

# 气动分度器 MDF 系列

## 关于安全与安装的说明

〈安全使用MDF系列的指引〉

22.12

**强制** 请将此安装说明书交给使用者。  
非常感谢您使用本公司的产品。  
使用MDF产品之前，请认真阅读此说明书并妥善保管。若有不明之处，请与我公司联系。

### 1 安全事项

#### 1.1 警告标识说明

本说明书中，为了防止因误安装引起的事故，都添加了标识，标识的意思有以下几种。

**警告** 如果无视此标识进行安装，有可能导致使用者的死亡或重伤。

**注意** 如果无视此标识，有可能导致使用者的负伤及物品的损坏。

此外，**注意** 记载的事项也可能根据具体情况不同，引发其他的严重问题，2种标识都记载着相当重要的信息，请务必仔细阅读。

#### ■记号的说明

记号	说 明	记号	说 明
	强制执行		禁止执行

#### 1.2 关于搬运

**注意** 在搬运时请务必确保以下事项

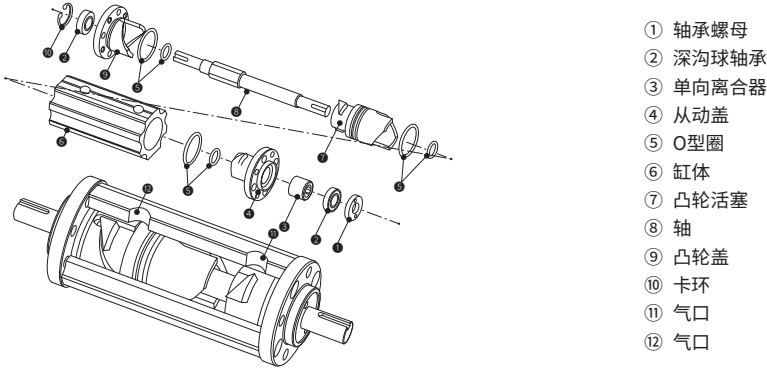
- 本产品为精密机械，请不要撞击或跌落。
  - 可能会导致产品在使用中发生故障。
- 跌落时很可能对身体部位造成损伤，请确认好本产品的型号与重量后再进行搬运。

MDF重量表	型 号	MDF20	MDF30
重 量		0.5kg	0.9kg

## 2 MDF的构造

### 2.1 构造・部件名称

※内部为单向轴承，无法进行逆向旋转。



- ① 轴承螺母
- ② 深沟球轴承
- ③ 单向离合器
- ④ 从动盖
- ⑤ O型圈
- ⑥ 缸体
- ⑦ 凸轮活塞
- ⑧ 轴
- ⑨ 凸轮盖
- ⑩ 卡环
- ⑪ 气口
- ⑫ 气口

### 3.2 定位安装

**注意** 确保固定

- 请务必确保MDF在使用时已经固定。安装前，请确认安装方法或使用条件及本体重量相匹配。
  - 可能在安装过程中/动作中脱落导致二次灾害。
- 请勿安装已经损坏的MDF产品。
  - 可能引发人身伤害及二次灾害。

**注意** 请保护本体

- 本品不是防水防尘式样。如果在滴水、滴油和粉尘较多的环境下使用，请务必采用防水/防尘罩进行防护。（防水・防尘是特殊式样。）
- 安装本体时，请务必按照下表所示，确认螺丝深度和紧固扭矩。

型 号	安装螺丝尺寸	螺丝长度 mm		紧固扭矩 N・m (kgf・m)
		MIN	MAX	
MDF20	M4	8	10	2.8±0.15 (0.28±0.015)
MDF30	M5	10	12	5.6±0.3 (0.57±0.03)

### 3.3 关于负载安装

**注意** 禁止超载

- 承载重量不得超过允许值。
  - 可能导致产品内部损坏。
- 横向（轴水平）安装的情况下，相对于负载旋转方向，负载时请注意左右平衡。
  - 单臂/一方偏重会导致旋转方向的失速。
- 负载安装时，需确认键/轴未出现间隙，确保安装螺丝安装到位。
  - 未确认的安装可能导致运行中发生人身伤害及二次灾害。
- 横向安装时，尽量避免轴直接承重，应给其设计支撑结构。
  - 可能导致轴损坏。

