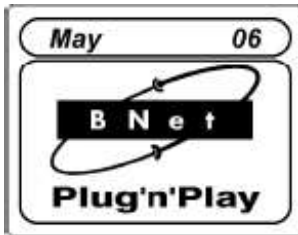


Abb. 135: Label for Plug`n`Play-capable devices

1. Bnet-capable components have a Plug`n`Play label.
2. The labels are identical (colour and date).
3. After the production software no further software (with Bnet Tool) is installed on one of the Bnet-capable components.

**i** Bnet Tool:  
Software program for a PC for manual startup and for service work.

4. Analogue display is available.
5. Installation sequence is specified for test lanes.

**i** Installation sequence:

1. Side slip tester
2. Suspension tester
3. Brake tester

6. The functions and settings are standard. Country-specific, legal or individual defaults are not possible.
7. A PC is not used for visualisation (Screen Lane) or service work (Bnet Tool) but instead only for archiving and order administration (Ordermanager).

**i** Screen Lane:  
Software program for a PC for the operation of test devices and display of the measured values in real time.

**i** Ordermanager:  
Software program for a PC for archiving, order administration and printing out test certificates.

**!** If the preconditions are not met or if errors occur, the startup must be done with a PC and the Bnet Tool program.

**!** Automatic startup with Plug`n`Play is not possible for the suspension tester SDL 49x. The suspension tester operates only with PC. The setup installs and configures the software.

**i** Software installation for SDL 49x refer to installation manual software.

### 6.2.3 Procedure

1. Press the automatic button at the analogue display and hold it down for at least 5 seconds after switching on the main switch box.
2. Turn on the switch at the main switch box.
3. The startup is carried out automatically.

**i** LCD display:  
"PnP" appears on the LCD display (optional) of the analogue display during startup.

**i** Braking force pointer:

- The green pointer shows the progress of the automatic startup.
- The red pointer is used for error messages.
- Startup has been completed once both pointers are back to zero on the scales.

**i** Repetition:  
The process can be repeated as often as desired to remove errors.

### 6.2.4 Error

**i** Error messages are shown at the right-hand braking force scale of the analogue display.

Error messages:

No.	Error number	Error designation	Error description
1	1000 N	No Plug`n`Play test device found.	Possible causes: Only display or printer is a Plug`n`Play device, defective EEPROM.
2	2000 N	Plug`n`Play test device does not respond.	Possible causes: Incorrect wiring, defective EEPROM.
3	3000 N	Calibration with Cal.-Check failed.	Sensor values not in valid range of 0 -1024 digits.
4	4000 N	Creation of a test lane failed.	Possible causes: Incorrect wiring, defective EEPROM.
5	5000 N	Configuration failed.	Possible causes: Incorrect wiring, defective EEPROM.
6	6000 N	Wrong Plug`n`Play version	Plug`n`Play versions of display and test device do not match.

Tab. 65: Error messages

### 6.3 Attaching the rating plate

! To complete initial commissioning, the rating plate must be attached to the main switch box for the brake test stand / test line. The rating plate must only be attached by an authorized service technician.

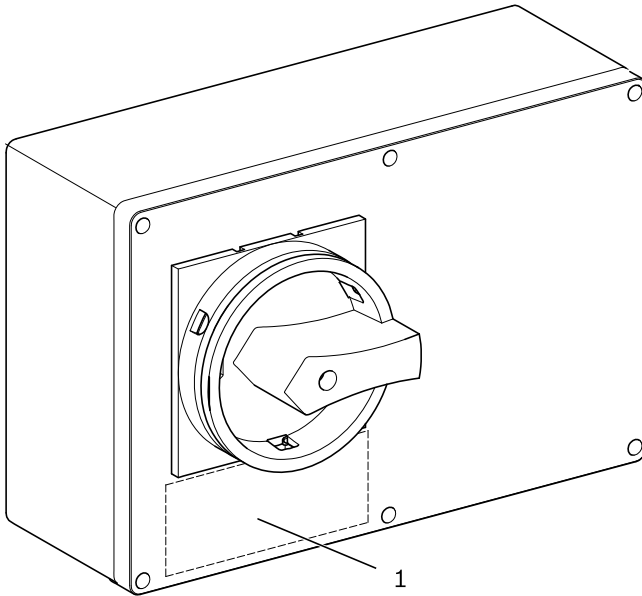


Abb. 136: Main switch box


1 Rating plate position

- Affix rating plate to the designated position.
- ➔ Rating plate attachment is complete.

