



OFFICINA MECCANICA LOMBARDA S.p.A.
Via Cristoforo Colombo,5
27020 Travacò Siccomario (PV) – ITALY
Tel. +39 0382. 55 96 13
Fax +39 0382. 55 99 42
www.omlspa.it omlspa@omlspa.it

*Complete Mechanical Drive
Automatic Index Table*

TOUCHDEX^{PAT.}

Operation Manual

Please read this manual before using this product.
After reading this manual, keep it in a secure place
where you can readily access it at any time.

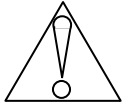
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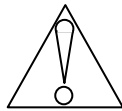
Cautions regarding use (avoiding collisions)

Marks that are used in this manual



Caution

Cautions that always must be observed
Failure to observe such a caution could result in mechanical breakdown or damage to this product or to other machinery.

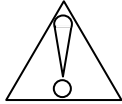


CAUTION

When using coolant (machining fluid) for machine centering using Touchdex, use the appropriate dilution for the type of work and use it in appropriate condition that is recommended by the maker. If an inappropriate dilution is used, rust may occur inside the main body, and the machine may not operate properly.

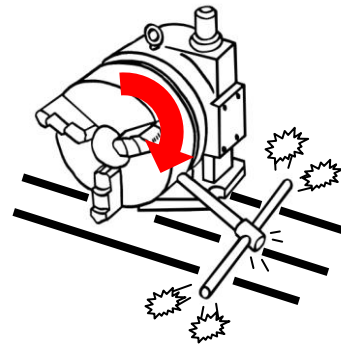
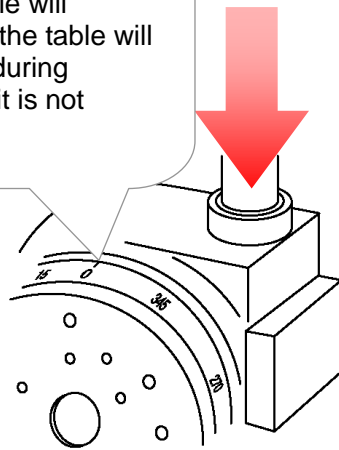
Touchdex has a completely mechanical mechanism.

There is no need for electricity or air. However, if used incorrectly, trouble may arise due to collision etc.

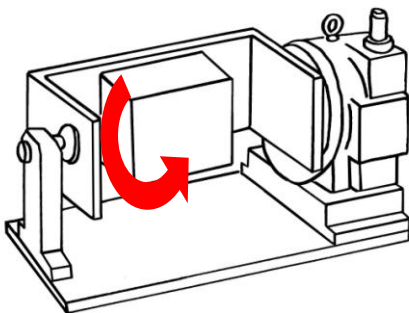


Caution

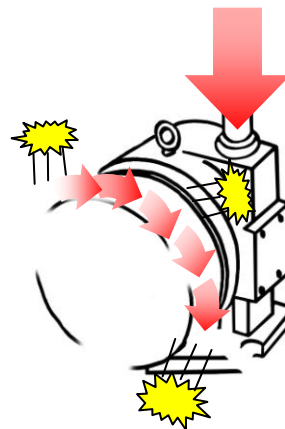
If not pushed in by the correct push-in amount, the index angle will fluctuate and the table will start moving during processing if it is not clamped.



If you forget to remove tools such as the scroll chuck handle, a collision will occur when rotation starts.

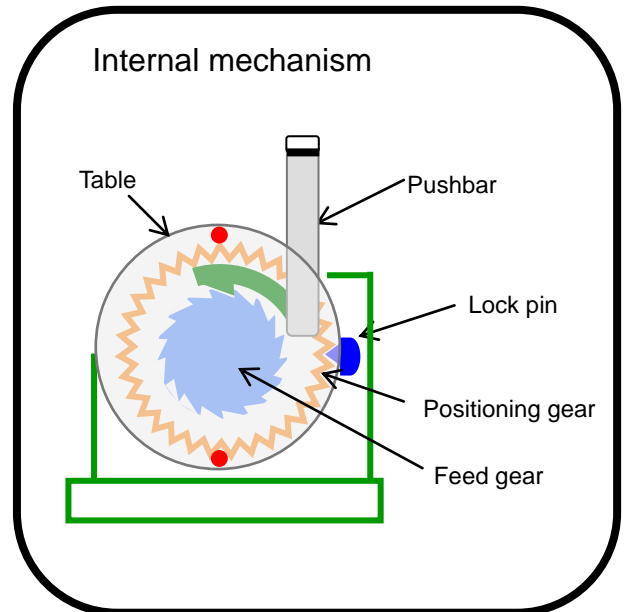
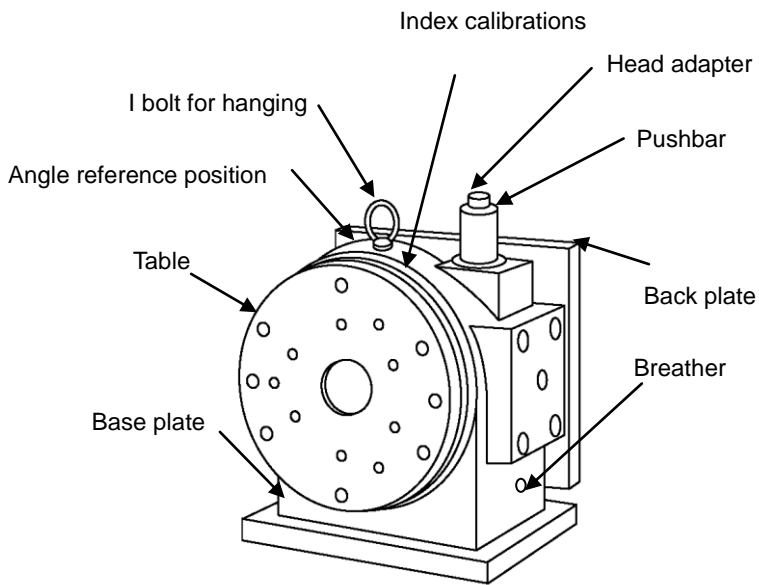


When attaching items and jigs that are not balanced in the rotating direction of the table, it may not be possible to perform indexing well. (See page 9 for details.)