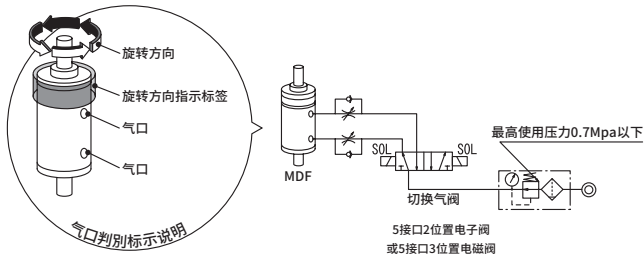
### 3.4 配管时的注意事项

**注意** 请正确配管

- 请熟读配管方法，正确配管。
  - 可能引起动作异常、损坏、损伤。
- 请勿碰伤配管，请勿在配管上施加过大的压力或夹坏配管。
  - 可能导致配管破裂。
- 请不要使用3点紧急停止回路。
  - 运行开始时的速度不稳定，有可能导致内部破损。
- 速控器靠近本体附近时必须用节气阀进行配管。
  - 可能导致无法正常工作。
- 配管前请务必进行管内清洗。
  - 可能导致动作不良。

### 3.5 配管方法

- 本产品内部有活塞、将此活塞单向旋出约10%。配管与普通的往复型气缸相同。
- 请将速控器分别安装在节气阀的接气口。
- 请使用与周边设备匹配的装置。

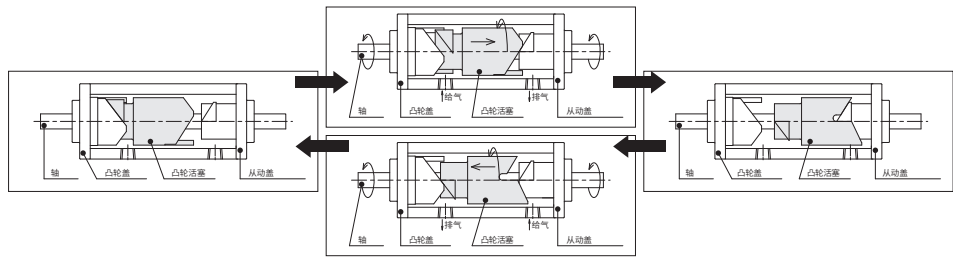


### 2.2 运作方向

- 单向分度
  - 由回转方向指示标签侧看向旋转轴，向左旋转进行分度。
  - 如果想变更旋转方向，需将本体反向安装。

### 2.3 运作状态

MDF是将压缩空气用电磁阀等进行送气・排气之后进行分度的，轴停止旋转，即定位结束。分度流程如下图所示：



- 凸轮活塞与凸轮盖啮合状态。
- 切换气阀，凸轮活塞向右（左）推动，和凸轮盖（从动盖）的啮合分离后，开始与从动盖（凸轮盖）啮合，产生回转，并将回转动作传递给输出轴。
- 凸轮活塞与从动盖完全啮合后，1次分度结束。

## 3 安装

### 3.1 注意事项

**注意** 不得混入异物

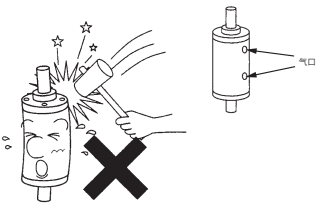
- 接气口处不得混入金属片等异物。
  - 可能导致内部损坏。

不得强行旋转

- 不得从外部强行旋转轴部。
  - 可能导致内部损坏。

不得撞击

- 请不要撞击产品，在负载安装产品时请务必注意。
  - 可能导致内部损坏，而不能正确进行分度。
- 产品在出货时会涂布防锈剂暂时防锈。产品在组装时请用酒精或煤油等进行擦拭，将防锈膜去除之后再行使用。
  - 防锈剂品种:油性涂料
  - 【防锈剂的去除方法】
    - 取适量的涂料用酒精或煤油，用布擦拭去除。



