



engineering manual & design guide

### General index





### MD/MDE

MD4x90° / MDE8x45° - Automatic indexing power chuck. Hydraulic feed.

E.13 - E.32



### MADV

Manual self-centering power chuck. Manual clamping and manual indexing.

E.35 - E.38



### MADT

Semi-automatic self-centering power chuck. Draw rod clamping and manual indexing.

E.39 - E.42



EQUIPMENT Adapter plate for machine spindle.

**E.43** 

### Overview



Mechanical indexing power chucks are used by industries to work pieces with faces at right and axial angles using single loading and blockage.

To work these profiles with traditional chucks every side needs a new clamping and a replacement : this causes precision and time lost.

The complete working with indexing power chucks is made with only a rotation clamping, during rotation and indexing processes the workpiece is closed in the chuck.

With the automatic version it is happend without stopping chuck on the lathe.

nitially conceived to work crosspieces and valve bodies, over the last years constant improvements have been made to their construction and quality; this has led to a vaster application in the automobile, aeronautical, industrial components and in all industrial sectors needing to work pieces with a crossed axis in a single hold. A utomatic and semi-automatic indexing chucks are a good alternative to expencive special working machine or transfert machine with rotary table.

Manual power chucks are the best solution to work small series, prototype and equipment on lathe and on milling machines.

Very precise references and technical specifications adopted permit fast retooling of the power chuck between jobs and fast mounting and dismounting on the machine.

With this catalog we would help our customers giving all the tecnical informations and specifications they need about our indexing power chucks production.

Special chucks can be designed and manufactured on customer request.



#### This photo shows some pieces which can be worked with indexing chucks



### **Selection of the chuck**



#### Workpiece sample scheme





For a first chuck selection it is most important to check the following dimentions:

- G = the biggest diagonal of the raw component.
- C = clamping area thickness + jaws thickness.

n the first following drawing it is rappresented a valve clamped in an automatic not self-centering power chuck MD.

n the second one a manual self-centering power chuck MADT (or MADV).

Other parametres to select the chuck are :

- profile shape
- working
- workpiece loading
- clamping stroke
- tools accessibility
- rotation speeds
- clamping force
- and other.

The experience of Tecnomors technicians can help you in this decision process; please contact them for every information you need.







MD 300 power chuck jaws set photograph

### **MD/MDE** • Features







**MD** is an automatic indexing chuck with hydraulic clamping and indexing. It is not self-centering.

**tecnomors** is backed in the design and manufacture of MD indexing chucks by its exceptional experience matured in the construction of this specific product over last thirty years.

Unique MD tecnomors automatic indexing chucks features :

- 1.1 made in special high resistence hardened and cementing 60HRC steel UNI18NiCrMo5, to maintain a high degree of precision, reliability and quality.
- 1.2 indexing movement (tecnomors patent) simple and reliable with only a piston that works in rotation and in clamping position. Indexing precision ± 1'.
- 1.3 guiding system of clamping and of the indexing mechanism.



### **MD/MDE** • Features



- This system uses 2 pre-loaded solid straight roller radially and 1 axial bearing.
- seals against contamination by coolant, chips or dust.
- **1.5** constant and long lasting precision.
- **1.6** easy installation to the machine.
- 1.7 the chuck is connected to the rear rotating oil manifold thanks to the nest tube.
   This tube system is supplied with grinding hardened steel clutchs.
- **1.8** centrifugal force compensation system for parts susceptible to deformations to obtain an higher productivity performance.
- **1.9** indexing control device.
- **1.10** a good automation system level grows using robot to load and to unload workpieces.

**tecnomors** co-operates with anthropomorphic and/or cartesian robot manufacturers also in grippers supply.

Other MD automatic indexing chuck technical features:

- 2.1 indexing process is possible also in rotation position to allow a fast indexing position passage. The rotation speed has to be not at the maximum power.
- 2.2 indexing takes, with position control, approx. 2-4 seconds per 90°, depending on the size of the chuck.

**E.14** 

- 2.3 very simple hydraulic system based on 2 indexing mechanism ports, 2 clamping pistons ports and 1 manifold drain.
- 2.4 the chucking piston is connected to a safety device and keeps the working securely gripped in the jaws even in the event of a complete pressure loss.
- 2.5 costant and automatic control of the indexing position and other working parametres by a separate electronic interface (not supplied) by the machine CNC.
- 2.6 Optional:
  - Retractable Locator see (pag. E.30)
- 2.7 Complete "Operating Manual" is supplied with the chuck.
- **2.8** The MDE 8x45° chucks are supplied on

request.

#### Photo shaped grips for special chuck



### MD 4x90°• Indexing - Clamping system

### Indexing system 4x90°

A single hydraulic piston, feeded from the rotating oil manifold and the tube nest, rotates and locks the indexing gear.

This device (tecnomors patent) with only one piston guarantees higher reliability than the two syncronized pistons that usually the other constructors apply.

The main parts of this system are the following :

- A = indexing shaft (driven by two pre-loaded cylindrical roller lines and supported by an axial ball bearing).
- A1 = indexing square.
- A2 = rotation square.
- **B** = indexing and rotation piston.
- B1 = finger
- B2 = locater

The drawings show the different phases of the rotation and of the indexing:

- phase 1 = indexed chuck (pressure in P1).
- phase 2 = turning operation (pressure in P2) : piston B advances and the finger B1 moves the rotation square A2.
- phase 3 = rotation phase completion:



piston **B** advances, finger **B1** acts on rotation square **A2** and determines a rotation of 80°.

- phase 4 = indexing (pressure in P1): piston B reverses the mouvement, locater
- **B2** act on indexing square **A1** and completes the rotation of 10° indexing and blocking the head pin.
- ndexing precision =  $0^{\circ}01^{\circ}$ .

#### **Clamping system**

The main parts of the locking device are :

- the closing piston C
- the pilot operated non-return valve A
- the compensating piston B.

The rotation shaft enclosed in the clamping piston is driven by two pre-loaded cylindrical roller lines and is supported by an axial ball bearing.

### Work system :

- pressure in **P3** = clamping piston **C**.
- pressure in P4 = The oil drives the non-return valve A opening that allowes piston C opening.