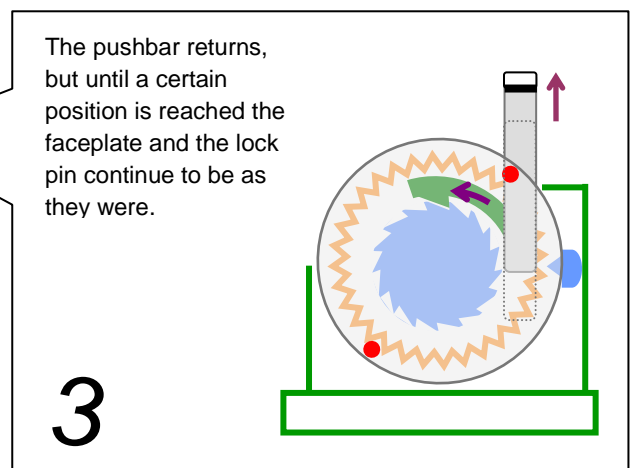
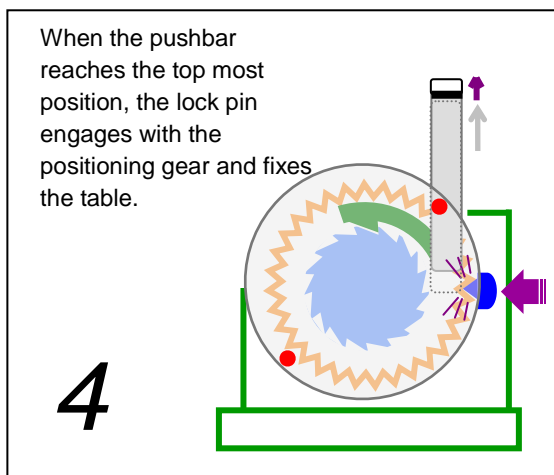
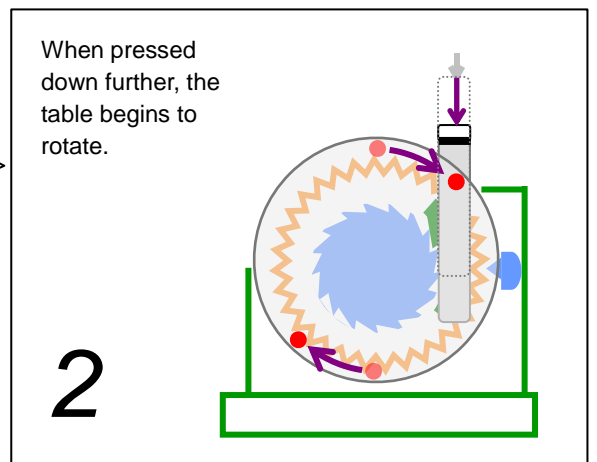
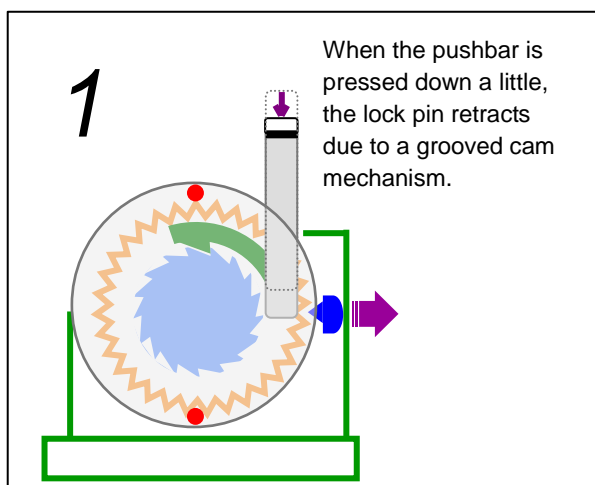


When pressed with too much speed, the faceplate may over rotate due to inertia.





Names of parts







Indexing mechanism



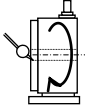
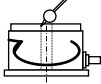
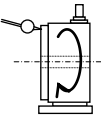
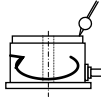
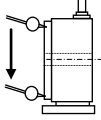
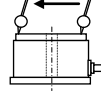
Specification

Model		FDM150	FD(M)-200	FD(M)-200-04	FD(M)-200-360	FDM230	FDM230-360	FDR230	FDR230-360	FD(M)300	FD(M)300-360
Table diameter	mm	170	210	210	210	230	230	230	230	310	310
Spindle Bore Diameter	mm	37	16.5	16.5	16.5	58	58	58	58	52	52
Center Height	mm	120	135	135	135	145	145	145	145	185	185
Table Indexing Angles at Full Pushbar Stroke	deg.	45	15	90	15	45	45	45	45	45	45
Min. Indexing Angles	deg.	5	5	5	1	5	1	5	1	5	1
Approx. Full Pushbar Stroke	mm	38	35	78	35	56	56	56	56	75	75
Approx. Pushbar Load	N(kgf)	295 [30]	588 [60]	784 [80]	588 [60]	784 [80]	784 [80]	1470 [150]	1470 [150]	1078 [110]	1078 [110]
Loadings (kg)	Vertical use  Kg	200	250	250	250	250	250	250	250	350	350
	Horizontal Use  Kg	300	350	350	350	350	350	350	350	350	500
Allowable Unbalanced Weight (Differences in load at table periphery)	W_1-W_2  Kg	4	4	4	4	4	4	20	20	4	4
Allowable load (Table clamped)	$F \times L$  N·m [kgf·m]	588 [60]	1030 [105]	1030 [105]	1030 [105]	1127 [115]	1127 [115]	1127 [115]	1127 [115]	2280 [232.5]	2280 [232.5]

Specification

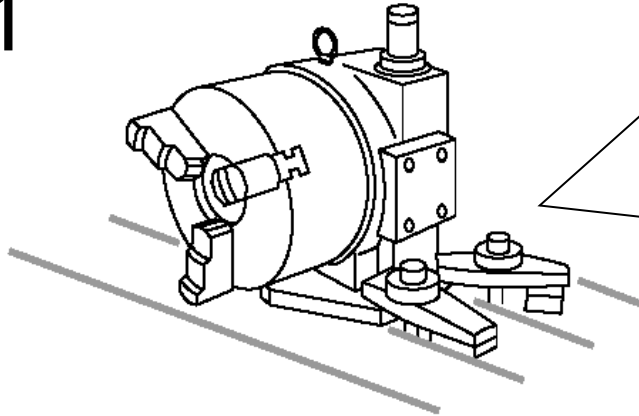
Model		FDMK150-04	FDMK230	FDMK230-360	FDMK230-04	FDMK230-04-360	FDMK340	FDMK340-360
Table diameter	mm	170	230	230	230	230	340	340
Spindle Bore Diameter	mm	37	58	58	58	58	100	100
Center Height	mm	120	145	145	175	175	200	200
Table Indexing Angles at Full Pushbar Stroke	deg.	90	45	45	90	90	45	45
Min. Indexing Angles	deg.	5	5	1	5	1	5	1
Approx. Full Pushbar Stroke	mm	53	56	56	83	83	83	83
Approx. Pushbar Load	N(kgf)	392 [40]	1470 [150]	1470 [150]	1470 [150]	1470 [150]	1764 [180]	1764 [180]
Loadings (kg)	Vertical use  Kg	200	250	250	250	250	350	350
	Horizontal Use  Kg	300	350	350	350	350	500	500
Allowable Unbalanced Weight (Differences in load at table periphery)	W_1-W_2  Kg	20	20	20	20	20	20	20
Allowable load (Table clamped)	$F \times L$  N·m [kgf·m]	588 [60]	1127 [115]	1127 [115]	1127 [115]	1127 [115]	2280 [233]	2280 [233]

