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## 1

## TRANSPORT AND INSTALLATION

### 1.1 DIMENSIONS AND WEIGHT

	<u>UNI 60 COMBI</u>	<u>UNI 60 COMBICAL</u>
Weight kg. Approx.	160	170
Length mm	750	750
Width mm	410	410
Height mm	1120	1120

### 1.2 LOAD CENTRE AND LIFTING

- The load centre of the machine is approximately at three-quarter distance position of the traverse of the counterformer support.
- The lifting and the material handling must be executed using a rope which passes inside the screwed lifting eyebolt on the counterformer support which had to be brought on the load centre previously.
- **The lifting eyebolt must be removed after the installation as it will hamper the working of the machine.**

### 1.3 STORAGE CONDITIONS

- The machine and the double foot-pedals are packed in a wooden case, which is designed to be moved with a fork truck.
- The machine must be kept in vertical position.
- The vertical position is highlighted on the surface of the packaging with appropriate diagrams.
- When the machine is removed from the packing case, using the procedures described in section 1.2, it must be placed on a flat floor.
- The machine must be stored in a covered and dry place and it is further suggested to keep the machine inside the packaging until the delivery of the product.

## 2

## STARTING

### 2.1 INSTALLATION

#### 2.1.1 Installation in a workshop

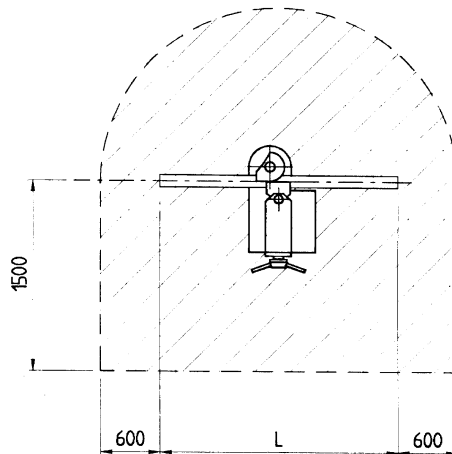
The machine must stand on and be levelled on a flat floor.

#### 2.1.2 Use in a building site

It is not foreseen; in case follow the explanation contained in section 2.1.1 by checking that the power supply is suitable for the machine.

## 2.2 SPACE REQUIREMENTS

- The area and the safety place of the machine are represented in the drawing.
- It is essential to foresee the necessary clearance area for the pipes which must be bent and those which have already been bent.



**L = MAXIMUM LENGTH OF THE PIPE IN THE MOST CUMBERSOME POSITION**

**Scheme 2.2**

## 2.3 ELECTRIC CONNECTION

- Installed motor Uni 60 combi/combical 1,5 KW power.  
The machine voltage is shown on the electronic board on the machine.

**3**

## **DESCRIPTION**

### 3.0 FUNCTIONAL DESCRIPTION

UNI 60 COMBI bender is a machine suitable to bend metal pipes with a bending angle from 0° to 180°. It was designed to bend without mandrel and was prepared to be used for the ring rolling of pipes, structural sections, and plates.

By operating the geared motor, the die mounted on the outlet shaft will make a rotation clockwise with programmable width which corresponds to the angle which is imprinted on the pipe.

UNI 60 COMBICAL is a ring roller which allows to bend pipes, structural sections, and plates (it is equipped with three universal rollers to bend structural sections, and plates). It is supplied so as to bend metal pipes with a bending angle from 0° to 180°; the machine was designed to bend without mandrel.

Both are composed of a geared motor with outlet shaft, where the dies are placed (according to the diameter and the radius), and of a quick-guide positioner which is aimed

at positioning the counterdies and at pushing the pipe against the die through a mechanical control.