## 4 控制方法

### 4.1 电气控制的注意点

**警告** 请务必设计紧急停止回路

- 在紧急情况下必须停气断电，请进行紧急断电及安全性功能的设计。
  - 紧急时如不能停机是非常危险的。

**注意** 请正确配线

- 请正确安装限位开关。
  - 可能导致设备失控。
- 请正确设定换气时机。
  - 若切换时机设置不良，将会导致无法正常分度。

### 4.2 电气控制的方法

- 控制方法与一般往复气缸相同，切换气阀需要信号。
- 相当于气缸前进端开关的传感器挡片可以安装在传动轴上。
- 如果不使用限位开关，请使用计时器进行时间控制。
- 低速运行时若在分度完成前启动开关，切换气阀，下次分度可能会无法完成，请注意。
  - 此种情况可以利用计时器，在开关启动之后稍过片刻，再切换气阀。

## 5 调试・参考回路

### 5.1 关于调试的注意事项

**警告** 请务必进行试运行


- 运行前请务必确认各个控制部分。
  - 根据设备的不同，可能会出现不可预期的动作，非常危险。


**注意** 请务必进行调试

- 为避免在停止端发生冲击或产生裂痕，请由低速开始，缓慢提高速度。
  - 若初次启动就进行高速运转，可能会导致轴部损坏。


⑥ 使用注意事项


6.1 使用中

**警告**


**运行中禁止接触**


- 绝对不可以用手直接接触动作中的旋转部分，此外请注意防止衣物卷入。
- 身体或衣物的卷入十分危险。

**注意**




**禁止超压**


- 请在气/油压力允许范围内使用。
- 超压使用可能导致重大事故。

**注意**

**禁止旋转负载侧**


- 本产品在停止后，不得旋转负载侧。
- 强行旋转可能导致产品内部损坏，从而导致不能正常运行，引发故障。




**指定外压力禁止**

⑦ 维护·检修

7.1 异常情况处理方法


**警告**


- 停电及有可能发生危险时，请务必切断电源。
- 再次通电后可能引发设备失控，十分危险。
- 紧急停止并不会立即终止运行，请务必注意。
- 误操作可能产生危险，导致受伤。
- 再启动设备时请勿过于靠近设备。
- 设备在启动后可能会产生不可预期的动作，十分危险。

**注意**


- 如发生过载，撞击等异常情况，请联系本公司。
- 有可能导致的意想不到二次灾害。


7.2 维护·检修

**注意**


**安全保管**

- 请勿在以下场所存放机械设备及附属品。


**儿童可以轻易接触并带出的场所・温度与湿度变化极大的场所・高湿度场所・阳光直射的场所・放置易挥发物品的场所**

**禁止拆解·改造**

- 不得拆解、改造本产品。
- 否则不保证正常的运行。
- 拆卸本产品时，请务必断气以及泄压。
- 可能引发人身伤害或机械失控。
- 使用有机溶剂擦拭本体涂层面或标签，可能会导致涂层脱落或印刷文字消失，请注意。



⑧ 其他

关于保修（请确认保修期及保修内容）

- MDF的免费保修期为：在样本条件内使用的前提下，出货后1年或实际使用2500小时。（以先达到时间的准）
- 在保修期内、确是由于MDF的品质问题引起的故障、本公司对此进行无偿维修，但不负担拆卸工时及相关费用。
- 对于使用人无端进行改造，解体等情况，本公司无法进行无偿服务。
- 关于产品的长期保存，请联系本公司或相关代理商。
- 请不要剥离本体上的标签，如无标签可能无法进行正规的维保。

关于售后

- 本商品因技术改良，时常有式样变更的情况，请您知晓。
- 如需产样本录及其他技术资料，请联系本公司销售部门。
- 我们还提供产品选型技术咨询等服务。

维修委托

- 问题产品・维修等，请联系本公司销售部或相关代理商。（销售部）TEL 0565－76－0029   FAX 0565－76－0023

关于废弃

- 请将本产品作为一般工业废弃物处理。



Yes We can! Yes I can!

加茂精工株式会社

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**COMPULSORY** Deliver this manual to those who actually use MINIDEX. Thank you very much for purchasing our product. Read this manual carefully to use MINIDEX properly. After reading, keep this manual properly. If you have any question, feel free to contact us.

1 Note for Safety.

1.1 Description of signs

The manual includes notices marked by signs in order to prevent accident from being occurred due to incorrectly using the device.

