

ABOP 6, 10, 13-2



Repair instructions





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1. Models described

These instructions describe how to repair the following models:

Model	Order no.
ABOP 6	710501
ABOP 10	710502
ABOP 13-2	710503



2. Technical data

Technical data

The complete technical data can be found in the operating instructions for the model.

Test data

Up-to-date test data for all models can be found on the FEIN Extranet (Customer Service → Repair Guides).

Lubricants

The lubricants and container sizes available from FEIN can be found on the FEIN Extranet (Customer Service → Repair Guides).

Lists of spare parts

Lists of spare parts and exploded views are available online at www.fein.com



3. Provisions

Provisions

Please note that power tools may only be repaired, maintained and checked by a trained electrician, as improper repair can result in serious risks to the user.

The provisions set out in *DIN VDE 0701-0702* should be observed after repairs.

Only use original FEIN spare parts!

The relevant accident prevention regulations of the employers' liability insurance associations are to be observed when commissioning.

The German Equipment and Product Safety Act applies for correct use.

Outside Germany, the regulations applicable in the relevant country must be observed!



4. Tools required

Standard tools

Torx 15 and 20 screwdrivers
 Small slotted screwdriver
 Arbor press
 Plastic hammer
 Slide gauge
 Cable hooks
 Circlip pliers

Special tools

Unlocking tool

Arbor

Sleeve: Inner diameter 55 mm
 Outer diameter 65 mm

Sleeve: Inner diameter 15 mm
 Outer diameter 25 mm

Sleeve: Inner diameter 7 mm
 Outer diameter 30 mm

Ball bearing support 19 mm

Ball bearing puller 15 mm 6 41 07 015 00 0

Ball bearing puller 19 mm 6 41 07 019 00 7

Drawing-off socket cap 6 41 04 150 00 8

Open-ended spanner 17 mm (width 4 mm) 6 29 03 002 00 9

Test board 6 41 340 0100 0

NOTE

You can only order special tools with an order number from FEIN.



4. Tools required

Special tools

Unlocking tool



FEIN recommends using this unlocking tool because it is designed precisely for the plug contact used.

Order no.: 1-1579007-6 (not available from FEIN)

Manufacturers: www.te.com



5. Lubricants and auxiliary substances required

Lubricants

ABOP 6

Grease	0 40 101 0100 4	12 g	Gearbox
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ABOP 10

Grease	0 40 101 0100 4	12 g	Gearbox
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Grease	0 40 205 0000 2		Bearing journal of spur gear shaft
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ABOP 13-2

Grease	0 40 101 0100 4	25 g	Gearbox
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Grease	0 40 205 0000 2		Bearing journal of spur gear shaft
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Sealants

ABOP 6, 10, 13-2

Surface seal	Loctite 5188		Gearbox head
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6. Disassembly



1. Remove battery.
2. Clamp socket wrench in drill chuck.
3. Firmly hold drill shaft with open-ended spanner.
4. Unscrew drill chuck with socket wrench.

Tool:

- Open-ended spanner, 17 mm (width 4 mm)
6 29 03 002 00 9
- Socket wrench



6. Disassembly



1. Remove screws from gearbox head.
2. Remove gearbox head.

Tool:

-Torx 20 screwdriver



6. Disassembly

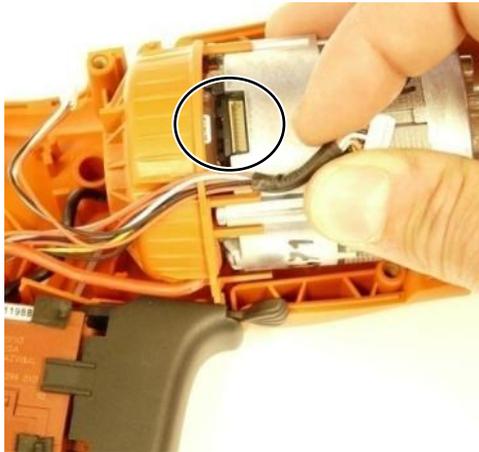


1. Loosen screws on upper housing section and remove this section.
2. Remove clamping piece from lower housing section.

Tool:
-Torx 15 screwdriver



6. Disassembly



1. Remove plug on motor.
2. Pull shrink-fit hose slightly to the right and press out individual cables over fixing mechanism on air guide ring.
3. Press motor cable out of plug with unlocking tool.

