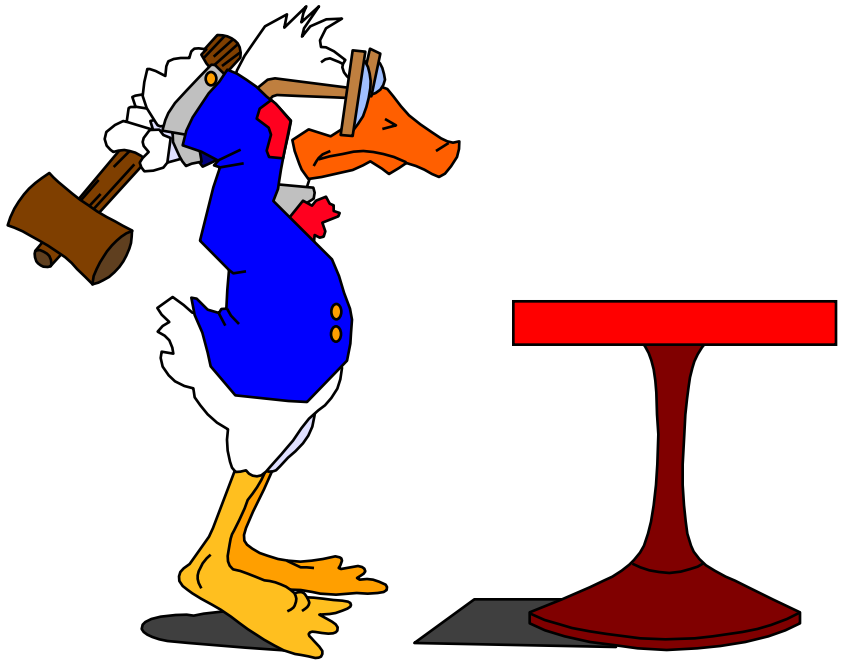
FRT: FMM 250 / FMM 250 Q

Starting page



FRT: FMM 250 / FMM 250 Q

Contents

FRT: FMM 250 / FMM 250 Q

1. Technical data

Model		FMM 250	FMM 250 Q
Part number		7 229 36	7 229 37
Power consumption	Watt	250	
Power output	Watt	150	
Idle speed	1000 rpm	11 - 21	
Power mains connection type		1~	
Safety class		II	
Cable length with plug	m	5	
Weight without cable	kg	1.2	1.4

3. Electrical function test

3.1. Function test

3.2. Test data

3.3. Testing devices and aids

3.4. Wiring diagram / Connection plan

3.5. Safety test

3.1. Function test

3.1.1. Motor

Checking the motor without electronics

- Disconnect motor lead from electronics
- Apply testing voltage to motor lead according to table.

Rated voltage	100 – 120 V AC	220 – 240 V AC
Testing voltage	max. 65 V AC	max. 130 V AC

3.1. Function test

3.1.2. Electronics

- The electronics cannot be tested without load (motor), the control circuit has to be closed.
- The function of the electronics is released when the speed values correspond to the test data.

Attention!

At supply voltage, the machine may only be operated with correctly loaded electronics, otherwise the control circuit is interrupted and the speed increases to prohibited levels.