**Warning** This sign means that there is a possibility of getting damaged or fatally injured if used incorrectly by ignoring the warning.

**Caution** This sign means that there is a possibility of getting injured or doing damage on other material if used incorrectly by ignoring the caution.

\* Noted that the sign designated by **Caution** involves a grave consequences. Since all precautions are important, be sure to observe them.

What symbols mean

pictograph	meaning
	This sign includes content which notifies to force and instruct to do.
	This sign notifies to prohibit to do.

1.2 Carriage

**Caution** **Hold firmly during carriage.**

- Since MINIDEX is a precision instrument, do not have a strong impact on it or drop it.
  - Otherwise, breakdown could be caused.
- If MINIDEX is dropped, it could cause an injury to your hand, foot or other body part. Before carrying it, confirm its model and weight.

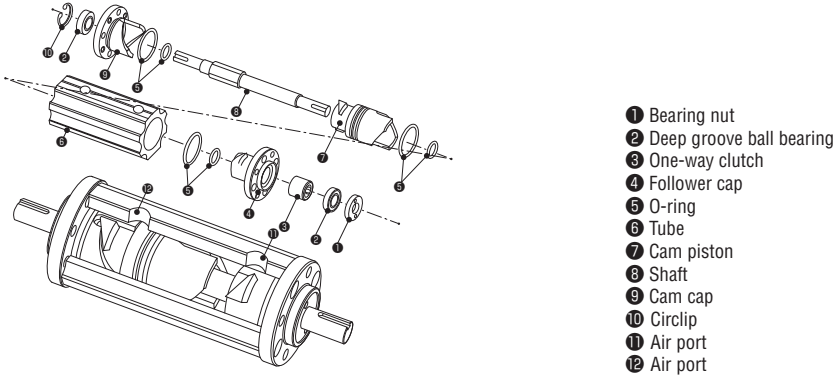
weight table of MINIDEX

Model	MDF20	MDF30
Weight	0.5kg	0.9kg

2 Composition of MINIDEX

2.1 Composition and components

※Reverse rotation is impossible due to the internal one-way clutch operation.



3.2 Installation

**Caution** **Fix firmly.**

- Mount MINIDEX by using the method that can satisfy the operating conditions and support the main body weight, and then fix it firmly.
  - Otherwise, MINIDEX may drop during the operation, causing a secondary disaster.
- Do not mount broken MINIDEX.
  - Otherwise, an injury or a secondary disaster may be caused.

**Protect the main body.**

- Since MINIDEX is not waterproofed or dustproofed, be sure to protect the main body with a cover or the like depending on the operating environment. (Waterproof and dustproof specifications are also available as a special-purpose product.)
- When mounting the main body, observe the threaded depth and bolt tightening torque as per the below table.

Model	Mounting screw dia.	Threaded depth mm		Tightening torque N・m (kgf・m)
		Min.	Max.	
MDF20	M4	8	10	2.8±0.15 (0.28±0.015)
MDF30	M5	10	12	5.6±0.3 (0.57±0.03)

3.3 Load mounting

**Caution** **Do not apply overload.**

- Do not apply load heavier than the permitted.
  - Otherwise, the inside may be broken.
- When mounting laterally (with the shaft horizontally), balance the load right and left against the rotating direction.
  - In case of one-sided load such as the arm, the load may be lopsided in the rotating direction.
- In mounting the load, confirm that the key and shaft have no looseness, and firmly fix the load with the set bolt.
  - Otherwise, the key or the shaft may come off during the operation, causing an injury or a secondary disaster.
- When mounting laterally, provide a prop or the like to minimize the direct load, if any, on the shaft.
  - Otherwise, the shaft may be broken.