NOTE

The locking noses in the plug are worn during disassembly.
Use new plugs for assembly.

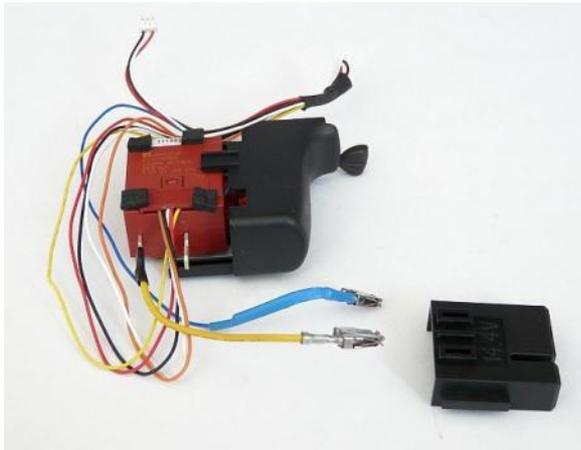
4. Take motor and air guide ring out of housing.

Tool:

-Unlocking tool



6. Disassembly



1. Press switch cable out of plug with unlocking tool.

Tool:

-Unlocking tool



6. Disassembly



1. Pull ball bearing and sealing ring off motor.

Tool:

- Ball bearing puller 19 mm
- Drawing-off socket cap with tip



6. Disassembly

ABOP 6



ABOP 10



ABOP 13-2





6. Disassembly

ABOP 6



1. Prise intermediate bearing off gearbox head.
2. Pull out ball bearing.
3. Dismantle circlip.
4. Remove spur gear along with spring washer.

Tool:

- Ball bearing puller
6 41 07 015 00 0
- Drawing-off socket cap with tip
6 41 04 150 00 8
- Circlip pliers



6. Disassembly

ABOP 6



1. Remove clutch ring and rollers.
2. Dismantle circlip.
3. Press shaft out of gearbox head along with ball bearing.
4. Take plastic washer off shaft.

Tool:

- Circlip pliers
- Arbor press
- Sleeve: Inner diameter 30 mm
Outer diameter 40 mm



6. Disassembly

ABOP 6



1. Dismantle circlip.
2. Press ball bearing down and off shaft.

Tool:

- Circlip pliers
- Arbor press
- Sleeve: Inner diameter 13 mm
Outer diameter 17 mm



6. Disassembly

ABOP 10



1. Prise intermediate bearing off gearbox head.
2. Pull out ball bearing.
3. Dismantle circlip.
4. Drive out intermediate gear shaft.

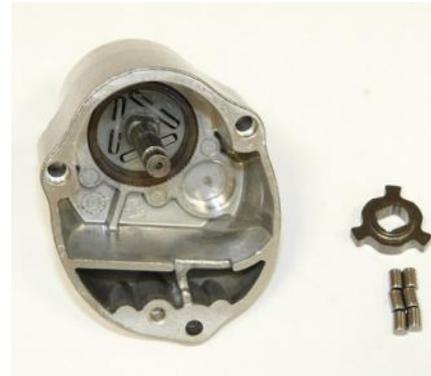
Tool:

- Ball bearing puller
6 41 07 015 00 0
- Drawing-off socket cap with tip
6 41 04 150 00 8
- Circlip pliers
- Plastic hammer



6. Disassembly

ABOP 10



1. Remove spur gear along with spring washer.
2. Remove clutch ring and rollers.
3. Dismantle circlip.

Tool:

-Circlip pliers



6. Disassembly

ABOP 10



1. Press shaft out of gearbox head along with ball bearing.
2. Take plastic washer off shaft.
3. Dismantle circlip.

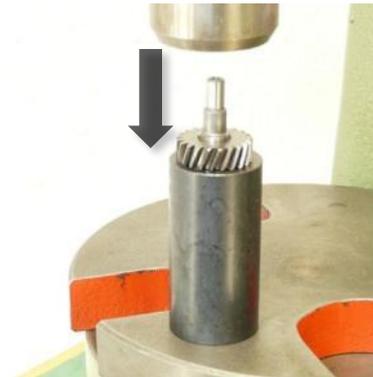
Tool:

- Arbor press
- Sleeve: Inner diameter 30 mm
Outer diameter 40 mm
- Circlip pliers



6. Disassembly

ABOP 10



1. Press ball bearing down and off shaft.
2. Press gear-wheel down and off shaft.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 30 mm



6. Disassembly

ABOP 13-2



1. Prise intermediate bearing off gearbox head.
2. Drive out shafts.
3. Remove shafts along with washers.

Tool:

-Plastic hammer



6. Disassembly

ABOP 13-2



1. Remove plate.
2. Pull off switch pushbutton.

WARNING

Parts may jump out.

When levering, hold hand over leaf springs.

3. Prise leaf springs opposite switch pushbutton out slightly.
4. Prise up leaf spring on switch pushbutton side.
5. Remove leaf springs, metal bolts and switch bolt.

Tool:
-Combination pliers
-Medium slotted screwdriver



6. Disassembly

ABOP 13-2



1. Pull out ball bearing.
2. Dismantle circlip.
3. Remove gear-wheel and spring washer.

Tool:

- Ball bearing puller
6 41 07 015 00 0
- Drawing-off socket cap with tip
6 41 04 150 00 8
- Circlip pliers



6. Disassembly

ABOP 13-2



1. Remove clutch ring and rollers.
2. Pull ball bearing out of gearbox head.
3. Dismantle circlip.

Tool:

- Internal puller device
- Circlip pliers



6. Disassembly

ABOP 13-2



1. Press shaft out of gearbox head along with ball bearing.
2. Take plastic washer off shaft.

Tool:

- Arbor press
- Sleeve: Inner diameter 30 mm
Outer diameter 40 mm



6. Disassembly

ABOP 13-2



1. Press ball bearing down and off shaft.

Tool:

- Circlip pliers
- Arbor press
- Sleeve: Inner diameter 13 mm
Outer diameter 17 mm



6. Disassembly

ABOP 13-2



1. Pull out ball bearing.
2. Press gear-wheel down and off shaft.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 30 mm



6. Disassembly

ABOP 13-2



1. Press gear-wheel down and off shaft.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 30 mm



6. Disassembly

ABOP 13-2



1. Dismantle circlip.
2. Pull out draw key.
3. Take off washer.
4. Take gear-wheels and balls off drive.

Tool:

-Circlip pliers

7. Assembly





7. Assembly



WARNING

Incorrect assembly will damage the device.

Motor shaft must be supported when pressing (e.g. using an arbor).

1. Press ball bearing on to motor.

Tool:

- Arbor press
- Arbor
- Ball bearing support: D = 19 mm



7. Assembly



WARNING

Incorrect assembly will damage device.

Motor shaft must be supported when pressing (e.g. using an arbor).

1. Slide sealing ring on to motor shaft.
2. Carefully press sealing ring on to motor.

Tool:

- Arbor press
- Arbor
- Sleeve: Inner diameter 7 mm
Outer diameter 30 mm



7. Assembly

ABOP 6



1. Press bearing on to shaft.
2. Fit circlip.

NOTE

Use a new circlip for assembly.