The version UNI 60 COMBICAL, besides having the same characteristics of the UNI 60 COMBI, consists of a geared motor which operates two parallel shafts for the dragging of the structural section to bend whereas the third one is idle; thus, it has a regulation on the bending radius with decimal notation through the nonius placed on the wheel. Furthermore, an adjustable mechanical block is present to repeat the same bending and UNI 60 COMBICAL is also equipped with two lateral supports which allow the regulation of the pipe in height.

The machine is supplied with several accessories whose description and function are developed in the sections 3.2, 3.2.A, and 3.2.B in detail.

The use of the machine is described in section 4.

### 3.1 STRUCTURE

- \* In the bedframe an opening was foreseen to contain tools; this opening is provided with wheels and two removable handles to ease its movements.
- \* Single-phase motor.
- \* Holding-dies outlet shaft.
- \* The double foot pedal is detached from the machine and is placed on a specific pedestal which includes a manual putting back into service emergency push-button.
- \* The bending is checked and managed by a printed-circuit board placed on the bedframe of the machine; this board allows to store 50 bending programs with 9 sequential bends for each program.

TECHNICAL FEATURES	UNI 60 COMBI	UNI 60 COMBICAL
Shafts' diameter	40	40
Rollers' diameter		135 mm
Single-phase motor 230V/50HZ	1,5 KW	1,5 KW
Number of driving rollers		2
Working plan of the machine	horizontal	horizontal
Central shaft regulation	Manual/decimal	Manual/decimal
Bedframe with equipment cabinet	yes	yes
Double foot-pedal	yes	yes
Cylinder head	aluminium	aluminium

### 3.2 STANDARD ACCESSORIES INCLUDED

ACCESSORIES	DESCRIPTION	UNI 60 COMBI	UNI 60 COMBICAL
	<p>SQUARE D. 32 INTERCHANGEABLE SHAFT</p>	<p>X</p>	<p>X</p>
	<p>QUICK-GUIDE POSITIONER DEVICE</p>	<p>X</p>	<p>X</p>
	<p>2 CALENDER SHAFTS</p>	<p>X</p>	<p>X</p>
	<p>COUNTERFORM PIN Ø 18 AND Ø 18/14</p>	<p>X</p>	<p>X</p>
	<p>1 RIGHT LATERAL SUPPORT AND 1 LEFT LATERAL SUPPORT</p>		<p>X</p>
	<p>3 UNIVERSAL ROLLERS TO BEND STRUCTURAL SECTIONS AND PLATES</p>		<p>X</p>

### 3.2.A ACCESSORIES REQUIRED TO BEND WITHOUT MANDREL

#### 3.2.A.1 INTERCHANGEABLE SHAFT



Interchangeable shafts:

- 32 mm square to bend with formers until the diam. 42 mm (**standard equipment**)
- 42 mm square to bend higher diam. (**on request**).

#### 3.2.A.2 FORMER (DIE)



In aluminium or in spheroidal cast iron with ring to bend without mandrel with standard radii 3 or 4 times the diameter of the pipe.

- \* The external diameter of the pipe in mm/inches/ gas inches and
  - \* The Bending radius in mm
- Are described on the die.

#### 3.2.A.3 COUNTERFORMERS (COUNTERDIES)



The counterformer is used to bend thin pipes. The diameter of the pipe in mm/inches/ gas inches is written on the counterformer.

### 3.2.A.4 TWIN ROLLER COUNTERFORMER



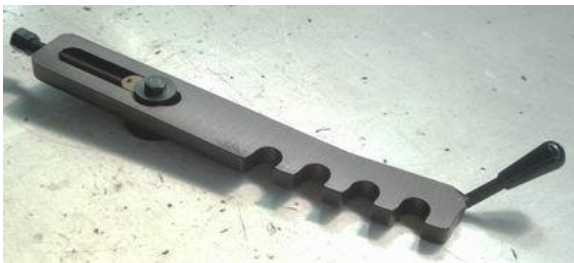
The counterformer for the twin rollers is used to bend pipes whose thickness exceeds 2,5 mm (it is used with two rollers on the basis of the pipe to bend); the use of this tool avoids the pipe flattening.