Indexing precision

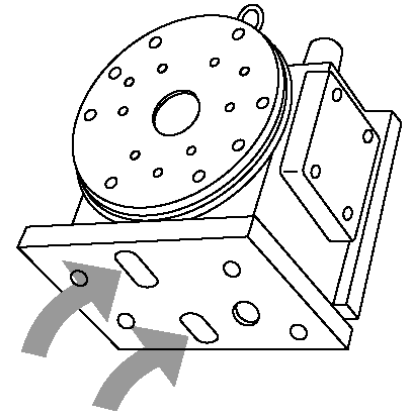
Location to be inspected	Tolerance	Method of measurement (FD)	Method of measurement (FDM)
Table center hole run-out	0.01 mm		
Table surface run-out (15 mm inside table periphery)	0.01 mm		
Table squareness (15 mm inside table periphery)	0.03 mm		
Accuracy	30 sec		
Repeatability	+/- 3 sec		

Operating procedure (Setting)

1



Use the rib of the base plate to fix the unit. (The fixing brackets are not supplied with the product.)



For the guide key, use the grooves with tapped holes on the underside. (The guide key is an optional accessory (sold separately).)

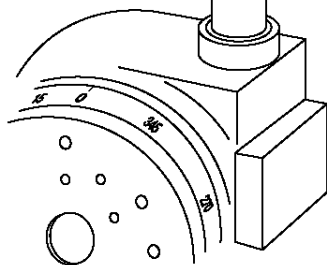
2



Do not rotate the tool.



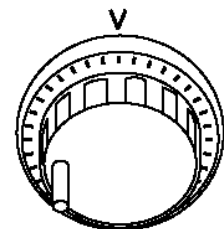
2 (B)



Move the tool over the push bar, using manual mode. (Keep the tool 2 mm or more above from the pushbar at this time.)

2 (A)

Using handle mode



2 (C)

POS
X: ▲▲▲▲▲
Y: □□□□□
Z: ○

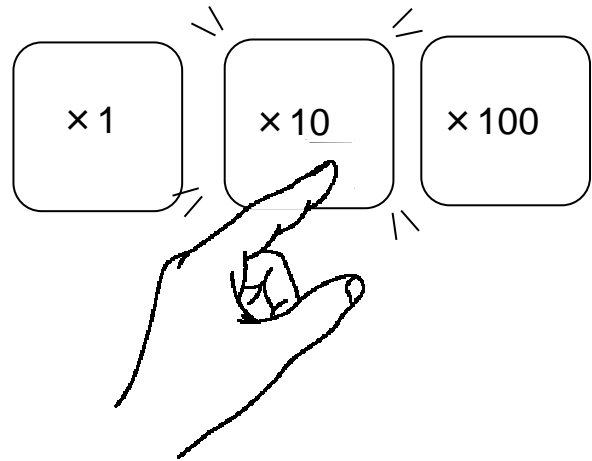


Read and memory Z axis number.

(Position A)

3

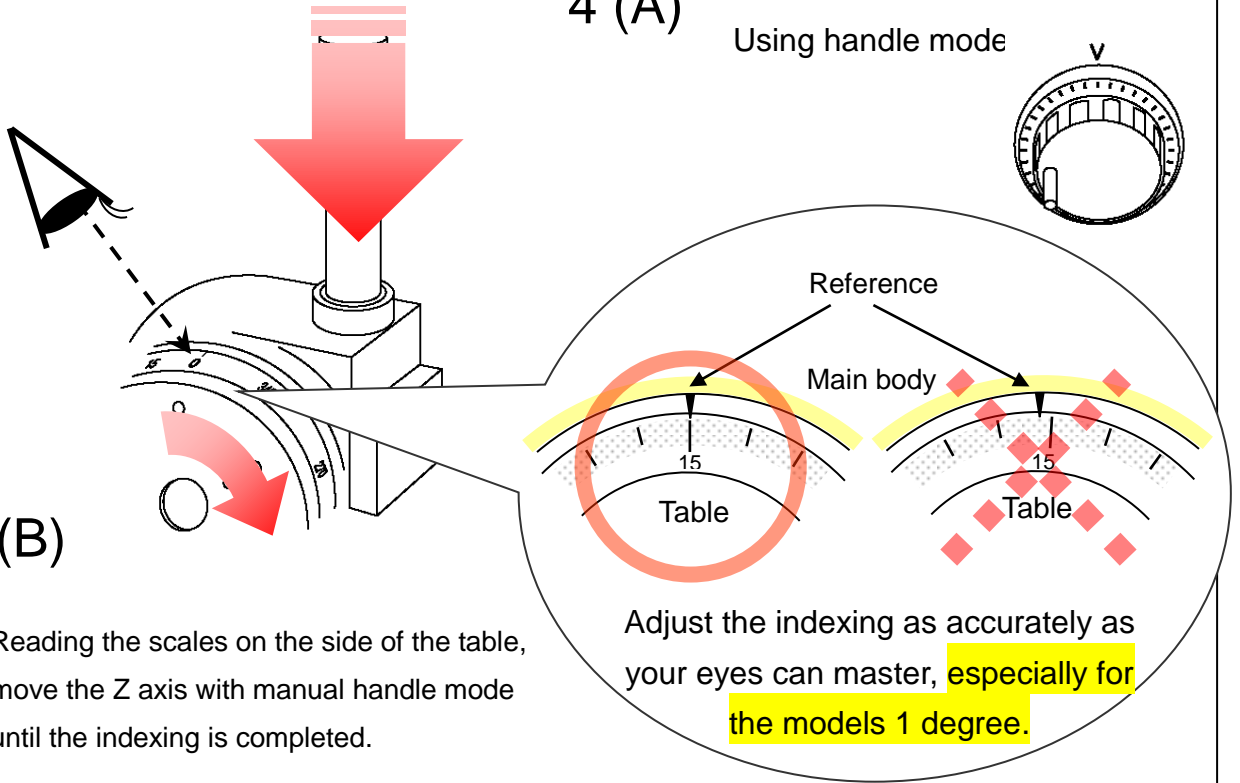
Set 1 pulse of the handle mode to x 10 (0.01 mm).



4

4 (A)

Using handle mode



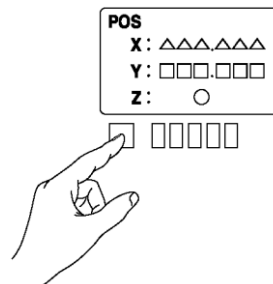
4 (B)

Reading the scales on the side of the table, move the Z axis with manual handle mode until the indexing is completed.

4 (C)

Read and memory Z axis number.

