

AC 650



Cylinder boring machine

A Company
of ThyssenKrupp
Technologies

BERCO S.p.A.



The machine and its functions

Fig. 1



Fig. 2



Fig. 3



Precision, fast operation and reliability are the main features of the AC 650 and AC 650M Cylinder Boring Machines. The two models, dimensionally and structurally alike, only differ in the table drive system: manual traverse on the AC 650 and power traverse on the AC 650M. Although they have been designed for reconditioning of small and middle sized I.C. engine blocks, they can profitably be used also for other jobs such as conrod and bearing housing boring, etc. On the AC 650M, with power table traverse, it is possible, by using a milling cutter, to resurface the contact surface, of cylinder blocks and heads as well as manifolds in either cast iron or aluminium. All of these operations are performed in the most rational way and with the utmost fastness as both models are equipped with a special device which allows fast boring spindle change and gives the possibility to preset the tools out of machine for subsequent machining. Other possibilities

to widen the field of application are given by the cutter arbor which can accommodate at the inside a special taper seat (No. 3 M.T.) bush which allows, fitting toolholders, drill chucks, twist drills of different sizes, etc. The AC 650 and AC 650M machines, manufactured with the unrivalled technique featuring all of the BERCO products, are featured by:

- **Structure components** all in high resistance, stress relieved cast iron;
- **Integral slide ways** widely dimensioned and finished with a particular process which assures, even under max. load, an even and rational dispensing of the lubricating film;
- **Controls and main plates** are, all of them, located on one side of the machine in a position comfortable for both reading and moves. They will never, in any case, interfere with preparation of the machine and loading/unloading of the cylinder blocks;

- **Top machining precision.** at both the start and the end of the work day because the heat generating components are not in direct contact with the spindle head or the column;
- **High output transmission of rotation and feed.** No low reliability belt type variators. Gearing, bearings and heat treated shafts run in oil bath;
- **Simple and fast preparation of machine.** A device allows to interchange the boring spindle with the cutter arbor without any waste of time. Furthermore, the boring spindles do not need change of the toolhead to cover their boring range. The assembly tool/toolholder allows presetting out of machine, except for the smallest spindle;
- **Angular positioning of the tool** inside the cylinder can be checked and adjusted by turning the boring spindle manually;

- **Mechanical and electrical safety devices** against overload, wrong moves, overvoltage and voltage drops;
- **Electrical equipment** designed according to CEI standards and in full compliance with the accident prevention regulations; all controls are low voltage. Many specific optionals such as spindles, tools, setup fixtures and squares are available on request, to boost the top flexibility and production features of this new line of boring machines, thus coping with the manifold requirements of our customers.