### 3.2.A.5 TWIN ROLLER SET



They are to be used with the twin roller counterformer.

### 3.2.A.6 REINFORCING TIE-ROD



It must be used when it is necessary to bend stainless steel pipes with a  $\varnothing$  exceeding 33mm and corresponding inch sizes; that is when it is necessary to bend other pipe types with a  $\varnothing$  exceeding 42mm and corresponding inch sizes.

### 3.2.A.7 MOVING ARM



Moving arm equipped with an angle of plane regulator to make sequential bends on the same pipe on different plans. Available from 1 - 2 - 3 - 4 metres.

## 3.2.B ACCESSORIES FOR RING ROLLING

### 3.2.B.1 LATERAL SUPPORTS



A right lateral support and a left lateral support allow to control the pipe height during ring rolling.

### 3.2.B.2 UNIVERSAL ROLLERS



Three universal rollers for ring rolling structural sections and plates (the picture shows one single universal roller).

### 3.2.B.3 ROUND PIPE ROLLERS



Three rollers to bend round pipes on the basis of the metrical/gas/inches  $\varnothing$  of the pipe to bend (the picture shows one single roller).



### **3.3 ELECTRIC CONTROLS**

#### **3.3.1 ELECTRICAL SYSTEM**

It is installed inside the bedframe of the machine. The power supply of the machine occurs through a switch placed on the rear side of the bedframe.

#### **3.3.2 CONTROL CONSOLE**

Digital electronic card fitted inside the metal base of the machine.

#### **3.3.3 DOUBLE FOOT-PEDAL**

It is installed on a pedestal and is equipped with a manual putting back into service emergency button; it has, moreover, two foot-pedal drives with forward/backward gear which are interlocked to each other.

### **3.4 RISK ANALYSIS**

#### **3.4.1 ELECTROCUTION**

The plant (described in section 3.3) was designed and built in accordance with the normative law of electromagnetic compatibility. Further measures are described in section 4.6.6.

#### **3.4.2 HAND CRUSHING**

Measures described in sections 4.2 A; 4.6.5.

#### **3.4.3 ENTRAPMENT OF CLOTHES AND HAIR**

Measures described in section 4.6.8.

#### **3.4.4 NOISE POLLUTION**

During the planning phase some devices (induction motor), which allow a max. noise under 85 db (A), have been adopted.

#### **3.4.5 AUTOMATIC RETURN OF THE PIPE AFTER THE BENDING**

Measures described in section 4.6.4.

For cycle programming, see section 6.3.

#### 4.1 BENDING CAPACITY

The bending capacity is reported in the table 4.1 first. The equipment must be used according to the specifications described in the following tables.

4.1 Second	Pipes with dimensions in mm
4.1 Third	Pipes with dimensions in real inches
4.1 Fourth	Pipes with dimensions in gas inches
4.1 Fifth	Pipes for small radii without mandrel






#### IMPORTANT:

- 1) The dies (3.2.A.2) for pipes with diameters exceeding 44 mm and corresponding inch sizes (tables 4.1 second, 4.1 third, 4.1 fourth) must be used with the outlet shaft on request for diameter 42 mm.

<u>UNI 60 COMBI/COMBICAL BENDING CAPACITY</u>	<u>Table</u>	
<u>TYPE OF PIPE</u>	<u>WITHOUT MANDREL</u>	
	$\varnothing < / =$ mm	thickness < / = mm
Annealed and hard copper pipes, annealed brass pipes	<b>54</b>	<b>2</b>
Steel pipes for electrical installations	<b>50</b>	<b>1,5</b>
AISI 304/316 stainless steel pipes	<b>35</b>	<b>3</b>
ST. 35,4 bonderized steel pipes for hydraulic plants*	<b>48</b>	<b>4</b>
Furniture pipes	<b>48</b>	<b>3</b>
(FE) Boiler pipes	<b>48</b>	<b>3</b>
Aluminium pipes	<b>54</b>	<b>3</b>
UNI 5745 Gas pipes	<b>1"1/2</b>	<b>Standard</b>
Double coated aluminium pipes	<b>63</b>	<b>Standard</b>
Square pipes	-	-
Standard radii (CLR)	<b>3D or 4D</b>	

\* TO BEND PIPES WHOSE THICKNESS IS EQUAL TO/ OVER 2,5MM USE THE TWIN ROLLER SET AND NOT THE GUIDE.