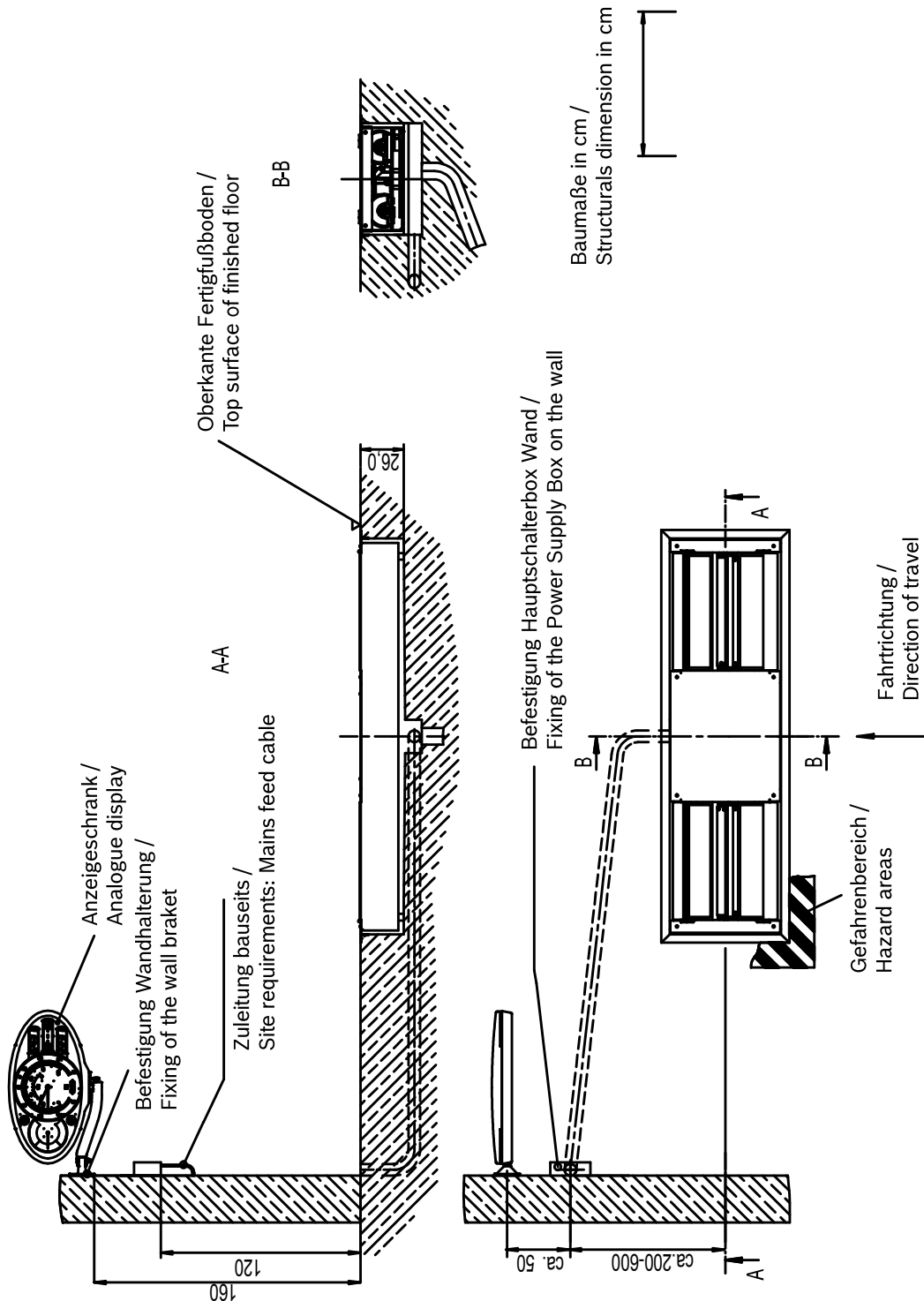


## 7. Appendix

### 7.1 Installation diagrams

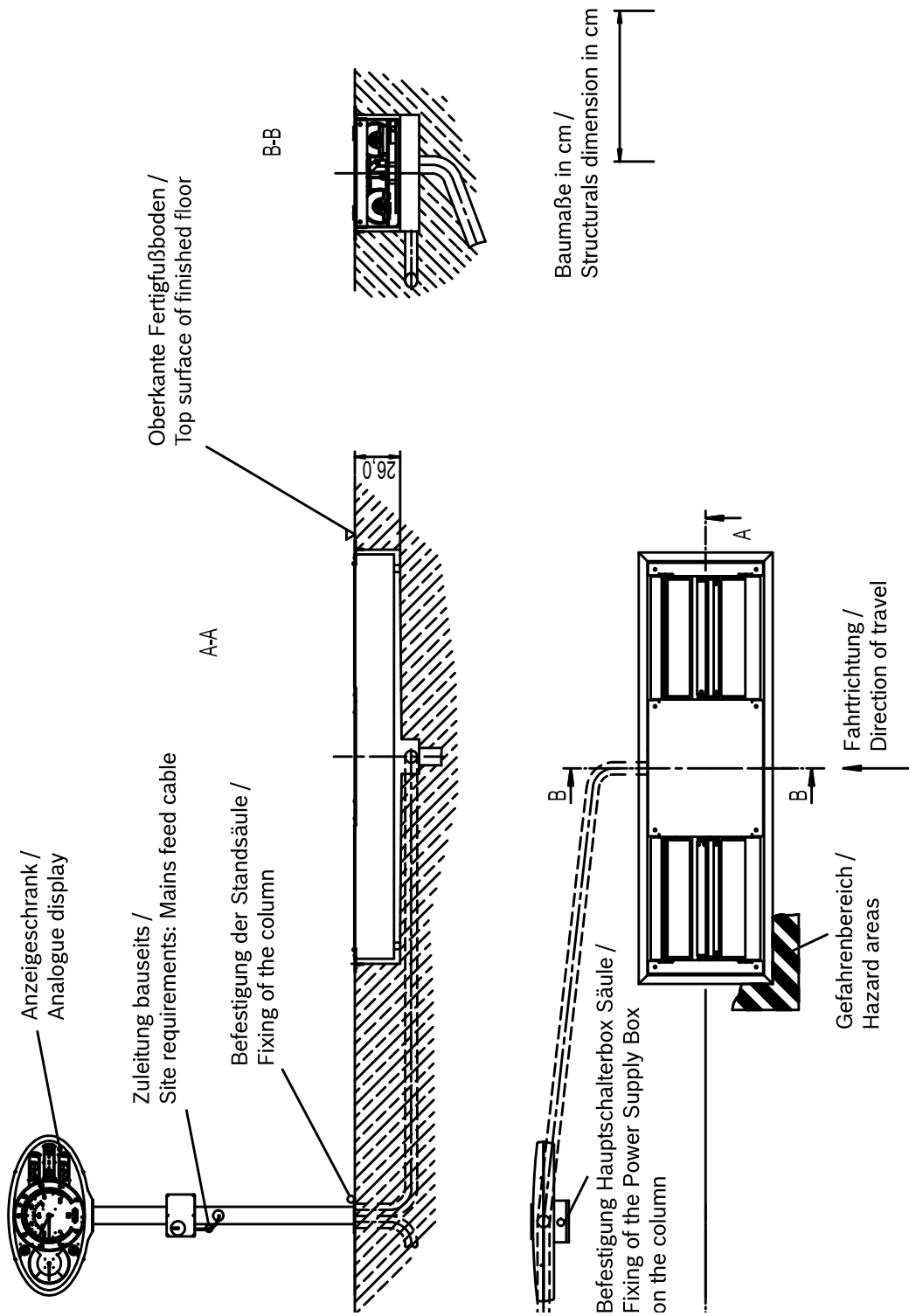
 Pit and installation diagrams:  
See the planning folder for further information and diagrams.

#### 7.1.1 Roller set BSA 42xx - 434x



925 600 026 - 01

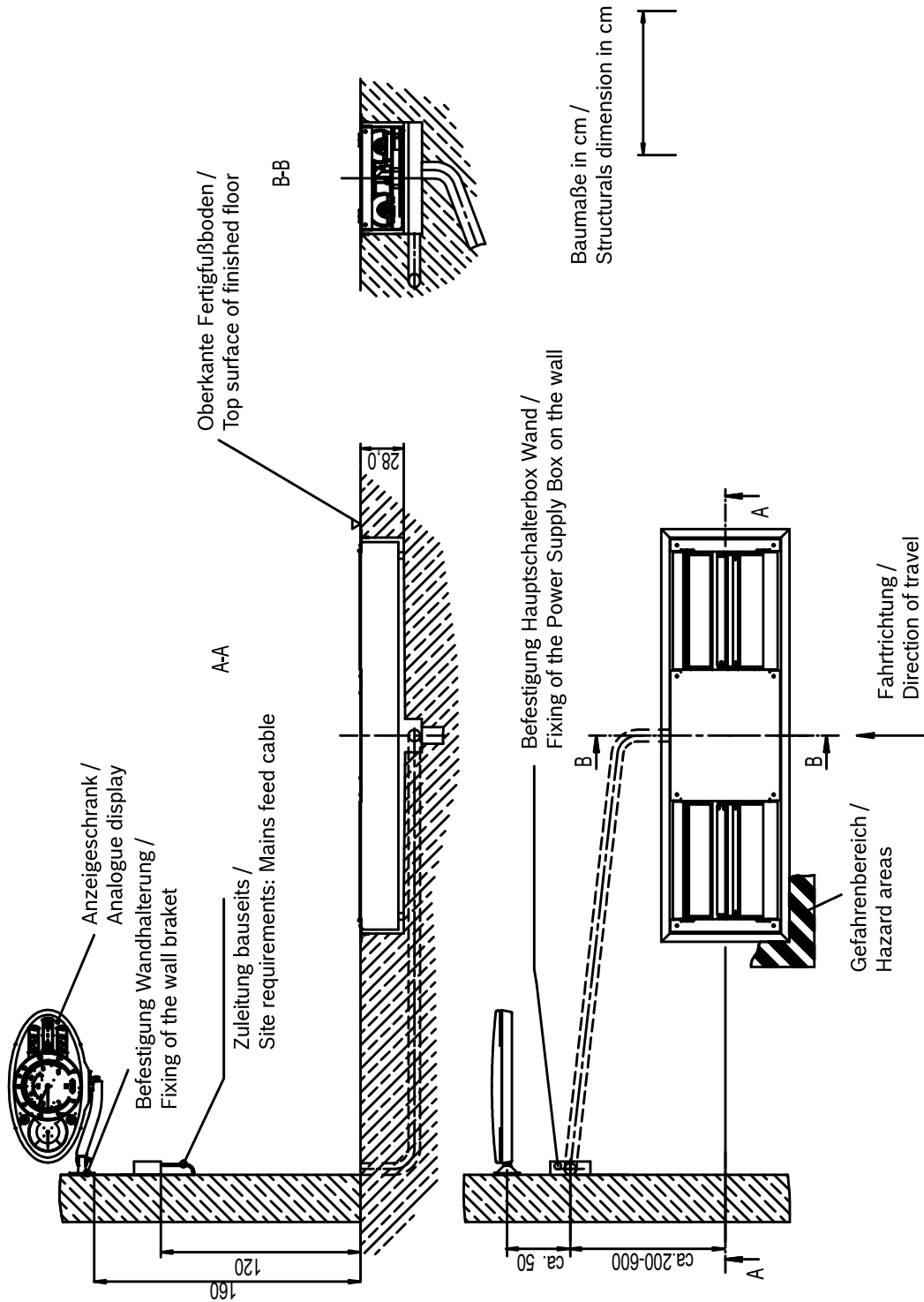
Abb. 137: Roller set BSA 42xx - 434x with wall bracket



