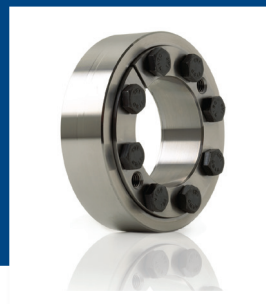
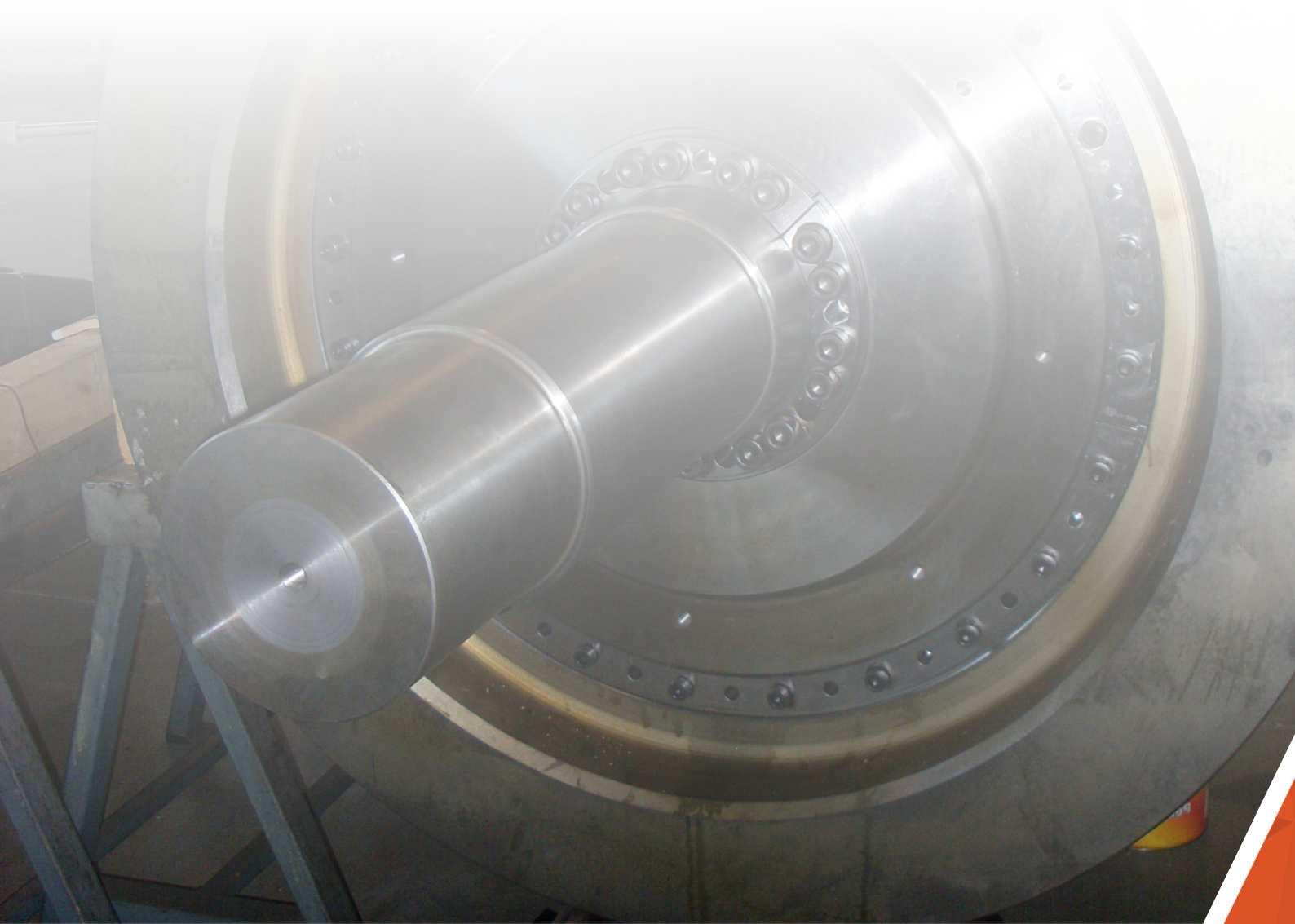




## INSTALLATION AND REMOVAL INSTRUCTIONS



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# RIGID COUPLING MAV 1004

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance, and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of the Rigid Coupling are secured against slipping, falling, or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Rigid Coupling, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Rigid Couplings MAV 1004 are external locking devices, which provide a rigid, zero-backlash frictional connection between two shafts. Rigid Couplings are suited for transmitting torque, axial load and bending moment, separately or in combination. Applied loads are transmitted via pressure and friction between the fitting surfaces of the shafts. In tightened condition, Rigid Couplings exert high radial pressure on shafts.

**Rigid Couplings MAV 1004 are supplied ready for installation. They are composed of (fig. 1):**

- One inner ring (slotted)
- One front outer ring with clearance holes
- One rear outer ring with threaded holes
- One set of socket head cap screws ISO 4762 grade 12.9

### Lubrication

Functional values are rated with **screws, locking rings and shafts contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

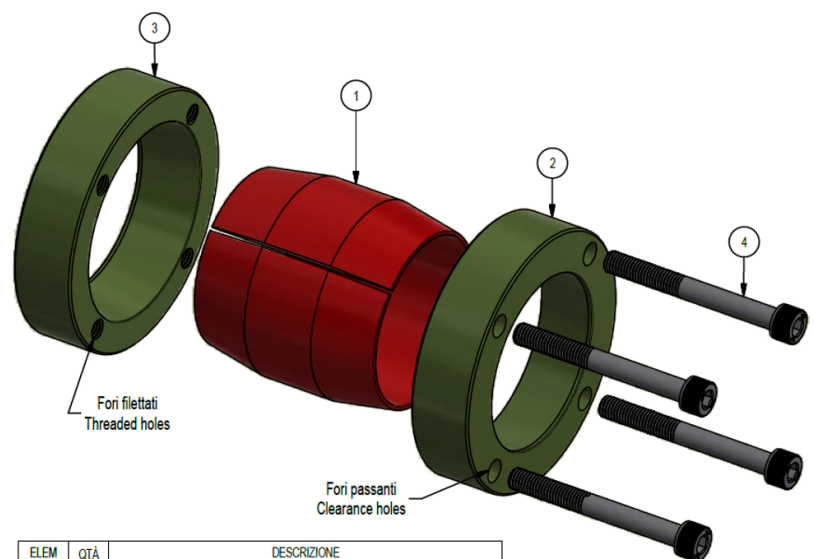
Recommended shafts tolerance: h9 max. Tolerances of the two shafts should be similar.

Recommended shafts surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Reduced tightening torque leads to lower functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.



ELEM	QTÀ	DESCRIZIONE
1	1	ANELLO INTERNO / INNER RING
2	1	ANELLO ESTERNO ANTERIORE / FRONT OUTER RING
3	1	ANELLO ESTERNO POSTERIORE / REAR OUTER RING
4	xx	VITE A TESTA CIL. ESAG. INCASS. ISO 4762 - 12.9 / S.H.C. SCREW ISO 4762 - 12.9

Fig. 1 Composition

# RIGID COUPLING MAV 1004

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Rigid Couplings MAV 1004 are supplied ready for installation. **Never tighten the screws prior to mounting the Coupling onto the shafts**, as inner ring might remain permanently contracted even at relatively low tightening torques.

1. Make sure that screws, locking rings and shafts contact areas are clean and coated with a film of oil.
2. Move the Coupling onto the shafts, making sure that they are aligned. **Shaft engagement shall be equal for both ends; distance between shaft ends shall not exceed 5% of shaft diameter (fig. 2).** Hand-tighten three or four evenly spaced screws (fig. 3) and make sure that outer rings are parallel; then hand-tighten remaining screws. At the end of this stage, a light connection is achieved.
3. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma). **Progressively tighten the screws in either a clockwise or counterclockwise sequence, using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved (fig. 4).
4. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach the specified tightening torque.
5. Reset the torque wrench to specified tightening torque (Ma) and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 4.

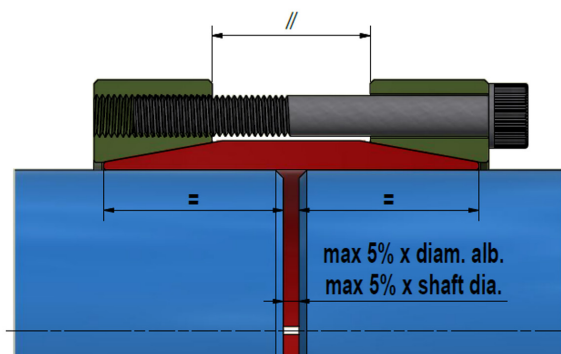


Fig. 2  
Positioning of Rigid Coupling

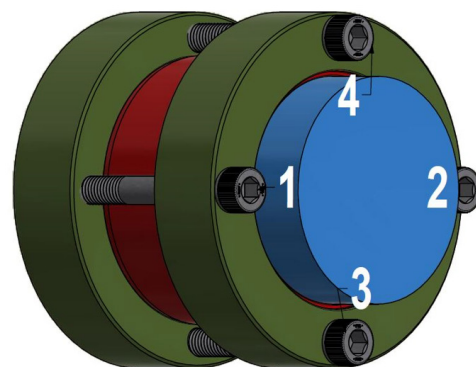


Fig. 3  
Pre-tightening

### REMOVAL

#### SAFETY NOTICE

**Prior to initiating the removal procedure, check to ensure that no loads are acting on Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

**DO NOT completely remove the screws before outer rings are disengaged. Sudden separation of the rings may occur and involve high separation forces that may result in permanent injury or death. Be certain that the rings are disengaged before completely removing the screws.**

1. **Progressively loosen all screws in either a clockwise or counterclockwise sequence, using approx. ½ turns for several passes** and release the outer rings with light hammering (lightly self-locking tapers).
2. Move the Coupling away until separation of the shafts is possible.

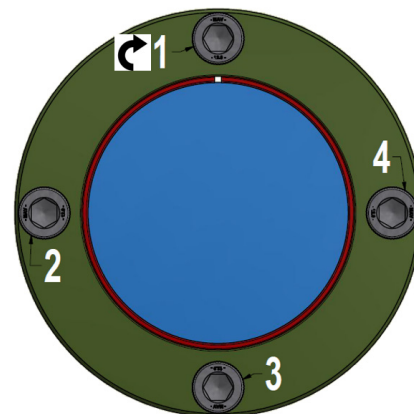


Fig. 4  
Example of tightening pattern

# RIGID COUPLING MAV 1004

## Installation and Removal Instructions



### REUSE OF USED RIGID COUPLINGS

1. **Disassemble, thoroughly clean and inspect all parts** of the Coupling. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, contact MAV S.p.A. for advice.
2. **Re-lubricate** the Rigid Coupling with a film of mineral or synthetic-base oil with low content of additives.
3. Re-assemble all parts as originally supplied.

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLY MAV 1008

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 1008 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies MAV 1008 are supplied ready for installation and are composed of (fig. 1):**

- One front thrust ring (w/ complete slit up to size 180x235, w/ staggered slit from size 190x250)
- One rear thrust ring (w/ complete slit up to size 180x235, w/ staggered slit from size 190x250)
- One outer ring (w/ complete slit up to size 380x475, w/out slit from size 400x495)
- One set of socket head cap screws ISO 4762 grade 12.9

### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h11 max / H11 max

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.6 \cdot Ma$  (max reduction by 40%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

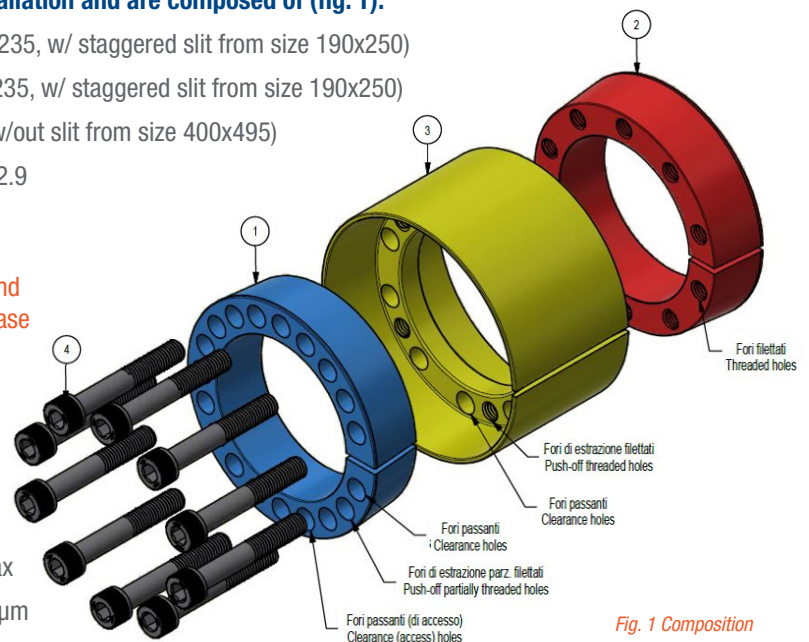


Fig. 1 Composition

ELEM	QTA	DESCRIZIONE
1	1	ANELLO DI SPINTA ANTERIORE / FRONT THRUST RING
2	1	ANELLO DI SPINTA POSTERIORE / REAR THRUST RING
3	1	ANELLO ESTERNO / OUTER RING
4	xx	VITE A TESTA CIL. ESAG. INCASS. ISO 4762 - 12.9 / S.H.C. SCREW ISO 4762 - 12.9

# LOCKING ASSEMBLY MAV 1008

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 1008 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the outer ring is not reversed and the slits in all rings are aligned. The unit is assembled correctly if there are no holes in the outer ring behind partially threaded holes in the front thrust ring as well as no holes in the rear thrust ring behind threaded holes in the outer ring. During tightening of Locking Assembly, a small axial displacement of hub respect to shaft may occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, thrust rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand tighten at least two screws into the push-off threaded holes in the front thrust ring and at least two screws into the push-off threaded holes in the outer ring, accessible via corresponding clearance holes in the front thrust ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Thrust rings and outer ring shall be completely supported by shaft respectively hub bore (fig. 2).** At this point, relocate the screws used to disengage the thrust rings. Installation into hubs with shoulder requires a few mm's gap between rear thrust ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit in the front thrust ring (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

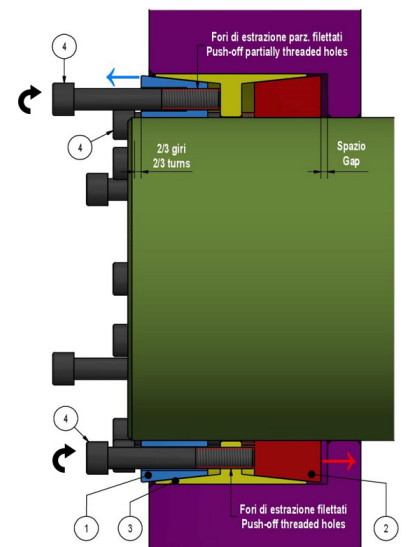


Fig. 2 Disengagement of thrust rings and positioning of Locking Assembly

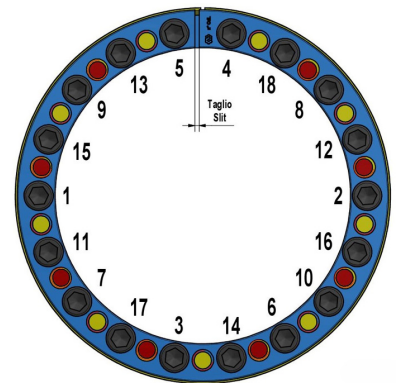


Fig. 3 Example of tightening pattern

NOTE: for connections subject to corrosion, slits in all rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

# LOCKING ASSEMBLY MAV 1008

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of front and rear thrust rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off partially threaded holes in the front thrust ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the front thrust ring is released (fig. 4). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row. Remove the screws still engaged in the rear thrust ring; then remove the front thrust ring.
3. Transfer some screws into all push-off threaded holes in the outer ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the rear thrust ring is released (fig. 5). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