**DIAMETERS AND SPECIAL RADII ON REQUEST**

Table 4.1 Second							
							
∅	R	(mm.)			(mm.)		
mm		min.	max.		min.	max.	
6	30	1	2	/	2,5	>	/
8	30	1	2	/	2,5	>	/
10	30	1	2	/	2,5	>	/
10	40	1	2	/	2,5	>	/
12	36	1	2	/	2,5	>	/
12	48	1	2	/	2,5	>	/
14	42	1	2	/	2,5	>	/
14	56	1	2	/	2,5	>	/
15	45	1	2	/	2,5	>	/
15	60	1	2	/	2,5	>	/
16	48	1	2	/	2,5	>	/
16	64	1	2	/	2,5	>	/
17	51	1	2	/	2,5	>	/
17	68	1	2	/	2,5	>	/
18	54	1	2	/	2,5	>	/
18	72	1	2	/	2,5	>	/
19	57	1	2	/	2,5	>	/
19	76	1	2	/	2,5	>	/
20	60	1	2	/	2,5	>	/
20	80	1	2	/	2,5	>	/
22	66	1	2	/	2,5	>	/
22	88	1	2	/	2,5	>	/
24	72	1	2	/	2,5	>	/
24	96	1	2	/	2,5	>	/
25	75	1	2	/	2,5	>	/
25	100	1	2	/	2,5	>	/
26	78	1	2	/	2,5	>	/
26	104	1	2	/	2,5	>	/
28	84	1	2	/	2,5	>	/
28	112	1	2	/	2,5	>	/
30	90	1	2	/	2,5	>	/
30	120	1	2	/	2,5	>	/
32	96	1	2,5	/	2,5	>	/
32	128	1	2,5	/	2,5	>	/
34	102	1	2,5	/	2,5	>	/
34	136	1	2,5	/	2,5	>	/
35	105	1	2,5	/	2,5	>	/
35	140	1	2,5	/	2,5	>	/
37	111	1	2,5	/	2,5	>	/
37	148	1	2,5	/	2,5	>	/
38	114	1	2,5	/	2,5	>	/
38	152	1	2,5	/	2,5	>	/
40	120	1	2,5	/	2,5	>	/
40	160	1	2,5	/	2,5	>	/
42	126	1	2,5	/	2,5	>	/
42	168	1	2,5	/	2,5	>	/
45	135	1	2,5	/	2,5	>	/
45	180	1	2,5	/	2,5	>	/
50	150	1	2,5	/	2,5	>	/

50	200	1	2,5	/	2,5	>	/
54	162	1	2,5	/	2,5	>	/
54	216	1	2,5	/	2,5	>	/

**NOTICE:**

**Bending without mandrel:**

- Aluminium formers must be used only with the counterformers. They are to be used for bending hard and soft copper, aluminium, annealed brass and steel pipes for electricians.
- Spheroidal cast iron formers can be used both with the counterformers and with the rollers counterformer. They are to be used for bending hard brass, steel, stainless steel, bonderized steel, furniture pipe, and gas pipes.






