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OPERATING INSTRUCTION AND MAINTENANCE MACHINES TYPE:

Combined machines

- PGT 32/25 three-phase
- PGT 32/25 mono-phase



Bending machines

- PG 26 three-phase
- PG 26 mono-phase 2 speed
- PG 30 three-phase
- PG 30 mono-phase
- PG 35 three-phase
- PG 40 three-phase



- Speed variator
- 9x9 Panel

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ENCLOSURES:

- ELECTRICAL DRAWING.
- WARRANTY CERTIFICATE.

IMPORTANT:

Send us the "WARRANTY CERTIFICATE" enclosed to the present handbook. Without this certificate, warranty will be valid starting from the date indicated on the certificate of conformity.



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CERTIFICATE OF CONFORMITY



Company **TECMOR** srl, declares on its own responsibility
 that the following product:

MACHINE TYPE : . PG.40.

SERIAL N° : . . 1503126

YEAR OF CONSTRUCTION: 2015

To which this declaration is referred, complies with the following regulations:
 Legislation 06/42/CE, 06/95/CE, 04/108/CE
 Regulations UNI EN ISO 12100 - CEI EN 60204/1-70/1-44/5 -D.L.G.S.81/08

Gavardo – Italy: . . 31.03.15



administrator
 Mora Gaetano

1 General features of the machine

1.1 **Machines name:**

- Bending machines type PG 26 ; PG 30 ; PG 35 ; PG 40.
- Combined machine type PGT 32/25.

1.2 **Machine description:**

The bending machines are electrically driven with manual control and they are built for the bending of reinforced-concrete bars to produce shaped and stirrups.

The bending operation is executed coldly through the rotation of a bending disc with central pin and a rotating pin allowing the bending operation thanks to the bars axial push.

The combined machines are electrically driven and are built for the bending and cutting of reinforced-concrete bars to produce shaped and stirrups.

The cutting operation is executed coldly through two knives, one fix and one mobile, which is driven by a rod, allowing the necessary movement for the cutting.

1.3 **Technical data:**

Machine type	N° turns per1'	Motor Kw	Weight Kg	Dimensions cm
PG 26 Three-phase	11	0,75	230	86x76xh88
PG 26 Mono-phase 2 speed	8 / 12	0,75	230	86x76xh88
PG 30 Three-phase	10	1,1	250	86x76xh88
PG 30 Mono-phase	9	1,5	250	86x76xh88
PG 35 Three-phase	10	1,5	270	86x76xh88
PG 40 Three-phase	9	1,83	330	100x85xh88
PGT 32/25 Three-phase	10	1,1	275	80x88xh86
PGT 32/25 Mono-phase	10	1,5	275	80x88xh86

1.4 **Marking:**

The Certificate of Conformity on page 2 shows the following information:

- Name and address of the producer.
- CE mark.
- Type of machine.
- Serial number.
- Year of construction.

The same data are indicated on a plate fixed on the machine.

2 Transport and unpacking

The machine is delivered on a pallet and covered by a polyethylene sheet, all fixed by strapping so packing and machine are a unique bloc.

For the unpacking, only eliminate the strapping and the polyethylene sheet (keep it to cover the machine at the end of its working).

3 Lifting and moving

For a safe machine moving you can:

- a) Lift it catching steel wires to two hooks already fixed on the machine body. The steel wire must have a diameter big enough to lift the indicated weight, as in the technical feature schedule.
Each time the hooks are used, check that they are well fastened in way their base is on the machine body.
- b) Use a lift truck or a pallet truck in case the machine is on a pallet (strong enough for the machine weight). During the machine handling and transport, it is forbidden to turn it over or on one side different from the normal ground-side. It is also forbidden to tilt the machine for more than 30°, in order to avoid oil exit.

4 Installation and connection

- 4.1 Prepare the placing space** for the machine, which must be perfectly horizontal and strong enough according to the machine weight.
- 4.2 The area for the placing** of the machine must be completely empty of other material and big enough to grant the worker moving during the use and the maintenance. Our advice is to leave a free space around the four sides of the machine of about 50 cm.
- 4.3 Connection to the supply net.** Before the connection, be sure that the line voltage corresponds to the machine connection.

