

Vespa®

WORKSHOP MANUAL

633572



LX 150 4T USA



WORKSHOP MANUAL

LX 150 4T USA

The descriptions and illustrations supplied in this publication are not binding. PIAGGIO therefore reserves the right to make any changes to pieces, parts or accessory supplies, which it believes to be appropriate for improvement purposes or any requirement of a constructive or commercial nature, at any time, without the obligation to up-dating this publication before time, the essential characteristics of the type described and illustrated here remaining valid.

Not all versions reported in this publication are available in all Countries. The availability of single versions should be checked at the official Piaggio sales network.

"© Copyright 2005 - PIAGGIO & C. S.p.A. Pontedera. All rights reserved. No part of this publication may be reproduced."

PIAGGIO & C. S.p.A. - Q.C.S./ After Sale Service V.le Rinaldo Piaggio, 23 - 56025 Pontedera (PI)
www.piaggio.com

WORKSHOP MANUAL

LX 150 4T USA

This workshop manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. This manual is addressed to Piaggio service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle fixing techniques and procedures. Any important changes made to the vehicles or to specific fixing operations will be promptly reported by updates to this manual. Nevertheless, no fixing work can be satisfactory if the necessary equipment and tools are unavailable. It is therefore advisable to read the sections of this manual relating to specific tools, along with the specific tool catalogue.

N.B. Provides key information to make the procedure easier to understand and carry out.

CAUTION Refers to specific procedures to carry out for preventing damages to the vehicle.

WARNING Refers to specific procedures to carry out to prevent injuries to the repairer.



Personal safety Failure to completely observe these instructions will result in serious risk of personal injury.



Safeguarding the environment Sections marked with this symbol indicate the correct use of the vehicle to prevent damaging the environment.



Vehicle intactness The incomplete or non-observance of these regulations leads to the risk of serious damage to the vehicle and sometimes even the invalidity of the guarantee.



INDEX OF TOPICS

CHARACTERISTICS

CHAR

TOOLING

TOOL

MAINTENANCE

MAIN

TROUBLESHOOTING

TROUBL

ELECTRICAL SYSTEM

ELE SYS

ENGINE FROM VEHICLE

ENG VE

ENGINE

ENG

SUSPENSIONS

SUSP

BRAKING SYSTEM

BRAK SYS

CHASSIS

CHAS

PRE-DELIVERY

PRE DE

TIME

TIME

INDEX OF TOPICS

CHARACTERISTICS

CHAR

Rules

This section describes general safety rules for any interventions to be performed on the vehicle.

Safety rules

- Should it be necessary to keep the engine running while servicing, make sure that the area or room is well ventilated, and use special exhaust fans, if required. Never let the engine running in closed rooms. In fact, exhaust gases are toxic.
 - The battery electrolyte contains sulphuric acid. Protect your eyes, cloths and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or clothes, rinse thoroughly with water and consult a doctor immediately.
 - The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks and flames when close to the battery, especially during recharge.
 - Fuel is highly flammable, and in some conditions it can be explosive. Do not smoke in the working area, and avoid free flames or sparks.
 - Clean the brake pads in a well ventilated environment, directing the compressed air jet so as to not intake the dust produced by the wear of the friction material. Even though the latter contains no asbestos, dust inhalation is harmful.
-

Maintenance rules

- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
 - Use only the specific tools designed for this vehicle.
 - Always use new gaskets, sealing rings and split pins upon reassembly.
 - After removal, clean the components using non-flammable or low fire-point solvent. Lubricate all working surfaces before reassembly, except for conical couplings.
 - After reassembly, check that all components have been installed properly and that they are in good working order.
 - For removal, overhaul and reassembly operations use only tools provided with metric measures. Metric bolts, nuts and screws are not interchangeable with coupling members with English measurement. Using improper coupling members and tools may impair the vehicle.
 - Should any interventions to the vehicle electric system be required, check that the electrical connections - especially earth and battery connections - have been implemented properly.
-

Vehicle identification

VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix	ZAPM 428 F5
engine prefix	M442M+1001

**Dimensions and mass****DIMENSIONS AND WEIGHT**

Specification	Desc./Quantity
Curbside weight	110 ± 5 kg
Maximum height	1140 mm
Width	740 mm
Wheelbase	1280 mm
Length	1800 mm