Table 4.1 Third							
 Ø " R (mm)	 mm.			 mm.			
	min.	max.		min.	max.		
1/4	R 3D (6,35)	1	2	/	2,5	>	/
5/16	R 3D (7,94)	1	2	/	2,5	>	/
3/8	R 3D (9,52)	1	2	/	2,5	>	/
1/2	R 3D (12,70)	1	2	/	2,5	>	/
1/2	R 4D (12,70)	1	2	/	2,5	>	/
5/8	R 3D (15,88)	1	2	/	2,5	>	/
5/8	R 4D (15,88)	1	2	/	2,5	>	/
3/4	R 3D (19,05)	1	2	/	2,5	>	/
3/4	R 4D (19,05)	1	2	/	2,5	>	/
7/8	R 3D (22,22)	1	2	/	2,5	>	/
7/8	R 4D (22,22)	1	2	/	2,5	>	/
1"	R 3D (25,40)	1	2	/	2,5	>	/
1"	R 4D (25,40)	1	2	/	2,5	>	/
1"1/8	R 3D (28,58)	1	2	/	2,5	>	/
1"1/8	R 4D (28,58)	1	2	/	2,5	>	/
1"1/4	R 3D (31,75)	1	2,5	/	2,5	>	/
1"1/4	R 4D (31,75)	1	2,5	/	2,5	>	/
1"3/8	R 3D (34,92)	1	2,5	/	2,5	>	/
1"3/8	R 4D (34,92)	1	2,5	/	2,5	>	/
1"1/2	R 3D (38,10)	1	2,5	/	2,5	>	/
1"1/2	R 4D (38,10)	1	2,5	/	2,5	>	/
1"5/8	R 3D (41,28)	1	2,5	/	2,5	>	/
1"5/8	R 4D (41,28)	1	2,5	/	2,5	>	/
1"3/4	R 3D (44,45)	1	2,5	/	2,5	>	/
1"3/4	R 4D (44,45)	1	2,5	/	2,5	>	/
1"7/8	R 3D (47,62)	1	2,5	/	2,5	>	/
1"7/8	R 4D (47,62)	1	2,5	/	2,5	>	/
2"	R 3D (50,80)	1	2,5	/	2,5	>	/
2"	R 4D (50,80)	1	2,5	/	2,5	>	/
2"1/8	R 3D (53,98)	1	2,5	/	2,5	>	/
2"1/8	R 4D (53,98)	1	2,5	/	2,5	>	/






Table 4.1 Fourth		
 Ø " GAS	 mm	mm
1/4	47	13,72
3/8	53,5	17,2
1/2	59	21,3
3/4	78	26,9
1"	100	33,70
1"1/4	157	42,25
1"1/2	199,5	48,2

Table 4.1 Fifth			
 Ø mm			
min.	max.	min.	max (mm)
12	20	2D	43
22	30	2D	61
32	38	2D	76
40	42	2D	91
42	45	2D	128