If the machine is three-phase, it must be 400V.

If the machine is mono-phase, it must be 230V.

The connection must be executed through a cable consistent with the engine power considering that it is compulsory to connect the machine with a net equipped of a highly-sensitive differential switch with intervention threshold $I_d < 30 \text{ mA}$.

It is compulsory to use extension cords to connect the machine to the supply net and the machine placing must grant that the connections are not damaged, being far from the passage ways and avoiding mechanical efforts and damages.

The machine is equipped with a movable socket to be connected with the supply cable; it will be inserted into the fix plug in the machine system.

- 4.4 It is compulsory to connect the machine with a grounding system** with a resistance value able to grant a contact tension not higher than **25V**.

For a better grounding there is the possibility to connect the machine with the grounding. The picture shows the position of the grounding indicated by the purpose symbol (As shown in the picture).



- 4.5 Lighting:**

The machine use is allowed only in case of normal ambient lighting. In case the ambient lighting is insufficient, the user must arrange an extra integrative lighting in order to grant the complete visibility of all the machine components and the working phases.

Missing the above mentioned lighting, use and starting of the machine are absolutely forbidden.

5 Machine standard toolings

The machine is delivered with the following standard toolings:

Machine type	Bending pins	Bending bushes
PG 26	n°3 Ø36	n°2 Ø48, n°1 Ø55, n°1 Ø69, n°1 Ø100
PG 30 – PG 35 PGT 32/25	n°3 Ø36	n°2 Ø48 - n°1 Ø55 - n°1 Ø69 n°1 Ø100 - n°1 Ø130
PG 40	n°3 Ø48	n°2 Ø68 - n°2 Ø87 - n°1 Ø130
For all the machines	Bending square with hexagon	

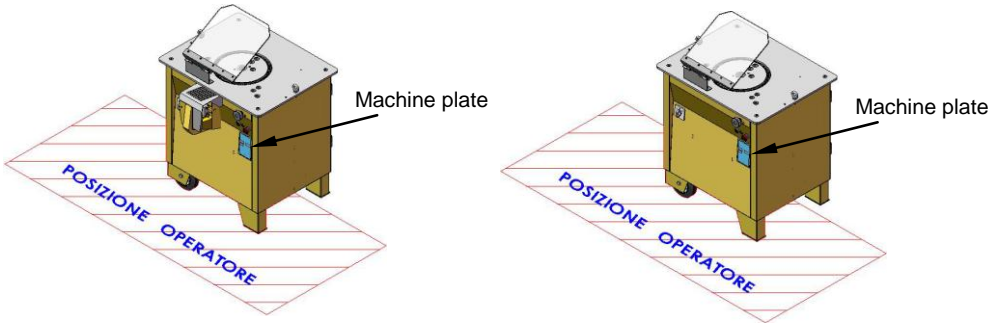
6 Worker assigned

The machine can be used only by experienced staff working directly in the construction or rod-setting sites. The staff can be helped by assistants who must have a safe distance according to the maximum bending length.

7 Worker position

The correct worker position must be as indicated in the following picture.

As shown by the picture, the position reserved to the worker is in the front of the machine, which is indicated by the machine plate.



8 Use of the machine

8a Use of the standard machine

8a.1 General controls of the machine:

1. Protection for the bending area.
2. Regulation handle.
3. Emergency STOP button.
4. Supply light.
5. Return-reset button.
6. Remote control for pedal used by operator.
7. Speed selector (only PG 26 mono-phase)
8. Main inverter-switch.
9. Shear (only for combined machines).
10. Protection for the cutting area (only for combined machines).



8a.2 Starting and working:

All the following operations must be executed maintaining the working plate free from any equipment and without inserting any pin into the disc.