Engine**ENGINE**

Specification	Desc./Quantity
Engine	Single cylinder 4-stroke Piaggio LEADER
Timing system	Single Over-Head Cam shaft (SOHC), 2 valves
Valve play	suction 0,10 exhaust: 0,15
Bore per stroke	62,6 x 48,6 mm
Dry weight	150,46 cm ³
Compression ratio	10.5 : 1
Carburettor	KEIHIN CVEK26
Idling	~ 1600 ÷ 1800 r.p.m.
Starter system	Electric
Max power	11,6 CV at 7750 rpm
Cooling	Forced air.

Transmission

TRANSMISSION

Specification	Desc./Quantity
Trasmission	With automatic expandable pulley variator, trapezoidal belt, automatic clutch, gear reducer and transmission compartment with forced circulation.

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil	~ 1000 cc
Rear oil hub	~ 100 cc
Fuel tank capacity	~ 8.5 litres (including 2 l reserve)

Electrical system

ELECTRICAL SYSTEM

Specification	Desc./Quantity
Starter system	Electric
Spark	Champion RG6YC- NGK CR7EB

Frame and suspensions

CHASSIS AND SUSPENSION

Specification	Desc./Quantity
Frame	Structural frame in pressed sheet steel
Steering and suspensions	Steering column tube pivoted on front wheel hub; helical spring suspension and hydraulic double-effect shock absorbers; rear with hydraulic double-effect shock absorber and adjustable coaxial spring in the preloading on 4 positions.

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 200 mm disc (hydraulically controlled via a lever on RHS of handlebars) with fixed calliper.

Specification	Desc./Quantity
Rear brake	Ø110 mm drum

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front wheel rim	Die-cast aluminium alloy 2.50x11"
Front tyre	Tubeless 110/70-11"
Rear wheel rim	Die-cast aluminium alloy 3.00x10"
Rear tyre	Tubeless 120/70-10"
Tyre pressure (front wheel)	1,6 bar
Tyre pressure rear wheel	2 bar
Tyre pressure (rear wheel driver and passenger)	2,3 bar

Secondary air

To reduce the amount of polluting emissions, this vehicle is equipped with a catalytic converter.

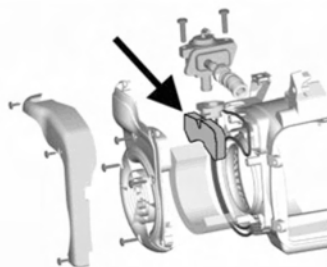
In order to facilitate the catalysis process, extra oxygen is supplied via a Secondary Air System (SAS).

Such system allows to add oxygen to the unburnt gases before the catalytic converter, thus improving the efficiency of the catalyser and hence the reaction process.

Air is added through an intake duct on the cylinder head, after being deperated by black filter.

The system is equipped with a shut-off valve which engages during deceleration, so to avoid undesired noise.

To ensure the SAS is always working correctly, it is necessary to have it checked by an **Authorised Piaggio Service** Station every 12,000 Km (see the Maintenance Operations section), so that the filters may be thoroughly cleaned.



The operation consists of cleaning the filtering elements with water and neutral detergent and then drying them with a clean cloth and light jets of compressed air.



SHOULD YOU REQUIRE ANY ASSISTANCE, CONTACT YOUR NEAREST AUTHORISED PIAGGIO DEALER.

Carburettor

150cc Version

Kehin

CALIBRATION CARBURETOR

Specification	Desc./Quantity
Type	CVEK 26
Throttle valve diameter	Ø 26,5
Choke diameter	Ø 26,4
Adjustment marking	265A
Maximum thrust	82
Maximum air thrust (on body)	85
Tapered pin stamping	NELA
Gas valve spring	130 ÷ 180 gr.
Minimum jet	35
Minimum air thrust (on body)	150
Initial minimum mixture screw opening	1 ¾
Starter jet	42
Starter air thrust (on body)	Ø 1,5
Starter pin stroke	10 mm (a 24°)
Choke resistor	20 Ohm (a 24°)