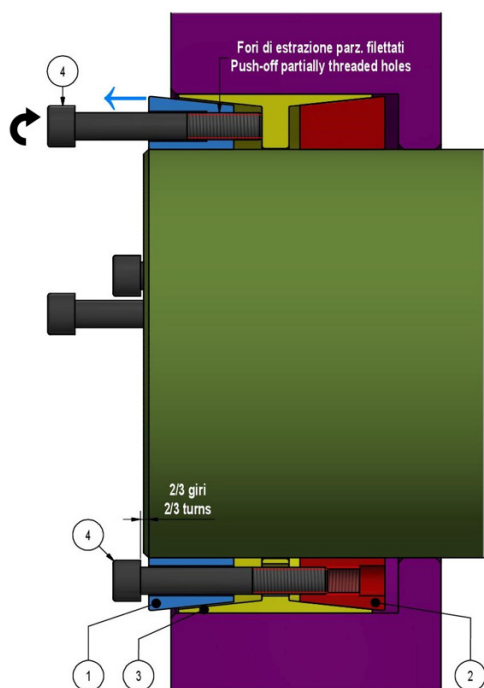


Fig. 4  
Release of front thrust ring

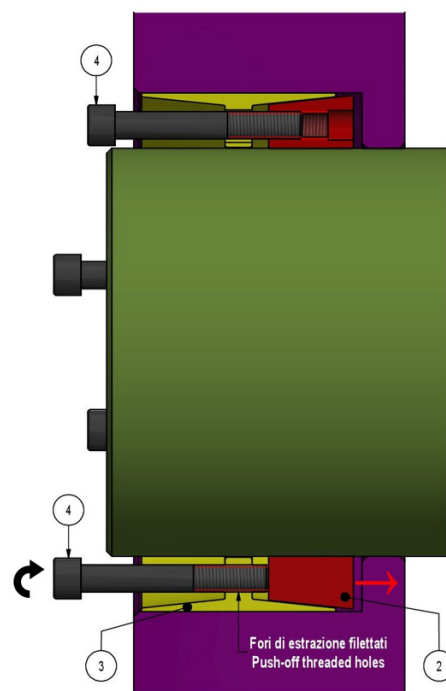


Fig. 5  
Release of rear thrust ring

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLIES MAV 1061, 2061, 3061, 3062, 3063

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance, and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 1061 – MAV 2061 – MAV 3061 – MAV 3062 – MAV 3063 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

#### Locking Assemblies are supplied ready for installation and are composed of (fig. 1):

- One inner ring (slotted), with integrated push-off threaded holes
- One outer ring (slotted)
- One set of socket head cap screws ISO 4762 grade 12.9

#### Lubrication

Functional values are rated with **screws, locking rings and shafts contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

#### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.8 \cdot Ma$  (max reduction by 20%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

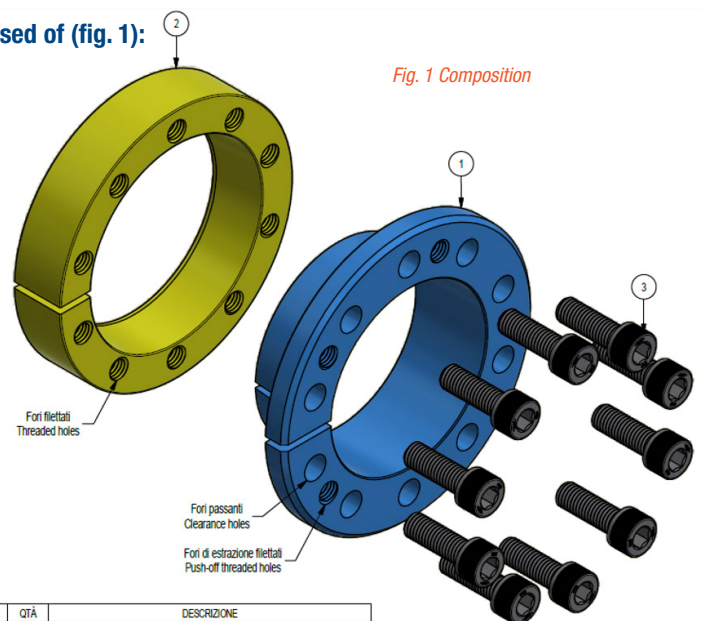


Fig. 1 Composition

ELEM	QTA	DESCRIZIONE
1	1	ANELLO INTERNO / INNER RING
2	1	ANELLO ESTERNO / OUTER RING
3	xx	VITE A TESTA CIL. ESAG. INCASS. ISO 4762 - 12.9 / S.H.C. SCREW ISO 4762 - 12.9

# LOCKING ASSEMBLIES MAV 1061,2061, 3061, 3062, 3063 – Installation and Removal Instructions



## INSTALLATION

### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 1061 – MAV 2061 – MAV 3061 – MAV 3062 – MAV 3063 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the slits in all rings are aligned. The unit is assembled correctly if there are no holes in the outer ring behind threaded holes in the inner ring. During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand-tighten at least two screws into the push-off threaded holes in the inner ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner and outer rings shall be completely supported by shaft respectively hub bore (fig. 2). The flange of inner ring shall be in full contact with the face of the hub (fig. 2).** At this point, relocate the screws used to disengage the locking rings. Installation into hubs with shoulder requires a few mm's gap between outer ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

NOTE: for connections subject to corrosion, slits in all rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

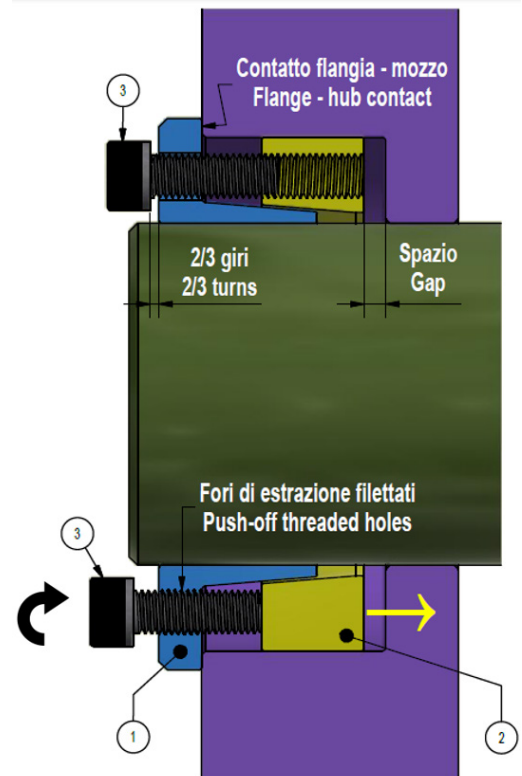


Fig. 2  
Disengagement of locking rings and positioning of Locking Assembly

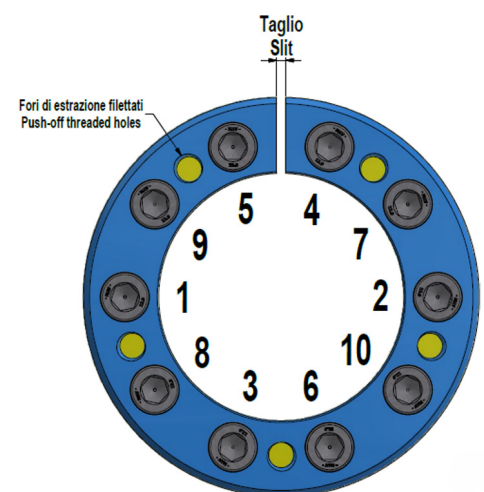


Fig. 3  
Example of tightening pattern

## REMOVAL

### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of locking rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off threaded holes in the inner ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the outer ring is released (fig. 4). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

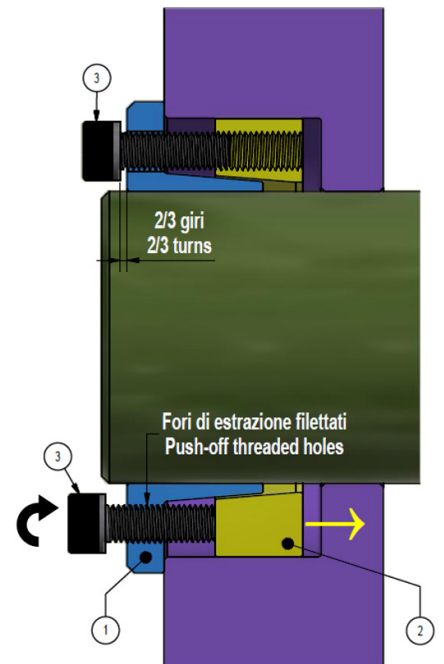


Fig. 4  
Release of outer ring

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLIES MAV 1062, 6901

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 1062 and MAV 6901 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

#### Locking Assemblies are supplied ready for installation and are composed of (fig. 1):

- One inner ring (slotted), with integrated push-off threaded holes
- One outer ring (slotted)
- One set of socket head cap screws ISO 4762 grade 12.9

#### Lubrication

Functional values are rated with **screws, locking rings and shafts contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

#### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.8 \cdot Ma$  (max reduction by 20%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

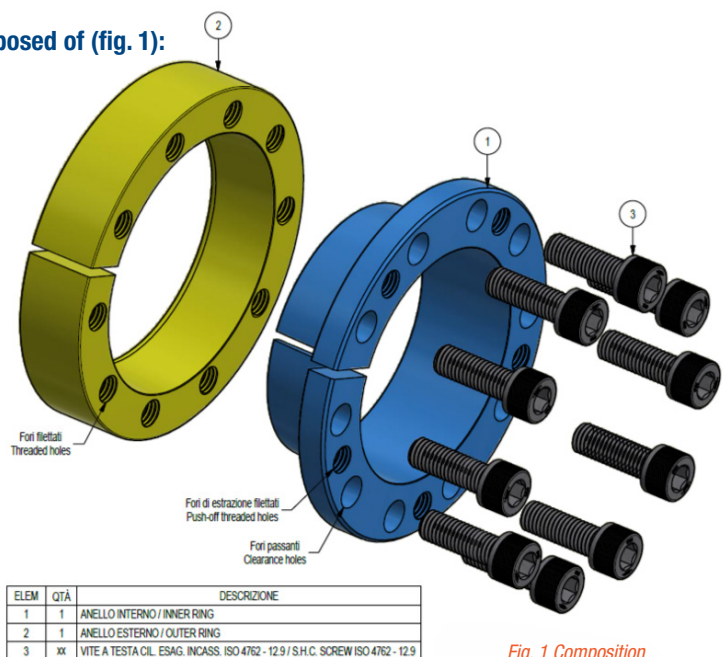


Fig. 1 Composition

# LOCKING ASSEMBLIES MAV 1062, 6901

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 1062 and MAV 6901 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the slits in all rings are aligned. The unit is assembled correctly if there are no holes in the outer ring behind threaded holes in the inner ring. During tightening of Locking Assembly, axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand-tighten at least two screws into the push-off threaded holes in the inner ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner and outer rings shall be completely supported by shaft respectively hub bore (fig. 2). MAV 1062 shall be COMPLETELY (whole length) mounted inside of the hub bore (fig. 2),** to avoid bending of inner ring's flange. At this point, relocate the screws used to disengage the locking rings. Installation into hubs with shoulder requires a few mm's gap between outer ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

NOTE: for connections subject to corrosion, slits in all rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

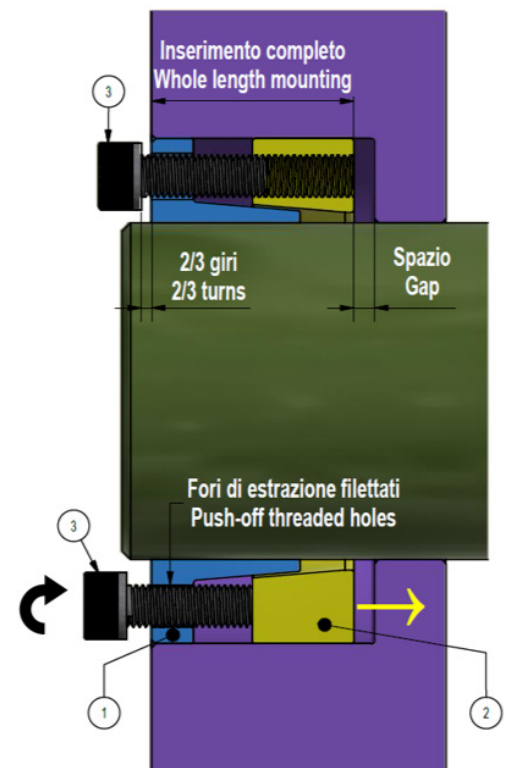


Fig. 2  
Disengagement of locking rings  
and positioning of Locking Assembly

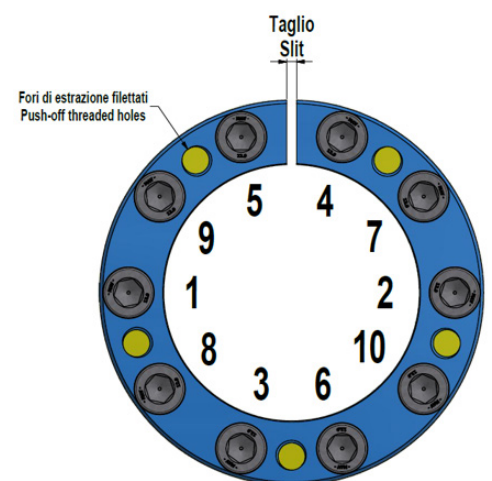


Fig. 3  
Example of tightening pattern

# LOCKING ASSEMBLIES MAV 1062, 6901

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of locking rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off threaded holes in the inner ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the outer ring is released (fig. 4). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

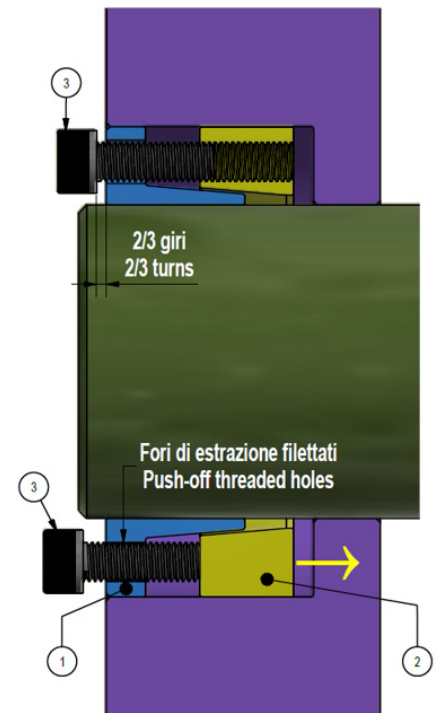
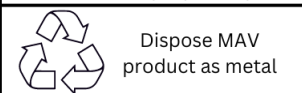


Fig. 4  
Release of outer ring

Information for proper disposal:



# LOCKING ASSEMBLIES 1071, 1072

## Installation and Removal Instructions



MAV 1071 and 1072 Locking Assemblies are supplied ready for installation. If the units should be dismantled before installation, make sure that re-assembling is made as originally delivered (keep position of slits unchanged, if applicable). The torque capacity of these devices is based on a coefficient of friction of  $\mu=0.12$ , for lightly oiled screws, tapers, shaft and hub contact areas. **Therefore, it is important NOT to use Molybdenum Disulfide (e.g., Molykote, Never-Seeze or similar lubricants) in any Locking Assembly installation.**

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface roughness:  $Ra \leq 3.2 \mu m$

### INSTALLATION

1. Make sure that locking screws, rings, shaft and hub contact surfaces are clean and lightly oiled.
2. Loosen all screws by minimum 2 turns and transfer at least 2 screws to push-off threads in the inner ring item [1]. Lightly tighten these screws, in order to disengage tapers for easy installation of locking assembly (fig.1). For series MAV 1072, it is recommended to locate the unit completely (whole length) inside of hub bore.
3. After installation of locking assembly, relocate locking screws used for separation of collars.
4. Hand tighten locking screws. For series MAV 1071 make sure that inner ring item [1] is parallel and in full contact with face of part to be attached to the shaft.
5. Use torque wrench and set it approximately 5% higher than specified tightening torque (Ma). Torque screws in a crosswise pattern, using only 1/4 turns for several passes until 1/4 turns can no longer be achieved.
6. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
7. Reset torque wrench to specified torque (Ma) and check all locking screws. No screw should turn at this point, otherwise repeat step 6 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: for installation subjected to extreme corrosion, the slits in collars item [1] and [2] should be sealed with a suitable caulking compound or equivalent. Likewise, push-off threads should also be protected with set screws or plastic plugs.