- Connect the supply cable as above described.
- Turn the main switch-inverter from the starting position 0 into position 1 or 2 according to the required rotation direction. Push the reset button: now the light is on. **In this way the bending disc does not move in case it is already in the correct starting position. On the other hand, it moves to get the correct starting position.**
- Start the machine pushing the pedal to check the disc rotation direction. Stop the machine elevating the foot from the pedal. Push the return button to place the disc in the starting position.
- The machine is ready to use the toolings.
- The reset operation has to be executed each time that:
 - The machine stops because of the emergency-stop button.
 - Voltage is untimely restored.
 - A starting operation is executed through the main inverter-switch.
- To start the machine after an emergency STOP, it is necessary to unblock the button turning its mushroom part and then to push the reset button; in this way the disc gets into the starting position, ready for the following operations.

8a.3 How to bend a piece:

After all the above-described operations, prepare the toolings as follows:

a) Bending operation with square:

The picture shows the correct position of the equipment ready for the bars bending using the square **only for iron with maximum diameter 14 mm.**

The bending square allows to place the bar near the bending centre, obtaining a perfect bending angle. Placing the equipment in this way, the disc must turn clockwise. Placing the equipment on the left side of the working plate and turning the disc anticlockwise, it is possible to obtain the same bending angles with the iron coming from the left side.



b) Bending operation with pin and bush:

The picture shows the correct position of the equipment ready for the bars bending using the pin with bush instead of the square, allowing the bending of big diameters, forcing less the machine and obtaining less sharp bending angles. Thanks to this system, it is possible to use bushes with a bigger diameter, as required by the present legislation.

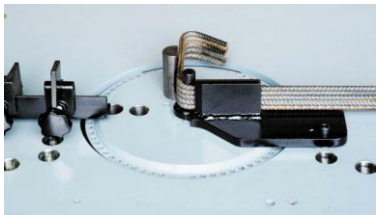


c) Stirrup bending with special tool:

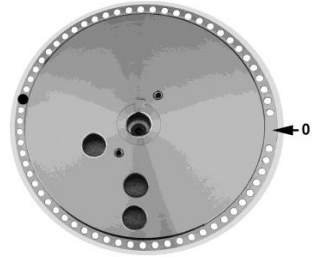
(equipment on demand)

The picture shows the correct tooling for the stirrup bending.

- Three kinds of tools are at disposal:
- With central pin Ø20 for iron up to Ø10.
- With central pin Ø25 for iron up to Ø16.
- With central pin Ø30 for iron up to Ø20



- Place the inversion pin into the disc holes to set the bending angle. Considering position 0 as the limit-switch position, the pin must be placed approximately according to the disc rotation direction.
- The exact angle can be found after some bending tests, using the regulation handle for some little angle corrections.
- After the pin insertion, place the iron bar to be bent on the working plate and start the machine pushing the pedal; in this way the disc turns and the bar is bent, until the pin touches the limit switch. When the pedal is released, the disc turns back into the starting position.
- During the bending operation the pedal must always be pushed, since when it is released the machine stops immediately.
- If the pedal is pushed during the return of the disc, it stops immediately in the position where it is.



8a.4 How to cut a piece (only for combined machines):

All the below-described operations must be executed with the working plate free of any kind of tooling.

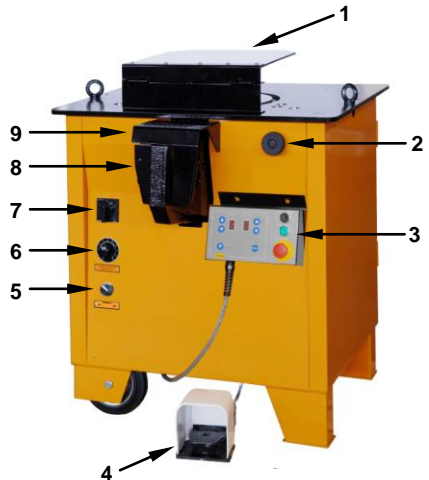
- Connect the supply cable as above described.
 - Turn the main inverter-switch from the starting position 0 into position 1 or 2.
 - Insert a pin at 180° from the point 0.
 - Push the reset button: now the light is on.
 - When the machine is stopped and the disc is in the starting position, le blades are completely open. Insert the bars to be bent into the space between the blades under the shear protection, and put them at the required length. Execute the cutting operation through the remotely-controlled pedal, keeping it pressed till the end of the cutting operation and automatic disc return – which is settled according to the pin position.
- Repeat the same operation for each cutting execution.