The machine and its components

Fig. 4



Fig. 5



Fig. 6



Fig. 7

Fig. 8

Fig. 9

Standard Outfit

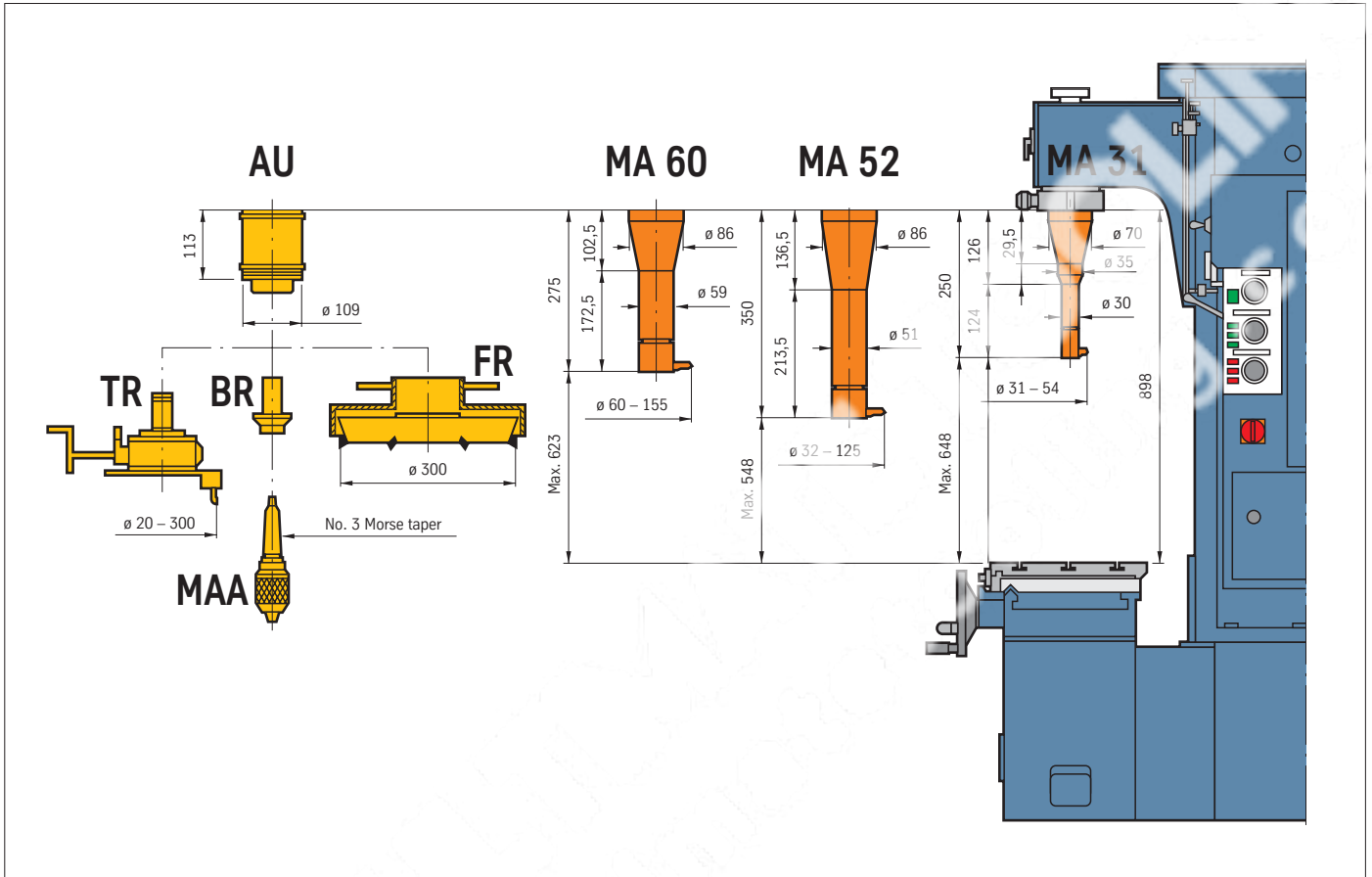
- Spindle Safety Guard
- Parallel support assy, 120 mm (4.72") high, complete with screws, nuts and clamps for securing the cylinder block.
- DM 52 measuring device (Fig. 5), 52 - 155 mm (2.05" - 6.10"), complete with micrometer (metric or imperial).
- Locking rod for counterweight.
- Tool puller, grease gun and set of service spanners.

Extra Outfit

- **A00.20473**
Parallel support assembly, 80 mm (3.15") high, with screws and nuts (2 pcs. required).
- **A00.20458**
Parallel support, 200 mm (7.87") high (2 pcs. required).
- **A00A27820**
Tool grinder (Fig. 4).
- **A00.67506**
Diamond wheel (Fig. 4).
- **A00A07602B**
Tool grinding jig assembly (Fig. 4).
- **A00.58100**
Stud puller, 8 - 13 mm (0.32" - 0.51") capacity.
- **A00.58105**
Ditto, 12 - 25 mm (0.47" - 0.1") capacity.
- **V11A23003**
Spindle infeed reading fixture (draw. No. A00A23700), assembled on the machine, metric (Imperial: V11A23004).
- **P00A23908**
MA 31 Boring spindle and DM 31 Measuring device (Fig. 11), 31 - 54 mm (1.20" - 2.13") capacity, cpl. with dial indicator, metric (Imperial: P01A23908).