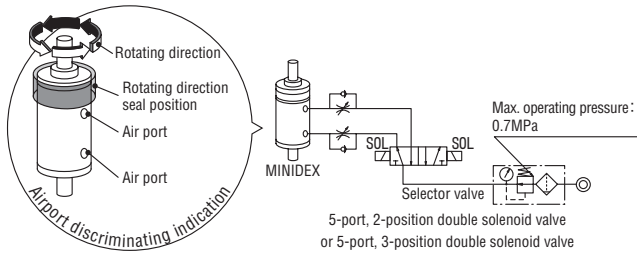
3.4 Precautions for piping

**Caution** **Provide correct piping.**

- Read the piping procedures carefully, and provide correct piping.
  - Otherwise, operation error, break or damage may be caused.
- Do not damage the piping, impose excessive stress on the piping, or pinch the piping.
  - Otherwise, break may be caused to the piping.
- Do not use any 3-position valve for the emergency stop circuit.
  - Otherwise, the operation start speed may be unstable, causing break to the inside.
- Be sure to pipe the speed controller near the main body in the meter-out mode.
  - Otherwise, the normal operation may not be achieved.
- Before starting the piping work, be sure to flush the inside of the pipes.
  - Otherwise, operational failure may be caused.

3.5 Piping procedures

- MINIDEX has a built-in piston. One-way motion of this piston makes one indexing. Therefore, piping of this piston is exactly the same as that of double-acting air cylinders.
- Set the speed controller to each port in the meter-out circuit.
- Use such peripheral units that can satisfy the specifications.

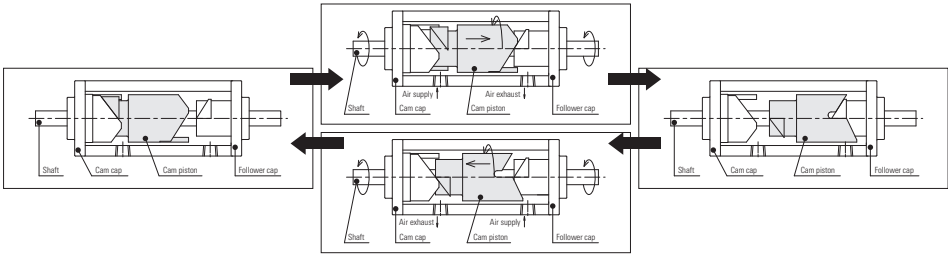


2.2 Operation

- Indexing in one direction (Refer 3.5)
  - Indexing is made counterclockwise when viewed the shaft from the rotating direction specifying seal
  - To change the rotating direction, reverse the mounting direction of the main body.

2.3 Operational state

MINIDEX makes indexing by supplying and exhausting compressed air under the control of the solenoid valve, etc. When the shaft rotation stops, the positioning is completed. According to the switching of the solenoid valve, the operation state changes as follows:



- The cam piston and the cam cap are in engagement.
- When the solenoid valve is switched, the cam piston moves directly to the right (left). When the cam piston is disengaged from the cam cap (follower cap), the cam piston starts engagement with the follower cap (cam cap), and rotates. The rotation of the cam piston is transmitted to the shaft.
- The cam piston and the follower cap become in complete engagement, and complete one indexing.

3 Setting

3.1 Handling

**Caution** **Do not allow foreign objects to mix in.**

- Do not allow metal pieces or other foreign objects to mix in through the air port.
  - Otherwise, the inside may be broken.

**Do not force the rotation.**

- Do not apply external force to the shaft for rotation.
  - Otherwise, the inside may be broken.

**Do not have a shock.**

- Do not have a shock on MINIDEX. Particularly when the load is mounted, for example, watch out for shock.
  - Otherwise, the inside may be broken, or precise indexing may be impossible.
- Our products including MINIDEX have been coated with rust preventing agent on the shaft to prevent rust temporarily. When mounting MINIDEX to the machine, remove the rust preventing agent.
  - Rust preventing agent type : Oil-based varnish
  - 【How to remove the rust preventing agent】
  - Wipe with a cloth or the like soaked with alcohol for coating or white kerosene.

4 Control Method

4.1 Precautions for electric control

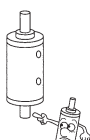
**Warning** **Provide an emergency stop circuit.**

- Design the emergency stop circuit with an emphasis on safety so that the air and power supply can be cut off instantaneously in an emergency.
  - Otherwise, the stopping in an emergency may be impossible very dangerously.

**Caution** **Provide correct wiring.**

- Mount limit switches, etc. correctly and exactly.
  - Otherwise, runaway may be caused.
- Set the air switch timing correctly.
  - Otherwise, the normal indexing operation may be impossible.