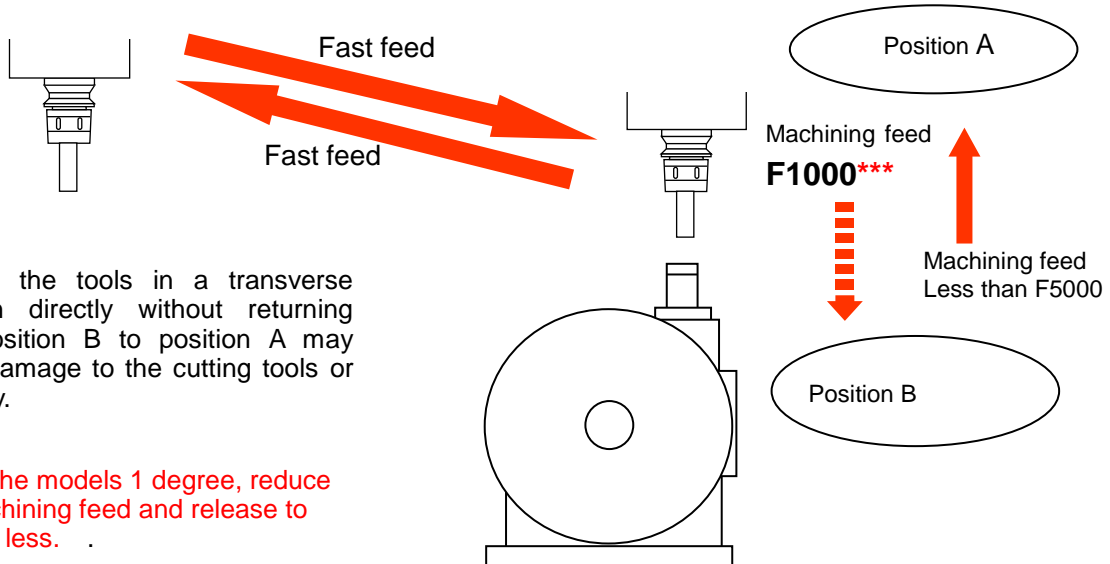
(Position B)



5

Use the measured positions A and B to create a program.

Home position

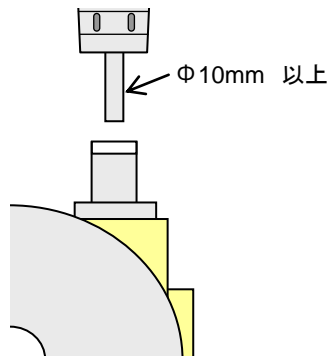


*Moving the tools in a transverse direction directly without returning from position B to position A may cause damage to the cutting tools or the body.

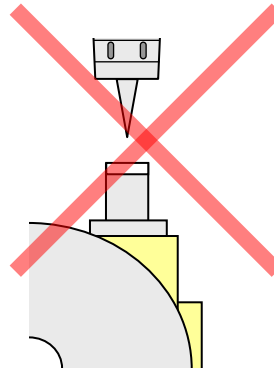
*** For the models 1 degree, reduce the machining feed and release to F500 or less.

- | | | |
|--|--|---|
| | | <p>If the table slightly rotates when the pushbar returns to position A, it means the setting for the location of the Z axis direction in position B is incorrect. Repeat procedure 4 until the table no longer rotates.</p> |
| | | <p>The tolerance of the push-in speed changes depending on the inertia of the rotating processed item or jig. Before commencing processing, perform a visual check of the operation of the program and make sure the table actually stops where it is supposed to stop.</p> |
| | | <p>For indexing of badly balanced articles or unbalanced work, see section 3.</p> |
| | <p>Make sure to read the cautions regarding safety in the following section and thoroughly understand them before starting the operation.</p> | |
| | <p>Note that the product precision does not guarantee the machining precision.</p> | |

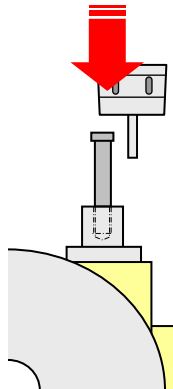
1 Regarding the push-in tool



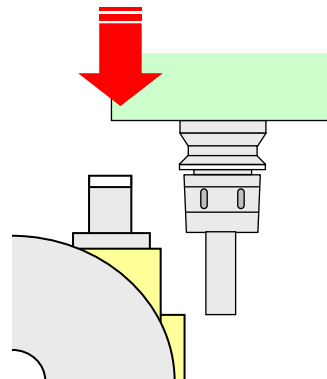
Providing the drill is $\text{Ø}10$ mm or wider and no bending is caused during the pushing down, the tool you are using is appropriate.



If a tool with a sharp tip is used, it will badly wear down the resin and the resin will have to be replaced.



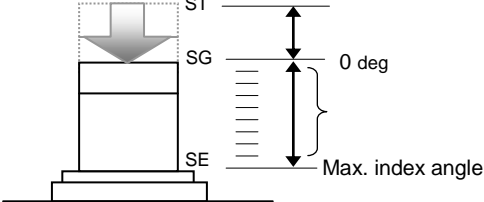
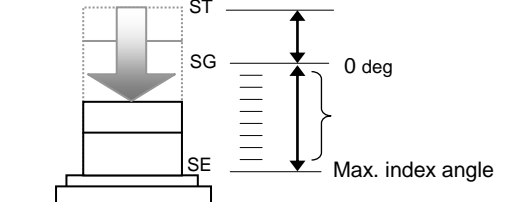
The head adapter (plastic) is attached with an M8 screw. Removing the head adapter and replacing the screw with a bolt allows the head adapter to be pushed by a drill chuck.



The main shaft cover can also be used to push down.

Relationship between the index angle and the amount the pushbar lowers

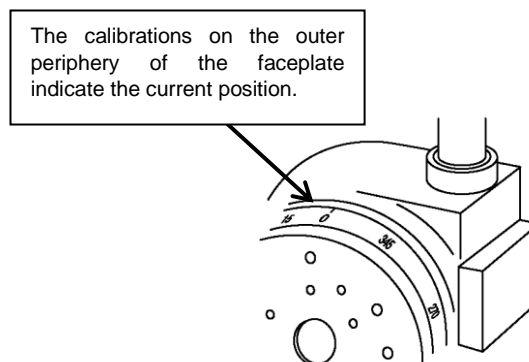
1.1 Push stroke

Stroke ST point to SG point	Stroke SG point to SE point
<p>The lock pin is unlocked. The table does not rotate.</p>  <p>The diagram shows a cross-section of a table with a pushbar. The pushbar is at the ST (Start) position. The SG (Stop) position is indicated by a horizontal line. The SE (End) position is indicated by another horizontal line. A vertical double-headed arrow between ST and SG is labeled '0 deg'. A vertical double-headed arrow between SG and SE is labeled 'Max. index angle'.</p>	<p>The table begins rotating when the pushbar is pressed down beyond the SG point. The extent of table rotation is in proportion to the extent to which the push bar has been pressed downwards.</p>  <p>The diagram shows a cross-section of a table with a pushbar. The pushbar is at the ST (Start) position. The SG (Stop) position is indicated by a horizontal line. The SE (End) position is indicated by another horizontal line. A vertical double-headed arrow between ST and SG is labeled '0 deg'. A vertical double-headed arrow between SG and SE is labeled 'Max. index angle'.</p>