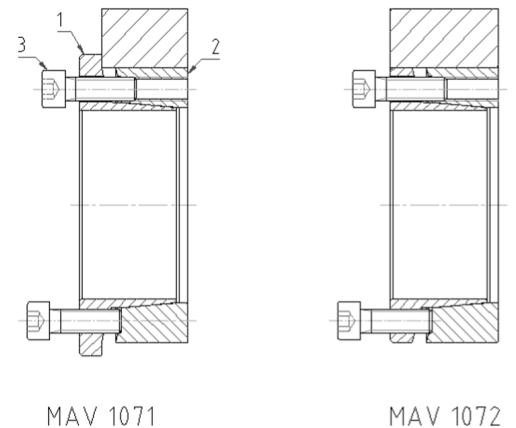


Fig. 1

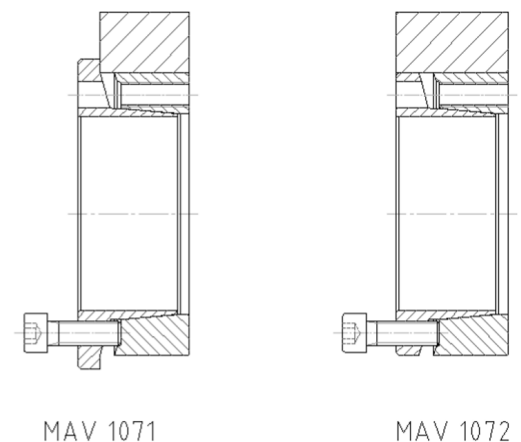


Fig. 2

### REMOVAL

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

**IMPORTANT!** The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.

1. Check to ensure that axial movement of collars – necessary for release of connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Remove all locking screws and transfer some into all push-off threads located in flange of inner ring item [1].
3. Release outer ring item [2] by tightening all push-off screws in a crosswise pattern, not exceeding 1/4 turns for several passes.

# RIGID COUPLING MAV 1204

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance, and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of the Rigid Coupling are secured against slipping, falling, or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Rigid Coupling, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Rigid Couplings MAV 1204 are external locking devices, which provide a rigid, zero-backlash frictional connection between two shafts. Rigid Couplings are suited for transmitting torque, axial load and bending moment, separately or in combination. Applied loads are transmitted via pressure and friction between the fitting surfaces of the shafts. In tightened condition, Rigid Couplings exert high radial pressure on shafts.

**Rigid Couplings MAV 1204 are supplied ready for installation. They are composed of (fig. 1):**

- One inner ring (slotted)
- One front outer ring with clearance holes
- One rear outer ring with threaded holes
- One set of hexagon head cap screws ISO 4014/4017 grade 10.9 (< M6 grade 8.8)

### Lubrication

- **Screws (under-head and threads): greased at factory with solid paste DOW CORNING MOLYKOTE® BR 2 Plus. Don't remove the lubricant.**
- **Conical surfaces: greased at factory with solid paste DOW CORNING MOLYKOTE® G-Rapid Plus. Don't remove the lubricant. Conical surfaces are lubricated with machine oil from size d = 6 to d = 14 included.**
- **Coupling bore and shafts: coated with a film of mineral or synthetic-base oil with low content of additives. DON'T USE low friction lubricants on shafts, as connection's capacity will be greatly reduced.**

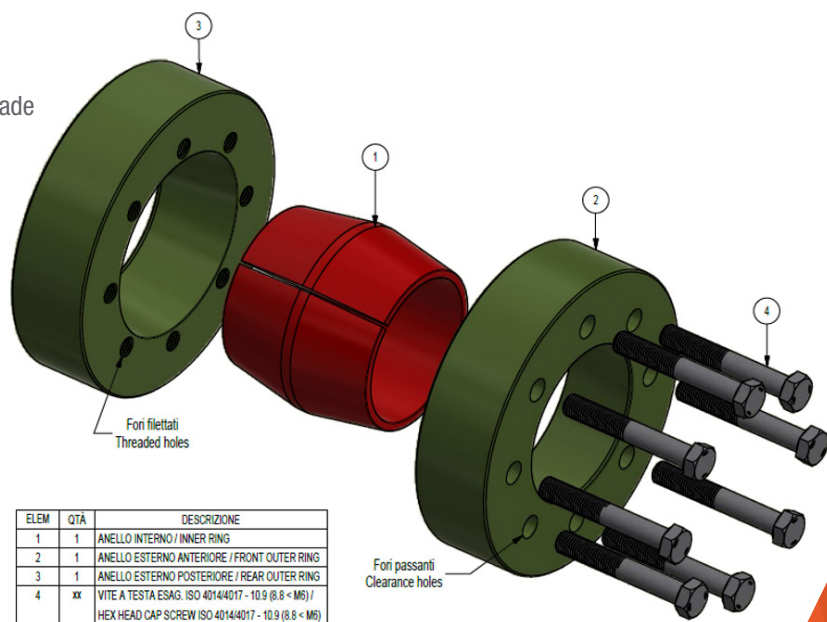


Fig. 1 Composition

Recommended shafts tolerance: h9 max. Tolerances of the two shafts should be similar.

Recommended shafts surface finish:  $0.8 \leq Ra \leq 3.2 \mu m$

# RIGID COUPLING MAV 1204

## Installation and Removal Instructions



### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Reduced tightening torque leads to lower functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Rigid Couplings MAV 1204 are supplied ready for installation. **Never tighten the screws prior to mounting the Coupling onto the shafts**, as inner ring might remain permanently contracted even at relatively low tightening torques.

1. Make sure that coupling bore and shafts are clean and coated with a film of oil.
2. Move the Coupling onto the shafts, making sure that they are aligned. **Shaft engagement shall be equal for both ends; distance between shaft ends shall not exceed 5% of shaft diameter (fig. 2).** Hand-tighten three or four evenly spaced screws (fig. 3) and make sure that **outer rings are parallel**; then hand-tighten remaining screws. At the end of this stage, a light connection is achieved.
3. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma). **Progressively tighten the screws in either a clockwise or counterclockwise sequence, using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved (fig. 4).
4. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach the specified tightening torque.
5. Reset the torque wrench to specified tightening torque (Ma) and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 4.

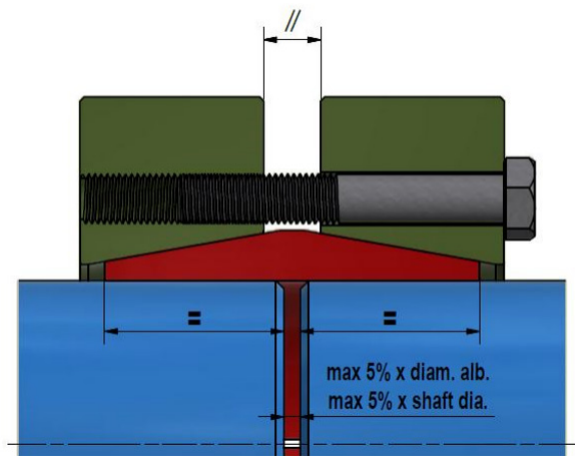


Fig. 2 Positioning of Rigid Coupling

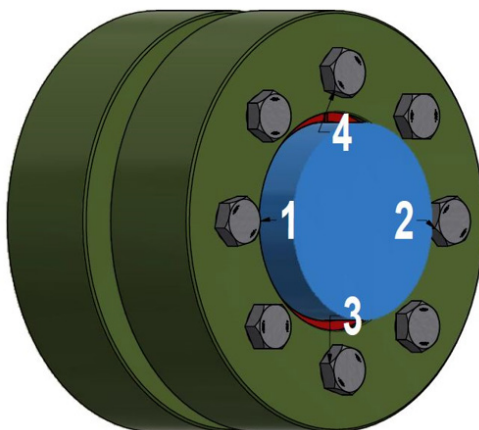


Fig. 3  
Pre-tightening

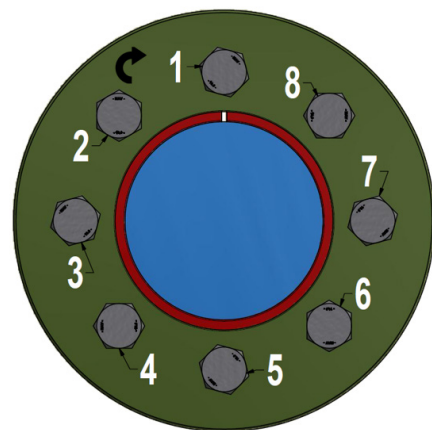


Fig. 4  
Example of tightening pattern

# RIGID COUPLING MAV 1204

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.

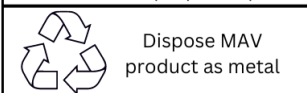
**DO NOT** completely remove the screws before outer rings are disengaged. Sudden separation of the rings may occur and involve high separation forces that may result in permanent injury or death. Be certain that the rings are disengaged before completely removing the screws.

1. Progressively loosen all screws in either a clockwise or counterclockwise sequence, using approx. ½ turns for several passes until the outer rings have released from the inner ring (self-releasing tapers). From size  $d = 6$  to  $d = 14$  included, release the outer rings with light hammering (lightly self-locking tapers).
2. Move the Coupling away until separation of the shafts is possible.

### REUSE OF USED RIGID COUPLINGS

1. Disassemble, thoroughly clean and inspect all parts of the Coupling. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, contact MAV S.p.A. for advice.
2. Re-lubricate the Rigid Coupling with the following products.
  - DOW CORNING MOLYKOTE® BR 2 Plus on screws under-head and threads.
  - DOW CORNING MOLYKOTE® G-Rapid Plus on conical surfaces from size  $d = 15$  and above. Mineral or synthetic-base machine oil on conical surfaces from size  $d = 6$  to  $d = 14$  included.
3. Re-assemble all parts as originally supplied.

Information for proper disposal:



# LOCKING ASSEMBLY MAV 1261

## Installation and Removal Instructions



MAV 1261 Locking Assemblies are supplied ready for installation. If the units should be dismantled before installation, make sure that all slits are aligned. The torque capacity of these devices is based on the following conditions:

- Tapers, shaft and hub contact areas not lubricated (dry contact, coefficient of friction  $\mu=0,15$ )
- Screws lightly oiled (coefficient of friction  $\mu=0,12\div 0,14$ )

**Therefore, it is important NOT to use Molybdenum Disulfide (e.g., Molykote, Never-Seeze or similar lubricants) in any Locking Assembly installation.**

Recommended shaft / hub bore tolerances:  $\pm 0.08 \text{ mm} / \pm 0.08 \text{ mm}$

Recommended shaft / hub bore surface roughness:  $Ra \leq 3.2 \mu\text{m}$

### INSTALLATION - FIG. 1

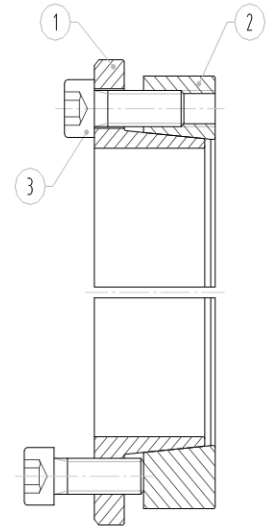


Fig. 1

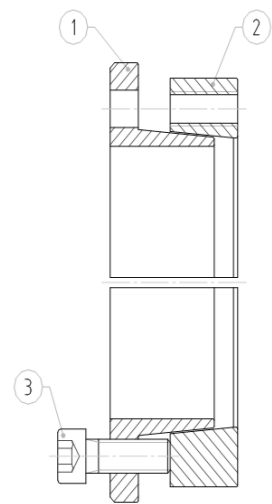


Fig. 2

1. Make sure that rings, shaft and hub contact surfaces are clean and without lubrication (dry). Locking screws to be lightly oiled.
2. Loosen all screws by minimum 2 turns and transfer at least 2 screws to push-off threads in the inner ring item [1]. Lightly tighten these screws, in order to disengage tapers for easy installation of locking assembly.
3. After installation of locking assembly, relocate locking screws used for separation of collars.
4. Hand tighten locking screws, and make sure that inner ring item [1] is parallel and in full contact with face of part to be attached to the shaft.
5. Use torque wrench and set it approximately 5% higher than specified tightening torque (Ma). Torque screws in a crosswise pattern, using only 1/4 turns for several passes until 1/4 turns can no longer be achieved.
6. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
7. Reset torque wrench to specified torque (Ma) and check all locking screws. No screw should turn at this point, otherwise repeat step 6 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: For installation subjected to extreme corrosion, the slits in collars item [1] and [2] should be sealed with a suitable caulking compound or equivalent. Likewise, push-off threads should also be protected with set screws or plastic plugs.

### REMOVAL - FIG. 2

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

**IMPORTANT!** The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.

1. Check to ensure that axial movement of collars – necessary for release of connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Remove all locking screws and transfer some into all push-off threads located in flange of inner ring item [1].
3. Release outer ring item [2] by tightening all push-off screws in a crosswise pattern, not exceeding 1/4 turns for several passes.

# LOCKING ASSEMBLY MAV 2005

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance, and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 2005 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

Locking Assemblies MAV 2005 are supplied ready for installation and are composed of (fig. 1):

- One inner ring (slotted)
- One outer ring (slotted)
- One front thrust ring, with integrated pull-out threaded holes
- One rear thrust ring
- One set of socket head cap screws ISO 4762 grade 12.9; two/three zinc plated screws are located into the pull-out threaded holes

### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h11 max / H11 max

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.6 \cdot Ma$  (max reduction by 40%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

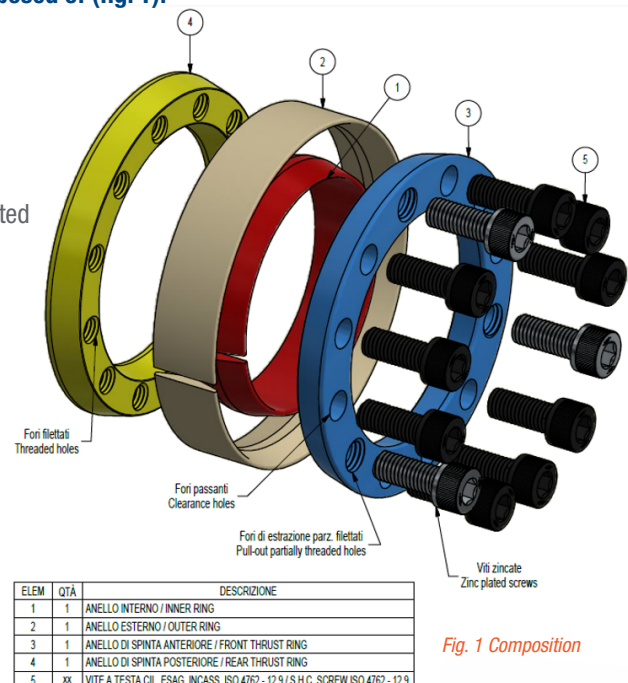


Fig. 1 Composition

# LOCKING ASSEMBLY MAV 2005

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 2005 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that clearance holes in the front thrust ring are aligned with threaded holes in the rear thrust ring. Zinc plated screws shall be located into the pull-out threaded holes in the front thrust ring. During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, thrust rings shall be disengaged (fig. 2) by loosening all screws by two/three turns.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. Inner and outer rings shall be completely supported by shaft respectively hub bore (fig. 2). Installation into hubs with shoulder requires a few mm's gap between rear thrust ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern (fig. 3) until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. Better centering of hub from the beginning of installation is essential for better centering when installation is completed.
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. 1/4 turns for several passes until 1/4 turns can no longer be achieved.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6.

NOTE: For connections subject to corrosion, slits in inner and outer rings should be sealed with a suitable caulking compound. Locking Assembly may also be protected with specific covers.