- Fig. 1 Boring a cylinder block.
- Fig. 2 Milling an in-line block top with multiedged insert milling cutter.
- Fig. 3 View of the controls box on AC 650M.
- Fig. 4 Tool grinder, complete with diamond wheel and tool grinding jig.
- Fig. 5 DM 52 measuring device, for setting tool out of machine.
- Fig. 6 Centering a cylinder with the fixture equipping the boring spindle.
- Fig. 7 Boring a cylinder with an insert type tool.
- Fig. 8 Chamfering a cylinder with the chamfering tool.
- Fig. 9 Boring a machine tool component with a dead-end hole tool.

The machine and its components



Spindler and Accessories

SPINDLES		TOOLS FOR CAST IRON													
Type	Tool-holder	BORING				SPOT-FACING				DEAD-END HOLE				CHAMFERING	
		capacity dia. mm	brazed tip	insert holder	insert type	capacity dia. mm	brazed tip	insert holder	insert type	capacity dia. mm	brazed tip	insert holder	insert type	capacity dia. mm	brazed tip
MA31		31 - 42 1.22" - 1.65"	U202265301 *	A03.19396	U003101000	31 - 42 1.22" - 1.65"	U202265301	A03.19396	U003101000	44 - 54 1.73" - 2.13"	U202248071	A04.19362	U003101000		
		40 - 54 1.57" - 2.13"	U202265331 *	A03.19399		40 - 54 1.57" - 2.13"	U202265331	A03.19399		75 - 107 2.95" - 4.21"	U202248101	A00A23678	U003101000	64 - 98 2.52" - 3.86"	U202269091
MA52	A00A23668	52 - 62 2.05" - 2.44"	U202267051 *	A00A23676	U010101060	56 - 66 2.21" - 2.60"	U202265351	A00A07891	U003101000	65 - 77 2.56" - 3.03"	U202248121	A00A23680	U003101000	54 - 66 2.13" - 2.60"	U202269101
	A00A23669	60 - 92 2.36" - 3.62"	U202267061 *	A00A07882		64 - 102 2.52" - 4.02"	U202265361	A00A07894		75 - 107 2.95" - 4.21"		A00A23678		64 - 98 2.52" - 3.86"	
	A00A23670	90 - 125 3.54" - 4.92"	U202267061 *	A00A07882		100 - 135 3.94" - 5.32"	U202265361	A00A07894		105 - 139 4.13" - 5.47"		A00A23680		96 - 130 3.78" - 5.12"	
MA60	A00A23669	60 - 92 2.36" - 3.62"	U202267051 *	A00A23676	U010101060	64 - 102 2.52" - 4.02"	U202265351	A00A07891	U003101000	75 - 107 2.95" - 4.21"	U202248101	A00A23678	U003101000	64 - 98 2.52" - 3.86"	U202269091
	A00A23670	90 - 125 3.54" - 4.92"	U202267061 *	A00A07882		100 - 135 3.94" - 5.32"	U202265361	A00A07894		105 - 139 4.13" - 5.47"		A00A23680		96 - 130 3.78" - 5.12"	
	A00A23771	123 - 155 4.84" - 6.10"	U202267061 *	A00A07882		133 - 165 5.24" - 6.50"	U202265361	A00A07894		137 - 165 5.39" - 6.50"		A00A23680		128 - 165 5.04" - 6.50"	

* Tools supplied as standard outfit of the relevant spindles

Tools for steel on request

ACCESSORIES

AU	A00A23800	Universal adaptor for milling cutter and step-down bush	MAA	A00A23903	Drill chuck, capacity dia. mm 1 - 13 ($\frac{3}{64}$ " - $\frac{33}{64}$ ")
BR	A00A23902	Step-down bush with No. 3 Morse taper	TR	A00A23840	Toolhead with radial feed tool, cpl. with tool No. U202265422 for cast iron
FR	A00A23820A	300 mm (11.8") dia. milling cutter with 8 multidedged insert No. U003355020 for cast iron and aluminium (only for AC 650M)			

All of the spindles and accessories are extra outfit.