Tightening Torques

LUBRICATION

Name	Torque in Nm
Hub oil drainage cap	15 ÷ 17
Oil filter	4 ÷ 6
Oil pump cover screws	5 ÷ 6
Oil pump screw tightening torque	5 ÷ 6 Nm
Pump drive pulley screw	10 ÷ 14
Chain cover screws	4 ÷ 6
Oil pan screws	10 ÷ 14
Minimum oil pressure sensor	12 ÷ 14
Blow-by recovery duct fastening screws:	3 - 4

CYLINDER HEAD

Name	Torque in Nm
Ignition spark plug	12 ÷ 14
Head cover screw	11 ÷ 13
Head to cylinder set nuts (*)	28 ÷ 30
Head set screws (external)	11 ÷ 13
Start up mass screws	7 ÷ 8,5
Magneto housing screw	1 ÷ 2
Magneto side air duct screw	3 ÷ 4
De-compressor balance weight fixing	7 ÷ 8,5
Camshaft pulley screw:	12 ÷ 14 Nm
Timing chain tightener sliding block screws	10 ÷ 14
Start up mass bell screws	11 ÷ 15
Tightener screws	11÷13 Nm
Timing chain tensioner central screw:	5 ÷ 6 Nm
Camshaft retain plate screw	5 ÷ 6
Exhaust pipe/cylinder head fixing nut.	16 ÷ 18
Suction manifold screw on head	11 ÷ 13

TRANSMISSION

Name	Torque in Nm
Driving pulley screw	75 ÷ 83
Transmission cover screw	11 ÷ 13
Driven pulley axis (°)	54 ÷ 60
Rear hub cover screw	24 ÷ 27
Clutch assembly nut on driven pulley	45 ÷ 50

FLYWHEEL

Name	Torque in Nm
Flywheel fan screws	3 ÷ 4 N.m
Stator cover screws (°)	3 ÷ 4
Flywheel nut	52 ÷ 58
Pick-up screw	3 ÷ 4

CRANKCASE AND DRIVING SHAFT

Name	Torque in Nm
Engine crankcase inside head screws (transmission side half shaft)	4 ÷ 6
Oil filter union on crankcase	27 ÷ 33
Rear brake shaft set screw	11 ÷ 13
Engine crankcase coupling screws	11 ÷ 13
Prefilter cap	24 ÷ 30
Starter motor fixing screw:	11 ÷ 13 Nm
Muffler to crankcase set screws	24 ÷ 27
Engine oil drainage cap	24 ÷ 30

STEERING UNIT

Name	Torque in Nm
Steering upper ring nut	35 ÷ 40
Steering lower ring nut	12 ÷ 14
Handlebar fastening screw	50 ÷ 55

CHASSIS UNIT

Name	Torque in Nm
Frame - swing arm bolt	44 ÷ 52
rocker arm pin - engine	33 ÷ 41
Centre stand pin	32 ÷ 40
Bolt mounting rocker arm silent-block	33 ÷ 41

FRONT SUSPENSION

Name	Torque in Nm
Shock absorber upper nut	20 ÷ 30
Front wheel spindle nut	75 ÷ 90
Shock absorber upper bracket bolt	20 ÷ 25
Wheel rim screw	20 ÷ 25
Shock absorber lower bolts (°)	20 ÷ 27

FRONT BRAKE

Name	Torque in Nm
Pump-tube oil connection	8 ÷ 12
Tube-caliper oil connection	20 ÷ 25
Screw fixing the caliper to the support	20 ÷ 25
Brake disc screw	5 ÷ 6,5
Oil bleeder valve (on caliper)	10 ÷ 12
Handlebar to pump	7 ÷ 10

REAR SUSPENSION

Name	Torque in Nm
Rear wheel axle	104 ÷ 126
Shock absorber bottom fixing	33 ÷ 41
Shock absorber/chassis nut:	20 - 25 N.m

Overhaul data**Assembly clearances****Cylinder - piston assy.****COUPLING BETWEEN PISTON (ASSO-WERKE) AND CYLINDER**