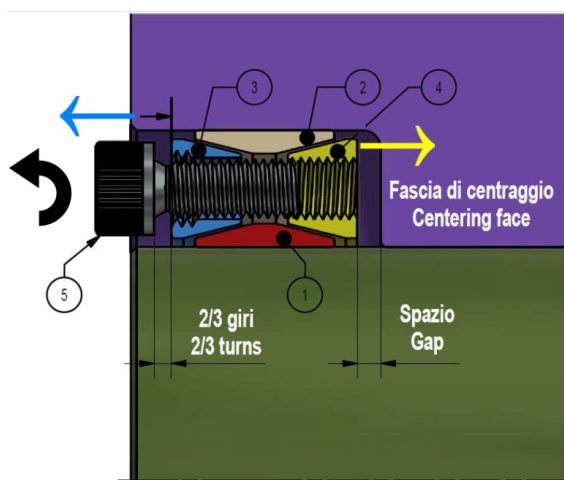


Fig. 2  
Disengagement of thrust rings and positioning of Locking Assembly

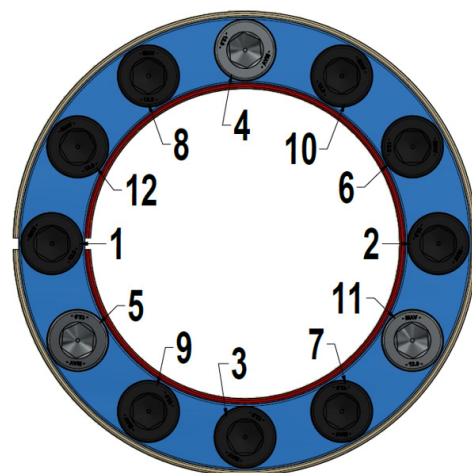


Fig. 3  
Example of tightening pattern

# LOCKING ASSEMBLY MAV 2005

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

**Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

1. Ensure that axial movement of front and rear thrust rings – necessary for removal – is not restricted.
2. **Progressively loosen all screws in several passes** until the thrust rings have released (self-releasing tapers). Should the thrust rings jam, light hammering on the head of three equally spaced, pre-loosened screws may be necessary to release the thrust rings (fig. 4).
3. Hub and Locking Assembly are normally removed together. Removal of Locking Assembly from deep counterbores is accomplished using two or three removal screws or threaded rods (supplied by others) turned into the pull-out threaded holes located in the front thrust ring under the zinc plated screws (fig. 4).

The pull-out holes are NOT to be used for high pulling forces. The diameter of pull-out threaded holes is larger than the diameter of locking screws (see table below).

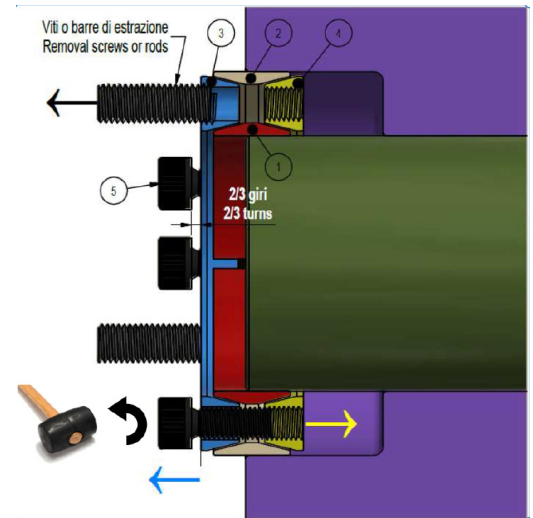
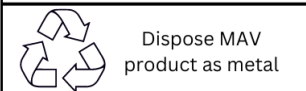


Fig. 4  
Release of thrust rings and removal of Locking Assembly

Locking screw dia.	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Pull-out thread dia.	M8	M10	M12	M14	M16	M20	M22	M24	M27	M30

Information for proper disposal:



# SHRINK DISCS MAV 2008, 2108, 2208

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of the Shrink Disc are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Shrink Disc, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Shrink Discs MAV 2008 – MAV 2108 – MAV 2208 are external locking devices, which provide a rigid, zero-backlash, frictional keyless connection between an outer hollow shaft (hub) and an inner shaft. Shrink Discs are installed onto the outer diameter of the hub, which is mounted onto the shaft. Shrink Discs are suited for transmitting torque, axial load and bending moment, separately or in combination. Applied loads are transmitted via pressure and friction between the fitting surfaces of hub and shaft. In tightened condition, Shrink Discs exert high radial pressure on hub and shaft.

**Shrink Discs are supplied ready for installation. However, it is necessary to remove the spacers that may have been used for shipping purpose prior to initiating the installation. They are composed of (fig. 1):**

- One inner ring (slotted)
- One front outer ring with clearance holes, zinc plated
- One rear outer ring with threaded holes, zinc plated
- One set of hexagon head cap screws ISO 4014/4017 grade 10.9 (< M6 grade 8.8)
- One rubber O-Ring between outer rings (as protection from dust and dirt, from size d = 140)

**Shrink Discs supplied in SPLIT version are composed of:**

- Two split inner rings (slotted)
- One front outer ring with clearance holes, zinc plated
- One rear outer ring with threaded holes, zinc plated
- Two rubber O-Rings (as protection from dust and dirt, from size d = 140) Bolting hardware is supplied only upon request

**Shrink Discs supplied in HALF HC and HT versions are composed of:**

- One split inner ring (slotted)
- One front outer ring with clearance holes (HC) or rear outer ring with threaded holes (HT), zinc plated
- One rubber O-Ring (as protection from dust and dirt, from size d = 140) Bolting hardware is supplied only upon request

### Lubrication

- **Screws (under-head and threads): greased at factory with solid paste DOW CORNING MOLYKOTE® BR 2 Plus. Don't remove the lubricant.**
- **Conical surfaces: greased at factory with solid paste DOW CORNING MOLYKOTE® G-Rapid Plus. Don't remove the lubricant.**
- **Hub ID and shaft OD: lubricant-free and dry.**
- **Hub OD: lubrication with oil or grease is recommended for ease of installation.**

# SHRINK DISCS MAV 2008, 2108, 2208

## Installation and Removal Instructions



### Recommended tolerances

Functional values in the catalog are based on values specified below. Any deviation requires new rating of functional values.

- Hub OD: h8 or f7
- Hub ID and shaft: see table

Recommended hub / shaft surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

Shaft dia.		ISO Tolerances	Max diam. clearance mm
above	up to		
6	10	H6/j6	0,011
10	18		0,014
18	30		0,017
30	50	H6/h6	0,032
50	80	H6/g6	0,048
80	120	H7/g6	0,069
120	180		0,079
180	250		0,090
250	315		0,101
315	400		0,111
400	500		0,123

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.6 \cdot Ma$  (max reduction by 40%). Reduction of tightening torque requires new rating of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

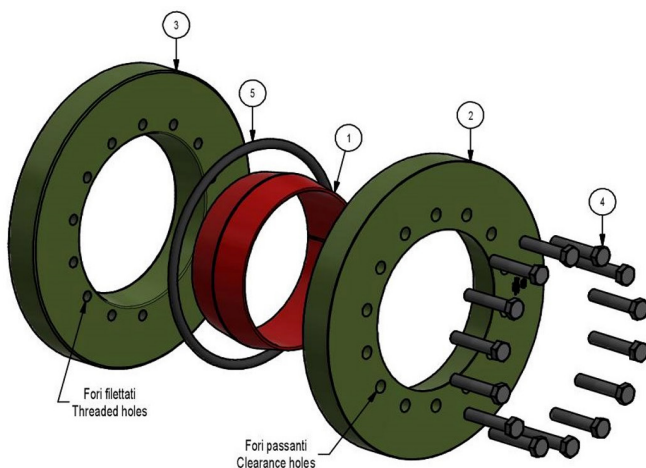


Fig. 1 Composition

ELEM	QTA	DESCRIZIONE
1	1	ANELLO INTERNO / INNER RING
2	1	FLANGIA SOPRA / FRONT OUTER RING
3	1	FLANGIA SOTTO / REAR OUTER RING
4	xx	VITE A TESTA ESAG. ISO 4014/4017 - 10.9 (8.8 < M6) / HEX HEAD CAP SCREW ISO 4014/4017 - 10.9 (8.8 < M6)
5	1	O-RING (misura / size $d \geq 140$ mm)

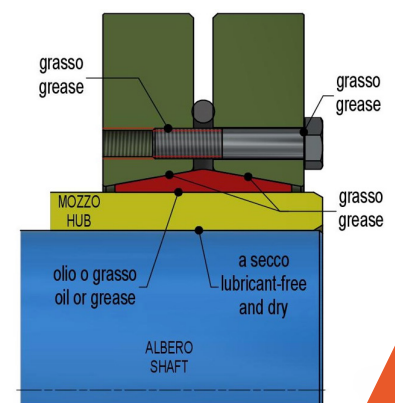


Fig. 2 Lubrication

# SHRINK DISCS MAV 2008, 2108, 2208

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

Prior to initiating the installation procedure, check to ensure that no loads are acting on Shrink Disc, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Shrink Disc MAV 2008 – MAV 2108 – MAV 2208 are supplied ready for installation. However, it is necessary to **remove the spacers** that may have been used for shipping purpose prior to initiating the installation. **Do not remove the grease from screws and conical surfaces (fig. 2).** **Do not remove the O-Ring.** **Never tighten the screws prior to mounting the Shrink Disc onto the shaft,** as inner ring and/or hub might remain permanently contracted even at relatively low tightening torques.

1. Clean hub OD and Shrink Disc bore. For ease of installation, lightly lubricate hub OD before assembling Shrink Disc onto hub (fig. 2).
2. Carefully **solvent clean and dry shaft and hub bore from any lubricant (fig. 2)** prior to mounting hub onto shaft. This step is critical, as any lubricant on the shaft/hub bore interface will greatly reduce the capacity of the Shrink Disc connection.
3. Move the Shrink Disc onto the hub, then move the hub onto the shaft until the required position is achieved. **The shaft must support completely the tolerated section of hub bore (fig. 2).** **Hand-tighten three or four evenly spaced screws (fig. 3) and make sure that outer rings are parallel;** then hand-tighten remaining screws. At the end of this stage, a light connection is achieved. Hub will not move axially respect to shaft during next tightening steps.
4. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in either a clockwise or counterclockwise sequence, using approx. ¼ turns for several passes until ¼ turns can no longer be achieved (fig. 4).**
5. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach the specified tightening torque.
6. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 5.

Once the screws are tightened, **check the parallelism** of outer rings. The max deviation of the distance between outer rings around the circumference shall be within 0,35% of the outer diameter (fig. 5). A larger error may cause a loss of pressure and, as a consequence, reduced performances.

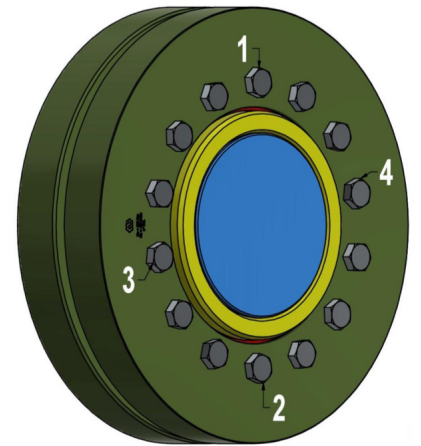


Fig. 3  
Pre-tightening

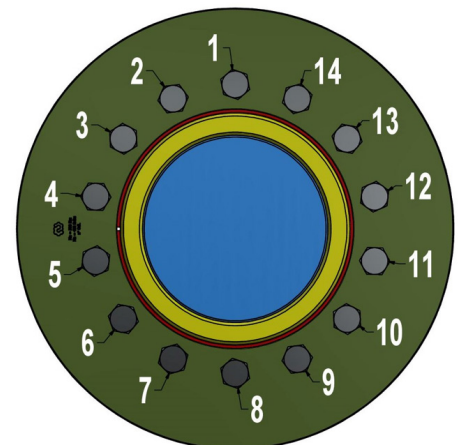


Fig. 4  
Example of tightening pattern

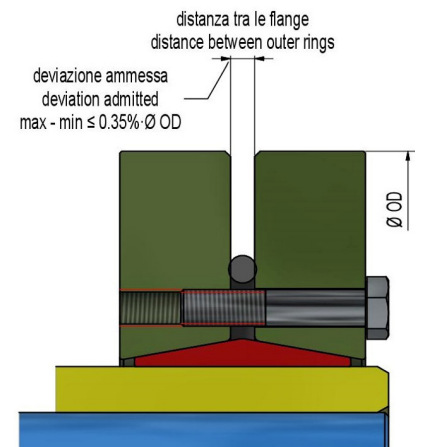


Fig. 5  
Parallelism of outer rings

# SHRINK DISCS MAV 2008, 2108, 2208

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Shrink Disc, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

**DO NOT** completely remove the screws before outer rings are disengaged. Sudden separation of the rings may occur and involve high separation forces that may result in permanent injury or death. Be certain that the rings are disengaged before completely removing the screws.

1. Progressively loosen all screws in either a clockwise or counterclockwise sequence, using approx. ½ turns for several passes until the outer rings have released from the inner ring (self-releasing tapers).
2. Remove the hub from the shaft, then remove the Shrink Disc from the hub.

### REUSE OF USED SHRINK DISCS

1. Disassemble, thoroughly clean and inspect all parts of the Shrink Disc. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, contact MAV S.p.A. for advice.
2. Re-lubricate the Shrink Disc with the following products.
  - DOW CORNING MOLYKOTE® BR 2 Plus on screws under-head and threads.
  - DOW CORNING MOLYKOTE® G-Rapid Plus on conical surfaces.
3. Replace the O-Ring by gluing together the ends of a cord of aerstop® EPDM + SBR rubber code SE34.
4. Re-assemble all parts as originally supplied.

Information for proper disposal:



Dispose MAV  
product as metal

# SHRINK DISCS MAV 2008, 2108, 2208 STAINLESS STEEL

## Installation and Removal Instructions



MAV 2008, 2108, 2208 stainless steel Shrink Discs are supplied ready for installation. However, prior to tightening of locking screws it necessary to remove wooden spacers that may have been used during shipping.

### INSTALLATION

**Important: Never tighten locking screws prior to shaft installation, as inner ring of Shrink Disc and/or hub can be permanently contracted even at relatively low tightening torques.**

1. Clean hub OD and Shrink Disc bore. Lightly lubricate hub OD before assembling Shrink Disc on hub.
2. Carefully solvent clean and dry shaft and hub bore of any lubricant prior to mounting hub onto shaft. This step is critical, as any lubricant on the shaft/hub bore interface will greatly reduce the torque transmitting capacity of the Shrink Disc connection.
3. Insert shaft into hub, then position Shrink Disc onto hub. After confirming correct position of hub and Shrink Disc, hand-tighten three (3) or four (4) evenly spaced locking screws and make sure that outer collars of Shrink Disc are parallel. Hand-tighten remaining locking screws.
4. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque MA. Tighten locking screws in either a clockwise or counterclockwise sequence, using approx.  $\frac{1}{4}$  (i.e.,  $90^\circ$ ) turns (even if initially some locking screws require a very low tightening torque to achieve  $\frac{1}{4}$  turns) for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
5. Continue to apply overtorque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque (MA) and check all locking screws. No screw should turn at this point, otherwise repeat Step 5 for 1 or 2 more passes. Once the screws are tightened, check the parallelism of the outer collars, considering that the maximum allowed error is 0.35% of the outer diameter of Shrink Disc. A larger error could cause a loss of pressure and, as a consequence, reduced performances. It is not necessary to re-check tightening torque after equipment has been in operation.

### REMOVAL

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Shrink Disc, shaft or any mounted components.**

Loosen all locking screws in several stages by using approx.  $\frac{1}{2}$  turns, following either a clockwise or counterclockwise sequence, until Shrink Disc can be moved on hub. The Shrink Disc, hub and shaft will return to their original fit clearances.

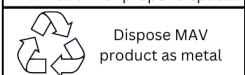
### WARNING

**DO NOT** completely remove locking screws before locking rings are disengaged. A sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.

### REINSTALLATION OF SHRINK DISCS

In relatively clean operating conditions, Shrink Discs may be reused without prior cleaning. In all other cases, Shrink Discs require thorough cleaning and abundant re-lubrication of screws (under-head and threads) and tapers with Dow Corning® Molykote P-1900.