#### 4.1.A MAXIMUM RING ROLLING CAPACITY

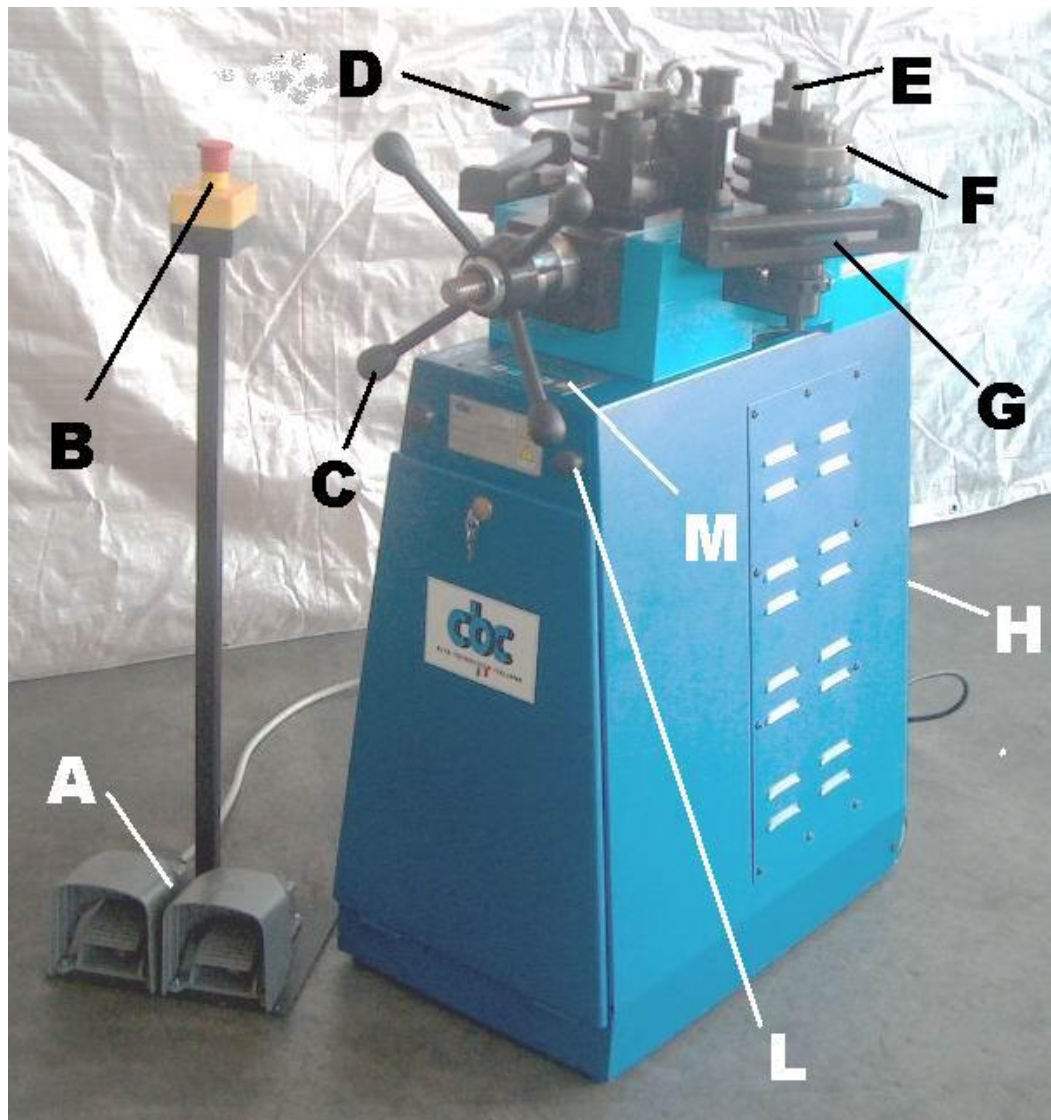
<u>UNI 60 COMBICAL CALENDER CAPACITY</u>	<u>Table</u>	
<u>STRUCTURAL SECTIONS</u>	$\varnothing < / =$	thickness < / = mm
Gas pipes	1"1/2	3,2
Square pipes	40x40	2
Rectangular pipes	50x25	2,5
Iron in solid bar	20	/
Square structural section	20	/
Rectangular structural section	50x8	/
"L" shaped structural section	40x40	3
"T" shaped structural section	40x40	5
"U" shaped structural section	30x15	4

SPECIAL SHAPED RING ROLLING DIES ON REQUEST

w w w . n i p o . c z  
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## 4.2 DRIVES DESCRIPTION



<b>THE DRIVES ARE:</b>	
<b>A</b>	Double foot-pedal drives
<b>B</b>	Manual putting back into service emergency button
<b>C</b>	Handwheel for the regulation of the counterformer and idle roller
<b>D</b>	Quick- guide positioner of the counterformer support
<b>E</b>	Outlet shaft for bending
<b>F</b>	Universal rollers (n. 3)
<b>G</b>	Lateral support (n. 2)
<b>H</b>	General switch
<b>L</b>	Pull-out pipes (n. 2) for the machine material handling
<b>M</b>	Control board