925.600.028 - 01

Abb. 138: Roller set BSA 42xx - 434x with vertical column

7.1.2 Roller set BSA 436x



925 600 030 - 01

Abb. 139: Roller set BSA 436x with wall bracket

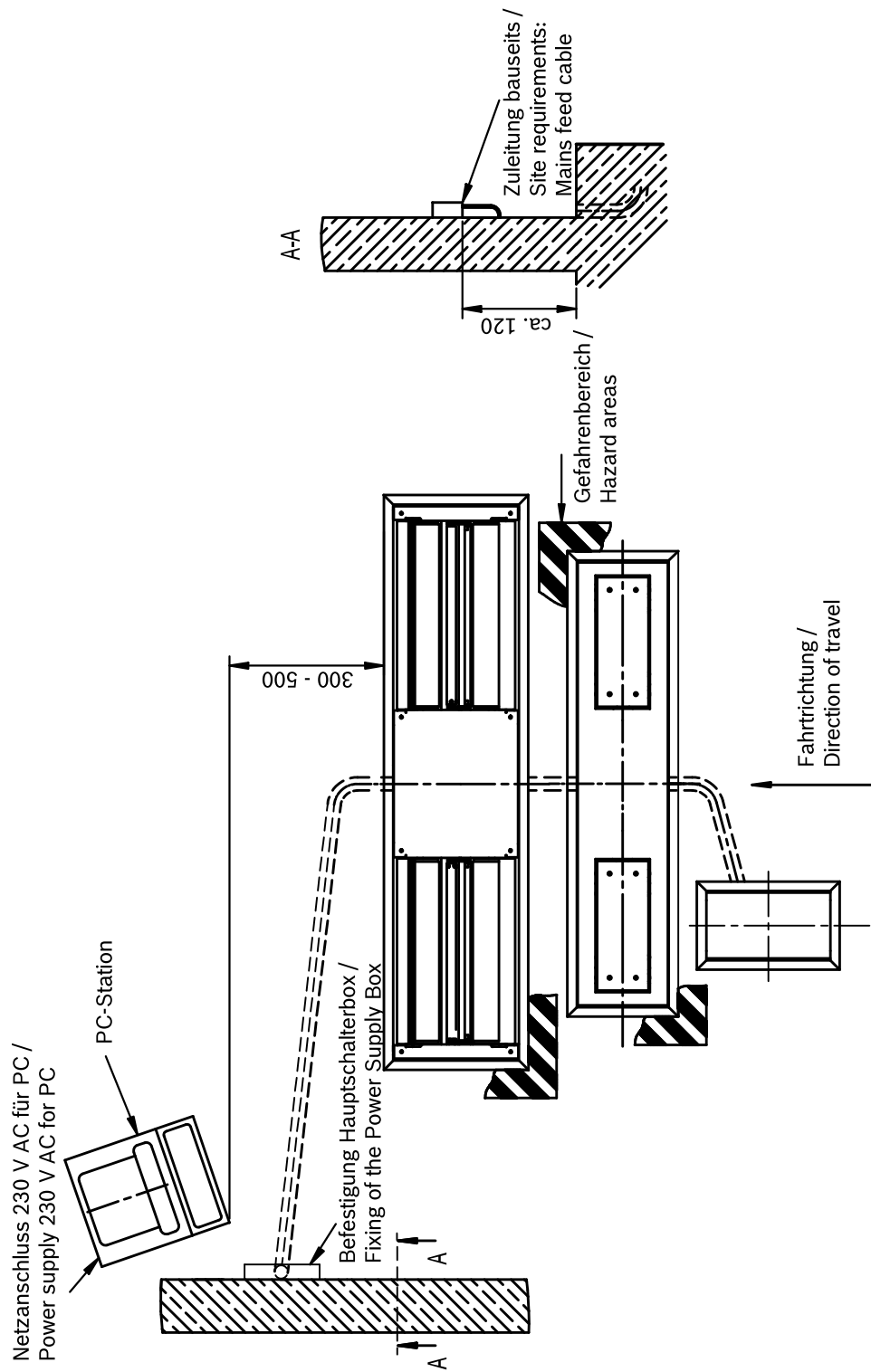
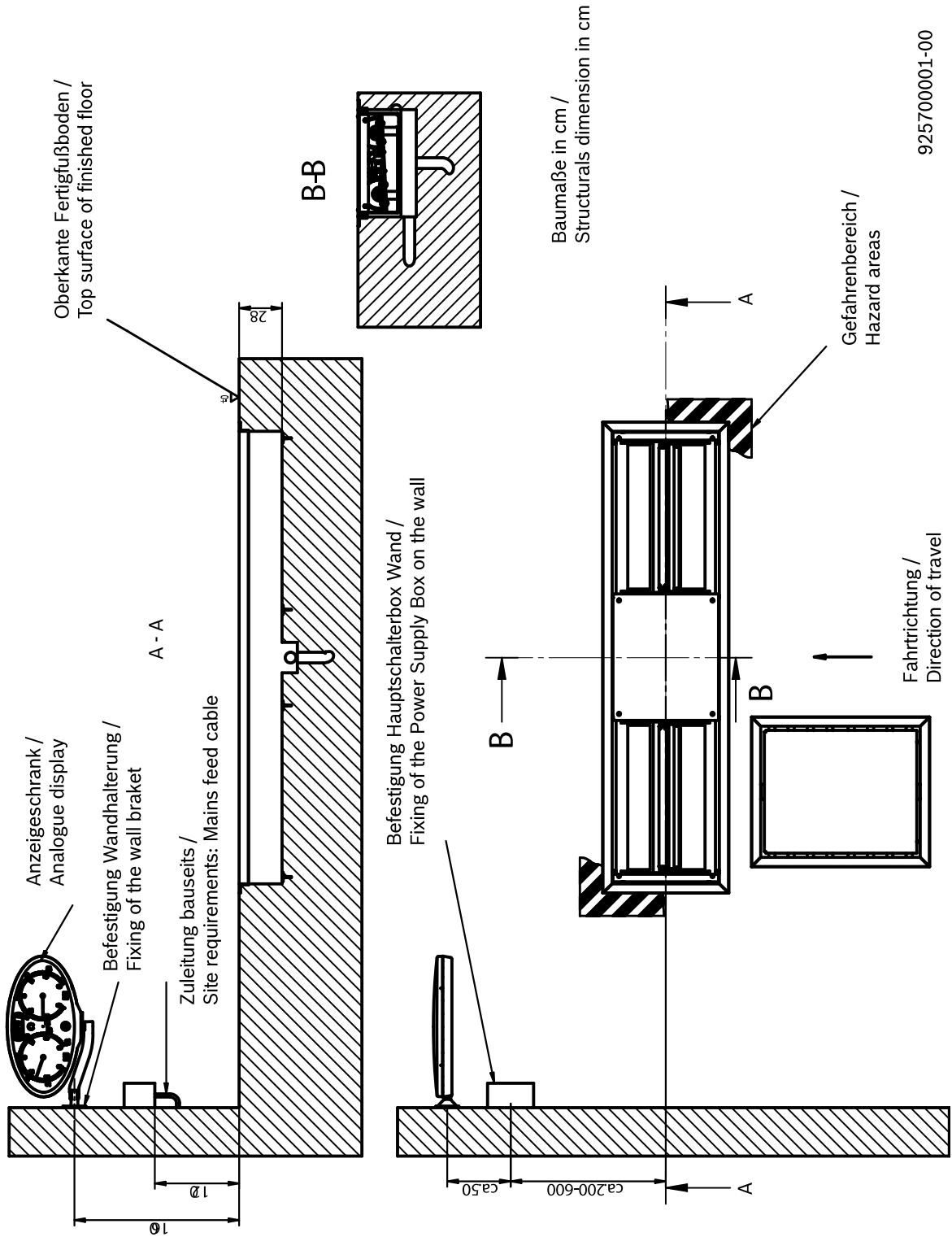