#### Safety device :

The chucking piston C is connected to a non-return valve A and keeps the workpiece securely gripped in the jaws even in the event of a complete pressure lost.

Centrifugal force compensation system :

This hydraulic device cuts the clamping power loss that comes to the centrifugal force of the piston and the jaw mass.



During rotation, the pressure created by the clamping piston **B** and valve action **A** increases the pressure on the circuit **P3** and compensates for the loss of gripping force due to the centrifugal force.

### **MD** 4x90° • Technical specifications



### Chuck size MD 160 - MD 425



#### Chuck size MD 500 - MD 550



E.16 electro-welding supports.

### MD 4x90° • Technical specifications



#### Dimentions - 4x90°

Code	MD160	MD 205	MD235	MD260	MD285	MD300	MD315	MD350	MD400	MD425	MD500	MD550
ØA	160	205	235	260	285	300	315	350	400	425	500	550
В	137,5	180	195	207.5	220	225	237.5	255	285	297.5	350	370
С	122	165	195	210	235	245	255	290	330	355	410	450
D1	-	47	62	65	77.5	85	82	99.5	111	123.5	125	150
D2	26	38	53	56	68.5	76	71	88.5	96.5	109	122.5	147.5
D3	30	43	58	60	72.5	80	77	94.5	105.5	118	137	162
E min.	18	27	42	40	52.5	60	52	69.5	73.5	86	95	120
E max.	28	41	56	58	70.5	78	75	92.5	103.5	116	135	160
F	27,5	35	35	45	45	45	52.5	52.5	62.5	62.5	82.5	82.5
G	60	92.5	107.5	115	127.5	132.5	137.5	155	175	187.5	215	235
H ± 0.010	21	32.5	47.5	50	62.5	70	65	82.5	90	102.5	115	140
I stroke	10	14	14	18	18	18	23	23	30	30	40	40
ØJH6	140	140	170	220	220	220	220	220	300	300	300	380
K *	-					"Adapte	er Plate"					
ØL	42	55	55	75	75	75	90	90	105	105	115	115
М	151,5	194	210	223.5	236	241	255.5	273	303	315.5	370	395
ØN	32	50.4	50.4	60	60	60	70	70	85	85	100	100
ØO	25	31.5	31.5	48.5	48.5	48.5	60	60	73	73	80	80
Ø P H7	16	22	22	35	35	35	45	45	55	55	60	60
Q H7	10	12	12	18	18	18	22	22	22	22	22	22
ØR	M5	6.5	6.5	8.5	8.5	8.5	10.5	10.5	10.5	10.5	12.5	12.5
S	2,5	3	3	6	6	6	7	7	10	10	10	10
Т	3,5	4	4	4.5	4.5	4.5	5	5	5.5	5.5	6.5	6.5
U	8	8	8	10	10	10	12	12	12	12	15	15
V	M5	M6	M6	M8	M8	M8	M10	M10	M10	M10	M12	M12
W H7	10	12	12	18	18	18	22	22	22	22	22	22
Х	104,80	104.8	133.4	171.4	171.4	171.4	171.4	171.4	235	235	235	330.2
Y	-	-	-	-	-	-	-	-	-	-	-	-
Z	11	11	13	17	17	17	17	17	21	21	21	25
aa	0	0	0	9	9	9	9	9	9	9	20	20
Ø bb	44	50	50	55	55	55	55	55	55	55	60	60
cc	95	95	95	105	105	105	105	105	105	105	125	125
Ø dd	0	0	0	79	79	79	79	79	79	79	89	89
ee	10	12	12	16	16	16	20	20	20	20	24	24
	MD160MAA	MD205MBA	MD235MCA	MD260MDA	MD285MEA	MD300MNA	MD315MFA	MD350MGA	MD400MHA	MD425MIA	MD500MLA	MD550MMA

#### - Note :

All the dimentions are in millimeter.

 $^{\ast}$  For K level in relation to the spindle nose see "Adapter Plate" section.

#### Specifications

Code	MD160	MD 205	MD235	MD260	MD285	MD300	MD315	MD350	MD400	MD425	MD500	MD550
Weight Chuck kg.	20	29	39	50	60	70	84	104	148	169	260	340
Max. speed rotat. g/1	4750	4200	3650	3500	3300	2900	2600	2200	2000	1800	1300	1000
Weight clamp.jaw kg.	0,2	0.5	0.5	1.2	1.2	1.2	2	2	4	4.5	5	5.5
Max. pressure bar.	55	55	55	55	55	55	55	55	55	55	55	55
Mom. of inertia kgm2	-	0.18	0.33	0.52	0.85	1.10	1.50	2.10	3.90	5	11	17.30
Clamp pist. area cm2	13,85	23.7	23.7	44.1	44.1	44.1	63.6	63.6	86.5	86.5	103.8	103.8

#### - Note :

• Important : max. rotation speed you find in the schedule can be reached only at max. operating pressure using a clamping jaw with a mass not exceeding the values shown for each model.

If the pressure is not at the max. power or the clamping jaw mass exceeds the schedule values you have to reduce the speed.

• It is advisable to reduce speed about 30 - 50 % during indexing and rotation operations to avoid vibrations due to the unbalance of masses while the piece is in an intermediate position.

• All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.

### MD 4x90° • Rear rotating oil manifold



### MD Rotating oil manifold - 4x90°



#### **Dimentions**

Code	ØA	ØВ
MD 160	44	8
MD 205 - MD 235	50	8
MD 260 - MD 425	55	10
MD 500 - MD 550	65	12

- The rear hydraulic unit has:
  - steel nest tube connected to the chuck.
    - rotating oil manifold.
    - indexing position control
    - chuck connection rod.
- Letters C1»C2»C3»C4 are the lever movements control system in comparison to the 4 proximity switches.
- See the paragraph " Indexing position control system" for details.

**E.18** 



Construction diagram - 4x90°



The indexing position control system allows to check the right working of the 4 indexing position interfaced with the machine.

**S**o it is possible to verify if the angular position obtained corresponds to that set by the CNC program.

The drawing shows the complete indexing position control mechanism.