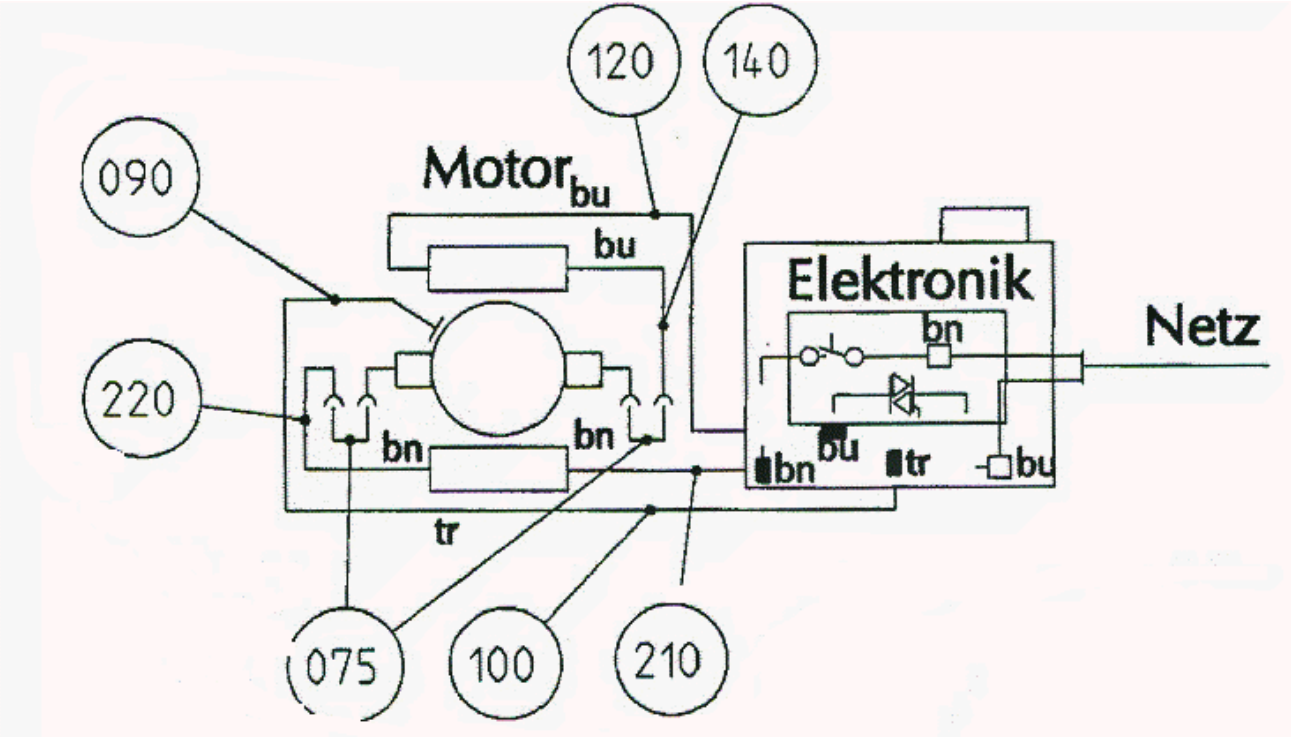
3.2. Test data

Model		FMM 250 and FMM 250 Q
Mark of conformity		CE
Dimensioning voltage	Volt	230
Dimensioning current	ampere	2,3
No-load current	ampere	0,60 (0,54-0,69)
Dimensioning output	Watt	250
Power output	Watt	150
Idle speed	1000 rpm	11,0 - 21,0
Idle speed / max	1000 rpm	19,0 - 21,0
Power mains connection type		1~
Safety class		II
Cable length with plug	m	5
Weight without cable	kg	1.2 / 1.4

3.3. Testing devices and aids

- Multimetre for effective measuring (voltage, current, resistance).
- Speed gauge, impulse counter (suitable for oscillating movement)
- Adjustable isolating transformer
  (for motor test without electronics at 65 and 130 VAC)

3.4. Connection plan



Wiring:

075 - carbon holder (2x)
090 - grounding cable
120 - supply line field magnet electronics (blue)
140 - supply line field magnet carbon holder (blue)
210 - supply line field magnet electronics (brown)
220 - supply line field magnet carbon holder (brown)

3.5. **Safety test /** (immediately after about 15 minutes run-in)

Safety test:

..as performed at FEIN

	Test steps	Test type
1.	Visual inspection	1. If necessary, dismantle clamped-in tool 2. Cable 3. Housing 4. Mechanical actuation elements 5. Check type identification label
2.	Insulation resistance measurement	1. Disconnect from mains 2. Connect L1 and N to plug 3. "ON" switch Measuring points: Gear head (405) and screws (160+170) against L1/N Testing voltage: 500 VDC Insulation resistance: min. 2.0 M Ohm
3.	High voltage test HV test according to: EN-60745-1, Art.15: 2003	1. Disconnect from mains 2. Connect L1 and N to plug 3. "ON" switch Measuring points: Gear head (405) and screws (160+170) against L1/N Testing time: at least 3 sec Testing voltage: 2500 VAC Trip circuit: 5mA > overload relay of testing status may not react
4.	Speed gauge	1. Speed setter (110) on step 6 2. Switch on machine 3. Measuring point on drive shaft Testing time: at least 12 sec Speed tolerance field: min. 18,500/min, max.18,900/min
5.	No-load current measurement	1. Switch on machine 2. Testing time: at least 3 sec No-load current tolerance field: min.0,72 A, max.0,92 A

Attention!