Abb. 140: Roller set BSA 436x with suspension tester SDL 430 - 435 and PC

7.1.3 Roller set BSA 44xx



925700001-00

Abb. 141: Roller set BSA 44xx

7.1.4 Test lane with SDL 430 - 435

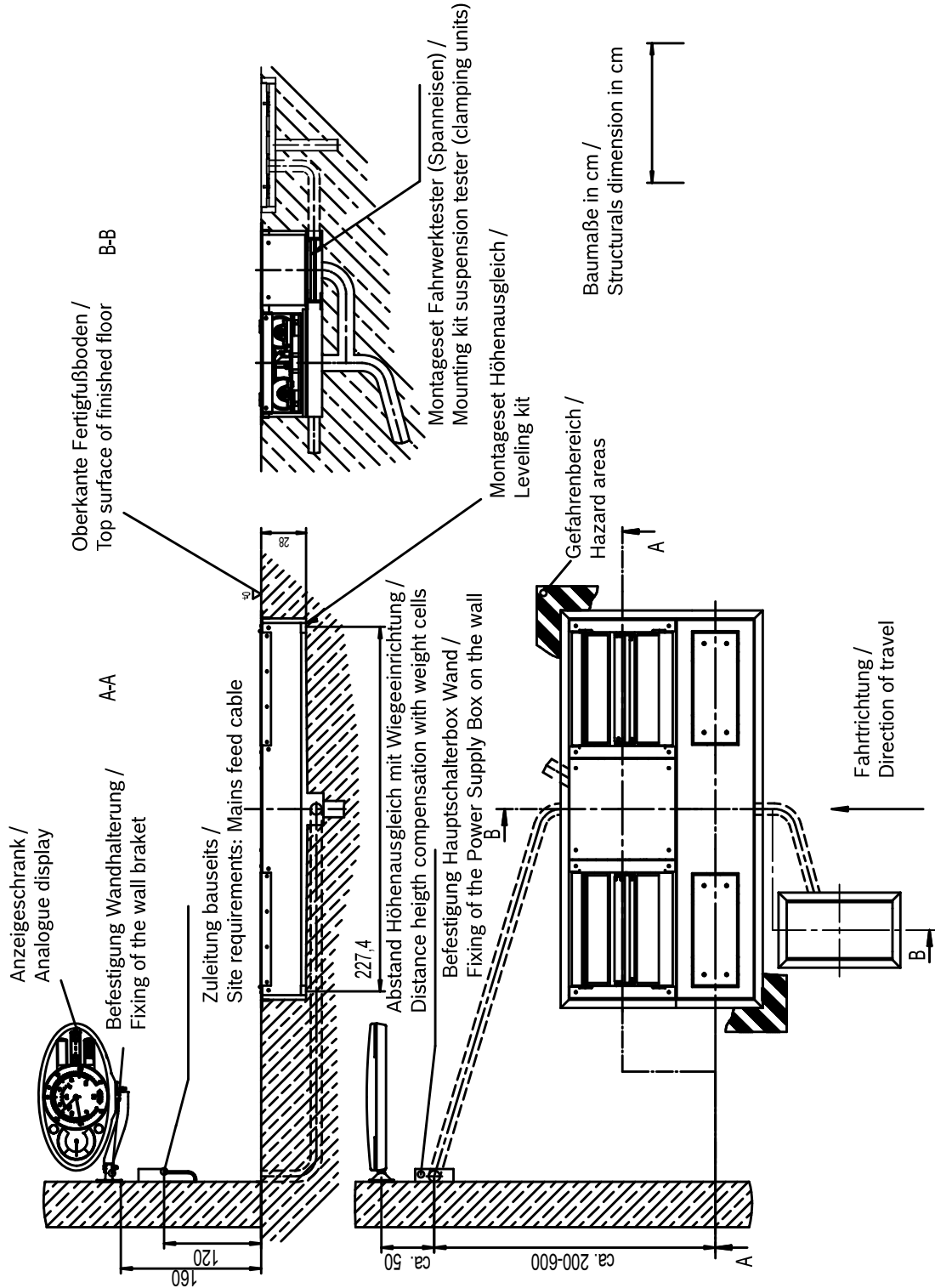
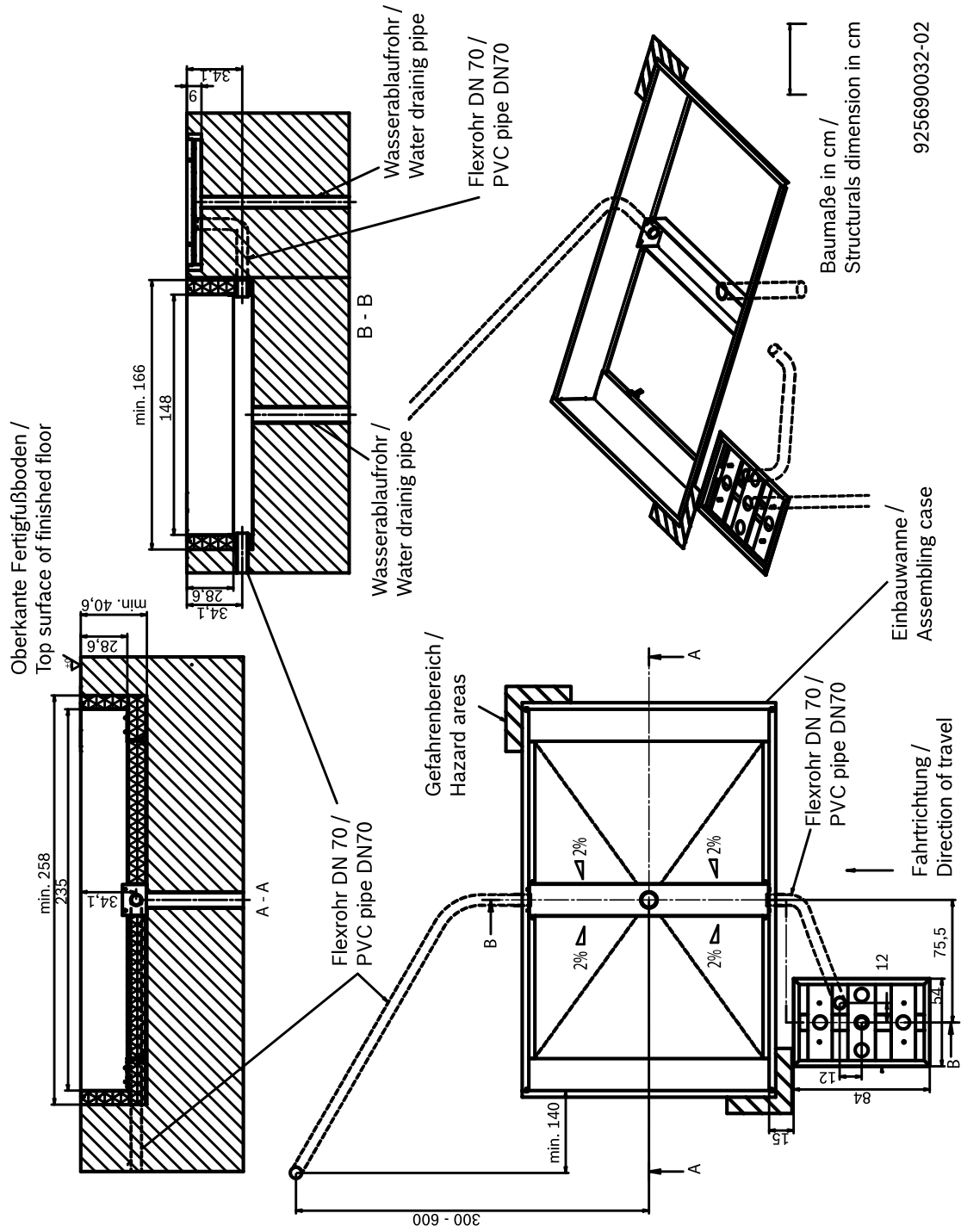