The main parts of this mechanism are the followings :

 Front indexing position control (chuck body side) :

Cam "H" drives the rotary movement of the indexing shaft in a rectilineal movement that through lever "I" is put off the central cursor "K".

Spring "L" assures the right power and the return of the cursor.

 Rear indexing position control (rotating oil manifold side) : The rectilinear movement of the rod "F", connected to the cursor "K" throught the screw "J", is amplified (relation 4.5/1) with a special device "E" fixed to the rotating oil manifold "C".

The movement produced to the lever "A" is brought up on the pin "D" by nr. 4 proximity

switches "G" fixed on the plate "B".

The originally of the indexing position control by **tecnomors** is the amplify mechanism over described.

This solution make the device sensitiver giving the right identification of the 4 indexing position and recognising the eventually anomalies (incomplete



### rotation).

The 4 proximity switches are schematized in the technical drawing ; the 4 proximity switches giving signals corresponding to the 4 indexing positions :

C1 = pos. 0° - 360° C2 = pos. 90° C3 = pos. 180° C4 = pos. 270°

### 

Hydraulic and connecting schemes, technical data and assembly instructions included in the present catalogue are supplied as information only. Please, refer to "Operating Instruction Manual - Indexing power chucks MD"for correct instruction about setting, connections, functioning, use, maintenance and safety indications.

### MD 4x90° • Hydraulic system



#### Diagram hydraulic system 4x90°



Suggested hydraulic circuit specifications:

- tank with approx. 60 100 I capacity.
- system pressure minimum 60 bar.
- variable pump capacity of 16 lt/min.
- accumulator capacity 0.7 1.1 litres, pre-load with 20 bar
- double oil filtring.
- nr. 2 electro-valves systems with double solenoid with fixed positions.
- nr. 2 pressure reducing valves for indexing and clamping systems.
- nr. 3 pressure switch: (nr.1 for clamping, nr.2 for indexing circuit)

#### Optionals :

- hydraulic oil cooling system.
- double pressure clamping drive for parts susceptible to deformations
- (contact our technical staff for information to unlock the pilot operated non-return valve incorporated).

Sideways to power chuck MD hydraulic system.

---- = add to change the existing circuit.

#### Note:

- The hydraulic oil manifold system of the chuck shall be ventilate.
- Hydraulic seat valves are very sensitive against contamination (recommended filtering BS5540/4 10  $\mu m).$
- OIL type HLP32 / DIN51524 ISOVG32 / DIN51519 (32 cSt at 40°C).
- Only clean and recommended oil shall be used.
- Therefore an oil change every six months is recommended.

### MDE 8x45° • Indexing - Clamping system

#### Indexing system 8x45°

A couple of hydraulic pistons, feeded from the rotating oil manifold and the tube nest, rotate and lock the indexing gear.

This device uses two pistons, designed synchronized, which guarantee high reliability in the positioning and gentleness motion.

The main parts of this system are the following:

- -A = indexing shaft (driven by two pre-loaded cylindrical roller lines and supported by an axial ball bearing).
- -A1 = rotation and indexing square
- -B = rotation and indexing piston at 90°
- -B1 = indexing plane at 90°
- -C = rotation and indexing piston at 45°
- -C1 = indexing plane at 45°

The drawing shows the different phases of the rotation and of the indexing:

- phase 1= indexed chuck at 90° (pressure in P1)
- phase 2 = turning and indexing operations at 45°, piston C advances (pressure in P2)
- phase 3 = C1 plane acts on A1 square, it turns and index at  $45^{\circ}$



 phase 4 = turning and indexing operation at 90°, piston B advance (pressure in P1) B1 plane acts on A1 square, it turns and index at 90° (increase of 45° from the previous posi tion).



### Clamping system

The main parts of the locking device are :

- the closing piston C
- the pilot operated non-return valve A
- the compensating piston **B**.

The rotation shaft enclosed in the clamping piston is driven by two pre-loaded cylindrical roller lines and is supported by an axial ball bearing.

### Work system :

- pressure in **P3** = clamping piston **C**.
- pressure in P4 = The oil drives the non-return valve A opening that allowes piston C opening.

#### Safety device :

The chucking piston C is connected to a non-return valve A and keeps the workpiece securely gripped in the jaws even in the event of a complete pressure lost.

Centrifugal force compensation system :

This hydraulic device cuts the clamping power loss that comes to the centrifugal force of the piston and the jaw mass.



During rotation, the pressure created by the clamping piston **B** and valve action **A** increases the pressure on the circuit **P3** and compensates for the loss of gripping force due to the centrifugal force.



### Chuck size MDE 160 - MDE300



### MDE 8x45° • Technical specifications

#### Dimentions - 8x45°

Code	MDE160	MDE 205	MDE 235	MDE 260	MDE 285	MDE 300
ØA	160	205	235	260	285	300
В	145	185	200	207.5	220	225
С	122	165	195	210	235	245
D1	-	47	62	65	77.5	85
D2	26	38	53	56	68.5	76
D3	30	43	58	60	72.5	80
E min.	18	27	42	40	52.5	60
E max.	28	41	56	58	70.5	78
F	27,5	35	35	45	45	45
G	60	92.5	107.5	115	127.5	132.5
H ± 0.010	21	32.5	47.5	50	62.5	70
I stroke	10	14	14	18	18	18
Ø Ј Н6	140	140	170	220	220	220
К*		"А	dapter Pla	te"		
ØL	42	55	55	75	75	75
М	159	199	215	223.5	236	241
ØN	32	50.4	50.4	60	60	60
ØO	25	31.5	31.5	48.5	48.5	48.5
Ø P H7	16	22	22	35	35	35
Q H7	10	12	12	18	18	18
ØR	M5	6.5	6.5	8.5	8.5	8.5
S	2,5	3	3	6	6	6
Т	3,5	4	4	4.5	4.5	4.5
U	8	8	8	10	10	10
V	M5	M6	M6	M8	M8	M8
W H7	10	12	12	18	18	18
X	104,80	104.8	133.4	171.4	171.4	171.4
Y	-	-	-	-	-	-
Z	11	11	13	1/	1/	1/
aa	0	0	0	9	9	9
Øbb	44	50	50	55	55	55
CC	95	95	95	105	105	105
Ødd	0	0	0	/9	/9	/9
ee	10	12	12	16	16	16
	MD160EBB	MD205EBB	MD235ECB	MD260EDB	MD285EEB	MD300ENB

#### - Note :

All the dimentions are in millimeter.