The safety test is based on the stipulations given by the current DIN VDE 0701 Part 1

(appendix "E" for electr. tools).

4. Disassembly

4.1. Electronics

4.2. Carbon brushes / carbon holder

4.3. Removing the armature

4.4. Changing the armature bearing

4.5. Removing the field magnet

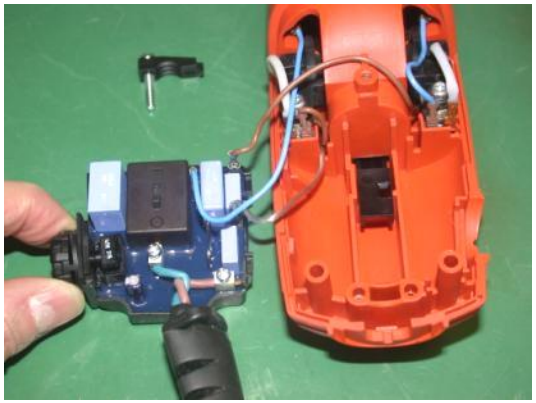
4. Disassembly

Before the disassembly of the device is begun (motor and gears), the machine should always be disconnected from the mains. Furthermore it is recommended to also disconnect the tool and clamping piece.

4. Disassembly - general information

Because of quality guidelines about pressing in force on the spindle, which can not be guaranteed after repair, the gear head of the new FMM 250 and FMM 250 Q
can only be replaced or offered as a complete spare part unit (405).
Only the small parts as seen on the picture can be purchased separately (see drawing and spare parts list at www.fein.com)

4.1. Disassembly: Electronics



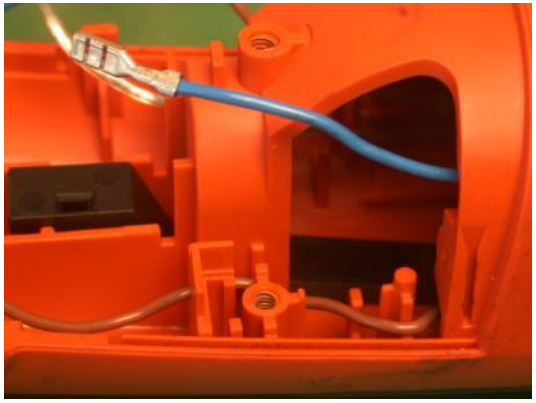
1. Remove screws and cover
2. Remove the electronics out of the motor case
3. Disconnect the plug connection between the motor and the electronics

Tools:

- Torx 15 Screwdriver

- Flat pliers

4.2. Disassembly: Carbon brushes



1. Lift up spring and pull out the carbon brush
2. Remove screws and detach the carbon holder
3. ATTENTION - Observe R / L during carbon holder assembly!!!!!!!!
4. During field magnet disassembly - Expose the flex from the field magnet !

Tools:

- Torx 15 Screwdriver

- Cable hook

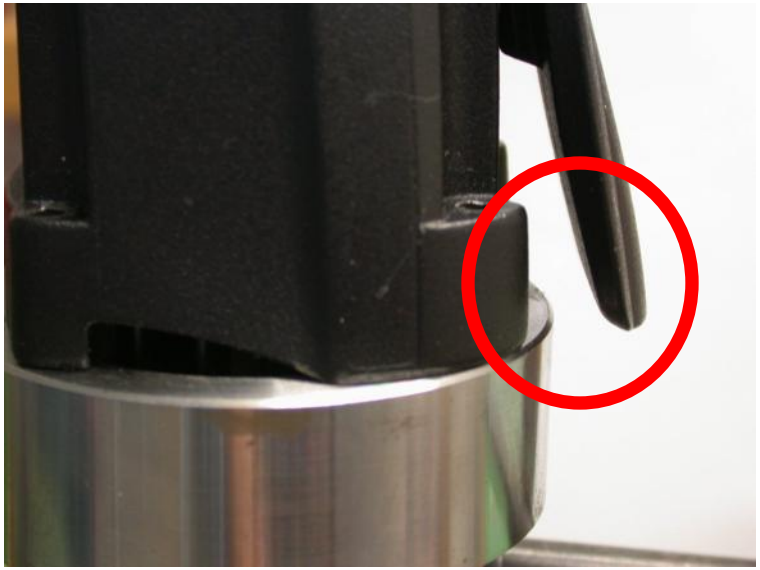
4.3. Disassembly: Removing the armature

1. Remove all 4 screws
2. Disconnect the gearbox case with the armature from the motor case

Tools:

- Torx 15 Screwdriver

4.3. Disassembly: Removing the armature



Attention - For pulling off the armature out of the gear box, the clamping lever **must** be open on the FMM 250 Q. (see left picture)

A pulling off without any damages is only possible if the gear box seats absolutly solidly on the pulling off device. (see right picture)
This is only guaranteed by the opened clamping lever.

Tools:

- Pull-off device
  6 41 14 031 000

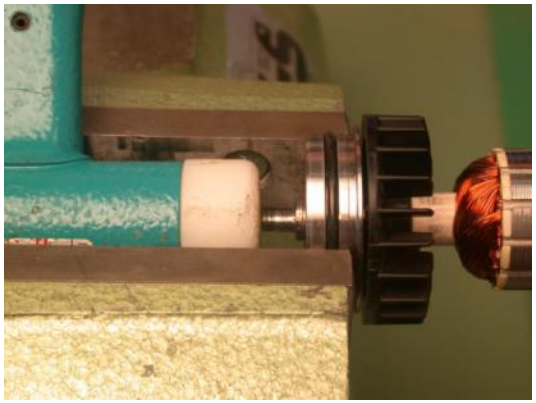
4.3. Disassembly: Removing the armature

1. Remove the armature with the device
2. Place and clamp the armature with the gear head into the device
3. Twist the top section of the device against the bottom section and pull off the gear head from the armature

Tools:

- Pull-off device
  6 41 14 031 000

4.4. Disassembly: Changing the armature bearing



1. Pull of the bearing on the collector side with the 19mm pull-off device
2. Remove the snap ring on the fan side with the pliers
   remove the spherical bearing with the 16mm pull-off device, pull off bearing ring
3. Remove the ball bearing from the armature shaft with the 26mm pull-off device

Tools:

- Circlip pliers
- Pull-off device 16,19,26mm
- Plastic hammer

4.5. Disassembly: Removing the field magnet

1. Take out the air management ring, release and take out both screws on the field magnet
2. Release the field magnet out of the motor case with light strokes from the plastic hammer, remove the field magnet
3. Remove the switch rod and switch slide

Tools:

- Torx 15 Screwdriver

- Plastic hammer

5. Assembly

5.1. Switch slide / switch rod

5.2. Field magnet

5.3. Armature

5.4. Armature / gear head

5.5. Armature / motor case

5.6. Carbon holder / carbon brushes

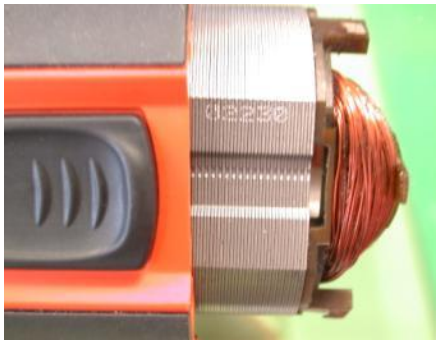
5.7. Electronics / cables

5.8. Case cover / Clamping piece

5.1. Assembly: Switch slide / switch rod

1. Click switch slide into motor case
2. Insert switch rod into the motor case and hook into the switch slide

5.2. Assembly: Field magnet

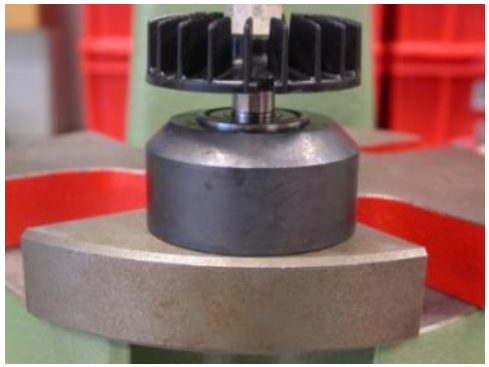
1. Insert into the field magnet interior
2. Insert the field magnet into the motor case and
   drive the field magnet in with light strokes using the plastic hammer
   Attention - The stamped-in ID no. has to be on the switch slide side !!!
3. Tighten the screws for fastening
4. Insert air management ring - Only fits in one position !!!