Name	Play	Initials	Cylinder	Piston	Play on fitting
Coupling	</>	A	62,580 ÷ 62,587	62,533 ÷ 62,540	0,040 ÷ 0,054
Coupling	</>	B	62,587 ÷ 62,594	62,540 ÷ 62,547	0,040 ÷ 0,054
Coupling	</>	C	62,594 ÷ 62,601	62,547 ÷ 62,554	0,040 ÷ 0,054
Coupling	</>	D	62,601 ÷ 62,608	62,554 ÷ 62,561	0,040 ÷ 0,054
Compression segment 1st increase	</>	A1	62,780 ÷ 62,787	62,733 ÷ 62,740	0,040 ÷ 0,054
Compression segment 1st increase	</>	B1	62,787 ÷ 62,794	62,740 ÷ 62,747	0,040 ÷ 0,054
Compression segment 1st increase	</>	C1	62,794 ÷ 62,801	62,747 ÷ 62,754	0,040 ÷ 0,054

Name	Play	Initials	Cylinder	Piston	Play on fitting
Compression segment 1st increase	</>	D1	62,801 ÷ 62,808	62,754 ÷ 62,761	0,040 ÷ 0,054
Compression segment 2st increase	</>	A2	62,980 ÷ 62,987	62,933 ÷ 62,940	0,040 ÷ 0,054
Compression segment 2st increase	</>	B2	62,987 ÷ 62,994	62,940 ÷ 62,947	0,040 ÷ 0,054
Compression segment 2st increase	</>	C2	62,994 ÷ 63,001	62,947 ÷ 62,954	0,040 ÷ 0,054
Compression segment 2st increase	</>	D2	63,001 ÷ 63,008	62,954 ÷ 62,961	0,040 ÷ 0,054
Compression segment 3st increase	</>	A3	63,180 ÷ 63,187	63,133 ÷ 63,140	0,040 ÷ 0,054
Compression segment 3st increase	</>	B3	63,187 ÷ 63,194	63,140 ÷ 63,147	0,040 ÷ 0,054
Compression segment 3st increase	</>	C3	63,194 ÷ 63,201	63,147 ÷ 63,154	0,040 ÷ 0,054
Compression segment 3st increase	</>	D3	63,201 ÷ 63,208	63,154 ÷ 63,161	0,040 ÷ 0,054

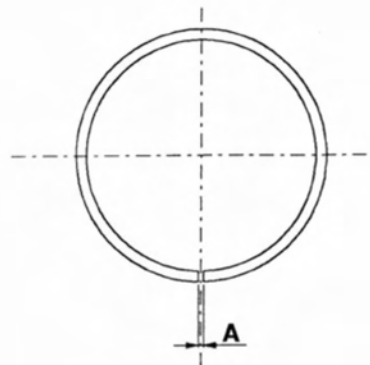
COUPLING BETWEEN PISTON (RIGHT WAY) AND CYLINDER

Name	Play	Initials	Cylinder	Piston	Play on fitting
Coupling	</>	A	62,580 ÷ 62,587	62,541 ÷ 62,548	0,032 ÷ 0,046
Coupling	</>	B	62,587 ÷ 62,594	62,548 ÷ 62,555	0,032 ÷ 0,046
Coupling	</>	C	62,594 ÷ 62,601	62,555 ÷ 62,562	0,032 ÷ 0,046
Coupling	</>	D	62,601 ÷ 62,608	62,562 ÷ 62,569	0,032 ÷ 0,046

Piston rings

PISTON RINGS

Name	Description	Dimensions	Initials	Quantity
Compression lining		62.6x1	A	0.15 ÷ 0.30
Scraper ring lining		62.6x1	A	0.20 ÷ 0.40
Scraper ring lining		62.6x2.5	A	0.20 ÷ 0.40
Compression lining 1° greater		62.8x1	A	0.15 ÷ 0.30
Scraper ring lining 1° greater		62.8x1	A	0.20 ÷ 0.40
Scraper ring lining 1° greater		62.8x2.5	A	0.20 ÷ 0.40
Compression lining 2° greater		63.0 x 1	A	0.15 ÷ 0.30
Scraper ring lining 2° greater		63.0 x 1	A	0.20 ÷ 0.40
Compression lining 2° greater		63.0 x 2.5	A	0.20 ÷ 0.40
Compression lining 3° greater		63.2 x 1	A	0.15 ÷ 0.30
Compression lining 3° greater		63.2 x 1	A	0.20 ÷ 0.40
Compression lining 3° greater		63.2 x 2.5	A	0.20 ÷ 0.40