4.2 Electric control method

 **●** The control method is the same as that of general double-acting air cylinders, requiring valve-switching signals.

- The sensor dog, corresponding to the forward end switch of the air cylinder, can be used by one shaft.
- If the limit switch is not used, control the time by using a timer.
- Note with care in the case of low-speed operation that the switch is activated immediately before the complete indexing, and the valve is switched instantaneously, but the next indexing may not be achieved.
  - In this case, take a little time by using the timer after the switch is turned on, and then switch the valve.

5 Adjustment and Reference Circuit

5.1 Precautions for adjustment

**Warning** **Be sure to conduct operation.**


- Check each control before conducting the operation.
  - Some machines move unexpectedly and very dangerously.

**Caution** **Be sure to conduct adjustment.**


- Raise the speed gradually from a low speed to prevent a shock or fluttering at the stop end.
  - High-speed operation from scratch may cause shaft damage or other trouble.


6 Usage Precautions

6.1 During usage





Warning






Caution







**Do not contact during operation.**



- During operation, do not contact the rotating part by hand. Also, watch out your clothes, etc. for catching.
  - Otherwise, your body or clothes may be caught very dangerously.

**Do not use overpressure.**

- Be sure to observe the specified air (oil) pressure by all means.
  - Overpressure above the specified may cause burst very dangerously.


**Do not restart from the load side.**

- If MINIDEX stops, do not restart it from the load side.
  - Forced rotation may damage the inside, and spoil the normal operation, causing breakdown.




7 Check and Maintenance

7.1 How to cope with abnormal situation




Warning




Caution

- Make sure to cut off electrical power source circuit when power failure occurs or dangerous situation is supposed.
  - Otherwise, it may be very dangerous if runaway or the like is induced when power failure is recovered.
- Be careful that device does not cease immediately at emergency stop.
  - It may be very dangerous if get injury when mistakenly touch device with hand.
- Make sure not to approach device when operated again.
  - Otherwise, it may unexpectedly move depending on device, and invite very dangerous situation.
- Contact our company when abnormal situation arises under influence of overload, impact or the like.
  - It may invite unexpected secondary disaster.

7.2 Check and maintenance




Caution



**Take safety measure when storing device.**


- Upon storing unused machines and accessories in a place, don't keep them in the following places.



Where is accessed by child, where they are easily taken out ,where temperature and humidity change abruptly, where is in high humidity environment ,where admits direct sunshine, and where volatile liquid substance is deposited.

- Disassemble and remodeling are prohibited.

- Don't disassemble and improve the device.
  - If otherwise, we can't guarantee normal operation of the device.
- Make sure to interrupt air, and release rest of air upon mounting and removing device.
  - Otherwise, it may invite injury or runaway.
- Note with care that wiping the coated surfaces of the main body and the seals with a cloth soaked with any organic solvent may thinning out the coating or peel off the seals.



8 Other notice

**8.1 Guarantee (Check the terms & contents of guarantee)**

- On the understanding that the device (MINIDEX) is used in accordance with our specification, we guarantee the period to repair the device free of charge until a time which earlier relapses after operating 2500 hours on delivery or within one year after delivery.
- If trouble or defect appears with in the guaranteed period of time obviously due to deteriorated quality of MINIDEX, we guarantee to repair the device free of charge. Note that we charge device-related expenditures and expenses arisen from steps of detaching parts from and attach parts to the device.
- If the device is repaired, disassembled or improved at customers' side, Repair free of charge should be outside our guaranteed requirements.
- We don't have oversea maintenance and technological support in connection with the device.

**8.2 After-Sales-Service**

- For the sake of quality improvement, the specification may be subject to change without notice.
- As for our catalogue and other technological documents, contact sales department of our company.
- We are always ready to arrange technological inquiry and meeting, feel free to contact us by telephone.

**8.3 Repair and trouble**

- In case of trouble or inquiry for repair, contact sales department of our company or sales shop where you purchased the device. Sales department TEL +81-565-76-0029 FAX +81-565-76-0023 (\* We hope that the catalogue will be of your help. Your inquiries and information would be highly appreciated. We always wait and welcome your direct contact.)

**8.4 Disposal**

- Dispose the device as general industrial wastes.