3. Slide plastic washer on to shaft.

NOTE

The flat side of the plastic washer must be on the side of the bearing.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 18 mm



7. Assembly

ABOP 6



1. Press shaft in to gearbox head.
2. Fit circlip.

Tool:

- Arbor press
- Sleeve: Inner diameter 20 mm
Outer diameter 27 mm
- Circlip pliers

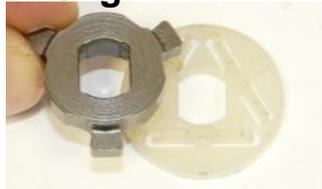


7. Assembly

ABOP 6



Wrong



Right

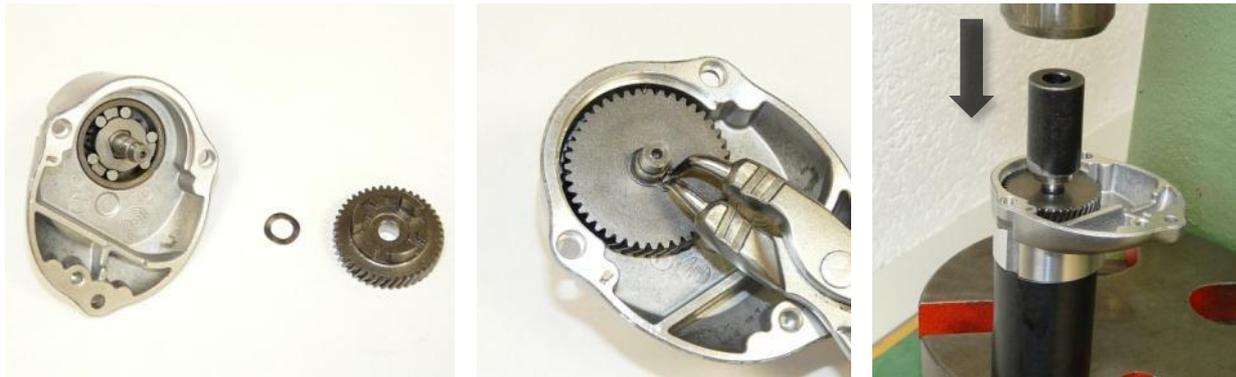


1. Slide clutch ring on to shaft.
2. Insert rollers in clutch ring.



7. Assembly

ABOP 6



1. Slide spring washer on to shaft.
2. Insert spur gear.
3. Fit circlip.

NOTE

Use a new circlip for assembly.

4. Press bearing as far as stop on shaft.

Tool:

-Arbor press
-Sleeve: Inner diameter 6 mm
Outer diameter 20 mm



7. Assembly

ABOP 6



1. Fill gearbox with grease (12 g).
2. Apply Loctite 5188 surface sealant.
3. Fit intermediate bearing on to gearbox head.

Tool:

-Grease
0 40 101 0100 4

-Loctite 5188



7. Assembly

ABOP 10



1. Press bearing on to shaft.
2. Fit circlip.

NOTE

Use a new circlip for assembly.

3. Slide plastic washer on to shaft.

NOTE

The flat side of the plastic washer must be on the side of the bearing.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 15 mm



7. Assembly

ABOP 10



1. Press shaft in to gearbox head.
2. Fit circlip.

Tool:

- Arbor press
- Sleeve: Inner diameter 20 mm
Outer diameter 27 mm



7. Assembly

ABOP 10



1. Press gear-wheel on to shaft.
2. Press bearing in to gearbox head.

Tool:

- Arbor press
- Sleeve: Inner diameter 6 mm
Outer diameter 20 mm

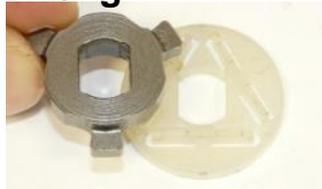


7. Assembly

ABOP 10



Wrong



Right



1. Slide clutch ring on to shaft.
2. Insert rollers in clutch ring.



7. Assembly

ABOP 10



1. Slide spring washer on to shaft.
2. Insert spur gear.
3. Fit circlip.

NOTE

Use a new circlip for assembly.

4. Press shaft in to gearbox head.

Tool:

-Arbor press
-Sleeve: Inner diameter 6 mm
Outer diameter 20 mm



7. Assembly

ABOP 10



1. Place washer on intermediate gear shaft.
2. Press ball bearing as far as stop on shaft.

Tool:

- Arbor press
- Sleeve: Inner diameter 6 mm
Outer diameter 20 mm



7. Assembly

ABOP 10



1. Fill gearbox with grease (12 g).
2. Apply Loctite 5188 surface sealant.
3. Fit intermediate bearing on to gearbox head.