Crankcase - crankshaft - connecting rod

AXIAL PLAY BETWEEN CRANKSHAFT AND ROD

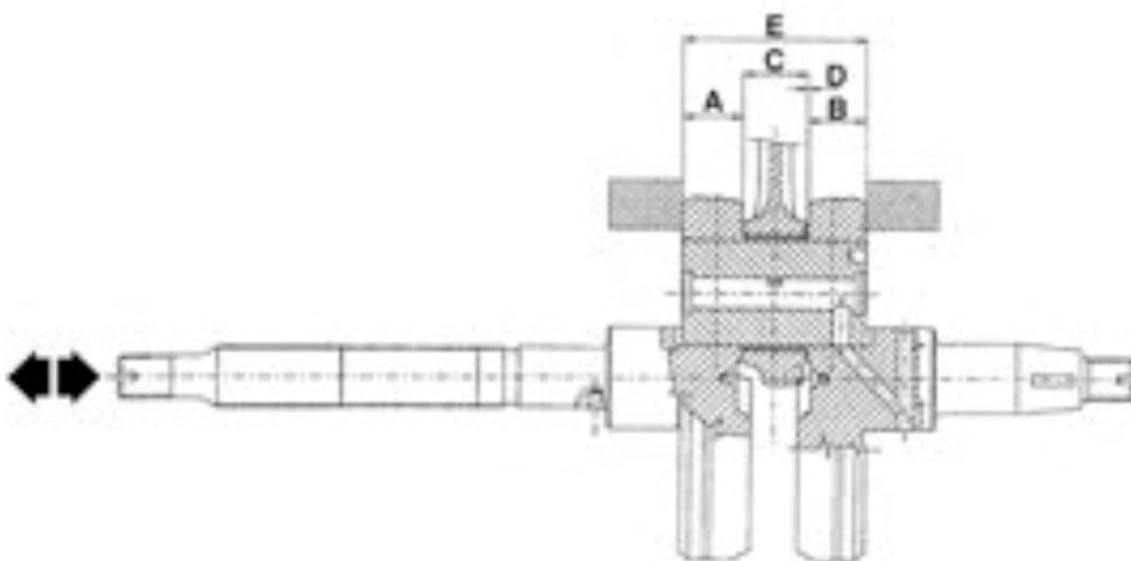
Name	Description	Dimensions	Initials	Quantity
Half shaft trans- mission side		16,6 +0 -0,05	A	D = 0,20 ÷ 0,50
Half shaft flywheel side		16,6 +0 -0,05	B	D = 0,20 ÷ 0,50
Connecting rod		18 -0,10 -0,15	C	0,20 ÷ 0,50

Name	Description	Dimensions	Initials	Quantity
Crank pin length		51,400	E	

AXIAL PLAY BETWEEN CRANKSHAFT AND BENCH SEMIBEARINGS

Name	Description	Dimensions	Initials	Quantity
Crankshaft			category 1	28,998 ÷ 29,004
Crankshaft			category 2	29,004 ÷ 29,010
Carter			Class 1	32,953 ÷ 32,959
Carter			Class 2	32,959 ÷ 32,965
Half crankshaft bearing			Type B - blue	1,973 ÷ 1,976
Half crankshaft bearing			Type C - yellow	1,976 ÷ 1,979
Half crankshaft bearing			Type E - green	1,979 ÷ 1,982
Crankshaft 1 category 1			E - E	
Crankshaft 1 category 2			C - C	
Crankshaft 2 category 1			C - C	
Crankshaft 2 category 2			B - B	

Crankshaft/crankcase axial play: 0,15 ÷ 0,40



Slot packing system

- Temporarily fit the cylinder on the piston, without the base gasket.
- Fit a comparator on the specific device
- Reset the comparator on an inspection surface with an average preload of 5 mm for example Keeping the reset position, fit the device on the cylinder and lock it with 2 nuts as shown in the figure.
- Turn the crankshaft until the upper dead centre point (inversion point of the comparator rotation).
- Calculate the difference between the two measurements: using the table below find the thickness of the cylinder base gasket to be used for reassembly. Correct identification of the thickness of the cylinder base gasket helps keep the correct compression ratio.
- Remove the specific device and cylinder.