Information for proper disposal:



# LOCKING ASSEMBLY MAV 2500

## Installation and Removal Instructions



MAV 2500 Locking Assembly is supplied ready for installation. If the unit should be dismantled, make sure there are no threads behind taps in front thrust ring item [3]. The torque capacity of this device is based on a coefficient of friction of  $\mu=0.12$  for lightly oiled screws, tapers, shaft and hub contact areas. **Therefore, it is important NOT to use Molybdenum Disulfide (e.g., Molykote, Never-Seeze or similar lubricants) in any Locking Assembly installation.**

Recommended shaft / hub bore tolerances: h9 / H9

Recommended shaft / hub bore surface roughness:  $Ra \leq 3.2 \mu\text{m}$

The rear thrust ring item [4] must be in contact with either shaft or hub shoulder (fig.1) to release the connection.

### INSTALLATION

1. Make sure that locking screws, rings, shaft and hub contact surfaces are clean and lightly oiled.
2. After positioning Locking Assembly between shaft & hub, successively hand tighten the screws in a crosswise pattern, so that most of the play is taken up but still leaving Locking Assembly free to move.
3. After confirming correct hub position, successively hand tighten the screws following a crosswise pattern, until the assembly is locked.
4. Use torque wrench and set it approximately 5% higher than specified tightening torque (Ma). Torque screws in a crosswise pattern, using only 1/4 turns for several passes until 1/4 turns can no longer be achieved.
5. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque (Ma) and check all locking screws. No screw should turn at this point, otherwise repeat step 5 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: for installation subjected to extreme corrosion, the slits in inner and outer rings should be sealed with a suitable caulking compound or equivalent.

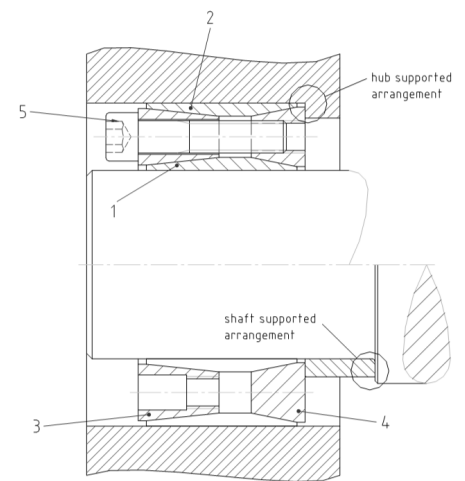


Fig. 1

### REMOVAL (REFER TO FIG.2)

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

**IMPORTANT!** The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.

1. Loosen all locking screws in several stages. Rear thrust ring item [4] features self-releasing taper, meaning it should release automatically.
2. Remove and transfer some screws into all push-off threads located in the front thrust ring item [3].
3. Release front thrust ring item [3] by tightening all push-off screws in a crosswise pattern, not exceeding 1/4 turns for several passes.

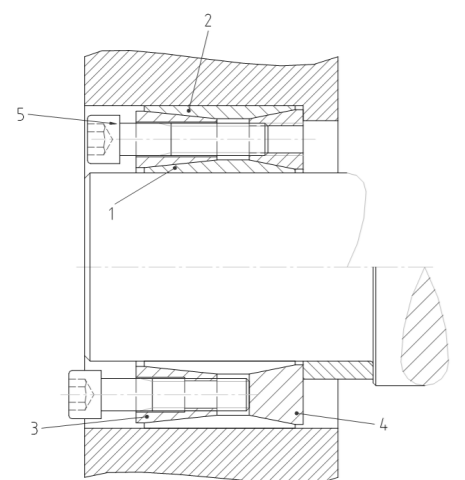


Fig. 2



# LOCKING ELEMENT MAV 3003

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Element are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Element, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Elements MAV 3003 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque and axial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Element, shaft and hub bore. In tightened condition, Locking Elements exert high radial pressure on shaft and in hub bore.

**Locking Elements MAV 3003 are supplied ready for installation and are composed of (fig. 1):**

- One inner ring (solid or slotted executions; slotted up to size d = 8)
- One outer ring (solid or slotted executions; slotted up to size d = 8)

The Locking Element shall be tightened by means of one customer design thrust ring\* and a set of locking screws, which shall be tightened into threaded holes tapped in the hub or shaft's end (fig. 2, 3). Installation may also require spacers. Tightening hardware and spacers are not supplied by MAV S.p.A.

\*The design of the thrust ring shall grant:

- A minimum distance from the face of the hub or shaft end, according to dimension X in the catalog
- A suitable thickness to avoid excessive deflection in tightened condition

The hub must be provided with a centering face to allow good concentricity of the connection, since the Locking Element is not self-centering (fig. 4).

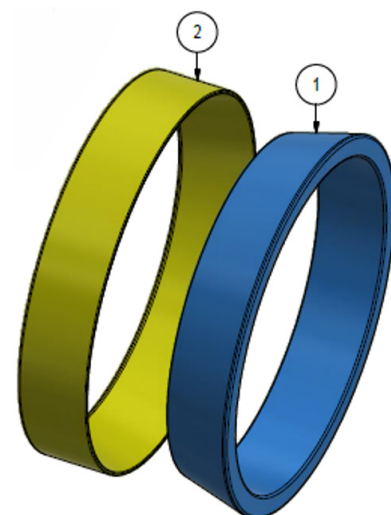
### Lubrication

Functional values are rated with rings of Locking Element, shaft and hub contact areas coated with a film of mineral or synthetic-base oil with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: see table

Shaft dia. [mm]	Shaft	Hub bore
≤ 38	h6	H7
> 38	h8	H8

Recommended shaft / hub bore surface finish:  $0.4 \leq Ra \leq 0.8 \mu\text{m}$



ELEM	QTÀ	DESCRIZIONE
1	1	ANELLO INTERNO / INNER RING
2	1	ANELLO ESTERNO / OUTER RING

Fig. 1 Composition

# LOCKING ELEMENT MAV 3003

## Installation and Removal Instructions



### Tightening torque

Functional values in the catalog are based on specified shaft pressure (Ps). Screws total preload shall equal the sum of assembling and locking loads specified in the catalog (Ca + Cb). In slotted execution, assembling load (Ca) is zero.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Element, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Elements MAV 3003 shall be tightened by means of one customer design thrust ring and a set of locking screws, which shall be tightened into threaded holes tapped in the hub or shaft's end (fig. 2). Installation may also require spacers. **Tightening hardware and spacers are not supplied by MAV S.p.A.** Connections using multiple Locking Elements installed in series are possible.

1. Make sure that rings of the Locking Element, shaft and hub contact areas are clean and coated with a film of oil. Locking screws (by others) shall be lubricated according to user's specifications.
2. Install the parts in the following sequence (fig. 4).
  - a) Hub onto shaft.
  - b) Spacer, to bridge the undercut (it may be not necessary with no undercut).
  - c) Rings of the Locking Element (use of multiple Elements is possible).  
The self-releasing taper allow for ease of installation.
  - d) Spacer, if any, and thrust ring.
  - e) Locking screws.

Make sure that **rings of the Locking Element are completely supported by shaft and hub bore.**

3. Tighten the screws by hand in a crosswise pattern (fig. 5) until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. The distance (X) between thrust ring and hub or shaft end **shall never be zero and be uniform** around the circumference (fig. 4). **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
4. Use a torque wrench set approx. 5% higher than the design tightening torque. **Progressively tighten the screws in a crosswise pattern (fig. 5), using approx. ¼ turns for several passes until ¼ turns can no longer be achieved.**
5. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
6. Reset the torque wrench to the design tightening torque and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 5.
7. **Check the distance (X) (fig. 4): the thrust ring must never contact the face of the hub or shaft end. Remaining distance shall be uniform** around the circumference.

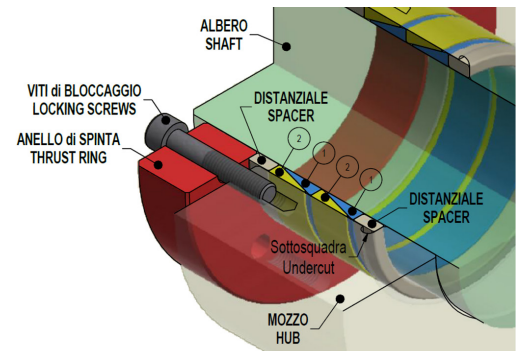


Fig. 2  
Design example w/ tapped hub

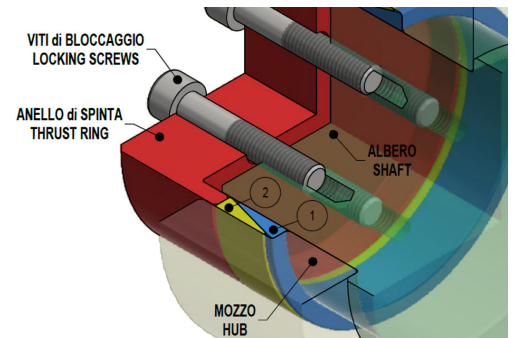


Fig. 3  
Design example w/ tapped shaft.

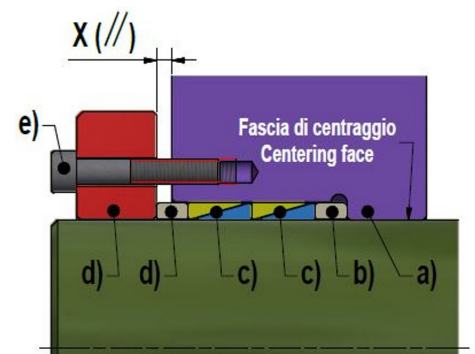


Fig. 4  
Example of mounting sequence

# LOCKING ELEMENT MAV 3003

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Element, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

1. Progressively loosen all screws in several passes until the rings of the Locking Element have released (self-releasing taper). Shouldn't be the case, light tapping will help the disengagement of the Locking Element.

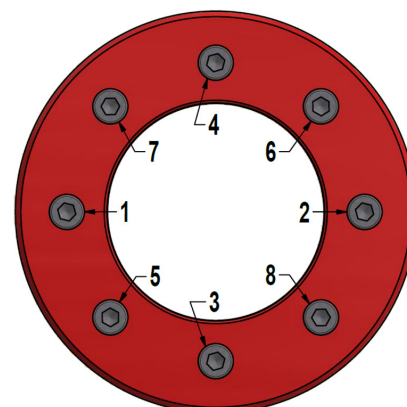


Fig. 5  
Example of tightening pattern

Information for proper disposal:



Dispose MAV  
product as metal

# SHRINK DISCS MAV 3008, 3009, 3108, 3208, 3209

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of the Shrink Disc are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Shrink Disc, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Shrink Discs MAV 3008 – 3009 – 3108 – 3208 – 3209 are external locking devices, which provide a rigid, zero-backlash, frictional keyless connection between an outer hollow shaft (hub) and an inner shaft. Shrink Discs are installed onto the outer diameter of the hub, which is mounted onto the shaft. Shrink Discs are suited for transmitting torque, axial load and bending moment, separately or in combination. Applied loads are transmitted via pressure and friction between the fitting surfaces of hub and shaft. In tightened condition, Shrink Discs exert high radial pressure on hub and shaft.

**Shrink Discs are supplied ready for installation. However, it is necessary to remove the spacers that may have been used for shipping purpose prior to initiating the installation. They are composed of (fig. 1):**

- One inner ring (slotted), with integrated push-off threaded holes
- One outer ring
- One set of hexagon head cap screws ISO 4014/4017, grade 10.9 (< M6 grade 8.8) for MAV 3008 – 3108 – 3208; grade 12.9 for MAV 3009 – 3209
- One set of hardened washers DIN 6916 (screw  $\geq$  M16)

### Lubrication

- **Screws (under-head and threads):** greased at factory with solid paste DOW CORNING MOLYKOTE® BR 2 Plus. Don't remove the lubricant.
- **Conical surfaces:** greased at factory with solid paste DOW CORNING MOLYKOTE® G-Rapid Plus. Don't remove the lubricant. Conical surfaces are lubricated with machine oil from size  $d = 12$  to  $d = 68$  included.
- **Hub ID and shaft OD:** lubricant-free and dry.
- **Hub OD:** lubrication with oil or grease is recommended for ease of installation.

### Recommended tolerances.

Functional values in the catalog are based on values specified below. Any deviation requires new rating of functional values.

- Hub OD: h8 or f7
- Hub ID and shaft: see table

# SHRINK DISCS MAV 3008, 3009, 3108, 3208, 3209

## Installation and Removal Instructions



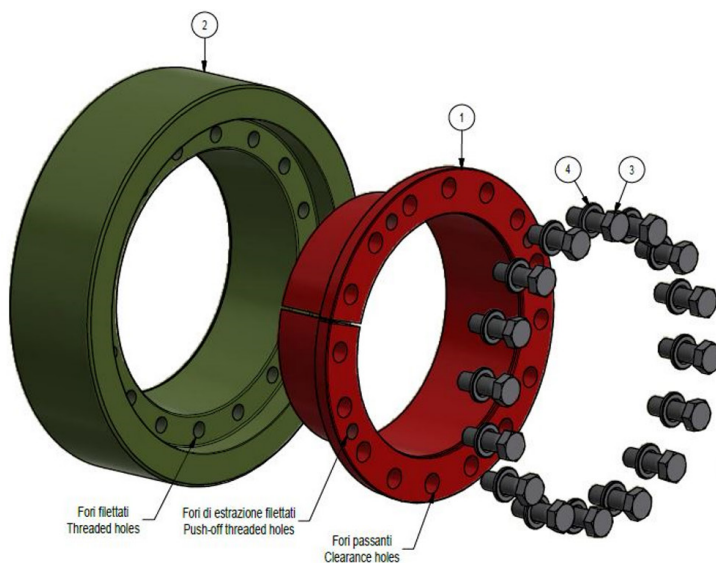
Shaft dia.		ISO Tolerances	Max diam. clearance
above	up to		mm
6	10	H6/j6	0,011
10	18		0,014
18	30		0,017
30	50	H6/h6	0,032
50	80	H6/g6	0,048
80	120	H7/g6	0,069
120	180		0,079
180	250		0,090
250	315		0,101
315	400		0,111
400	500		0,123

Recommended hub / shaft surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Reduced tightening torque leads to lower functional values. **Functional values depend on tightening torque only.** In tightened condition, top faces of inner and outer rings are flush or so (inner ring may protrude from or be recessed in the outer ring), however this is not an evidence of completed installation.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.



ELEM	QTA	DESCRIZIONE
1	1	ANELLO INTERNO / INNER RING
2	1	ANELLO ESTERNO / OUTER RING
3	xx	VITE A TESTA ESAG. ISO 4014/4017 - 10.9 o 12.9 (8.8 < M6) / HEX HEAD CAP SCREW ISO 4014/4017 - 10.9 or 12.9 (8.8 < M6)
4	xx	RONDELLA / HV WASHER DIN 6916 ( $\geq$ M16)

Fig. 1 Composition

# SHRINK DISCS MAV 3008, 3009, 3108, 3208, 3209

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Shrink Disc, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Shrink Discs MAV 3008 – 3009 – 3108 – 3208 – 3209 are supplied ready for installation. If any, remove the spacers used for shipping prior to initiating the installation: position the shrink disc with screws facing up; move some screws into all threaded holes in the top face of the inner ring; set the washers aside (don't discard); turn these screws until they bottom out; now back out each locking screw two complete turns; lift the inner ring slightly in order to remove the spacers. Once the spacers are removed, lower the inner ring back into position; move the screws used for lifting, together with washers, into their original positions.

Do not remove the grease from screws and conical surfaces (fig. 2). Never tighten the screws prior to mounting the Shrink Disc onto the shaft, as inner ring and/or hub might remain permanently contracted even at relatively low tightening torques.

Functional values depend on tightening torque only. In tightened condition, top faces of inner and outer rings are flush or so (inner ring may protrude from or be recessed in the outer ring), however this is not an evidence of completed installation.

1. Clean hub OD and Shrink Disc bore. For ease of installation, lightly lubricate hub OD before assembling Shrink Disc onto hub (fig. 2).
2. Carefully solvent clean and dry shaft and hub bore from any lubricant (fig. 2) prior to mounting hub onto shaft. This step is critical, as any lubricant on the shaft/hub bore interface will greatly reduce the capacity of the Shrink Disc connection.
3. Move the Shrink Disc onto the hub, then move the hub onto the shaft until the required position is achieved. The shaft must support completely the tolerated section of hub bore (fig. 2). Hand-tighten three or four evenly spaced screws (fig. 3) and make sure that inner and outer rings are aligned; then hand-tighten remaining screws.