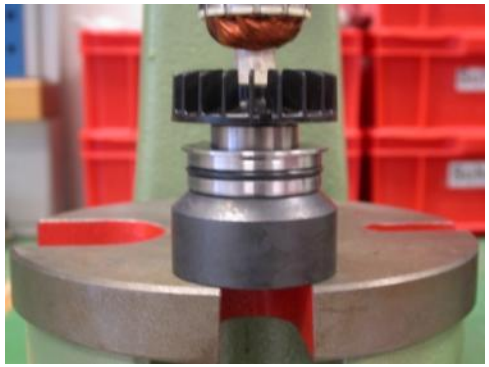
Tools:

Plastic hammer

Screwdriver
Torx 15

5.3. Assembly: Armature





1. Pressing on bearing and bearing ring
2. Press the ball bearing onto the mandrel press with the press-on tool
3. Press on the bearing ring
4. Press on the spherical bearing and circleclip

5.4. Assembly: Armature - Gear head

1. Press the completed armature with the pressing-on device on the mandrel press into the gear head

- **Caution !!!!!!** - The armature has to be placed onto the case centrically, otherwise the bearing fitting is destroyed during the pressing in (Burr)

- **Caution !!!!!!** - Observe the position of the fork during the pressing in (centred)

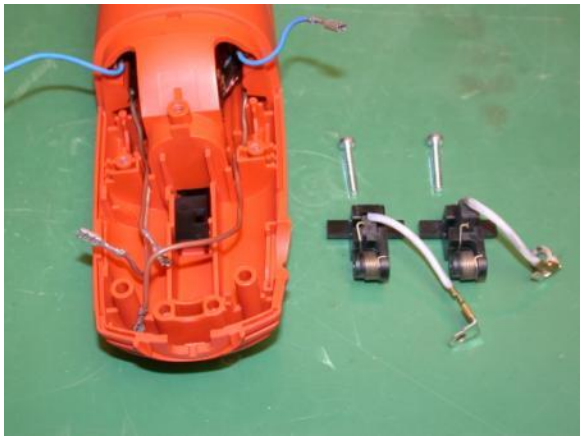
5.5. Assembly: Armature - motor case

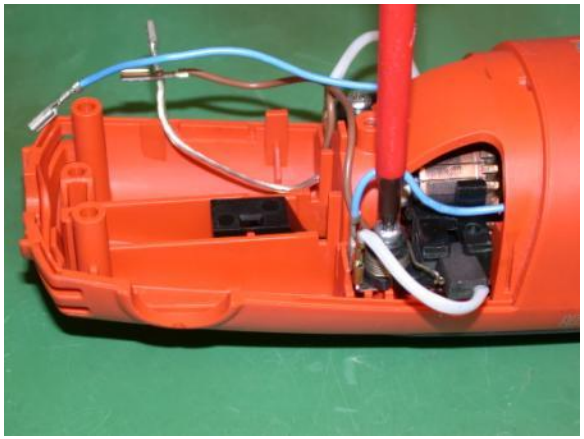
1. Insert the armature with the gear head into the motor case
2. Drive it into the bearing fitting (motor case) with light strokes using the plastic hammer
3. Tighten the gear head on the motor case with screws (4pcs. Torx 15)

Tools:

- Plastic hammer
- Screwdriver Torx 15

5.6. Assembly: Carbon brushes / carbon holder



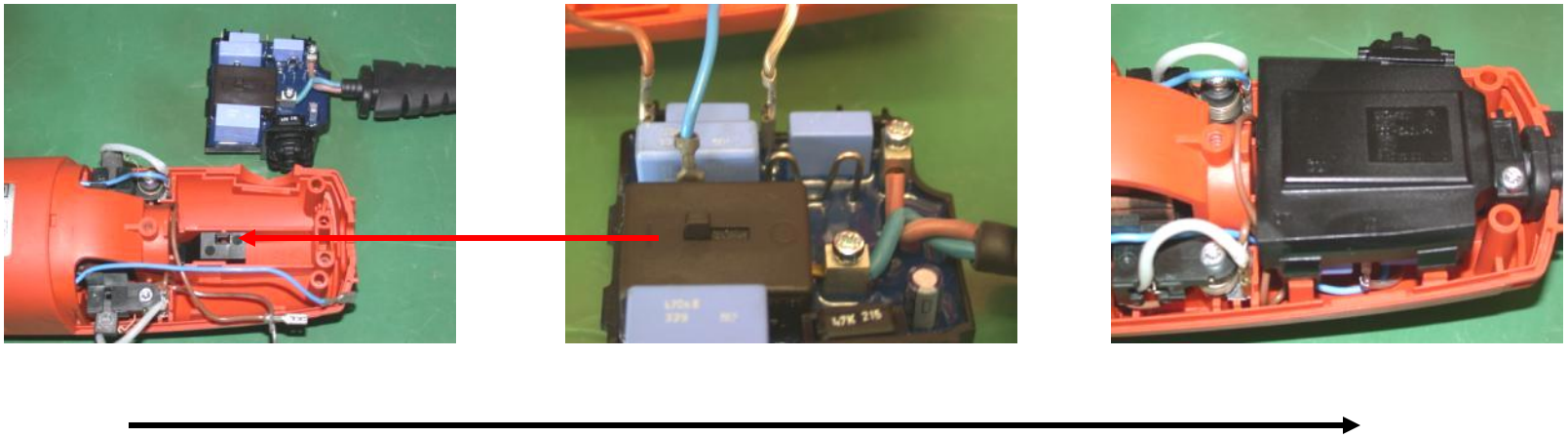


1. Assemble the carbon holder with carbon brush into the motor case
2. Observe the cable placement to avoid damage
3. Screw the carbon holder tightly and connect cables

Tools:

- Screwdriver Torx 15
- Flat pliers
- Cable hook

5.7. Assembly: Electronics / cables



1. Assemble the electronics with the mains power cable into the motor case
2. Connect cable to the electronics as seen in the picture
3. Assemble the electronics into the motor case - **Caution**, observe the switch position during the assembly , has to engage with the switch rod, otherwise **no** function of the machine

Tools:

- Screwdriver
  Torx 15
  PH 1
- Flat pliers
- Cable hook

5.8. Assembly: Case cover / clamping piece

1. Place case cover onto the motor case and screw tightly
2. Insert clamping piece and close clamping lever
3. Only inspect the machine with **closed** clamping lever -
   Danger of injury during opened clamping lever: clamping piece and previously placed tool can fall out.

6. Tools

6.1. General tools

6.2. Special tools

6.3 Lubricants

6.4 Adhesive, sealing and other agents

6.1. All mechanical tools

• Machine vice	Retail
• Mandrel press	Retail
• Plastic hammer	Retail
• Circlip pliers	Retail
• Screwdriver Torx 15, PH 1	Retail
• Flat pliers	Retail
• Cable hook	Retail

6.2. Special tools

Pull-off device for ball bearing

- Pull-off cap 6 41 04 150 00 8
- Clamping chuck 16mm 6 41 07 016 00 1
  19mm 6 41 07 019 00 7
  26mm 6 41 07 026 00 0

Press-on tool for ball bearing

- Ball bearing support 19mm
- Ball bearing support 26mm

Pull-off device armature / gear head 6 41 14 031 000

Straining screw 6 41 07 013 02 1

T-handle 6 41 07 013 03 7

Pressing-in device armature / gear head 6 41 22 108 000

Pull-off device spindle (only FMM 250) 6 41 04 601 00 9

Pressure piece (only FMM 250) 6 41 02 066 00 1

6.3. Lubricants

Lubricant, operation designation	Appearance	Technical data & consistency class	Use	Article code, of compl. package and type of package	Grease quantity and position
Lubricants					
0 40 101 0100 4 (old Sst1)	Light brown, beige, naturally cloudy, ointment consistency	Drop point: approx. 180°C Range of usage: -30°C to +120°C NLGI:2	Normally loaded spur gear and roller bearing, also slide bearing with higher speed	85g tube 32160003014 800g tin 3213200701 4500g tin 32132010015	Gears (405) 12g above service life