 $^{\ast}$  For K level in relation to the spindle nose see "Adapter Plate" section.

#### **Specifications**

Code	MDE160	MDE 205	MDE235	MDE260	MDE285	MDE300
Weight kg.	22	32	42	50	60	70
Max. speed rotat. g/1	4750	4200	3650	3500	3300	2900
Weight clamp.jaw kg.	0,2	0.5	0.5	1.2	1.2	1.2
Max pressure bar	. 55	55	55	55	55	55
Mom. of Inertia kgm2	-	0.18	0.33	0.52	085	1.10
Clamp pist. area cm2	13.85	23.7	23.7	44.1	44.1	44.1

#### - Note :

• Important : max. rotation speed you find in the schedule can be reached only at max. operating pressure using a clamping jaw with a mass not exceeding the values shown for each model.

If the pressure is not at the max. power or the clamping jaw mass exceeds the schedule values you have to reduce the speed.

- It is advisable to reduce speed about 30 50 % during indexing and rotation operations to avoid vibrations due to the unbalance of masses while the piece is in an intermediate position.
- All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.

### MDE 8x45° • Rear rotating oil manifold



### MDE Rotating oil manifold - 8x45°



				_
Dimentions	Code	ØA	ØВ	
	MDE 160	44	8	
	MDE 205 - MDE 235	50	8	
	MDE 260 - MDE 300	55	10	

- The rear hydraulic unit has:
  - steel nest tube connected to the chuck.
    - rotating oil manifold.
    - indexing position control
    - chuck connection rod.
- Letters C1»C2»C3»C4»C5»C6»C7»C8 are the lever movements control system in comparison to the 8 proximity switches.
- See the paragraph " Indexing position control system" for details.



Construction diagram - 8x45°



The indexing position control system allows to check the right working of the 8 indexing position interfaced with the machine.

**S**o it is possible to verify if the angular position obtained corresponds to that set by the CNC program.

The drawing shows the complete indexing position control mechanism.

The main parts of this mechanism are the followings :

 Front indexing position control (chuck body side) :

Cam "H" drives the rotary movement of the indexing shaft in a rectilineal movement that through lever "I" is put off the central cursor "K".

Spring "L" assures the right power and the return of the cursor.

 Rear indexing position control (rotating oil manifold side) : The rectilinear movement of the rod "F", connected to the cursor "K" throught the screw "J", is amplified (relation 4.5/1) with a special device "E" fixed to the rotating oil manifold "C".

The movement produced to the lever "**A**" is brought up on the pin "**D**" by nr. 8 proximity switches "**G**" fixed on the plate "**B**". The originally of the indexing position control by **tecnomors** is the amplify mechanism over described.

This solution make the device sensitiver giving the right identification of the 8 indexing position and recognising the eventually anomalies (incomplete rotation).



## DANGER

Hydraulic and connecting schemes, technical data and assembly instructions included in the present catalogue are supplied as information only. Please, refer to "Operating Instruction Manual - Indexing power chucks MD"for correct instruction about setting, connections, functioning, use, maintenance and safety indications.

The 8 proximity switches are schematized in the technical drawing ; the 8 proximity switches giving signals corresponding to the 8 indexing positions : C1 = pos. 0° - 360° C2 = pos. 45° C3 = pos. 90° C4 = pos. 135° C5 = pos. 180° C6 = pos. 225° C7 = pos. 270° C8 = pos. 315°

### MDE 8x45° • Hydraulic system



#### Diagram hydraulic system 8x45°



Suggested hydraulic circuit specifications:

- tank with approx. 60 100 I capacity.
- system pressure minimum 60 bar.
- variable pump capacity of 16 lt/min.
- accumulator capacity 0.7 1.1 litres, pre-load with 20 bar
- double oil filtring.
- nr. 2 electro-valves systems with double solenoid with fixed positions.
- nr. 2 pressure reducing valves for indexing and clamping systems.
- nr. 3 pressure switch: (nr.1 for clamping, nr.2 for indexing circuit)

#### Optionals :

- hydraulic oil cooling system.
- double pressure clamping drive for parts susceptible to deformations
- E.26 (contact our technical staff for information to unlock the pilot operated non-return valve incorporated).

Sideways to power chuck MDE hydraulic system.

---- = add to change the existing circuit.

#### Note:

- The hydraulic oil manifold system of the chuck shall be ventilate.
- Hydraulic seat valves are very sensitive against contamination (recommended filtering BS5540/4 10 μm).
- OIL type HLP32 / DIN51524 ISOVG32 / DIN51519 (32 cSt at 40°C).
- Only clean and recommended oil shall be used.
- Therefore an oil change every six months is recommended.



#### General connecting supply diagram



The standars MD/MDE power chuck includes:

- chuck
- hydraulic rear oil manifold
- tube nest
- indexing control predisposition
- (proximity switches not included)
- connecting flange to the lather spindle nose.

When ordering send us a drawing with the spindle lathe dimentions and specification to do the correct choice for you.

Components supplied only on request :

- M8x1 proximity switches (specify the type) to fix on the indexing control system.
- hydraulic unit with pipings (flexibility pipe length must be specified).
- shaped grips \*.

\*For this option we need a workpiece and the drawings of the raw part with working specifications.

We can't supply the following parts:

- the first installation on the lathe

- the electrical and electronic devices to interface the hydraulic unit and the proximity switches to the electrical cabinet and the machine CNC (indexing drive & controls).

- the hydraulic, electrical and electronic connection between chuck and machine tool.

See instruction enclosed with the furniture "Operating Manual".

For the correct working the CNC control unit needs to have auxiliary functions "M" wired to their respective relays.

The machines manufacturer had to supply them.