Abb. 142: Test lane with suspension tester SDL 430 - 435

925 690 011 - 03

7.1.5 Test lane with SDL 49x



925690032-02

Abb. 143: Test lane with suspension tester SDL 49x

## 7.2 Circuit diagrams

### 7.2.1 Main switch box 3 x 400 V AC

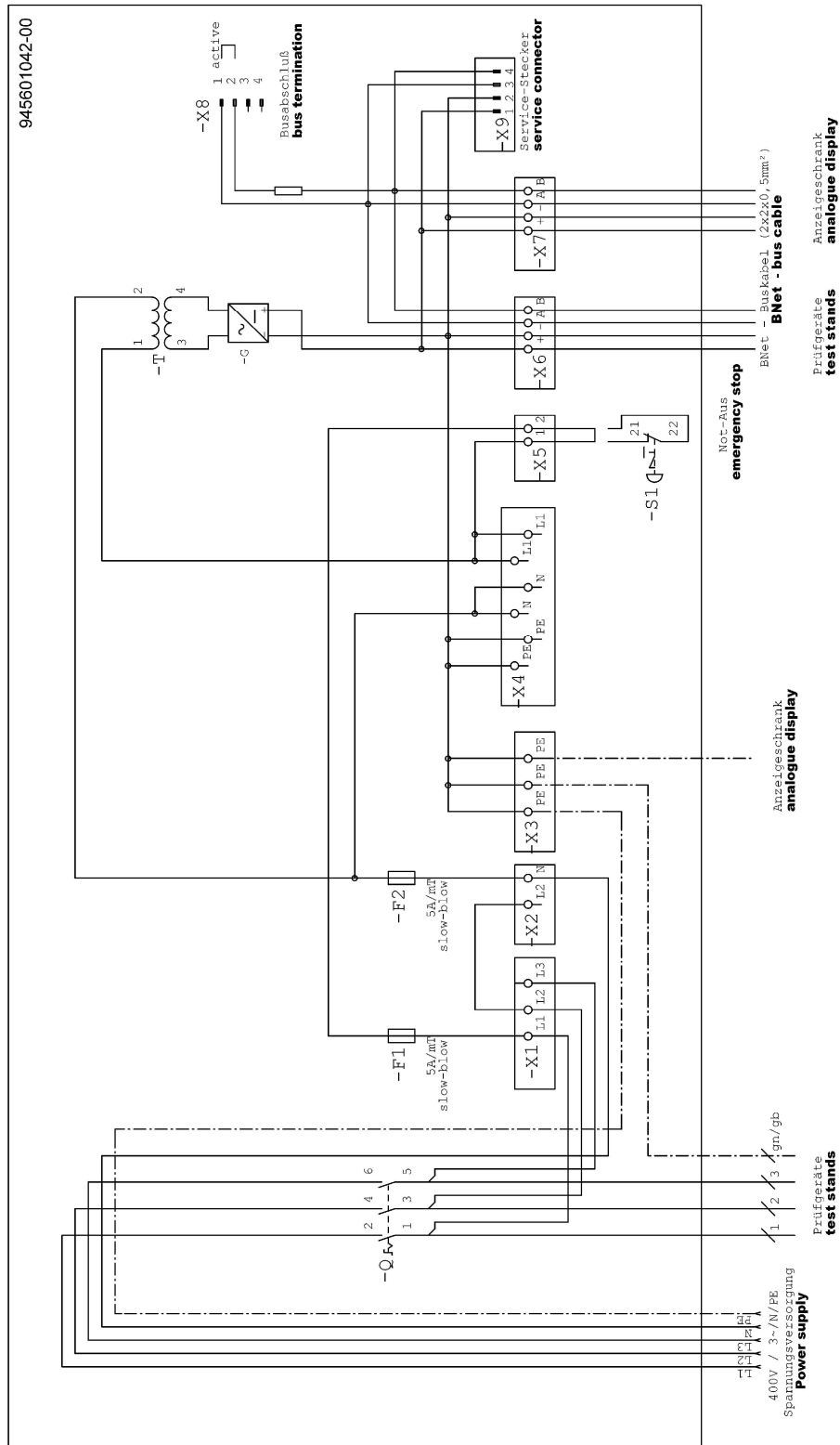


Abb. 144: Circuit diagram main switch box VPC-5060 with 3 x 400 V AC



7.2.2 Main switch box 3 x 230 V AC