1.2 Relationship between the current position and indexed position.

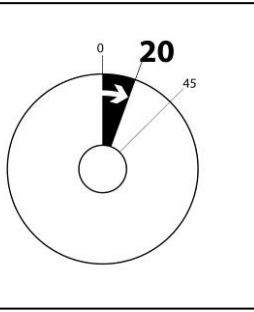
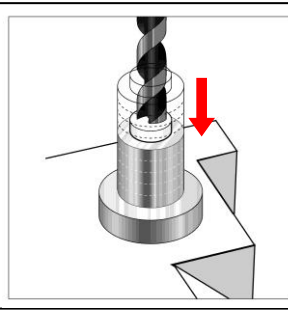
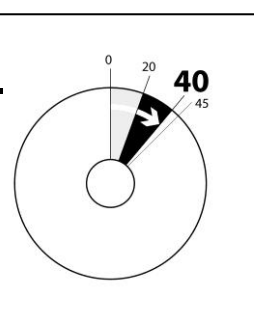
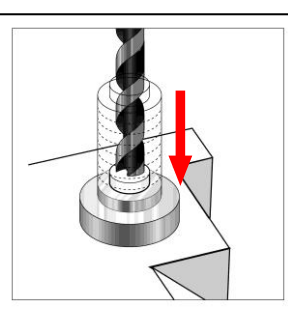
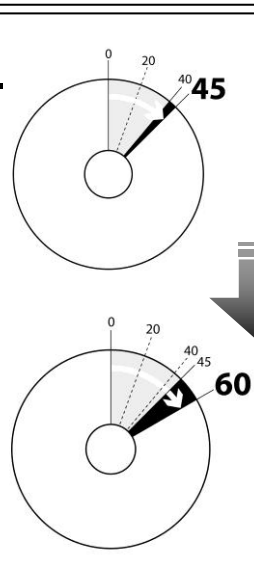
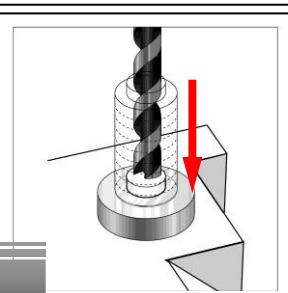
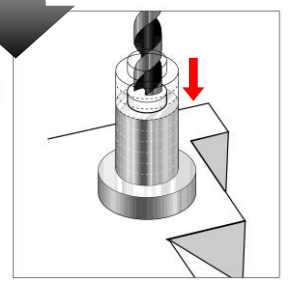
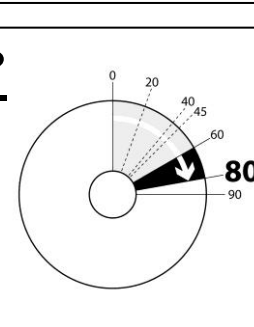
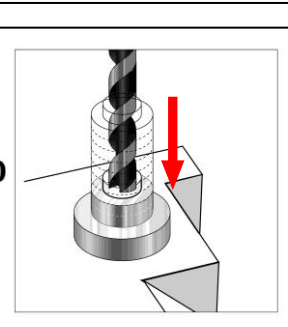
The push-in amount of the Touchdex is not constant even indexing at the same angle repeatedly. It is determined by the relation with the current position and index position.

Just for the first setting, please check each stroke of the Z axis in relation with the needed indexed position.



The following describes an example when the max. index angle is 45°.

< The index will be carried out from 0° to 80° in steps of 20°. >

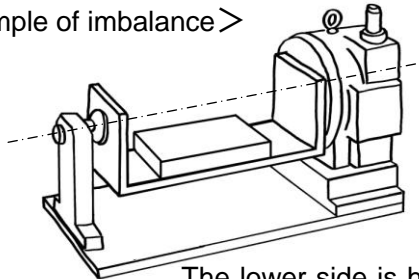
<p><u>0° to 20°</u></p>			<p>Push down the pushbar to the 20° position.</p>
<p><u>20° to 40°</u></p>			<p>Push down the pushbar to the 40° position.</p>
<p><u>40° to 60°</u></p>		 	<p>1. Push down the pushbar to the lowest position and turn it to 45°.</p> <p>2. From the 45° position, push the pushbar again to the 60° position.</p>
<p><u>60° to 80°</u></p>			<p>Push down the pushbar to the 80° position.</p>

When the max. index angle is, for example, 15° or 90°, the 45° position described above will be 15° or 90° respectively.

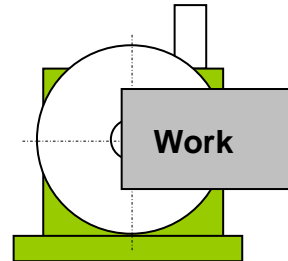
Processing work that is poorly balanced

With Touchdex you are using a manual unit, and with this in mind, the force by which the table is clamped during table rotation is small. Because of this, care must be taken when attaching jigs and work to be processed that are unbalanced in relation to the rotating center.

<Example of imbalance>



The lower side is heavier than the table center.

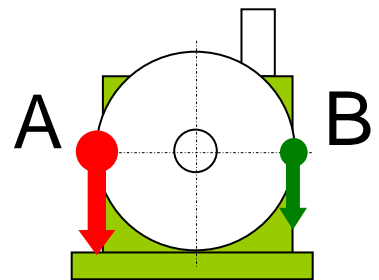


The center of gravity of the work is to the right of the table center.

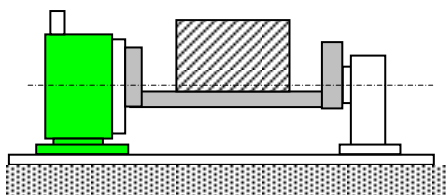
<Amount of tolerance imbalance>

The maximum tolerance (kg) for the difference of load A and B applied to the table periphery "A - B", is shown in the table below.

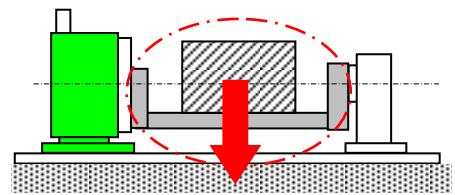
Model	Maximum load tolerance
FDR230 FDR230-360 FDMK150-04 FDMK230(-360) FDMK230-04(-360) FDMK340(-360)	20
FD(M)200(-360) FD(M)200-04 FDM230(-360) FD(M)300(-360)	4



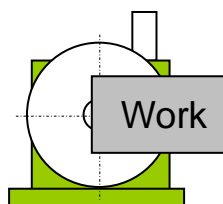
<Example of imbalance>



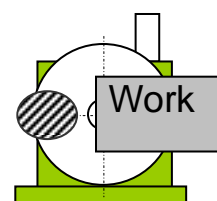
Cradle model



The center of gravity of the jig and workpiece must fit the rotating center of gravity of the index table.