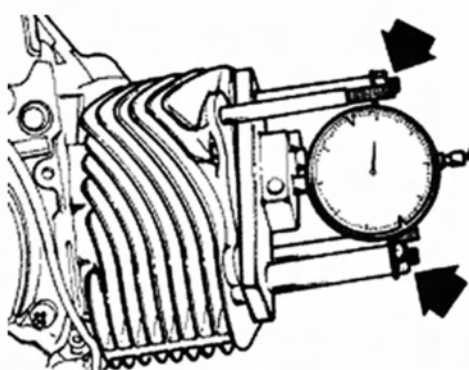
Characteristic

Compression ratio

10.5 : 1

PACKING SYSTEM

Specification	Desc./Quantity
Measured dimension	1 ÷ 1,1
Base gasket thickness	0,8 ± 0,05
Measured dimension	1,1 ÷ 1,3
Base gasket thickness	0,6 ± 0,05
Measured dimension	1,3 ÷ 1,4
Base gasket thickness	0,4 ± 0,05



Products

TABLE OF RECOMMENDED PRODUCTS

Product	Description	Specifications
TUTELA MATRYX MOTO RIDER	Oil for rear hub	Oil synthetic multidegree SAE 75W/85 API GL4

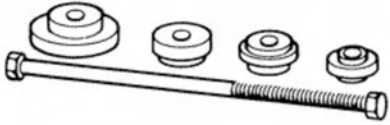


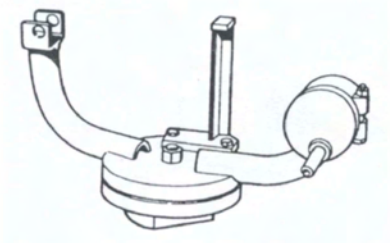

Product	Description	Specifications
SELENIA HI Scooter 4 Tech	Oil for flexible transmission lubrication (brake, acceleration control, km counter)	Oil for four stroke motors
SELENIA Air Filter Oil	Oil for air filter sponge	Mineral oil with specific additive for increasing the ISO VG 150
SELENIA HI Scooter 4 Tech	Engine oil	Synthetic oil SAE 5W/40 that passes the API SG specification.
JOTA 3 FS	Speedometer transmission	Lithium soap grease NLGI 33
TUTELA TOP 4	Brake fluid	Synthetic fluid SAE J1703, NHTSA 116 DOT 4, ISO 4925
MONTBLANC MOLYBDENUM GREASE	Grease for driven pulley shaft compensating ring and mobile driven pulley sliding seat	Molybdenum bisulphide grease
TUTELA ZETA 2	Grease for steering bearings and swing arm pin seats and driven pulley spring supporting surface (pulley side only)	Lithium soap and zinc oxide grease NLGI2
TUTELA TP1	Grease for brake control lever, gas	NLGI 1-2 calcium soap based white spray grease



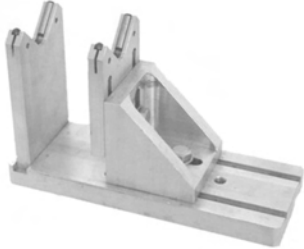
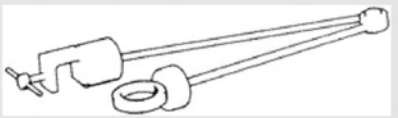

INDEX OF TOPICS

TOOLING

TOOL

TOOLS

Stores code	Description	
001330Y	Steering seat installer, to be fitted with parts: 001330Y009-For lower seat, 001330Y013-For upper seat	
001467Y009	Bell for bearings external Ø 50 mm	
001467Y013	15-mm pliers	
002465Y	Pliers for snap rings	
005095y	Engine support	
008564Y	Flywheel extractor	

Stores code	Description	
020004Y	Drift for removing thrust rings from steering head tube	
020055Y	Steering tube ring nut spanner	
020074Y	Crankshaft aligning tool	
020150Y	Support for air heater "METABO HG 1500/2"	
020151Y	Air heater "METABO HG 1500/2"	
020193Y	Oil pressure gauge	