At the end of this stage, a light connection is achieved. Hub will not move axially respect to shaft during next tightening steps.

4. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma). Progressively tighten the screws in either a clockwise or counterclockwise sequence, using approx. ¼ turns for several passes until ¼ turns can no longer be achieved (fig. 4).
5. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach the specified tightening torque.
6. Reset the torque wrench to specified tightening torque (Ma) and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 5.

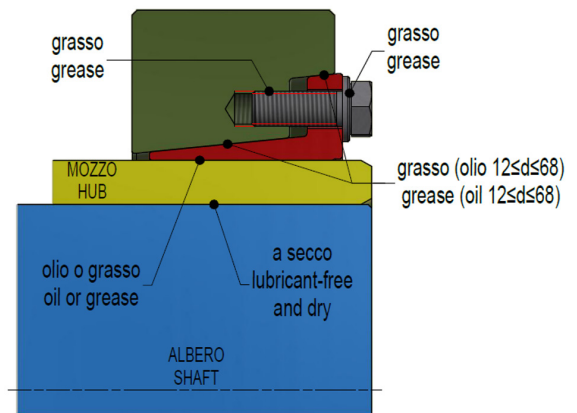


Fig. 2  
Lubrication

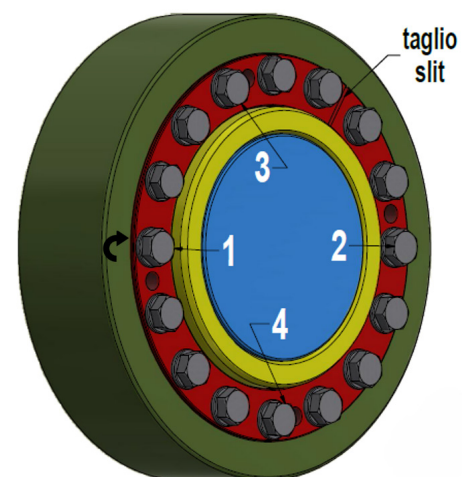


Fig. 3  
Pre-tightening

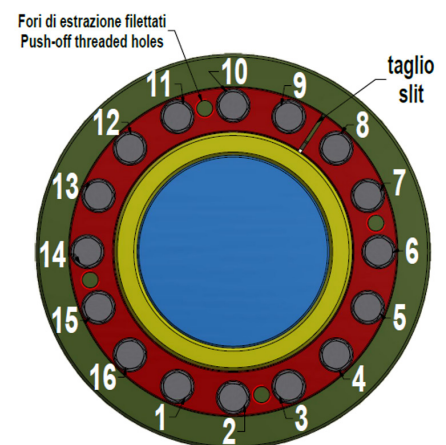


Fig. 4  
Example of tightening pattern

### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Shrink Disc, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

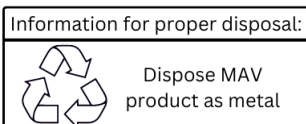
**DO NOT** completely remove the screws before outer rings are disengaged. Sudden separation of the rings may occur and involve high separation forces that may result in permanent injury or death. Be certain that the rings are disengaged before completely removing the screws.

Some locking screws might be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Progressively loosen all screws in either a clockwise or counterclockwise sequence, using approx. ½ turns for several passes until the outer ring has released from the inner ring (self-releasing tapers). Should releasing not occur, progressively tighten some screws into all threaded holes in the top face of the inner ring, in either a clockwise or counterclockwise sequence, using approx. ½ turns for several passes.
2. Remove the hub from the shaft, then remove the Shrink Disc from the hub.

### REUSE OF USED SHRINK DISCS

1. Disassemble, thoroughly clean and inspect all parts of the Shrink Disc. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, contact MAV S.p.A. for advice.
2. Re-lubricate the Shrink Disc with the following products.
  - DOW CORNING MOLYKOTE® BR 2 Plus on screws under-head and threads.
  - DOW CORNING MOLYKOTE® G-Rapid Plus on conical surfaces from size d = 75 and above.
  - Machine oil on conical surfaces from size d = 12 to d = 68 included.
3. Re-assemble all parts as originally supplied.



# LOCKING UNITS MAV 3012, 3022, 3023

## Installation and Removal Instructions



MAV 3012/3022/3023 locking units are supplied with MoS<sub>2</sub> lubricated tapers and without lubrication on locking screws. Locking screws to be lubricated by the user with MoS<sub>2</sub> before tightening.

MAV 3012/3022/3023 locking units are designed for shaft tolerance of quality h9 and surface roughness Ra < 3.2 µm.

### INSTALLATION

1. Carefully solvent clean and dry shaft as well as contact surface between hub and locking unit. Any lubricant on contact surfaces between shaft, hub and locking unit will reduce the torque capacity of the connection.
2. Lubricate all screws on thread and under head with the following MoS<sub>2</sub> based product: Dow Corning® Molykote BR 2 Plus (or equivalent, for a friction coefficient of 0.10)
3. Assemble hub and locking unit together by hand tightening the locking screws and position both parts onto the shaft.
4. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque  $M_A$ . Tighten locking screws in either a clockwise or counterclockwise sequence, using approx. ¼ (i.e., 90°) turns (even if initially some locking screws require a very low tightening torque to achieve ¼ turns) for several passes until ¼ turns can no longer be achieved.
5. Continue to apply overtorque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque (MA) and check all locking screws. No screw should turn at this point, otherwise repeat Step 5 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

### REMOVAL

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the locking unit, shaft or any mounted components.**

*IMPORTANT! The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

Loosen all locking screws in several stages by using approx. ½ turns, following either a clockwise or counterclockwise sequence, until locking rings are disengaged. If the locking unit does not release after loosening the locking screws:

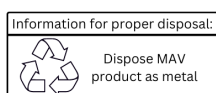
- For series 3012, force the locking rings to disengage by lightly hammering on the outer ring of the locking unit.
- For series 3022 – 3023, tighten some screws in the push-off threads (may be not the same size of locking screws).

### WARNING

**DO NOT** completely remove locking screws before locking rings are disengaged. As sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.

### REINSTALLATION OF LOCKING UNIT

Clean the rings and restore taper lubrication with Dow Corning® Molykote G-Rapid plus (or equivalent, for a friction coefficient of 0.04). Clean and restore lubrication on locking screws as described by installation instructions, step 2.



# LOCKING ASSEMBLIES MAV 3505, 3705 STANDARD STEEL & STAINLESS STEEL

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of the Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shafts or any connected components. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 3505 and MAV 3705 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers and many others. They are suited for transmitting torque and axial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies MAV 3505 and MAV 3705 are supplied ready for installation and are composed of (fig. 1 and 2):**

- One inner ring (slotted) item [1]
- One outer ring (slotted) item [2]
- One round nut item [3]
- One safety washer item [4] (standard steel version)
- One safety set screw item [5] (stainless steel version)

### Lubrication

Functional values are rated with **locking rings, nut, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Standard as well as stainless steel versions are coated at factory with a film of PETRONAS WHITE OIL P 15 (pharmaceutical grade, see Product Data Sheet).

Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

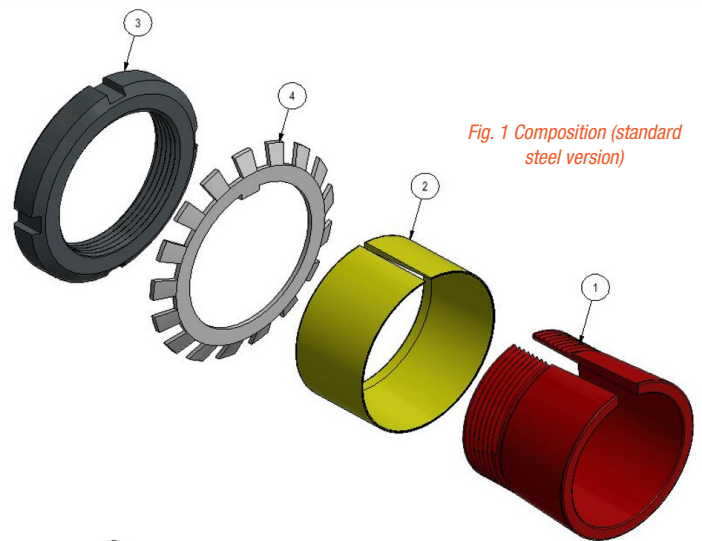


Fig. 1 Composition (standard steel version)

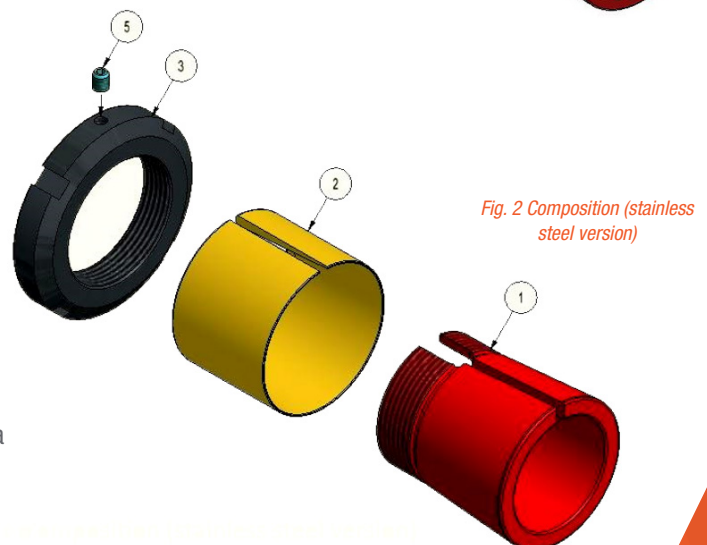


Fig. 2 Composition (stainless steel version)

# LOCKING ASSEMBLIES MAV 3505, 3705 STANDARD STEEL & STAINLESS STEEL

## Installation and Removal Instructions



### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tight clearance fits are typical of all functional surfaces. Mounting of all parts to be achieved WITHOUT HEATING or ANY OTHER FORCED INSTALLATION.

## INSTALLATION

### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 3505 and MAV 3705 are supplied ready for installation. During tightening of Locking Assembly, an axial displacement of hub respect to shaft will occur.

1. Make sure that nut, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 3). Loosen the nut by two/three turns and push the outer ring towards the nut.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner respectively outer rings shall be completely supported by shaft respectively hub bore (fig. 4).** Installation into hubs with shoulder requires a few mm's gap between inner ring and shoulder (fig. 4).
4. Tighten the nut by hand, until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a calibrated torque wrench and tighten the nut to the specified tightening torque (Ma) (fig. 4).
6. Lock the safety washer (standard steel version), or tighten the set screw located in the nut's body (stainless steel version), to prevent loosening of the nut.

NOTE: for connections subject to corrosion, slits in inner and outer rings should be sealed with a suitable caulking compound after installation.

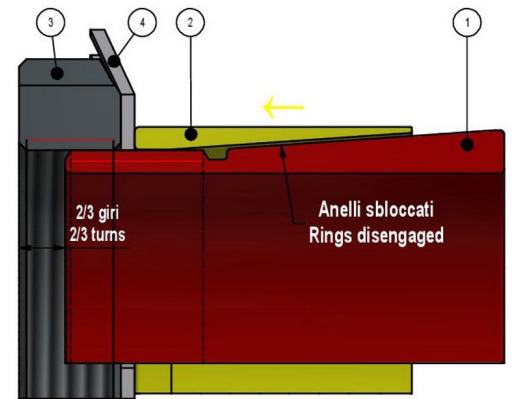


Fig. 3  
Disengagement of locking rings

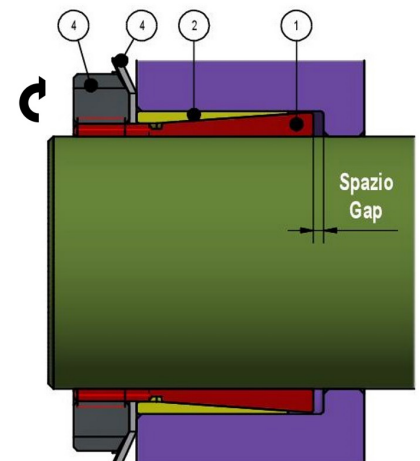


Fig. 4  
Positioning of Locking Assembly  
and tightening of the nut

## REMOVAL

### SAFETY NOTICE

**Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

**Prior to removing shaft, hub and Locking Assembly, make always sure that all parts are secured against slipping, falling or rolling.**

1. Unlock the safety washer (standard steel version), or loosen the set screw located in the nut's body (stainless steel version).
2. Loosen the nut until locking rings have released.
  - 2.1. Series MAV 3505 is self releasing. After loosening of the nut, locking rings will release automatically. Shouldn't be the case, light hammering may help.
  - 2.2. Series MAV 3705 is self locking. Releasing will be difficult and can be obtained by means of releasing systems not supplied by MAV.
3. Once the connection is released, shaft, hub and Locking Assembly can be removed.

# LOCKING ASSEMBLY MAV 4005

## Installation and Removal Instructions



MAV 4005 Locking Assembly is supplied ready for installation. The torque capacity of this device is based on a coefficient of friction of  $\mu=0.12$  for lightly oiled screws, tapers, shaft and hub contact areas. **Therefore, it is important NOT to use Molybdenum Disulfide (e.g., Molykote, Never-Seeze or similar lubricants) in any Locking Assembly installation.**

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface roughness:  $Ra \leq 3.2 \mu\text{m}$

The hub must be provided with a centering face to allow good concentricity connection, as the Locking Assembly is not self-centering (fig. 1).

### INSTALLATION

1. Make sure that locking screws, rings, shaft and hub contact surfaces are clean and lightly oiled.
2. After positioning Locking Assembly between shaft & hub, successively hand tighten the screws in a crosswise pattern, so that most of the clearance is taken up but still leaving Locking Assembly free to move.
3. After confirming correct hub position, successively hand tighten the screws following a crosswise pattern, until the assembly is locked.
4. Use torque wrench and set it approximately 5% higher than specified tightening torque (Ma). Torque screws in a crosswise pattern, using only 1/4 turns for several passes until 1/4 turns can no longer be achieved.
5. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque (Ma) and check all locking screws. No screw should turn at this point, otherwise repeat step 5 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: for installation subjected to extreme corrosion, the slits in inner and outer rings should be sealed with a suitable caulking compound or equivalent.

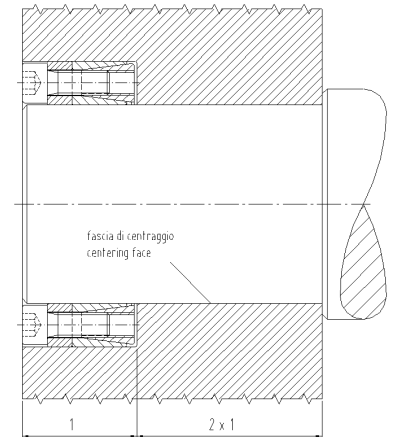


Fig. 1

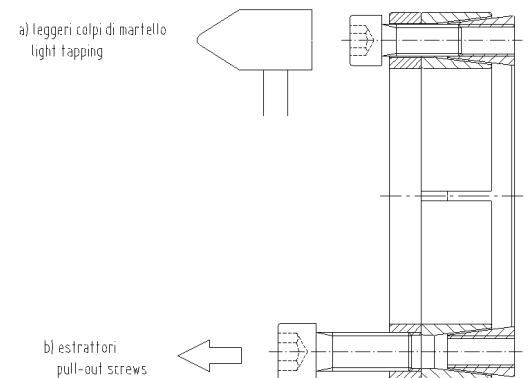


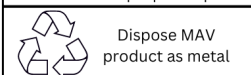
Fig. 2

### REMOVAL

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

1. Loosen all locking screws in several stages, but not remove them completely. MAV 4005 series feature self-releasing tapers, meaning thrust rings should release automatically. If the rings will not disengage, light tapping on screws head will help releasing operation (fig.2a).
2. Hub and Locking Assembly are normally removed together. Removal of Locking Assembly only from deep counterbores is accomplished by inserting pull-off screws or threaded bars (one size larger than locking screws, not provided) into threads located under zinc plated locking screws. These threads are NOT to be used for high pulling forces.