### **MD/MDE** • Mounting instructions

### Mounting diagram



tecn

### Forwarding :

The packing-case includes :

- MD/MDE power chuck
- ASA chuck adapter plate
- oil manifold + tube nest +
- control road
- rear lathe adapter plate
- fixing screw
- layout assembling drawing
  operating manual

When supplied our MD power chucks are already adapted to the application; no adjustments are usually required.

See the following chapter for mounting instructions details.

### **MD/MDE** • Mounting instructions



### Mounting instructions (extract from Operating Manual)

See the mounting diagram at page E.28, (and the assembling drawing and the Operating manual enclosed with the furniture for specific details).

### 01 Flange ASA

(see Adapter Plate description at page E.43):

- 01A = Direct flange fixing : Fix the flange "**S**" on the MD body.
- 01B = Fixing with reduction or augmentation flange:
   Mount the flange "S" on the lathe spindle nose

(the flange has to coincide with the reference pin) and fix with the screws "**R**".

**02** Set MD chuck body "W" on lathe spindle nose and fix the supplied screws "T".

**03** Rear flange "J" :

- 03 A = The front support "**O**" passes through the flange hole (around "**L**") : Fix flange "**J**" on the rear chuck side "**I**" and fix with screws "**K**".
- 03 B = The front support "**O**" doesn't pass trought the flange hole (around "**L**"). In this case flange "**J**" is supplied introduced in the tube nest "**N**"; to put in the tube nest to fix it at the flange "**J**" with screws "**K**".

**04** To align tally mark on the oil manifold "**F**" in the same radial position as the one marked on the chuck body "**W**".

To put in the rotary union "C" kindly untill clutch terminals "P" that are on the seats "Q" on the chuck body.

Lubricate clutches "P" for a good sliding.

**05** Fix flange "G" of the oil manifold "C" with screws "H". Mount and fix the cover "G1".

**06** Connect control road "**M**" using screw "**U**" (do not tighten them excessively); fix bottom plate "**V**" with screws "**X**".

**07** Connect hydraulic piping to **D1** and **D2**.

Connect drain pipe to "E" to recover oil (approx. 1.5 lt/min, it is dipent to the pressure and to the temperature).

IMPORTANT: Not rotate the lathe without pressure in the hydraulic circuit to avoid distributor damaging.

**08** Fix proximity switches **A1** and **A2** and adjust its 4 indexing positions with led control.

Regulate the proximity switches off-center respect the sensor pin "B" to encrease their sensibility (see indexing control system chapter) and to prevent their switch on incomplete rotation (80°) or not indexing position.

With adjusting screw it is possible regulate the rod.

**09** General features for the first starting ignition:

- before start ignition test the pressure setting.
- acting the elettro-valves, with working chuck not in rotation, and effect some working cycles to bleed pipes.
- at the first starting ignition wait always for a shortly warming up phase, than it is possible to work

#### Photograph MD with shaped grips



at the maximum power.

- hydraulic, electric and electronic connections have to be conforming to the laws in force.
- mount an antirotation bracket on the manifold that does not create axial or radial forces.
- if it is necessary balance, after jaws set mounting, the chuck acting on either jaws or chuck body.
- during indexing process reduce speed as it is shown in specifical chapter.

### **MD/MDE** Retractable Locator

#### **Dimentions**



MD Automatic Indexing Chuck+Retractable Locator												
Code	MD/MDE 235	MD/MDE 260	MD/MDE 285	MD/MDE 300	MD 315	MD 350	MD 400	MD 425	MD 500	MD 550		
А	107.5	115	127.5	132.5	137.5	155	175	187.5	215	235		
В	35	35	35	35	40	40	45	45	45	45		
С	72.5	80	92.5	97.5	97.5	115	130	142.5	170	190		

For special applications, where the loading operation needs a phase positioning of the workpiece, a special hydraullically operated unit has been designed and built.

The name of this component (optional) is "Hydraulic Retractable Locator".

The functioning of the Retractable Locator is made in sequence respect the clamping piston movement, thanks to the use of a couple of incorporated sequence valves (adjustable).Setting dipended to the oil pressure and to the temperature.

Supplementary hydraulic supplies are not needed because it has a direct supply from the hydraulic circuit.

This part is applied after market too in all the chuck models able to received this accessory in specifing the chuck part number.

Functioning sequence (in reference with the drawing):

Phase 1 : when the clamping piston is opening, the Retractable Locator piston feed in giving a fix axial reference. Phase 2 : when the clamping piston is closing, the Retractable Locator piston come back permiting next rotation and indexing phases.

#### NOTE:

Retractable Locator reduce chuck's capacity.

This option is not available for the chuck size MD160 and MD205.

During the first chuck mounting phase on the lathe it's necessary remove the hydraulic Retractable Locator group to reach the fixing screw of the indexing position reading rod.



	Retractable Locator													
Code	MD/MDE 205	MD/MDE 235	MD/MDE 260	MD/MDE 285	MD/MDE 300	MD 315	MD 350	MD 400	MD 425	MD 500	MD 550			
D	-	27	27	27	27	31	31	36	36	40	40			
E	-	10x0.75	10x0.75	10x0.75	10x0.75	12x1	12x1	12x1	12x1	17x1	17x1			
<b>F</b> - h8	-	12	12	12	12	14	14	14	14	20	20			
G	-	18	22	22	22	28	28	28	28	40	40			
н	-	9	9	9	9	9	9	9	9	9	9			
L.	-	18	18	18	18	20	20	20	20	24	24			
J	-	4	4	4	4	5	5	5	5	6	6			
К	-	8	8	8	8	10	10	10	10	12	12			
L	-	8	8	8	8	10	10	15	15	15	15			
area cm2	-	7.1	11.3	11.3	11.3	24.6	24.6	24.6	24.6	38.5	38.5			



### MADV - MADT • Features





# MADV/MADT

Chucks serie MAD are self-centering.

n version MADT jaws clamping is automatic trough a draw rod and a rear cylinder, in version MADV jaws clamping is manual thanks to an operating key.

Chucks MADT and MADV have booth manual indexing system.

n MADT and MADV power chucks manifacture and design we have applied the experience and the technology matured in particular in indexing power chuck design.

The originality of these indexing self-centering power chucks comes to the costant improvements **tecnomors** done since the early 1960's after the first chuck prototype realisation.