The work is away from the center



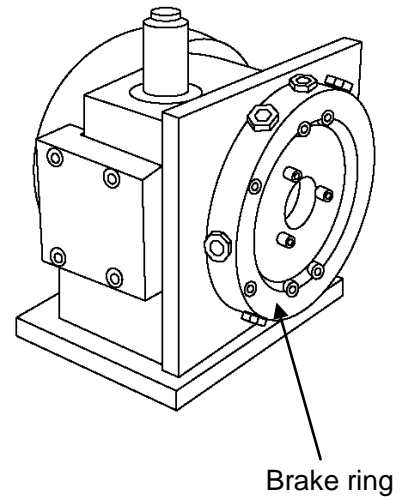
Placement of a counterbalance

Brake ring (Optional accessory(sold separately))

Features

- Stabilizes the indexing of unbalanced work or large work.
- Enables adjustment of the holding power
- Enables later attachment

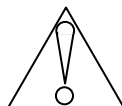
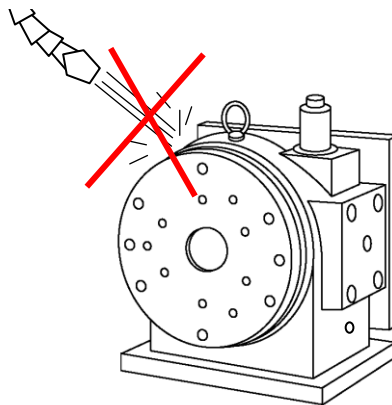
Touchdex model	Holder model
FDM-150	KH-150
FD -200 (-04)	KH-200
FD -300	KH-300



The maximum tolerance (kg) for the difference of load A and B applied to the table periphery "A – B " exceeds **20 kg**.

Coolant

The front face is sealed to prevent the coolant from entering the inside of the product. However, the coolant may enter inside as the seal ages, and it could adversely affect the accuracy of the product performance. Avoid directly spraying the coolant on sliding parts. Since there are no electric parts used inside the Touchdex, there will be no problem with the functions of the product even if some coolant should enter inside.



Caution

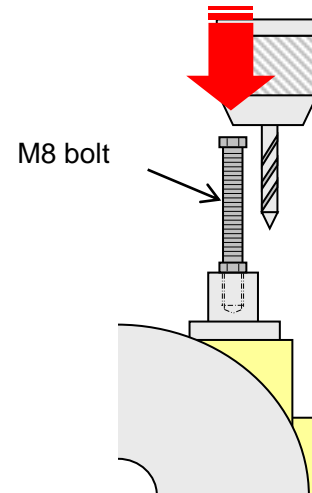
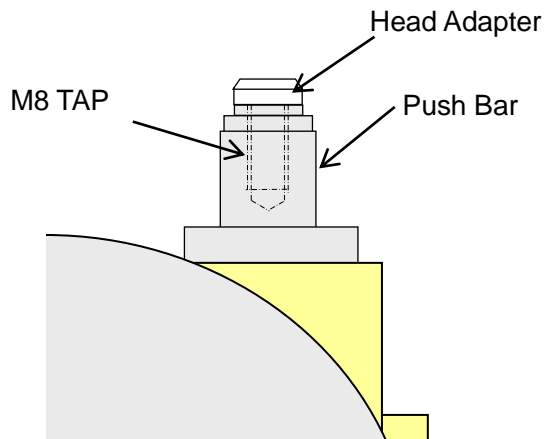
When using coolant (machining fluid) for machine centering using Touchdex, use the appropriate dilution for the type of work and use it in appropriate condition that is recommended by the maker. If an inappropriate dilution is used, rust may occur inside the main body, and the machine may not operate properly.

OTHER INFORMATION

1. Replacement of the head adapter

The head adapter is made of plastic. It is attached with an M8 tap.

It is possible to replace the head adapter with a bolt in order to avoid interference due to the pushing position.



When using the end of a drill chuck to push, replace the head adapter with a bolt in order to avoid interference with the cutting tools if the pushing position is limited.

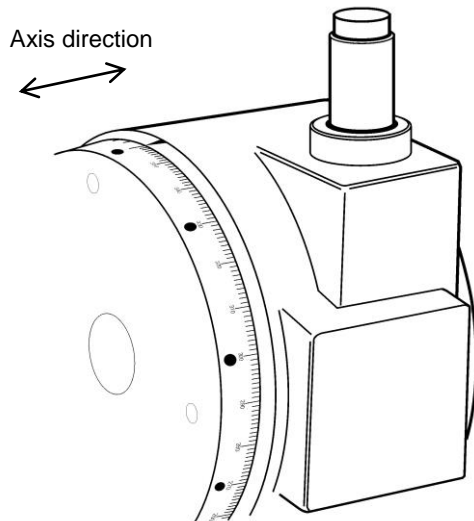
2. Additional preparation for the table

When adding screws to the table, the hole depth should be 16 mm or less.

3. Index position feed back

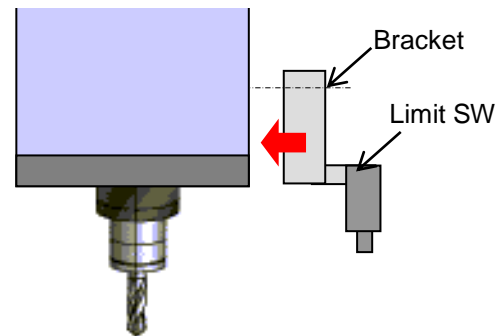
Since the Touchdex uses no electricity and is used independently, checking for index cannot be carried out electrically. When using it as a part of a system, we recommend that you check it by using a limit switch or the like.

1. Making a hole to the outer periphery of the table for checking



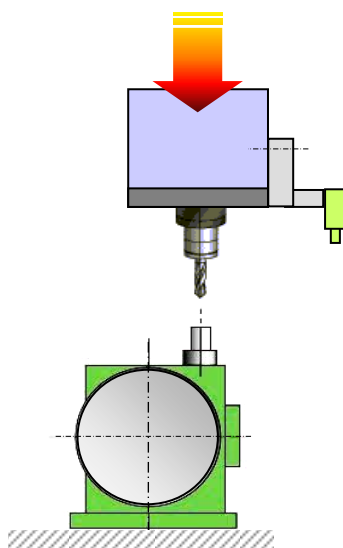
Slightly shifting the hole position in the shaft direction allows the checking of multiple index angles.