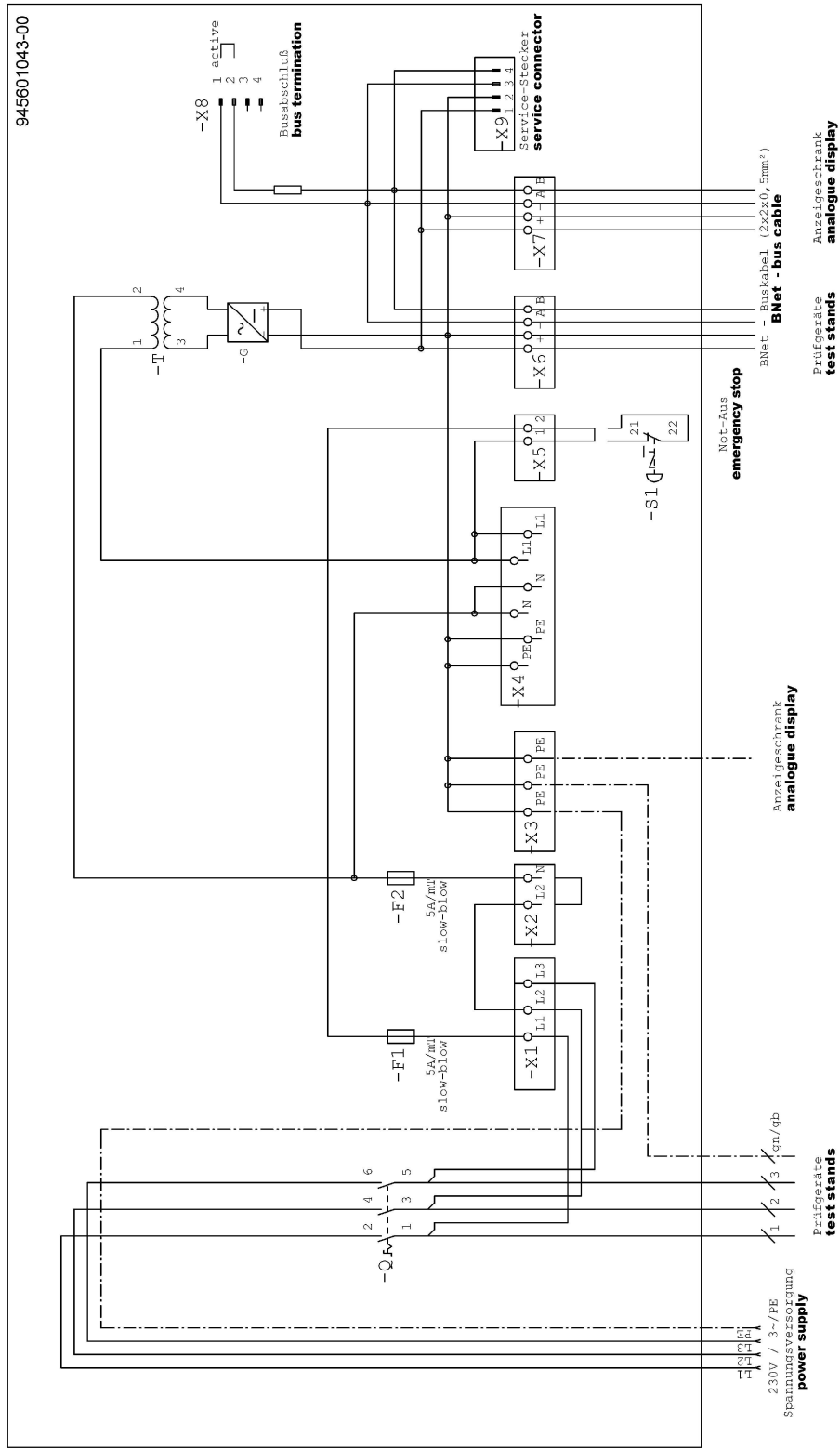


Abb. 145: Circuit diagram main switch box VPC-5061 with 3 x 230 V AC

7.2.3 Soft-starter box 3 x 400 V AC

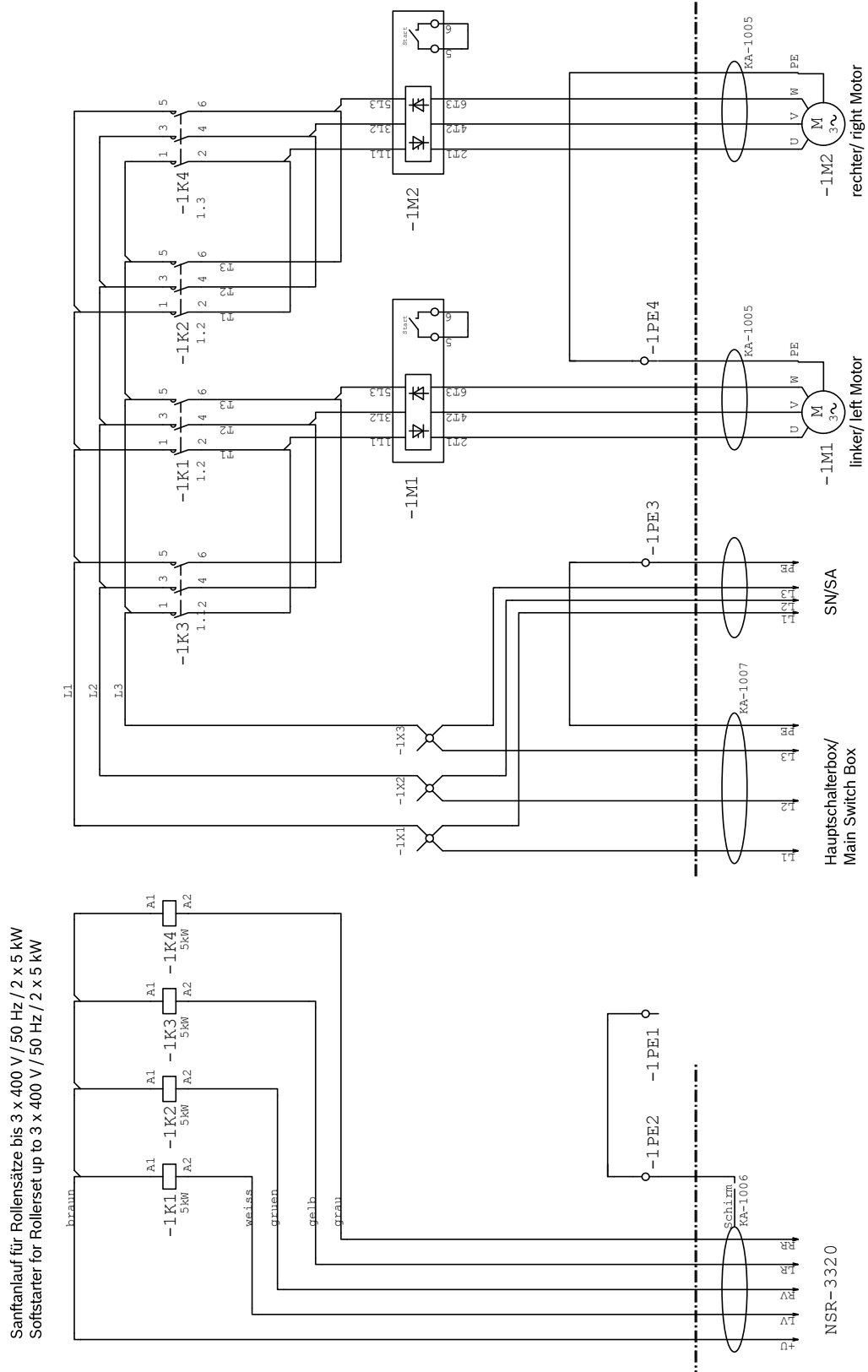


Abb. 146: Circuit diagram soft-starter box QD-3020 with 3 x 400 V AC

7.2.4 Power section  
230 V / 400 V AC / 5 kW

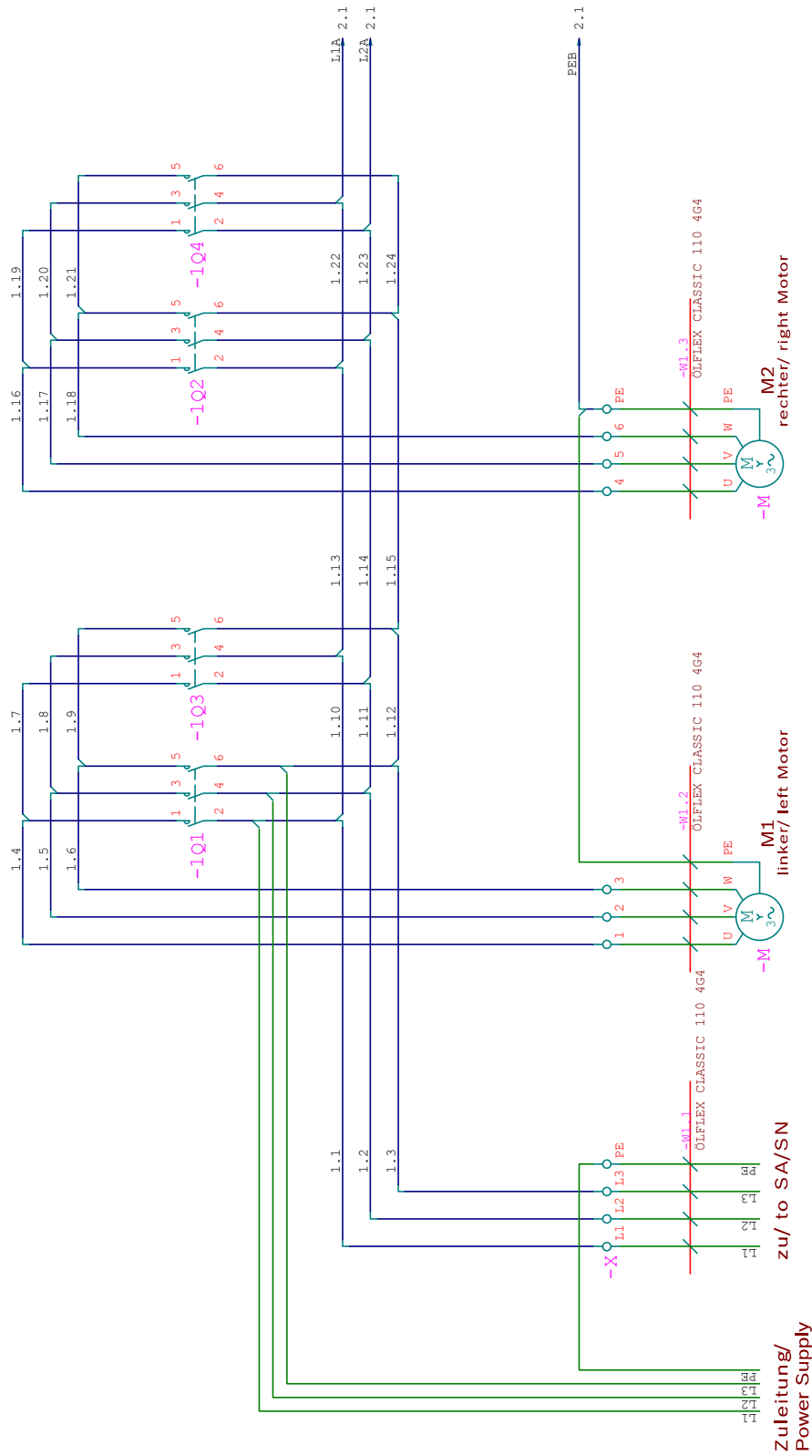
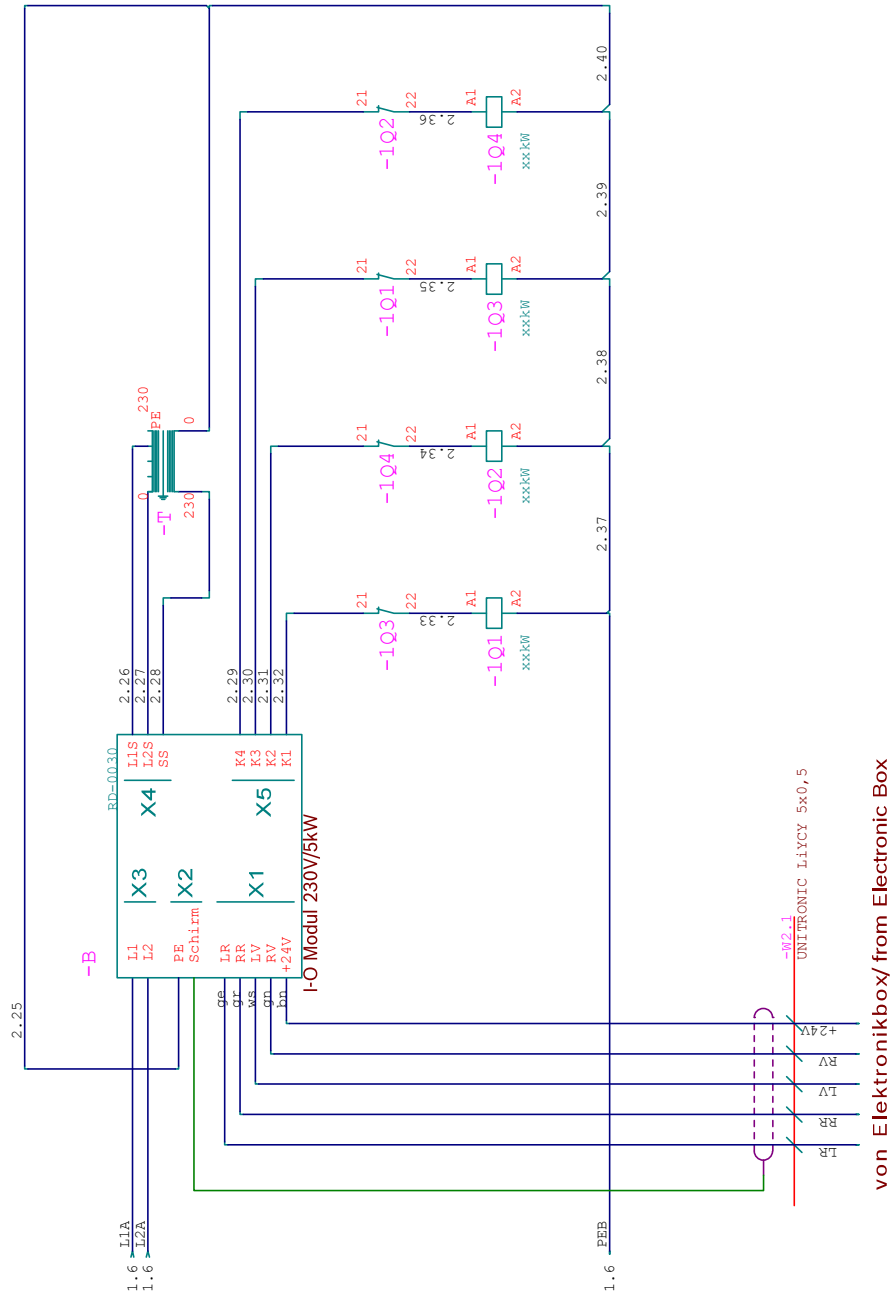