Tool:

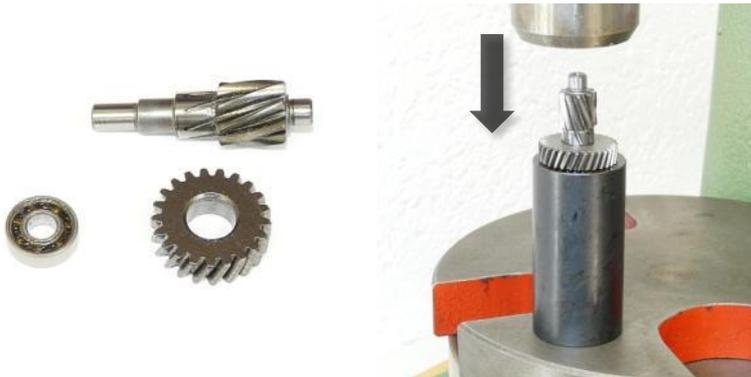
-Grease
0 40 101 0100 4

-Loctite 5188



7. Assembly

ABOP 13-2



1. Press gear-wheel on to shaft.
2. Press bearing in to gearbox head.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 30 mm



7. Assembly

ABOP 13-2



1. Press gear-wheel on to shaft.
2. Press bearing on to shaft.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 30 mm



7. Assembly

ABOP 13-2



1. Press bearing on to shaft.
2. Fit circlip.

NOTE

Use a new circlip for assembly.

3. Slide plastic washer on to shaft.

NOTE

The flat side of the plastic washer must be on the side of the bearing.

Tool:

- Arbor press
- Sleeve: Inner diameter 12 mm
Outer diameter 15 mm



7. Assembly

ABOP 13-2



1. Press shaft in to gearbox head.
2. Fit circlip.

Tool:

- Arbor press
- Sleeve: Inner diameter 20 mm
Outer diameter 27 mm



7. Assembly

ABOP 13-2



1. Insert clutch ring.
2. Insert rollers in clutch ring.

Tool:

-Forceps



7. Assembly

ABOP 13-2



1. Coat recesses (for the draw keys) in the guide sleeve with a little grease.
2. Slide sleeve a little in to guide sleeve.
3. Insert draw keys in guide sleeve.
4. Slide sleeve fully in to guide sleeve.
The draw keys cannot now fall out.

Tool:

-Small slotted screwdriver



7. Assembly

ABOP 13-2



1. Lubricate the drive holes with a little grease.
2. Insert balls in holes.
3. Slide gear-wheels on to drive.

NOTE

The recesses in the gear-wheels must be in line with the balls.

4. Place washer on top gear-wheel.



7. Assembly

ABOP 13-2



1. Fit circlip.
2. Insert draw key in drive.
3. Press draw keys outwards.

The drive can then be easily placed on the drill shaft.

Tool:

- Small slotted screwdriver
- Circlip pliers



7. Assembly

ABOP 13-2

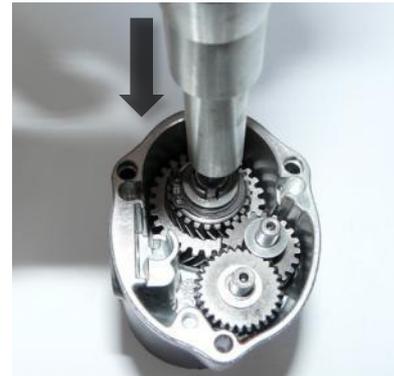


1. Insert spring washer.
2. Insert gear-wheel (with drive).
Turn drive's gear-wheel until cams of gear-wheel sit in recesses in the clutch ring.
The gear-wheel must slide down a little.
3. Insert both shafts together.
4. Fit both washers.



7. Assembly

ABOP 13-2



1. Fit conical sleeve to drill shaft.
2. Fit circlip to conical sleeve.
3. Fit pull-on taper on circlip.
4. Apply pressure and press down pull-on taper.
5. Check that circlip is seated correctly in the drill shaft groove.