2. Attaching a limit switch to the spindle for checking

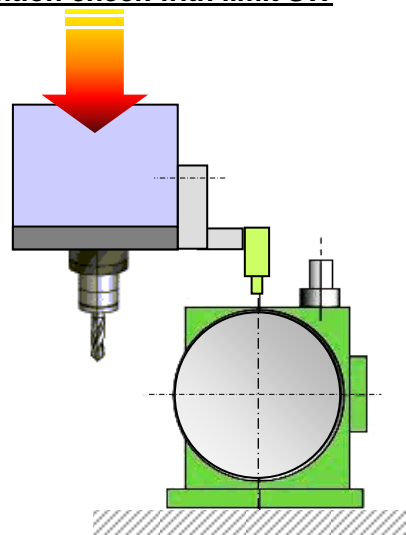


The limit switch and its attaching position vary with user's equipment. Please prepare the switch yourselves.

3. Indexing operation



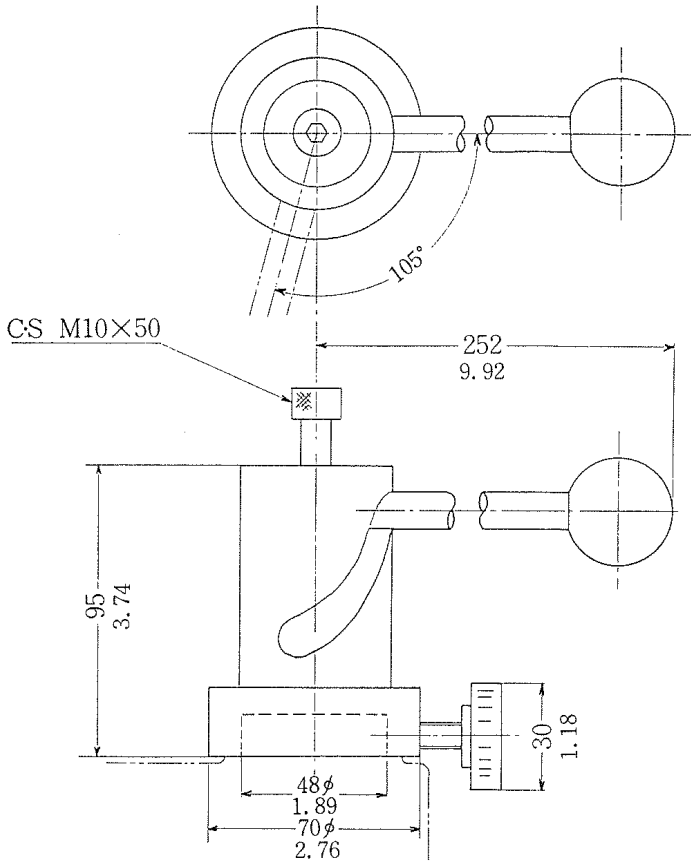
4. Position check with limit SW



After indexing with tools, have the limit switch contact the outer periphery of the table and check that the index rotation is performed.

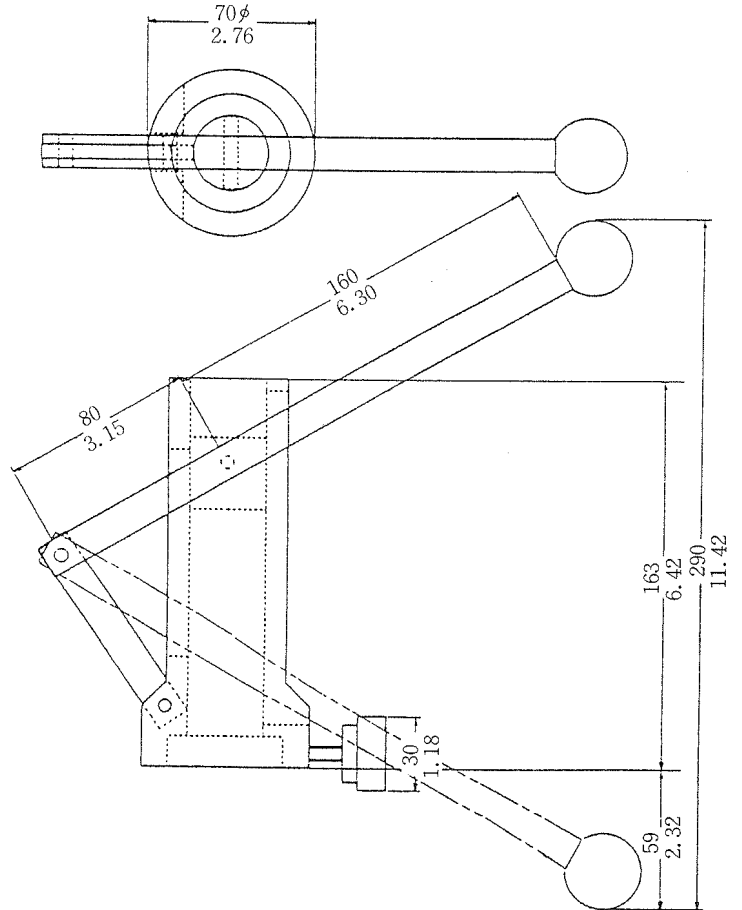
It is possible to check by using a touch sensor instead of a limit switch.

4. Manual Handle (Optional accessory)



MH-1

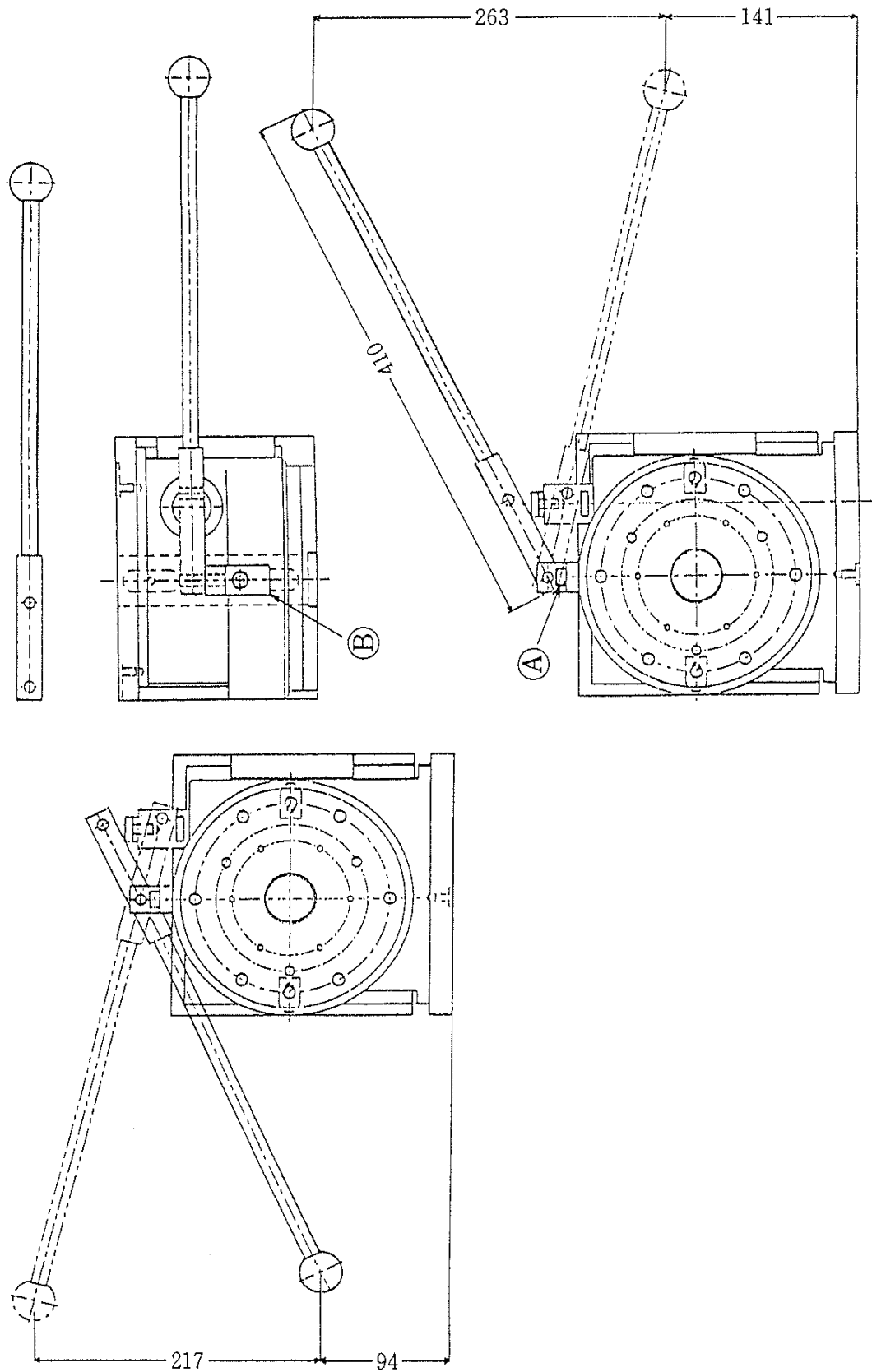
(FD200, FD200-360, FDM200, FDM200-360)