Abb. 147: Circuit diagram power section 230 V / 400 V AC / 5 kW (QD-3030) part 1



von Elektronikbox/ from Electronic Box

Abb. 148: Circuit diagram power section 230 V / 400 V AC / 5 kW (QD-3030) part 2

7.2.5 Roller set with NSR 32xx

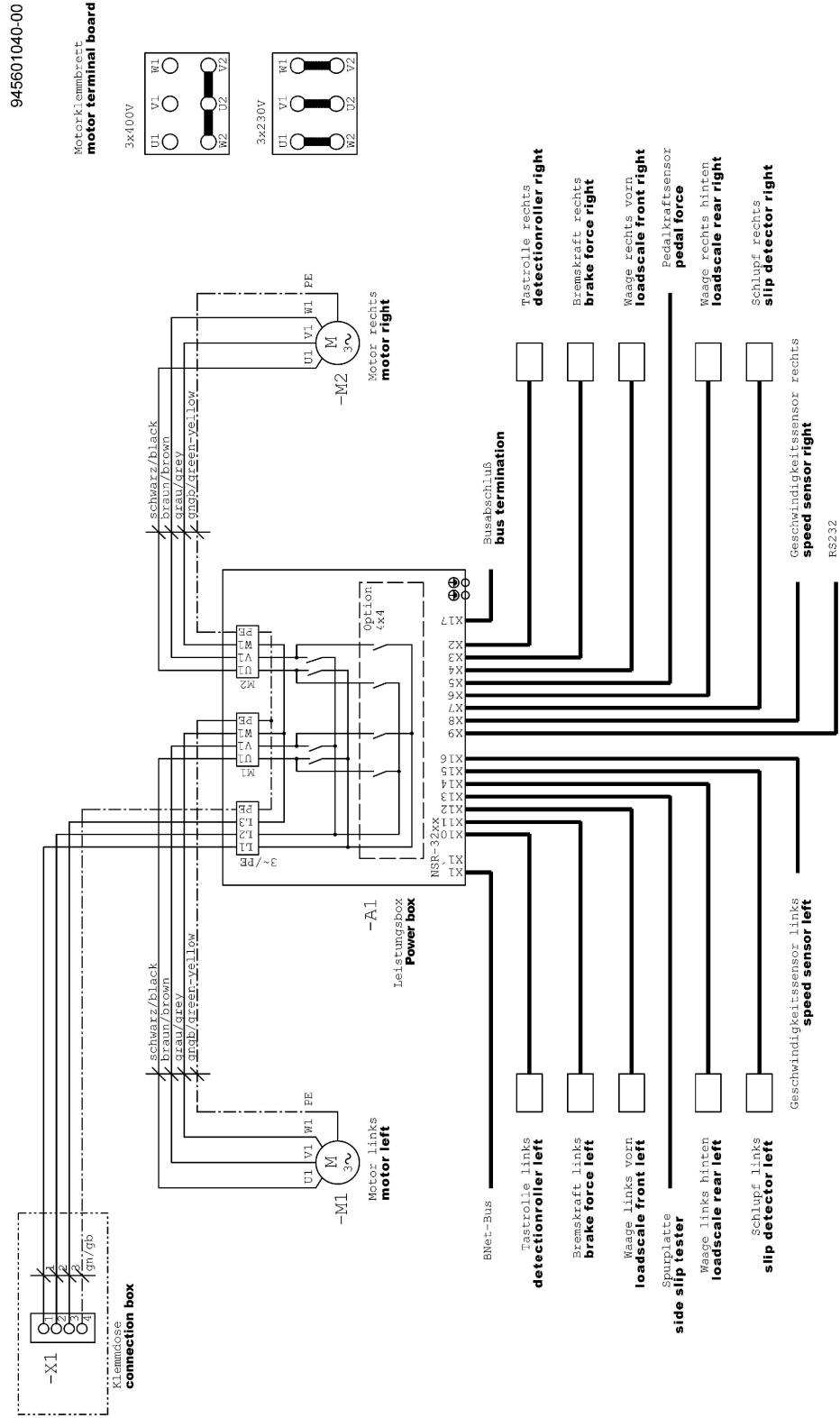


Abb. 149: Circuit diagram roller set with power box NSR 32xx for 3 x 400 V AC and 3 x 230 V AC

7.2.6 Roller set with NSR 330x

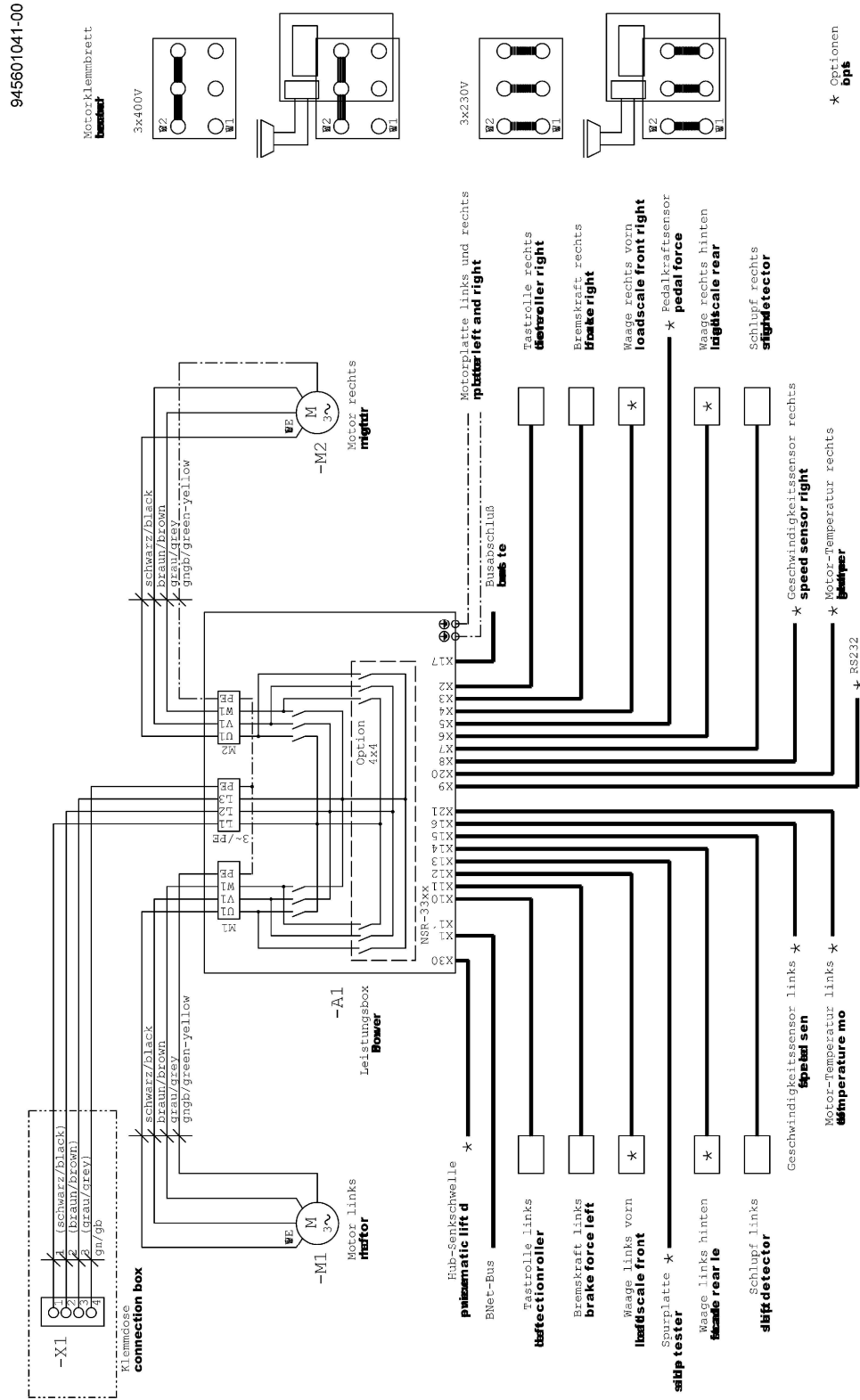


Abb. 150: Circuit diagram roller set with power box NSR 330x for 3 x 400 V AC and 3 x 230 V AC