NOTE

If the circlip isn't seated correctly in the groove, the gear changeover won't work.

Tool:

-Conical sleeve and pull-on taper
64131017000



7. Assembly

ABOP 13-2



1. Insert plastic bolt as shown.
2. Insert right-hand metal bolt half way in to right-hand hole.
3. Insert both leaf springs in right-hand metal bolt and in groove of guide sleeve (of drive).
4. Turn plastic bolt to the right and insert leaf spring in groove of plastic bolt.
5. Insert left-hand metal bolt in hole along with leaf spring.



7. Assembly

ABOP 13-2



1. Insert switch pushbutton.
2. Insert plate.
3. Press ball bearing on to shaft.
4. Test gear changeover before further assembly.

Tool:

- Arbor press
- Sleeve: Inner diameter mm
Outer diameter mm



7. Assembly

ABOP 13-2



1. Fill gearbox with grease (25 g).
2. Apply Loctite 5188 surface sealant.
3. Fit intermediate bearing on to gearbox head.

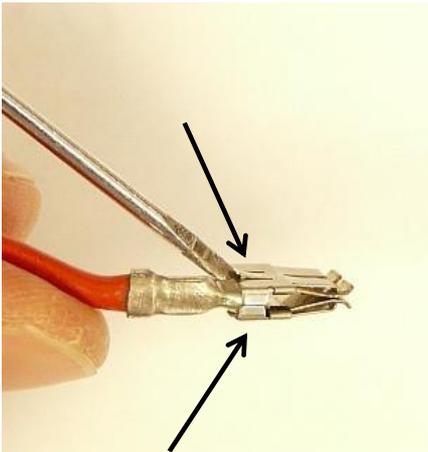
Tool:

-Grease
0 40 101 0100 4

-Loctite 5188



7. Assembly



1. Check springs of battery plug contacts.
If necessary, press the spring up a little.
2. Fit air guide ring on to motor.

NOTE

The recess with the detent must be next to the plug connection on the motor.

3. Press motor cable in to air guide ring's guides.

Tool:

-Small slotted screwdriver



7. Assembly



1. Insert motor in to lower section of housing with air guide ring.
2. Insert black motor cable at bottom.
3. Insert switch in to lower section of housing.
Place thin cables on top of black cable. The red cable is at the top.

NOTE

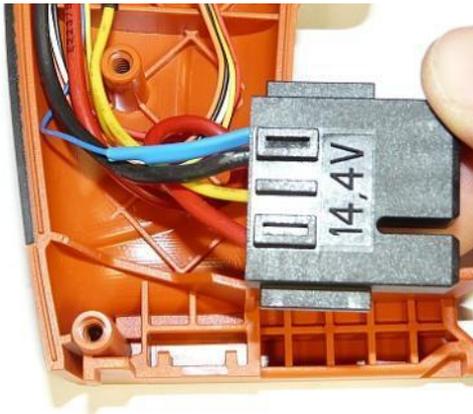
The thin cables must be under a thick cable so they are not squashed by the upper section of housing.

Tool:

- Small slotted screwdriver
- Cable hooks



7. Assembly



1. Insert cables in plug as shown.
Check whether cables are secure in the plug.
2. Individually press motor plug's cables over fixing mechanism on air guide ring.
3. Insert plug in motor.
4. Insert red motor cable in the guide above the other cables.

Tool:

-Cable hooks



7. Assembly



1. Insert clamping piece in lower section of housing.

NOTE

The same switch is also used by tools with potentiometer electronics (e.g. ASCS 4.8, 6.3).
The small switch plug on this tool has no function and no connection.



7. Assembly



1. Fit upper section of housing and screw in place.
2. Fit gearbox head and screw in place.

Tool
-Torx 20 screwdriver



7. Assembly



1. Fit drill chuck and screw in place.
2. Clamp socket wrench in drill chuck.
3. Firmly hold drill shaft with open-ended spanner.
4. Screw down drill chuck.
Tightening torque = 35 Nm.