8b Use of the machines with the panel 9x9 and the speed variator:

- The panel was designed to allow the operator to execute a bending sequence without stopping and move the pin. In this way, a lot of time on the production can be saved.
- The speed variator allows the operator to choose the number of bending-disc turns.

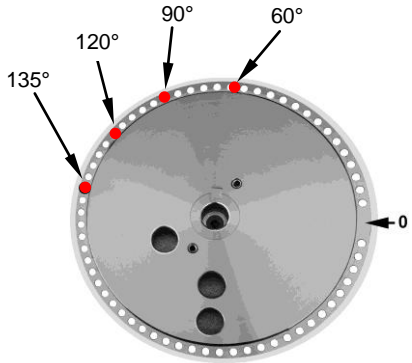
8b.1 General controls of the machine:

1. Protection for the bending area.
2. Regulation handle.
3. Movable panel 9x9.
4. Remote control for pedal used by operator.
5. Panel selector ON-OFF.
6. Speed-variator.
7. Main inverter-switch.
8. Shear (only for combined machines).
9. Protection for the cutting area (only for combined machines).



Place and number the pins as follows:

The pins are 4, corresponding to the 4 different angles (make some tests to find out the correct position). Place as in the picture, considering that the rotation direction is clockwise:
 The pin at 60° is n° 1 (the numbering starts with the one nearest the limit switch).
 The pin at 90° is n° 2
 The pin at 120° is n° 3
 The pin at 135° is n° 4

**Panel-programming for the bending sequence:**

- Push the button for programme activation-deactivation: the light is on and the programme is active.
- Using the bending buttons select 1 (1° bending) and using the pin buttons select 4 (n° of the pin corresponding to the 1° bending).
- Repeat the operations for the following bendings:
 - Bending 2 pin 2
 - Bending 3 pin 3
 - Bending 4 pin 1
 - Bending 5 pin 4
- The programme ends when the 6° bending is selected on 0.
- Push the button for programme activation-deactivation: the light is off and the programme is not active.
- Keep the RESET button pressed for 4÷5 sec. and start the programme with the 1° bending.

Bending repetition

- Push the button for programme activation-deactivation (light on).
- Using the bending buttons select the required bending.
- Push the button for programme activation-deactivation (light off).
- Push the pedal to execute the chosen bending. The programme goes on with the next bending. Push RESET for 4÷5 seconds to start the programme with the 1° bending.

9 Limitations on the use**9.1 European legislation UNI EN 1992-1-1 Chapter 8 - paragraph 8.3**

Minimum diameter of the mandrel to avoid damages to the concrete:

Bar diameter	Minimum diameter of the mandrel
$\varnothing \leq 16\text{MM}$	4 x \varnothing bar
$\varnothing > 16\text{MM}$	7 x \varnothing bar

Mandrel table

\varnothing bar	\varnothing mandrel
\varnothing 6	\varnothing 24
\varnothing 8	\varnothing 32
\varnothing 10	\varnothing 40
\varnothing 12	\varnothing 48
\varnothing 14	\varnothing 56
\varnothing 16	\varnothing 64
\varnothing 18	\varnothing 126

\varnothing bar	\varnothing mandrel
\varnothing 20	\varnothing 140
\varnothing 22	\varnothing 154
\varnothing 24	\varnothing 168
\varnothing 26	\varnothing 182
\varnothing 28	\varnothing 196
\varnothing 30	\varnothing 210
\varnothing 32	\varnothing 224

9.2 Maximum working performance:

The maximum working performance is represented by the possibility of bending together one or more bars, according to the diameter and strength of the rod.

Mandrels indicated in the following tables show maximum performances of the machine not keeping in consideration the iron yield point. For constructions made in reinforced concrete it is necessary to use the mandrels complying with Laws in force.