7.2.7 Suspension tester SDL 430

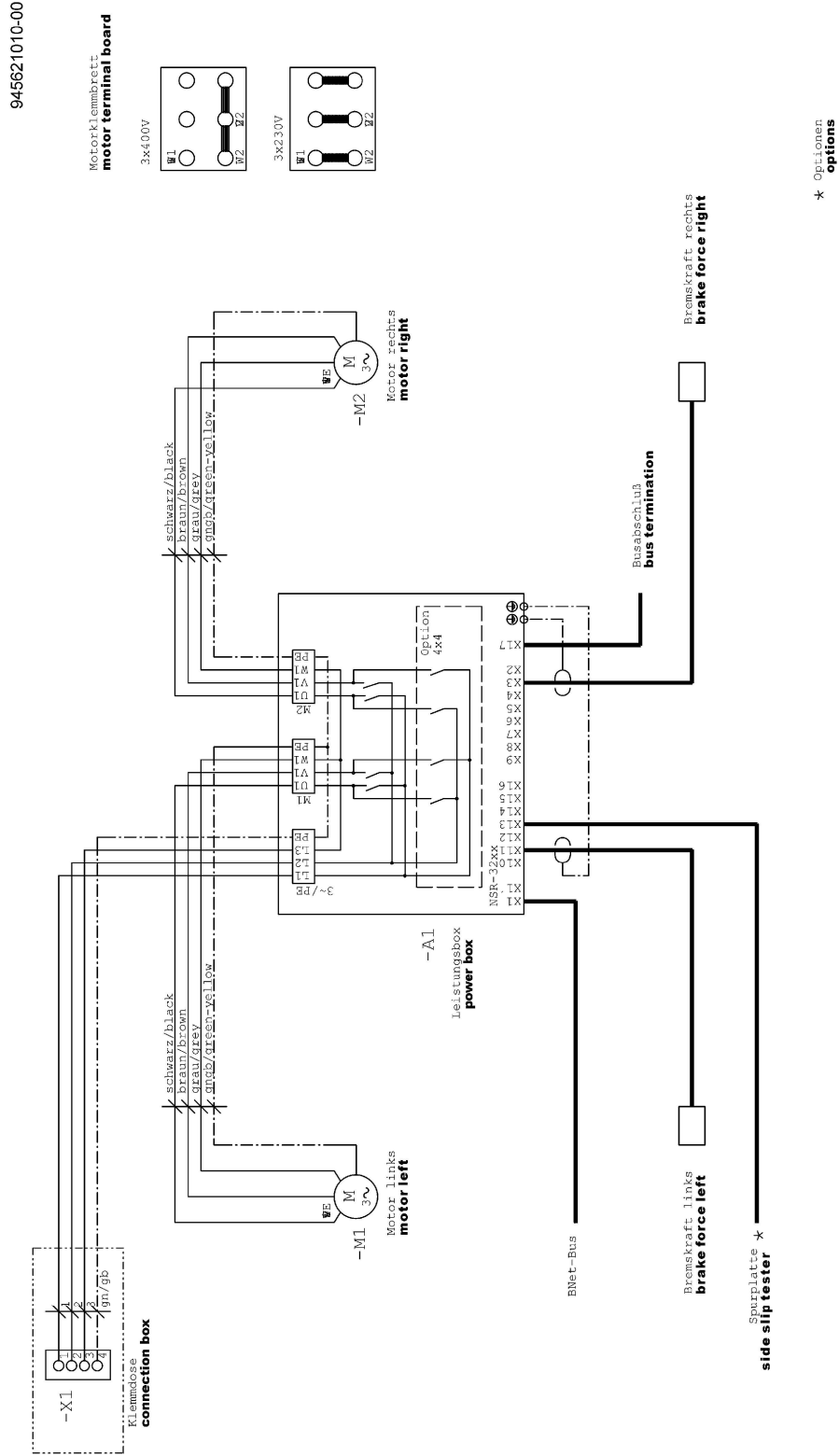


Abb. 151: Circuit diagram suspension tester SDL 430 with power box

7.2.8 Suspension tester SDL 435

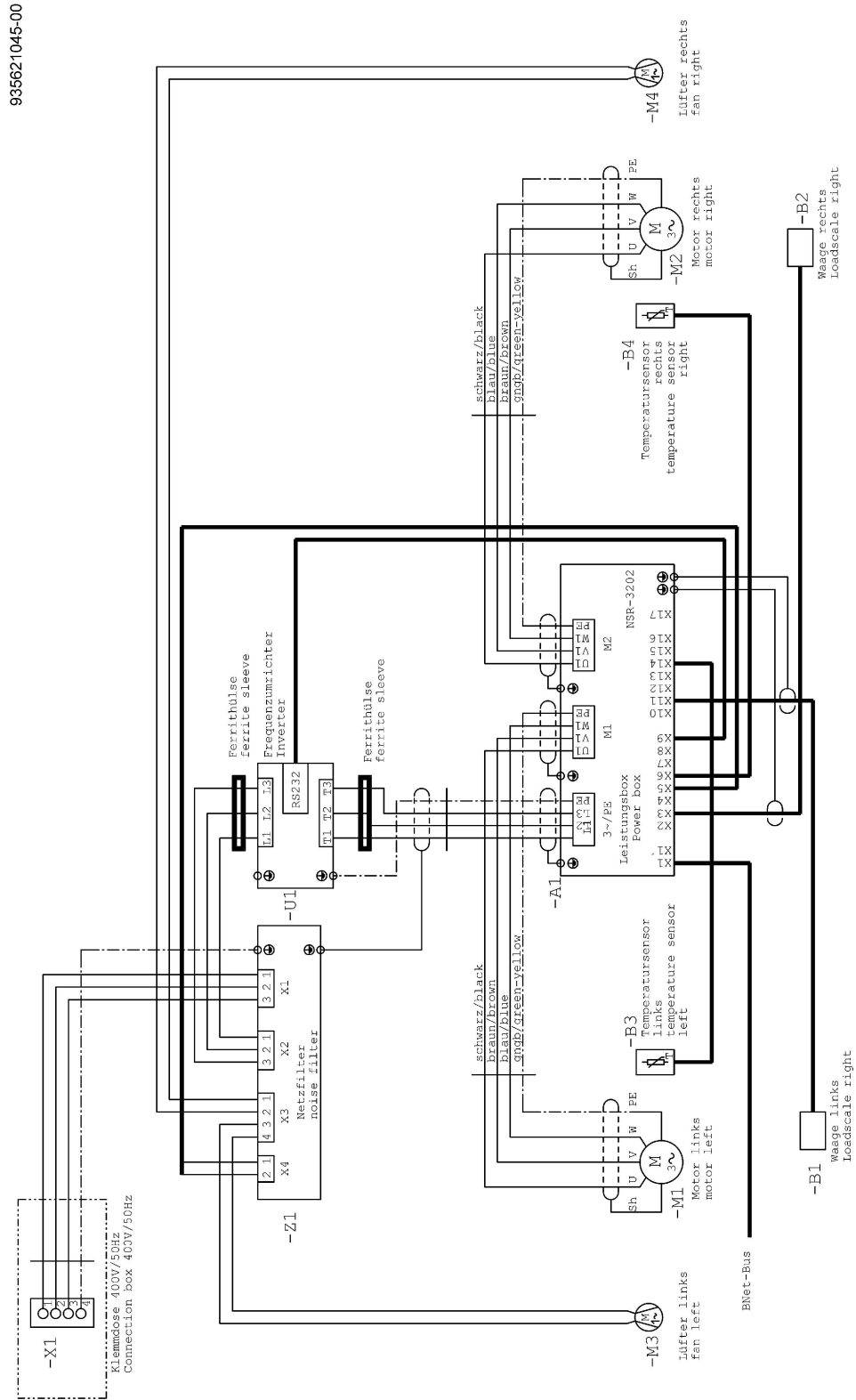


Abb. 152: Circuit diagram suspension tester SDL 435 with power box



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*Local distributor:*

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Ein Unternehmen der Bosch-Gruppe  
A Bosch Group Company  
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