Tool:

- Open-ended spanner, 17 mm (width 4 mm)
6 29 03 002 00 9
- Socket wrench
- Torque wrench



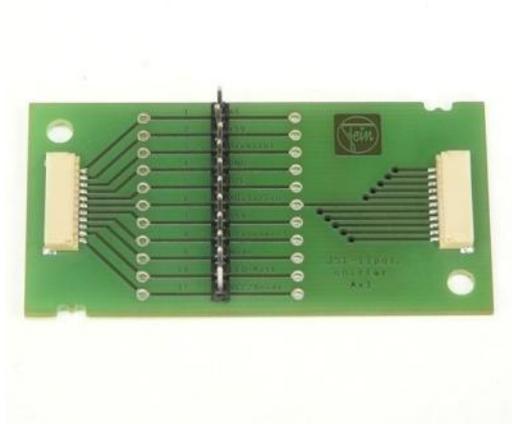
8. Troubleshooting

Fault	Cause	Remedy
Motor not running.	Motor is defective.	Check electrics with test board.
	Switch is defective.	Check electrics with test board.
	Battery plug contacts have come loose.	Check components.
Motor is running out of round. Speed fluctuates.	Bearing / gearbox is defective.	Check components.
Motor only turning in one direction.	Plug on motor has come loose or is not secure.	Check components.
Gear changeover is not working.	Leaf springs not sitting in guide sleeve.	Check components.
	Clutch ring inserted incorrectly.	Check components.
	The small circlip is not correctly seated on the drill shaft.	Check components.
	Ball has jammed in a hole in the drive (burrs).	Remove burrs.

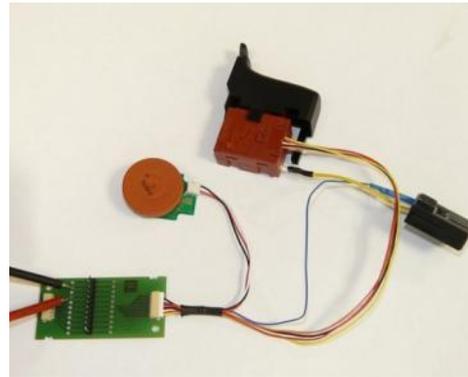


8. Troubleshooting (electrics)

Test board



Test setup



FEIN recommends using the test board (special tool) for electrical troubleshooting.

You can use the test board for ASCS 4.8/6.3, ASCT 14/18, ASCM, ABOP 6/10/13-2.

Since the motor cannot be tested directly, you can use the test board to check the functions of switches and torque potentiometers (if present).

The test steps and nominal values for use with the test board are provided on the next page.

Tool:

-Test board 6 41 34 001 01 0
-Multimeter



8. Troubleshooting (electrics)

Test object	Test method	Nominal value	Measurement line +	Measurement line -
General tests				
Battery Sense	Passage	Switch not pressed: > 1 M Ω Switch pressed: < 10 Ω	Battery Sense (yellow)	Pin 1
Battery data	Passage	< 10 Ω	Battery data (blue)	Pin 6
Right-left	Passage	Position 1: > 1 M Ω Position 2: < 10 Ω	Pin 4	Pin 5
Speed potentiometer, total resistance	Resistor	20 k Ω \pm 4 k Ω	Pin 4	Pin 2
Speed potentiometer, resistance range	Resistor	0 Ω to 20 k Ω \pm 4 k Ω (proportional to potentiometer travel) Switch not pressed: 0 Ω Switch pressed: 20 k Ω \pm 4 k Ω	Pin 4	Pin 3
Tool-dependent tests				
Torque potentiometer, total resistance (ASCS only)	Resistor	100 k Ω \pm 10 k Ω	Pin 7	Pin 9
Torque potentiometer, resistance range (ASCS only)	Resistor	0 k Ω to 90 k Ω \pm 10 k Ω (proportional to potentiometer travel) Stage 1: 90 k Ω \pm 10 k Ω Drilling stage: 0 k Ω	Pin 7	Pin 8



9. Connection diagram