The main MAD power chucks features are:

### MADV - MADT • Features

- 1.1 made in special high resistence hardened and cementing 60HRC steel UNI18NiCrMo5, to maintain a high degree of precision, reliability and quality.
- **1.2** jaws slideways execution with gib allows a good sliding surface finish with possibility to recover clearances consequent to wear.
- $\begin{array}{l} \textbf{1.3} \text{ indexing movement simple and reliable:} \\ a \ conical \ shutter \ guarantees \ the \\ mechanical \ indexing. \ Indexing \ precision \\ \pm1'30" \ . \end{array}$
- **1.4** shaft guide system with two lines of big filled cylindrical pre-loaded roller radially and with a strong axial ball bearing axially.
- 1.5 seals against contamination by coolant, chips and dust.
- **1.6** constant and long lasting precision.
- **1.7** easy installation to the machine.
- **1.8** standard with 4 indexing 90° + 1 indexing 45°.

On request special indexing positions available (8x45°, 6x60°).

### 2.1 - MADT specifications :

- self-centering clamping.
- big clamping capacity.
- versions with long jaw for workpieces that need a big radius of revolution.
- quick and easy installation to the machine, it is request only the connection to the hydraulic cylinder on the lathe.

### 2.2 - MADT benefits:

- manufacturing of different pieces and also of small series.
- workpieces with big radius of revolution and flanges with big diameter.
- could be apply in the same machine with a conventional 3 jaws power chuck thanks to the quick retooling increasing unit flexibility and productivity.
- the indexing device allowing a quick change between the multiple working axes.
- good tools accessibility thanks to the chuck shape.

- 2.3 a special tecnomors device with titled plane transmits the clamping force to the jaws.
- 2.4 Chuck is supplied without driving cylinder. See the specific chapter to check cylinder and chuck size.

### 3.1 - MADV specifications:

- self-centering clamping.
- big clamping capacity.
- versions with long jaw for workpieces that need a big radius of revolution.
- it can be used on every tools machine (lathe, fresatrice, etc.)

### 3.2 - MADV benefits:

- the big jaws stroke makes really the clamping of complex profiles that couldn't be good clamping with an automatic chuck.
- prototypes, samples and series also of big pieces realisation.
- **3.3** a central screw supported by axial sloding bearing transmits the clamping force to the jaws.

#### MADV jaws set photograph



### MADV • Indexing - Clamping system

#### Indexing system

n MADV chucks to obtain shaft revolution it is necessary to stop chuck rotation.

The main parts of this device are:

- A = indexing shaft (driven by 2 lines of cylindrical pre-loaded rollers supported by an axial ball bearing).
- A1 = indexing notch.
- **B** = indexing shutter with spring.
- B1 = conical tooth.
- C = shutter stop lever.

The mechanism is in each jaw. The particular releasing lever allows to pilot the two shutters at the same time.

Rotation and indexing in the following diagram described:

- phase 1 = indexed chuck : the shutter tooth is connected in the shaft notch.

- stop of the rotation of the chuck

- phase 2 = shutter realase: let the releasing



lever to disconnect the shutter.

- phase 3 = rotation: the rotation is manual working on the
- piece in the jaws. - phase 4 = indexing: lever release allows spring shutter connection.

he realasing lever device is designed to use the centrifugal force in rotation as indexing force.

ndexing precision 0°01'30".

#### Clamping system

The main parts of the blocking device are:

- lead screw A
- jaws B
- the chuck body C
- axial unit of centering D
- safety pins E.

The chucks MADV are manual clamped.

The opening and the clamping of the jaws is allowed rotating the lead screw with a key or with a screw driver.

Respect the clamping couple values you find in the specifications.

The screw **A** is fixed with the centering unit **D** that containes the axial ball bearing.

The torque applied to the drilled screw **A**, gives the movement and the clamping of the jaws **B**.

#### Safety device :

The safety screws **E** keep the jaws securely in the chuck body in the eventually event of a lead screw broken.



Normally these screws are used to reduce the opening stroke of the jaws.

Never remove these screws.



### Chuck size MADV 170 - MADV 450



### Specifications

Code	MADV 170	MADV 180	MADV 195	MADV 230	MADV 250	MADV 275	MADV 315	MADV 350	MADV 425	MADV 450
Stroke per jaw mm	23.5	22.5	23.5	32	33	40.5	45	51	66	70
Max. couple to clamping screw Nm	60	80	90	95	115	120	120	140	145	185
Real static clamping force per jaw * daN	900	1200	1350	1450	1750	1800	1800	2100	2200	2800
Ripetibility ± mm	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Max. speed g/1	1700	1550	1500	1300	1100	1000	850	750	550	450
Moment of Inertia J Kgm2	0.07	0.13	0.16	0.29	0.55	0.70	0.90	1.40	2.90	9.80
Weight version C Kg	16	21	23	30	44	51	64	76	110	165
Weight version L kg	-	-	-	32	46	54	69	80	115	180

#### - Note :

• \* The real clamping force is taken with a load cell between the jaws during a non rotation period.

• All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.