Type	PG 26 three-phase					PG 30 three-phase				
n°bars	1	2	3	4	5	1	2	3	4	5
Ø mandrel	100	69	69	55	48	130	100	69	55	48
650 N/mm ²	22	16	14	12	10	26	18	14	12	10
850 N/mm ²	20	14	12	10	10	22	16	12	10	10

Type	PG 35 three-phase					PG 40 three-phase				
n°bars	1	2	3	4	5	1	2	3	4	5
Ø mandrel	130	100	69	55	48	130	130	87	68	68
650 N/mm ²	30	22	18	14	10	34	24	18	16	14
850 N/mm ²	26	20	16	14	10	30	22	16	14	12

Type	PGT 32/25 three-phase Bending					PGT 32/25 three-phase Cutting				
n°bars	1	2	3	4	5	1	2	3	4	5
Ø mandrel	130	100	69	36	36					
650 N/mm ²	26	18	14	12	10	22	16	12	10	10
850 N/mm ²	22	16	12	10	10	20	14	10	10	10

Maximum working performance for mono-phase machines:

The supply value (VOLT) must be checked during the working process.

Machine type	Operation	Maximum performance at 220V	Maximum performance at 200V	Maximum performance at 190V
PG 26 – 8 turns	Bending	Ø22 (mandr. Ø100)	Ø20	Ø18
PG 26 – 12 turns	Bending	Ø18 (mandr. Ø100)	Ø16	Ø14
PG 30	Bending	Ø24	Ø22	Ø20
PGT 32/25	Bending	Ø24	Ø22	Ø20
PGT 32/25	Cutting	Ø20	Ø18	Ø16

Supply cable for mono-phase machines:

An inappropriate supply cable can cause a voltage drop decreasing the machine performance.

Supply cable section:

2,5 mm² for a cable with maximum length 15 meters

4 mm² for a cable with maximum length 60 meters

6 mm² for a cable with maximum length 80 meters

10 Malfunctioning, failure and breakdown

Following, the most common malfunctioning situations on the machines:

- a) The machine cannot bend the maximum diameters as in the schedules:
 - Check if the line voltage is over the tolerance 5%.
 - Check if the diameter of the cable used to supply the machine is long enough to avoid any current leakage.
 - Check the transmission belting stretching and efficiency: they could split during the maximum effort of the machine.
 - Check if the bars strongness corresponds to the foreseen parameters according to the use limitations.
 - Check the blades efficiency (only for combined machines). In case the blades are damaged, also just in part, the machine can not cut the maximum diameter on the schedule.
- b) The machine stopped and it doesn't start again:
 - Check if the emergency buttons are not pushed.
 - Check the position of the bending protection and its limit-switch.
 - Check the position of the cutting protection and its limit-switch
 - Check if the current reaches the electrical box.
 - Check the pedal components.
- c) The disc turns without stopping at the limit-switch signal:
 - Check that the pin position is perfectly in the required hole.
 - Check the two limit-switches: they could be damaged or simply moved.

11 Maintenance, inspections and checks

Our advice is to submit periodically the following checking:

11.1 Oil level:

Monthly check the oil level and add it in case the level is too low.

The complete oil substitution is recommended each 4.000 working hours, unloading all the spent oil in the reducer unscrewing the unload cap. After the unload-cap cleaning, screw it and full the reducer pouring the oil through the load cap in the quantity required by the indicated level using oil type **CC 460 (ISO E UNI)** or some correspondents:

Mobil MOBILGEAR 634	Shell OMALA OIL 460	Agip BLASIA 460	Esso SPARTAN EP 460	Castrol ALPHA SP460	BP ENERGOL GR-XP 460
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11.2 Belts:

Check tension and conditions of the driving belts.

The belts have to be always well tightened to avoid any slipping that might lead to a malfunction or a quick wear of the belts themselves.

11.3 Blades replacing:

Check every 40 working hours the blades efficiency and replace them in case they are damaged.

For the blades replacement it is enough to unscrew the blades from the machine. For the unscrewing of the mobile blade from the rod, the blade must stop totally outside the machine. To obtain this, follow these instructions:

- a) Check that there are no pins into the bending disc and that the machine working plate is empty from all the fittings.
- b) Turn the machine on, turning the main inverter-switch.
- c) Push the reset button.
- d) Push the pedal for the mobile blade exit and release it when the blade is completely outside.
- e) Detach the machine tension.
- f) Replace the mobile blade.

12 Cleaning

In case of cleaning do not use any solvents which could damage the machine.
Clean and lubricate carefully all the holes and the sliding parts.