MH-2

(FDM230, FDM230-360, FDR230, FDR230-360, FD200-04, FDM200-04, FD300, FDM300, FD300-360, FDM300-360)

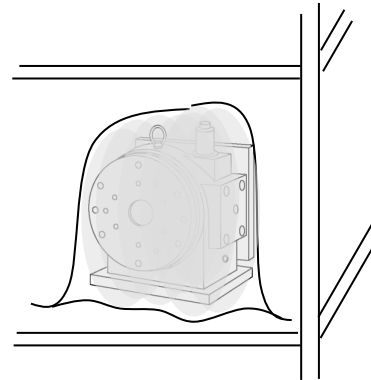
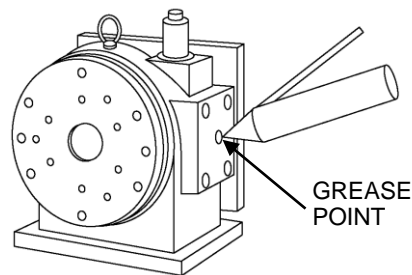
MH-3
(FDM150)



5. Storage method

1. Normally greasing should be performed once every 5000 push-ins of the pushbar. The max quantity of grease must be 3ml each time. Excessive grease may cause operation failure. (For FD-107, grease 3ml at 5000, 10000, 15000 push-ins. After that, grease 3ml once every 100000 push-ins.)
2. If not used for a lengthy period, apply grease after use and push the pushbar down manually about 2 or 3 times before storing it. This will prevent rust from occurring inside the main body while it is in storage.
3. We suggest to use our grease K 67 (see our general catalogue page. 297) or a kind of grease with this characteristics:

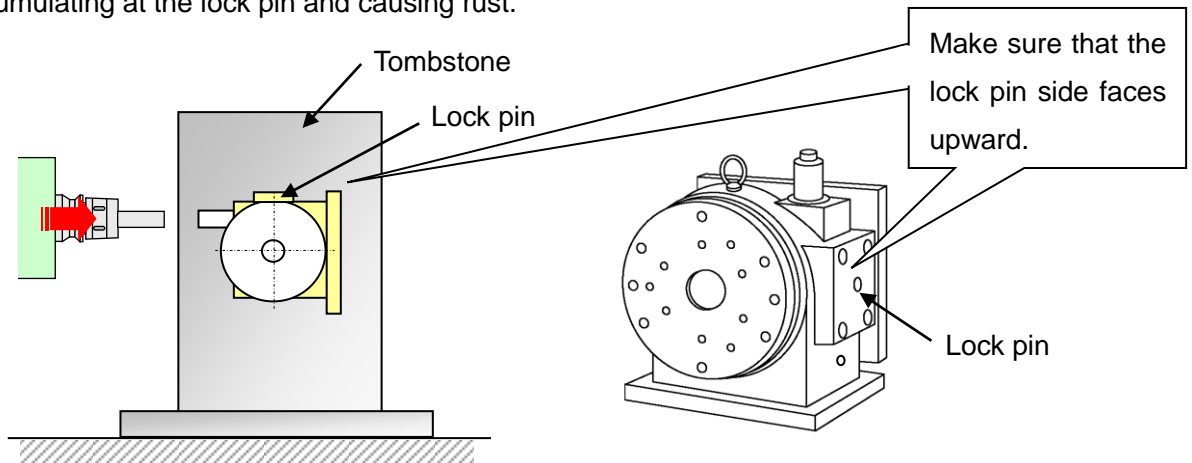
Density @ 15° cm³ 0.92
Flash point (COC) °C 250
Boiling point °C 349
Dropping point °C 193



During storage, put the heat retention cover, such as a blanket.

6. When using on HMC

By using the FDM type Touchdex and a tombstone fixture as shown in the illustration below, machining of 5 or more faces can be easily carried out with a horizontal MC. In this case, make sure that the lock pin side faces upward in order to prevent the coolant from accumulating at the lock pin and causing rust.



Mounted on the tomb stone with HMC

7. Troubleshooting

Problem 1: The pushbar is pressed down but the table does not rotate.

Cause: The table is stopped before it reaches the maximum angle because the pushbar has not been pushed in until it has reached a full stroke. Push down the pushbar until the bottom most position.

Problem 2: The angle is incorrect and there is fluctuation. The table moves further than the set angle.

Cause 1: The jig or the work is unbalanced. See "Processing work that is poorly balanced" on page 9 for what measures to take for unbalanced work.

Cause 2: The pushbar push-in amount is not correct or the push-in speed is fast causing the table to over rotate. Perform the push-in program using single stop mode at a very slow speed and stop when the pushbar has been lowered to the bottom most position. While the pushbar is in this position, check the calibration on the faceplate periphery to see whether the angle is correctly set. Refer to the instructions in this operation manual to set the angle again.

Problem 3: When the pushbar returns after the index rotation, the table position also returns.

Cause: The jig or the work is unbalanced. See "Processing work that is poorly balanced" on page 9 for what measures to take for unbalanced work.