### **MADV** • Technical specifications



### Dimentions

Code	MADV 170	MADV 180	MADV 195	MADV 230	MADV 250	MADV 275	MADV 315	MADV 350	MADV 425	MADV 450
Version *	СL	C L	C L	C L	C L	C L	C L	C L	C L	C L
ØA	170	184	195	230	248	275	315	350	425	445
В	180 -	199 -	211 -	221 241	254 279	266 301	282 322	319 354	346 396	435 470
С	198	222	228	262	290	315	345	385	455	525
D min (closed)	48	55	59	74	89	99	120	138	178	180
D max (open)	95	100	106	138	155	180	210	240	310	320
E	85 -	90 -	100 -	105 125	125 150	135 170	145 185	175 210	190 240	240 275
F	27	35	35	35	44	44	44	48	55	65
G	8	8	8	10	10	10	10	10	12	12
н	20	20	20	25	25	25	28	30	35	45
I	48	54	56	56	60	62	65	66	66	85
Ø J H6	140	170	170	220	220	220	220	220	300	300
К	41	44.5	44.5	49.5	52	52	55	58	63	80
L	15	17	17	17	17	17	17	19	19	21
М н7	16	18	18	18	22	22	22	22	25	25
N (open)	198	224	230	262	295	320	350	395	470	510
0	51.5	62	62	62	70	70	70	77.5	80	95
Р	9.5	10.5	10.5	10.5	12	12	12	13.5	14	14
Ø Q H7	16	18	18	18	22	22	22	22	25	25
R	10.5	11	11	11	12.5	12.5	12.5	14	14.5	14
S	4.5	5	5	5	5.5	5.5	5.5	5.5	6	6
T (stroke)	23.5	22.5	23.5	32	33	40.5	45	51	66	70
U	58	72	72	72	90	90	90	98	110	130
V min	55	64	68	83	99	109	130	149	190	194
ØW	35	45	45	45	63	63	63	70	80	85
Х	206 -	235 -	241 -	272 278	308 328	333 373	360 415	407 477	483 560	575 630
Y	90.76	115.53	115.53	148.44	148.44	148.44	148.44	148.44	203.52	203.52
Z	52.40	66.70	66.70	85.70	85.70	85.70	85.70	85.70	117.50	117.50
aa	11	13	13	17	17	17	17	17	21	21
bb	8.50	10.50	10.50	10.50	12.50	12.50	12.50	14.50	14.50	14.50
сс	-	M6	M6	M6	M8	M8	M8	M10	M10	M10
dd	-	32	32	32	45	45	45	50	60	60
ARTICLE CODE	DV170VBA	DV180VCA	DV195VDA -	DV230VEA DV230VFA	DV250VGA DV250VHA	DV275VIA DV275VLA	DV315VRA DV315VSA	DV350VMA DV350VNA	DV425VOA DV425VPA	DV450VTA DV450VUA

- Note :

All the dimentions are in millimeter.

\* Version : C = Standard Jaw / L = Long Jaw (Long jaw up size MADV 230).

X = overall dimentions during rotation with max. jaw opening.

All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.

### MADV• Standard supply



### Supply diagram



### Photograph of MADV with jaws and operating key.



### MADT • Indexing - Clamping system

#### Indexing system

n MADT chucks to obtain shaft revolution it is necessary to stop chuck rotation.

The main parts of this device are:

- A = indexing shaft (driven by 2 lines of cylindrical pre-loaded rollers supported by an axial ball bearing).
- A1 = indexing notch.
- **B** = indexing shutter with spring.
- B1 = conical tooth.
- C = shutter stop lever.

The mechanism is in each jaw. The particular releasing lever allows to pilot the two shutters at the same time.

Rotation and indexing in the following diagram described:

- phase 1 = indexed chuck : the shutter tooth is connected in the shaft notch.

- stop of the rotation of the chuck

- phase 2 = shutter realase: let the releasing



lever to disconnect the shutter.

allows spring shutter

- phase 3 = rotation: the rotation is manual working on the
- piece in the jaws. - phase 4 = indexing: lever release

connection.

designed to use the centrifugal force in rotation as indexing force.

The realasing lever device is

ndexing precision 0°01'30".

#### Clamping system

The main parts of the blocking device are:

- driving hub with inclined plane A
- jaws B
- the chuck body C
- safety pin D.

The chucks model MADT are automatic clamped.

The driving hub **A** allows the opening and the clamping of the jaws through a draw rod connected to an hydraulic cylinder behind the lathe shaft.

Respect the max. power traction values you find in the specifications.

Traction applied to the hub A produces thanks to inclinad plane:

- jaws movement B
- clamping force increase.

#### Safety device:

The safety pins **D** keeps the jaws securely in the chuck body in the eventually event of a inclined



planes coupler broken.

These pins are the bottom plates of the indexing device.



### Chuck size MADT 165 - MADT 450



### Specifications

Code	MADT 165	MADT 195	MADT 220	MADT 230	MADT 250	MADT 275	MADT 315	MADT 350	MADT 400	MADT 450
Stroke per jaw mm	8	8.5	9	12.5	13	14	15	16	16	21
Piston stroke mm	22	23.5	25	27	29	30	32.2	34.5	34.5	45
Real static clamping force per jaw * daN	900	1400	1400	1400	1750	1750	1750	2200	2200	2800
Ripetibility ± mm	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Max. speed g/1	1800	1600	1450	1400	1200	1100	950	850	650	500
Moment of inertia J Kgm2	0.05	0.16	0.25	0.30	0.56	0.82	0.98	1.60	2.15	8.5
Weight version C Kg	17	24	30	36	45	59	65	76	90	175
Weight version L kg	-	-	32	38	47	62	70	80	95	190

#### - Note :

• \* The real clamping force is taken with a load cell between the jaws during a non rotation period.

• For the correct hydraulic actuating cylinder choise see chapter "MADT • Standard supply".

• All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.