13 Machine keeping

- In case the machine does not work for a long time, it is better to grease or lubricate the unpainted parts of the machine.
- Moreover, grease or lubricate all the pins, the bending bushes and the toolings.
- Unplug the power cable.
- If the machine is placed outdoors, cover it completely with waterproof material.
- The standard life of the machine used according to the instructions of this handbook and to a correct periodical maintenance is about 20.000/30.000 working hours.

14 Demolition and disposal

There is no particular caution before breaking up the machine, because it does not contain dangerous materials. In case of breaking up, it is necessary to separate three different materials: oil contained in the reduction gear, copper of the motor/electric system and metal parts.

15 Safety instructions

- a) It is forbidden to repair, set, service or clean any moving part.
- b) The safety guards and devices in the machine must not be removed or modified.
- c) Dimensions and shapes to be bent or cut cannot be foreseen and, for this reason, the worker must produce some supports if necessary to avoid any danger for the worker himself.

16 Safety devices

The machine is provided with the following safety devices:

16.1 **Magneto-thermic switch and differential.**

16.2 **Grounding of the machine-body.**

16.3 **Button for emergency-stop:**

The machine is equipped with a mushroom-button as emergency-stop. Through this control the machine power is immediately off.

16.4 **Controls for machine starting:**

All the controls are produced with purpose protections according to their use in order to grant a protection IP 54, according to the EC legislation, and they cannot start accidentally.

16.5 **Man-driven control foot-pedal:**

The machine starting control is given by the man-driven electrical foot-pedal: the bending operation starts only if the pedal is kept pushed.

Whenever the pedal is released, the machine stops immediately.

16.6 **Guards for gear parts:**

The gear parts are arranged in the machine frame and they are protected by a screwed-on door which can be opened only by means of a wrench: in this way the contact is impossible.

The removal of this door is allowed for maintenance purposes only and therefore the power supply must be disconnected.

16.7 Moving interlocking guards for bending area:

The guard for the moving parts is a hinged sheet metal plate that can be opened. It is a moving guard provided with a safety electrical contact - called tampering prevention interlock – which stops immediately the machine in case it is open even partially; the machine cannot start since the guard is completely closed.

16.8 Fixed guard for cutting area:

The cutting area is guarded by a fixed steel protection.

17 One-man safety devices

The use of protection gloves and safety shoes is compulsory as safety devices for the worker.

18 Residual risks

- 1) Mechanical risks: In the bending area the residual risk consists in the possible impact of hands against the guard.
The cutting area presents the risk of shearing for the upper limbs.
The two protections shows a warning signal.
- 2) Electrical risk: The machine is supplied with 400 V and it gives an electrical residual risk.
- 3) Noisiness: The level of the equivalent continuous sound pressure ponderate A of the machine results less than 70 dB during the bending and cutting operation.

19 After-sales service during guarantee

- 1) **The machines have a guarantee of 24 months from the date of delivery, and the guarantee is valid only if the GUARANTEE CERTIFICATE (sheet enclosed) has been duly filled in and sent to TECMOR company. OTHERWISE THE MACHINE WILL NOT BE COVERED BY GUARANTEE.**
- 2) The producer undertakes to repair any manufacturing defect found during the period of guarantee. That means the free replacement of the faulty parts after the producer has made sure of the manufacturing or material defects.
- 3) The user shall send the producer the faulty part - covered by guarantee - to make it repaired. The cost and the risk of the transport of the faulty or repaired / replaced parts are borne by the user.
- 4) If the repair of the replacement must take place where the machine is installed, the travel, board and lodging expenses for the producer's technicians will be invoiced to the user. The replaced parts will not be charged.
- 5) This guarantee does not cover the parts subject to a particular wear or wrongly used, not maintained, overloaded or modified.
- 6) The after-sales service during the period of guarantee will be carried out promptly; however TECMOR company will not answer for any possible delay.

20 Spare-parts

A complete catalogue of the spare parts is supplied at customer's request or is available at the area dealer. According to the EC legislation, TECMOR grants delivery and availability of spare-parts for maximum ten years after the date of purchase.