Information for proper disposal:



# LOCKING ASSEMBLIES MAV 4061, 4061L

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 4061 and MAV 4061L provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies MAV 4061 and MAV 4061L are supplied ready for installation and are composed of (fig. 1):**

- One front thrust ring (w/ complete slit up to size 180x235, w/ staggered slit from size 190x250)
- One rear thrust ring (w/ complete slit up to size 180x235, w/ staggered slit from size 190x250)
- One outer ring (w/ complete slit up to size 380x475, w/out slit from size 400x495)
- One set of socket head cap screws ISO 4762 grade 12.9

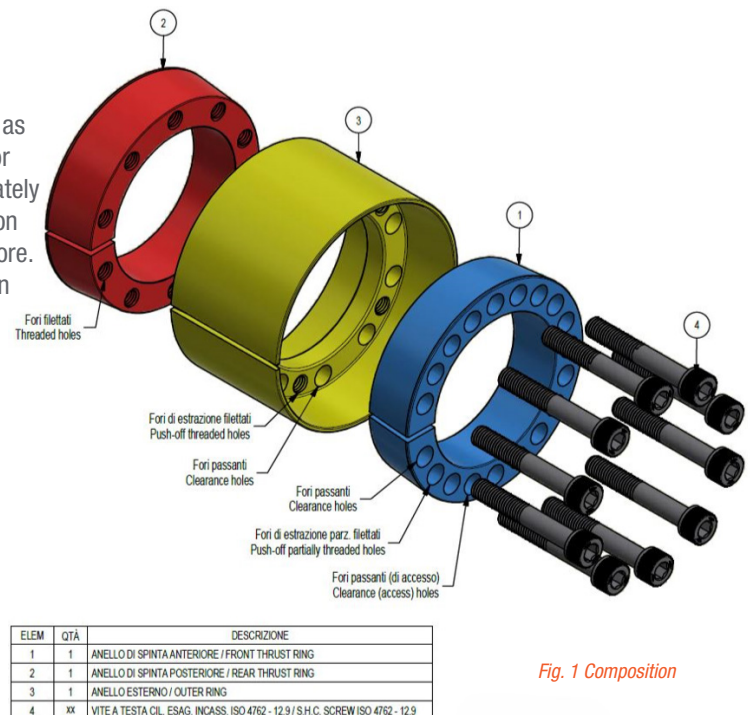


Fig. 1 Composition

### Lubrication

Functional values are rated with screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.6 \cdot Ma$  (max reduction by 40%). A given reduction of tightening torque leads to a proportional reduction of functional values.

# LOCKING ASSEMBLIES MAV 4061, 4061L

## Installation and Removal Instructions



After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation**

Locking Assemblies MAV 4061 and MAV 4061L are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the outer ring is not reversed and the slits in all rings are aligned. The unit is assembled correctly if there are no holes in the outer ring behind partially threaded holes in the front thrust ring as well as no holes in the rear thrust ring behind threaded holes in the outer ring. During tightening of Locking Assembly, a small axial displacement of hub respect to shaft may occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, thrust rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand tighten at least two screws into the push-off threaded holes in the front thrust ring and at least two screws into the push-off threaded holes in the outer ring, accessible via corresponding clearance holes in the front thrust ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Thrust rings and outer ring shall be completely supported by shaft respectively hub bore (fig. 2).** At this point, relocate the screws used to disengage the thrust rings. Installation into hubs with shoulder requires a few mm's gap between rear thrust ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit in the front thrust ring (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

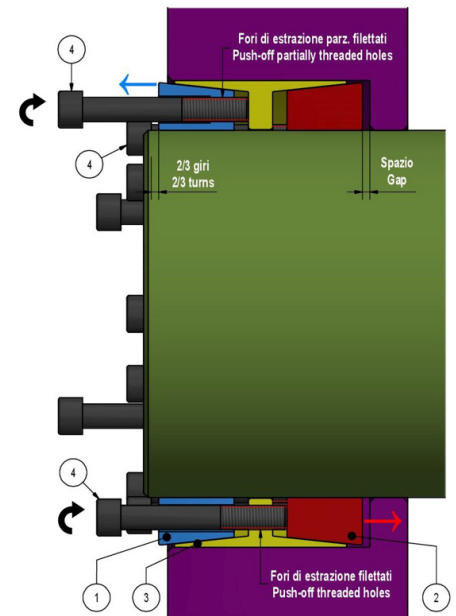


Fig. 2  
Disengagement of thrust rings and positioning of Locking Assembly

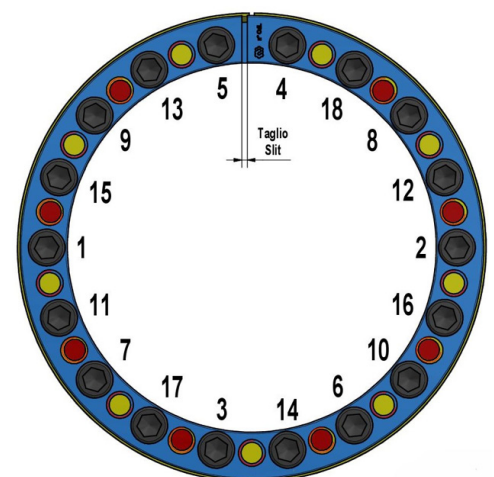


Fig. 3  
Example of tightening pattern

NOTE: for connections subject to corrosion, slits in all rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

# LOCKING ASSEMBLIES MAV 4061, 4061L

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of front and rear thrust rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off partially threaded holes in the front thrust ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the front thrust ring is released (fig. 4). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row. Remove the screws still engaged in the rear thrust ring; then remove the front thrust ring.
3. Transfer some screws into all push-off threaded holes in the outer ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the rear thrust ring is released (fig. 5). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

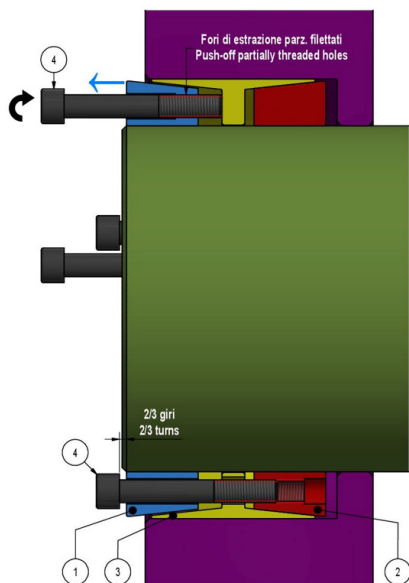


Fig. 4  
Release of front thrust ring

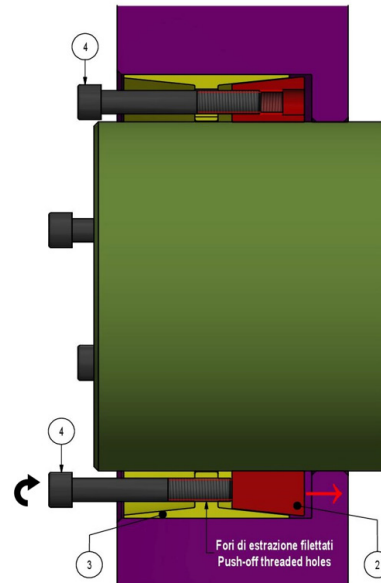


Fig. 5  
Release of rear thrust ring

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLIES MAV 4071, 1800

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to machinery or persons resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 4071 and MAV 1800 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies MAV 4071 and MAV 1800 are supplied ready for installation and are composed of (fig. 1):**

- One inner ring (slotted)
- Two outer rings (slotted)
- One double-cone front thrust ring
- One double-cone rear thrust ring
- One set of socket head cap screws ISO 4762 grade 12.9

### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to:

- $0.8 \cdot Ma$  (max reduction by 20%) for series MAV 4071
- $0.5 \cdot Ma$  (max reduction by 50%) for series MAV 1800

A given reduction of tightening torque leads to a proportional reduction of functional values.

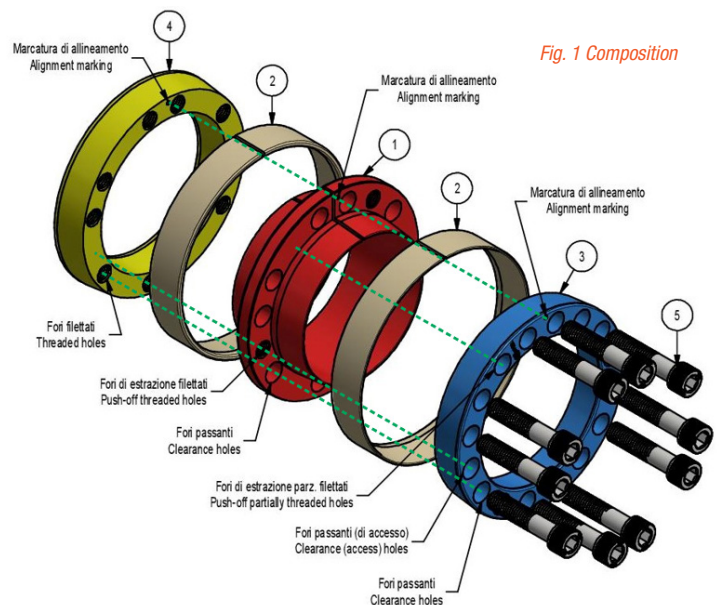


Fig. 1 Composition

ELEM	QTA	DESCRIZIONE
1	1	ANELLO INTERNO / INNER RING
2	2	ANELLO ESTERNO / OUTER RING
3	1	ANELLO DI SPINTA DOPPIO-CONICO ANTERIORE / DOUBLE-CONE FRONT THRUST RING
4	1	ANELLO DI SPINTA DOPPIO-CONICO POSTERIORE / DOUBLE-CONE REAR THRUST RING
5	xx	VITE A TESTA CIL. ESAG. INCASS. ISO 4762 - 12.9 / S.H.C. SCREW ISO 4762 - 12.9

# LOCKING ASSEMBLIES MAV 4071, 1800

## Installation and Removal Instructions



After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 4071 and MAV 1800 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that neither clearance nor threaded holes in the inner ring are below the partially threaded holes in the front thrust ring as well as no holes in the rear thrust ring are below the threaded holes in the inner ring. Thrust rings as well as inner ring are engraved with a circular marking: make sure that all markings are aligned (fig. 1, dashed lines). During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, thrust rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand tighten at least two screws into the push-off threaded holes in the front thrust ring and at least two screws into the push-off threaded holes in the inner ring, accessible via corresponding clearance holes in the front thrust ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner respectively outer rings shall be completely supported by shaft respectively hub bore (fig. 2).** At this point, relocate the screws used to disengage the thrust rings. Installation into hubs with shoulder requires a few mm's gap between rear thrust ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting from a screw located at 90° approx. respect to slit in the inner ring (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6.

NOTE: for connections subject to corrosion, slits in inner and outer rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

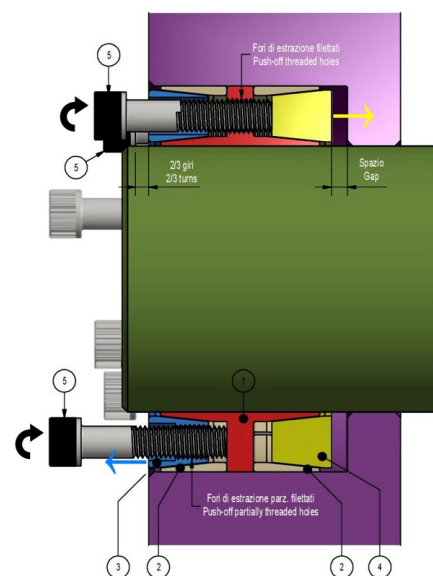


Fig. 2  
Disengagement of thrust rings and positioning of Locking Assembly

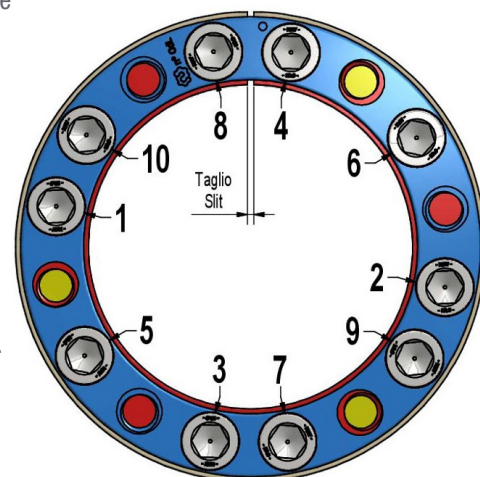


Fig. 3  
Example of tightening pattern

# LOCKING ASSEMBLIES MAV 4071, 1800

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

Locking rings shall be removed all together from hub bore. Do not remove locking rings separately. The rear thrust ring shall be released at first; releasing of the front thrust ring will follow.

1. Ensure that axial movement of both front and rear thrust rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off threaded holes in the inner ring, accessible via corresponding clearance holes in the front thrust ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until rear thrust ring is released (fig. 4). **Leave the screws in place after rear thrust ring is released.**
3. Transfer some screws into all push-off partially threaded holes in the front thrust ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until front thrust ring is released (fig. 5). **Leave the screws in place after front thrust ring is released.**
4. Hold the head of some screws still engaged in the rear thrust ring. Pull out these screws in order to remove locking rings all together from hub bore (fig. 6).

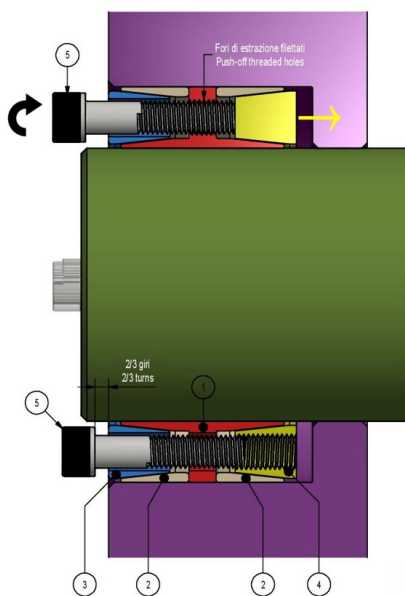


Fig. 4  
Release of rear thrust ring

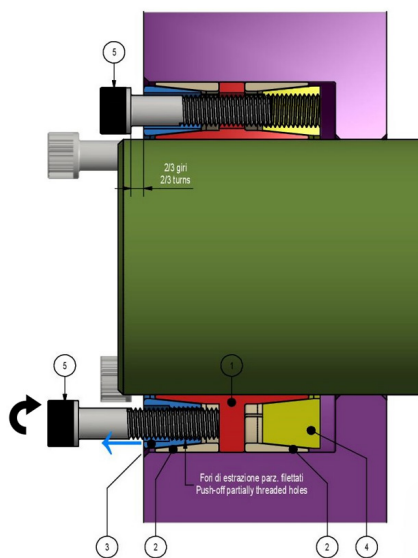


Fig. 5  
Release of front thrust ring

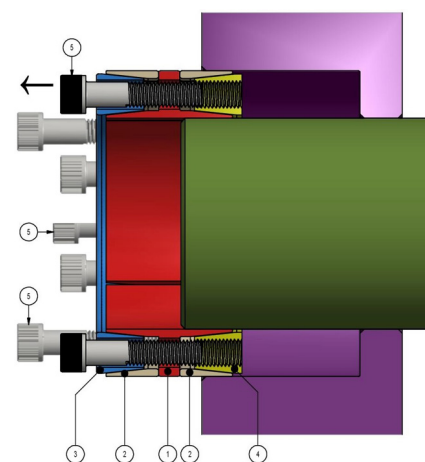
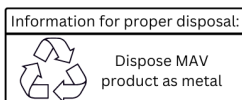


Fig. 6  
Removal of Locking Assembly



# LOCKING ASSEMBLY MAV 4081

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to machinery or persons resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 4081 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies MAV 4081 are supplied ready for installation and are composed of (fig. 1):**

- One inner ring (slotted)
- One outer ring (slotted)
- One double-cone front thrust ring
- One double-cone rear thrust ring
- One central ring for removal
- One set of socket head cap screws ISO 4762 grade 12.9

#### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

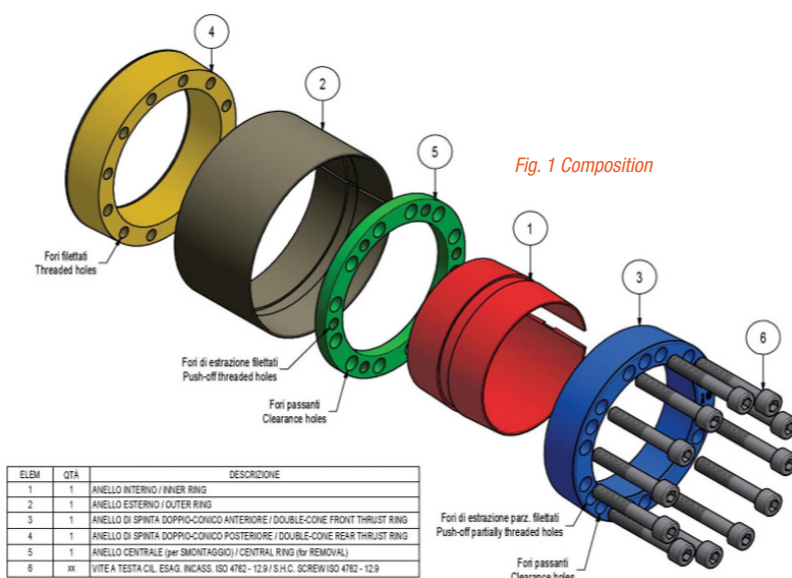
Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

#### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.6 \cdot Ma$  (max reduction by 40%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.