The machine and its components

Fig. 10



Fig. 11



Con-rod setup fixture

- **A00A23860**
PFB fixture for clamping con-rods with 50 - 370 mm (1.97" - 14.56") center distance (Fig. 12).
- **A00.21900A**
Expanding mandrel (Fig. 12), 17 - 31 mm (.67" - 1.22") capacity, for PFB fixture.
- **A00.21911A**
Expanding mandrel (Fig. 12), 31 - 63 mm (1.22" - 4.45") capacity, for PFB fixture.
- **A00A28800**
Expanding mandrel (Fig. 12), 63 - 113 mm (2.48" - 4.45") capacity, for PFB fixture.
- **A00A18834**
Boring spindle (Fig. 12), 17 - 35 mm (.67" - 1.38") capacity, complete with two tools, 15 mm (0.59") and 21 mm (0.83") long.
- **A00A23907**
Taper seat bush for No. A00A18834 boring spindle.
- **A00.21978**
Tool setting fixture for No. A00A18834 boring spindle.
- **A00.41700A**
Centering fixture (Fig. 12) for No. A00A18834 boring spindle, complete with dial indicator (metric or imperial).



Fig. 12

Fig. 13



Fig. 14



- Fig. 10
Toolhead with radial tool feed. Quite necessary for facing, milling and boring of counterbores.
- Fig. 11
DM 31 measuring device mounted on MA 31 spindle.
- Fig. 12
Centering of conrod mounted on the PFB fixture and subsequent boring.
- Fig. 13, 14
Drilling machine tool components with, respectively, a drill mounted in taper seat bush and in the drill chuck.

The machine and its components

Fig. 15



Fig. 15
Motorcycle cylinder clamping fixture.

Fig. 16
Quick clamping fixture for in-line block mounted on parallel supports.

Fig. 17
PCV Universal V-block fixture. Photo shows the 45° setup square.

Fig. 18
Fixture for boring 90° and 60° V-blocks.



Fig. 16



Fig. 17



Fig. 18

Cylinder block fixtures

- **A03.20456**
Cylinder block quick clamping fixture (Fig. 16), 2 pcs. required.
- **A00.56934**
Motorcycle cylinder clamping fixture (Fig. 15).
- **A01A07824**
90° and 60° V-block fixture (Fig. 18).
- **A00.69650**
PCV Universal V-block fixture (Fig. 17), cpl. with 45° setup square.
- **A00.69670**
30° setup square for PCV fixture.

- **A00.69689**
22° 30' setup square for PCV fixture (Ford Transit).
- **A00.69690**
30° setup square for PCV fixture.
- **A00.69691**
30° setup square for PCV fixture (Ford 20M).
- **A00.69692**
32° setup square for PCV fixture (GM 8V-M107).

Cylinder head fixtures (AC 650M)