### **MADT** • Technical specifications



### Dimentions

Code	MADT 165	MADT 195	MADT 220	MADT 230	MADT 250	MADT 275	MADT 315	MADT 350	MADT 400	MADT 450
Version *	СL	CL	C L	C L	C L	C L	C L	C L	C L	C L
ØA	165	195	220	230	248	275	315	350	400	445
В	186 -	217 -	220 245	223 243	261 286	274 304	295 335	326 356	368 418	465 500
ØC	28	32	32	32	40	40	40	45	45	55
D min (closed)	59	78	102	115	123	147	180	198	233	278
D max (open)	75	95	120	140	150	175	210	230	265	320
E	80 -	95 -	95 120	100 120	120 145	130 160	145 185	170 200	190 240	240 275
F	27	35	35	35	44	44	44	48	55	65
G	8	8	8	10	10	10	10	10	12	12
н	27	29	32	30	35	38	39	40	43	55
I	52	58	58	58	62	62	67	68	80	105
Ø Ј Н6	140	170	170	220	220	220	220	220	300	300
ØК	13	17	17	17	17	17	17	23	23	25
Ø L н8	18	22	22	22	24	24	24	30	30	35
М н7	16	18	18	18	22	22	22	22	25	25
N (open)	178	219	244	264	290	315	350	385	425	510
0	51.5	62	62	62	70	70	70	77.5	80	95
Р	9.5	10.5	10.5	10.5	12	12	12	13.5	14	14
ØQH7	16	18	18	18	22	22	22	22	25	25
R	10.5	11	11	11	12.5	12.5	12.5	14	14.5	14
S	4.5	5	5	5	5.5	5.5	5.5	5.5	6	6
T (stroke)	8	8.5	9	12.5	13.5	14	15	16	16	21
U	58	72	72	72	90	90	90	98	110	130
V min	66	90	115	128	137	160	190	209	245	292
ØW	35	45	45	45	63	63	63	70	80	85
Х	187 -	231 -	255 280	274 284	304 320	326 355	360 415	398 454	439 560	575 630
Y (draw rod stroke)	22	23.4	24.8	26.8	29	30	32.2	34.4	34.4	45
Z	9	9.5	8	10	13	10	12	16	11	11
аа	90.76	115.53	115.53	148.44	148.44	148.44	148.44	148.44	203.52	203.52
bb	52.4	66.7	66.70	85.70	85.70	85.70	85.70	85.70	117.50	117.50
Øcc	11	13	13	17	17	17	17	17	21	21
Ø dd	8.5	10.5	10.5	10.5	12.5	12.5	12.5	14.5	14.5	14.5
ee	-	M6	M6	M6	M8	M8	M8	M10	M10	M10
ff	-	32	32	32	45	45	45	50	60	60
<b>99</b>	15	15	15	15	15	15	15	16	16	16
ARTICLE CODE	0T165TBA -	DT195TCA -	DT220TDA DT220TEA	DT230TFA DT230TGA	DT250THA DT250TIA	DT275TLA DT275TMA	DT315TRA DT315TSA	DT350TNA DT350TOA	DT400TPA DT400TQA	DT450TTA DT450TUA

#### - Note :

All the dimentions are in millimeter. \* Version : C = Standard Jaw / L = Long Jaw (Long jaw up size MADT220). X = overall dimentions during rotation with max. jaw opening. All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.

### **MADT** • Standard supply

### Supply diagram



- MADT chuck.
- Clamping screws.
- Components supplied on request:
- Clamping rough jaws.
- Clamping shaped jaws. (in this case we need the drawings and the workpiece).

### Scheme for the correct hydraulic cylinder choice.

Code		MADT 165	MADT 195	MADT 220	MADT 230	MADT 250	MADT 275	MADT 315	MADT 350	MADT 400	MADT 450
s	least stroke - mm.	22	24	25	27	29	30	33	35	35	45
F	max.power - daN	1470	2300	2300	2900	3620	3620	3620	4550	4550	5800

### Equipment



#### Adapter plate to the late spindle nose - DIN55026 / ISO-A 702/1



#### **Dimentions**

ARTICLE CODE	Spindle nose	ØA	ØB	ØC	ØD	Е	ØF	ØJ h7	М	Туре	PD2 kgm2	Weight Kg
FA 145 ABA	ASA 5"	82.563	104.8	11.5	-	-	-	140	15	I	0.003	1
FA 175 BCA	ASA 5"	82.563	104.8	11.5	133.4	M12	-	170	24	11	0.012	2.7
FA 225 BDA	ASA 5"	82.563	104.8	11.5	171.4	M16	-	220	24	11	0.038	5.5
FA 176 AEA	ASA6"	106.375	133.4	13.5	-	-	-	170	17	1	0.007	1.5
FA 226 BFA	ASA 6"	106.375	133.4	13.5	171.4	M16	-	220	24	11	0.035	5
FA 306 BGA	ASA 6"	106.375	133.4	13.5	235	M20	-	300	30	11	0.135	11
FA 146 CHA	ASA 6"	106.375	133.4	13.5	104.8	M10	165	140	35	111	0.018	3.7
FA 228 AIA	ASA 8"	139.719	171.4	17	-	-	-	220	19	1	0.022	2.7
FA 308 BLA	ASA 8"	139.719	171.4	17	235	M20	-	300	30	11	0.16	11.5
FA 178 CMA	ASA 8"	139.719	171.4	17	133.4	M12	210	170	40	111	0.038	6.2
FA 301 ANA	ASA 11"	196.869	235	21	-	-	-	300	21	I	0.09	5.5
FA 221 COA	ASA 11"	196.869	235	21	171.4	M16	280	220	45	111	0.13	11.8
FC 145 DPA	Cam Lock 5"	82.563	104.8	19	104.8	M10	-	140	30	IV	0.007	2.2
FC 175 DQA	Cam Lock 5"	82.563	104.8	19	133.4	M12	-	170	30	IV	0.016	3.7
FC 176 DRA	Cam Lock 6"	106.375	133.4	22.2	133.4	M12	-	170	35	IV	0.020	3.9
FC 226 DSA	Cam Lock 6"	106.375	133.4	22.2	171.4	M16	-	220	35	IV	0.055	7.5
FC 306 DTA	Cam Lock 6"	106.375	133.4	22.2	235	M20	-	300	35	IV	0.20	15
FC 228 DUA	Cam Lock 8"	139.719	171.4	25.4	171.4	M16	-	220	40	IV	0.06	7.2
FC 308 DVA	Cam Lock 8"	139.719	171.4	25.4	235	M20	-	300	40	IV	0.22	16
FC 301 DZA	Cam Lock 11"	196.869	235	30.2	235	M20	-	300	45	IV	0.22	14.5

#### Note :

- Type I = adapter plate with direct fixing ( the chuck boring is like that on the lather spindle nose). The adapter plate is fixed on the chuck that is connected direct to the lathe spindle nose with screws.

-Type II = reduction adapter plate, indirect fixing (the lathe spindle nose dimention is smaller that the standard of the chuck).

- -Type III = augmentation adapter plate, indirect fixing ( the lathe spindle nose dimention is bigger that the standard of the chuck). In these cases (type II and type III) the adapter plate is fixed on the machine spindle nose. The chuck is connected after to the adapter plate.
- -Type IV = cam-lock adapter plate (special on request)
- We supply adapter plate with clamping screws.
- All dimentions are indicative and subject to variation for technical upgrading. We reserve the right to make alterations without prior notification.



**E.44** 