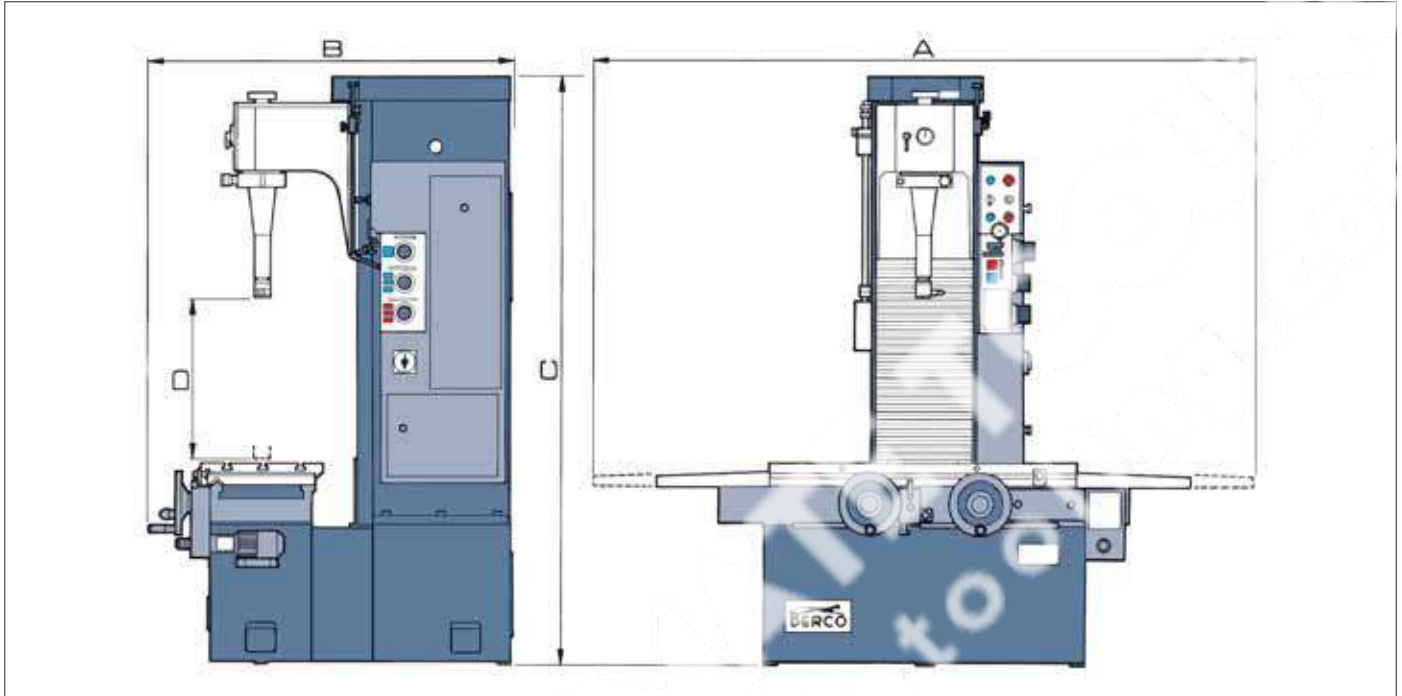
- **A01.32433**
Swinging fixture for holding cylinder heads and V-blocks.

- **A00.41731A**
Universal setup square, with variable angle top, for cylinder heads (Fig. 17).
- **A00A02600**
Parallel support for cylinder heads, complete with plate and lock screws (2pcs. required).
- **A00.41749**
Clamp with lock screws for A00A02600 parallel supports (4 pcs. required).

All the setup fixtures are extra outfit.

Technical data

Fig. 20



AC 650

AC 650 M

Working capacity

Boring capacity	mm (inch)	31 - 155 (1.22" ÷ 6.10")
Max. boring depth	mm (inch)	350 (13.78")
Max. milling width	mm (inch)	298 (11.73")
Max milling area	mm (inch)	200 x 825 (7.87" x 32.48")

Geometric features

Max spindle head travel (D)	mm (inch)	530 (20.87")
Distance spindle C/L to column ways	mm (inch)	335 (13.20")
Useful table surface	mm (inch)	400 x 1000 (15.75" x 39.37")
Max table traverse	mm (inch)	880 (34.64")
Max table cross traverse	mm (inch)	100 (3.94")

Speeds

Spindle rotation speeds (6)	r.p.m.	105 ÷ 210 ÷ 280 (390 ÷ 550 ÷ 780)
Spindle head work feed speed (3), per revolution	mm (inch)	0.06 ÷ 0.12 ÷ 0.18 (0.0024" ÷ 0.0047" ÷ 0.0071")
Spindle head fast feed, up and down, per minute	mm (inch)	1200 (47.24")
Table work feed speeds (2), per minute	mm (inch)	52 ÷ 104 (2.05" ÷ 4.10")

Motor rating

Spindle head work feed and spindle rotation	kW	1.2 ÷ 0.9 (1.6 ÷ 1.2HP)
Fast spindle head traverse, up and down	kW	0.060 (0.080 HP)
Table traverse	kW	0.072 (0.094 HP)
Tool grinder	kW	0.190 (0.250 HP)

Dimensions

Length (A)	mm (inch)	2570 (101")
Width (B)	mm (inch)	1175 (46.25")
Height (C)	mm (inch)	1920 (75.59")

Weight

Approx. weight, unpacked	kg (lbs)	1240 (2731)	1250 (2753)
Approx. weight, ocean packed	kg (lbs)	1540 (3392)	1550 (3414)

Measurements, weights and executions are not binding on the manufacturer. Motor rating is referred to 50Hz frequency.

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