# LOCKING ASSEMBLY MAV 4081

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 4081 are supplied ready for installation. **Do not disassemble.** During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. **For ease of installation, thrust rings shall be disengaged (fig. 2).** Loosen all screws by two/three turns; then transfer and hand tighten at least two screws into the push-off threaded holes in the front thrust ring and slightly tap the head of remaining screws with an hammer.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. Push the screws engaged into the rear thrust ring only. **Inner respectively outer rings shall be completely supported by shaft respectively hub bore.** At this point, relocate the screws used to disengage the front thrust ring. Installation into hubs with shoulder requires a few mm's gap between rear thrust ring and shoulder.
4. Tighten the screws by hand in a crosswise pattern (fig. 3) until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required. Alignment of hub respect to shaft may be checked using a dial indicator (fig. 4). **Better centering of connected parts from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. For better centering result, it is recommended to check the alignment of hub respect to shaft with a dial indicator after each tightening pass (fig. 4).
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6.

NOTE: for connections subject to corrosion, slits in inner and outer rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

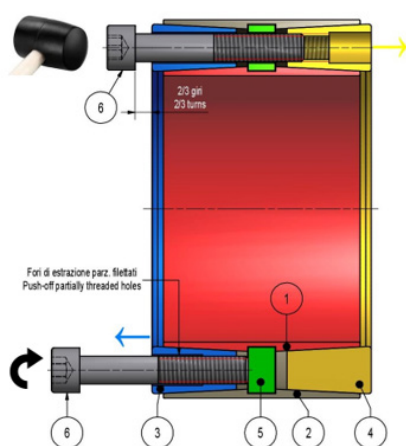


Fig. 2  
Disengagement of thrust rings

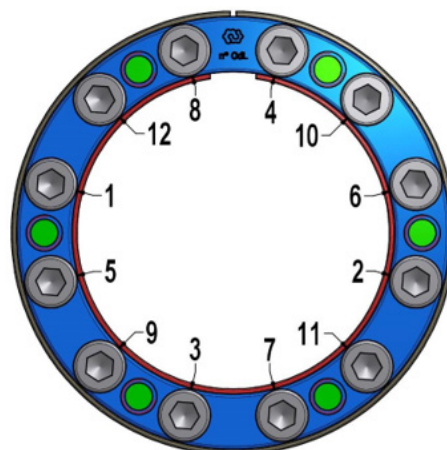


Fig. 3  
Example of tightening pattern

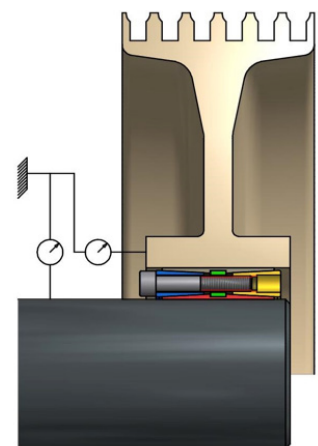


Fig. 4  
Check of shaft/hub alignment

# LOCKING ASSEMBLY MAV 4081

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of both front and rear thrust rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off partially threaded holes in the front thrust ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until front thrust ring is released (fig. 5). Remove the screws still engaged in the rear thrust ring; then remove the front thrust ring.
3. Transfer some screws into all push-off threaded holes in the central ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until rear thrust ring is released (fig. 6). Leave these screws in place after rear thrust ring is released.
4. Insert two/three screws into corresponding threaded holes in the rear thrust ring. Hold the head of these screws and pull them out in order to remove inner ring, outer ring, central ring, rear thrust ring all together from hub bore (fig. 7).

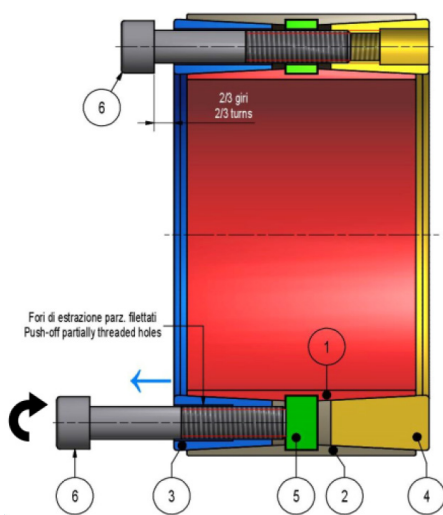


Fig. 5  
Release of front thrust ring

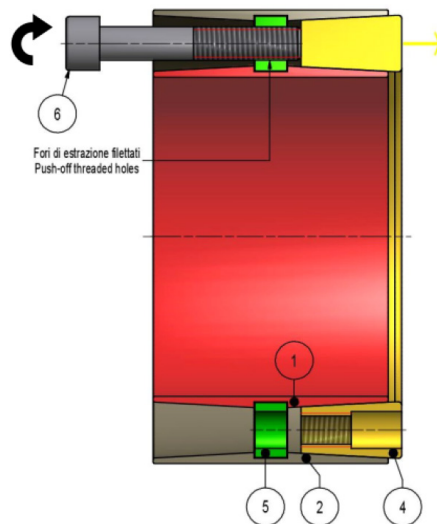


Fig. 6  
Release of rear thrust ring

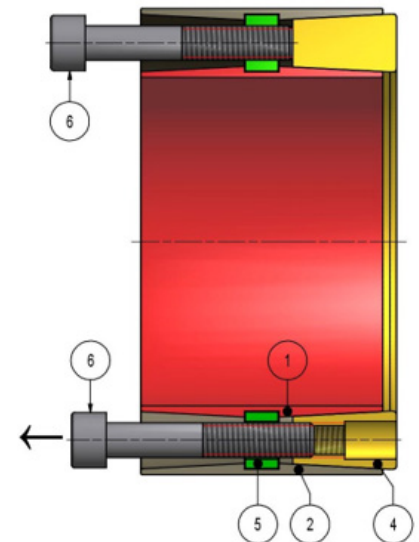


Fig. 7  
Removal of Locking Assembly

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLY MAV 4081 SPECIAL W/ GROUND FLAT & CHAMFERED SCREWS

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to machinery or persons resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 4081 SPECIAL W/ GROUND FLAT & CHAMFERED SCREWS provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via friction across the fitting surfaces of shaft and Locking Assembly and Locking Assembly and hub bore. In tightened condition, the Locking Assembly exerts high radial pressure on shaft and in hub bore.

**Locking Assemblies MAV 4081 SPECIAL W/ GROUND FLAT & CHAMFERED SCREWS are supplied ready for installation and are composed of (see fig. 1):**

- One inner ring
- One outer ring
- One front thrust ring
- One rear thrust ring
- One central ring for removal
- One set of socket head cap screws ISO 4762 grade 12.9 with ground flat and chamfered end tip

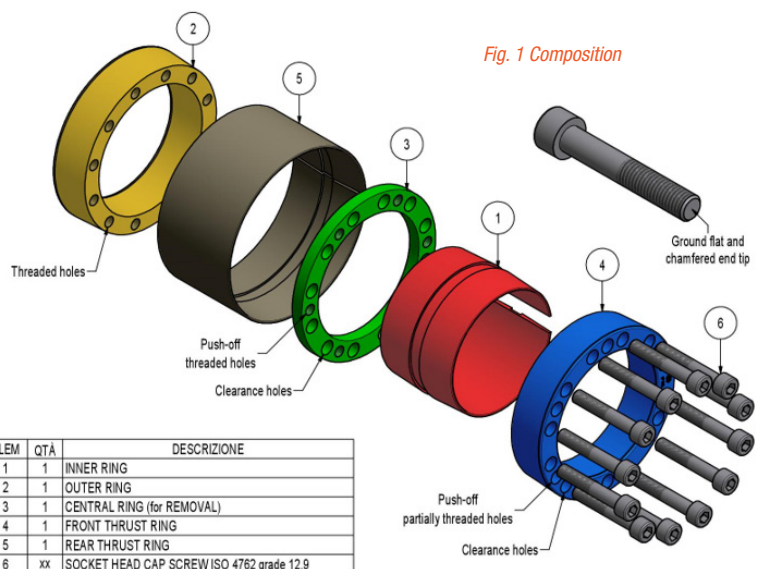
### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar components (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8.

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.



ELEM	QTA	DESCRIZIONE
1	1	INNER RING
2	1	OUTER RING
3	1	CENTRAL RING (for REMOVAL)
4	1	FRONT THRUST RING
5	1	REAR THRUST RING
6	xx	SOCKET HEAD CAP SCREW ISO 4762 grade 12.9

# LOCKING ASSEMBLY MAV 4081 SPECIAL W/ GROUND FLAT & CHAMFERED SCREWS

## Installation and Removal Instructions



### INSTALLATION

Locking Assemblies MAV 4081 SPECIAL W/ GROUND FLAT & CHAMFERED SCREWS are supplied ready for installation. **Do not disassemble.** During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, tapers of thrust rings need to be disengaged (see fig. 2). In order to release the tapers of the front thrust ring, loosen all screws by minimum 2 turns; then transfer and hand tighten at least 2 screws into the push-off threads. In order to release the tapers of the rear thrust ring, slightly tap the head of remaining screws with a hammer.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft. Push the screws engaged into the rear thrust ring only. **Inner respectively outer rings shall be completely supported by shaft respectively hub bore.** At this point, relocate the screws used to release the tapers of the front thrust ring.
4. Tighten the screws by hand in a crosswise pattern (see fig. 3 as example) until fitting clearances with shaft and hub bore are bridged, while making sure that the hub is aligned as required. Alignment of hub respect to shaft may be checked using a dial indicator (see fig. 4). **Better centering of connected parts from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma). **Tighten the screws in a crosswise pattern (see fig. 3 as example), using approx. ¼ turns (even if initially some screws require a very low torque to achieve ¼ turns) for several passes** until ¼ turns can no longer be achieved. For better centering result, it is recommended to check the alignment of hub respect to shaft with a dial indicator after each tightening pass (see fig. 4).
6. Still apply overtorque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach the specified tightening torque.
7. Reset the torque wrench to the specified tightening torque (Ma) and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6 for 1 or 2 more passes.

NOTE: for connections subject to extreme corrosion, the slits in inner and outer rings should be sealed with a suitable caulking compound or equivalent. Likewise, push-off threads should also be protected from corrosion.

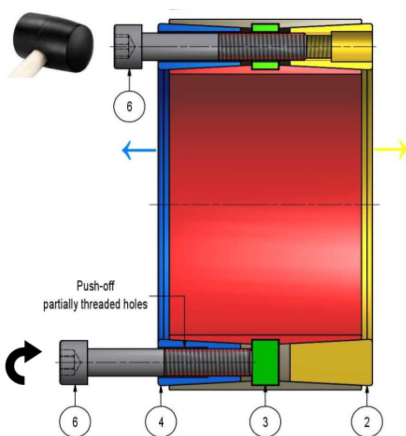


Fig. 2  
Release of tapers of thrust rings

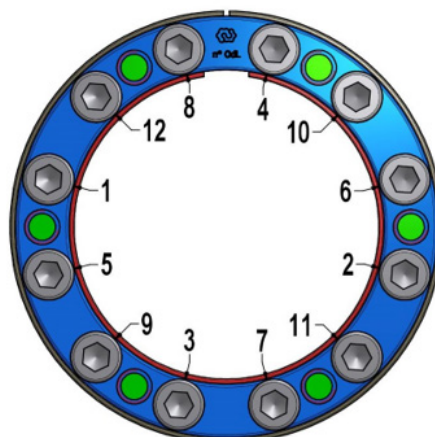


Fig. 3  
Example of tightening pattern

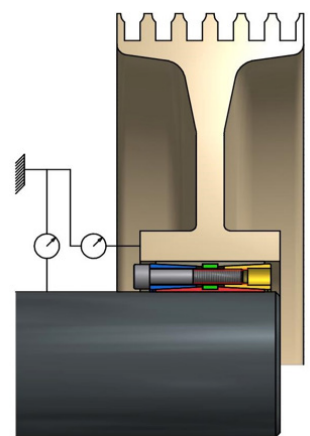


Fig. 4  
Check of shaft/hub alignment

# LOCKING ASSEMBLY MAV 4081 SPECIAL W/ GROUND FLAT & CHAMFERED SCREWS

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

**Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Some locking screws will be used for removal. In order to prevent damages to the threads of screws used for removal and allow their removal from push-off threads, **all locking screws are supplied with ground flat and chamfered end tip.**

1. Ensure that axial movement of both front and rear thrust rings – necessary for removal – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Remove all locking screws and transfer some into all push-off threads located in front thrust ring.
3. Release the front thrust ring by tightening the screws in all push-off threads against central ring in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes (see fig. 5). Remove the front thrust ring.
4. Transfer the screws used for releasing of front thrust ring into all push-off threads located in central ring.
5. Release the rear thrust ring by tightening the screws in all push-off threads against rear thrust ring in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes (see fig. 6). Hub and released Locking Assembly are then normally removed together from the shaft.

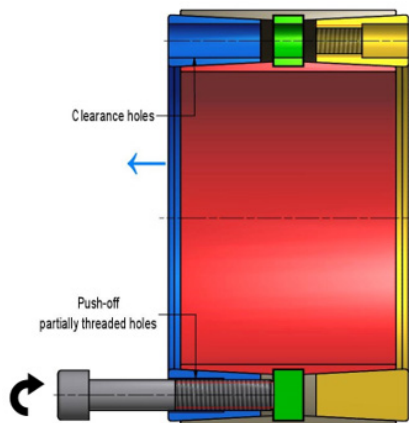


Fig. 5  
Release of front thrust ring

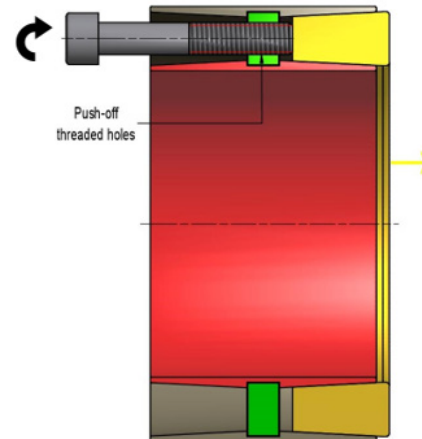


Fig. 6  
Release of rear thrust ring

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLY MAV 5061

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 5061 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

#### Locking Assemblies are supplied ready for installation and are composed of (fig. 1):

- One inner ring (slotted), with integrated push-off threaded holes
- One outer ring (slotted)
- One spacer ring
- One set of socket head cap screws ISO 4762 grade 12.9

#### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h11 max / H11 max

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

#### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.8 \cdot Ma$  (max reduction by 20%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

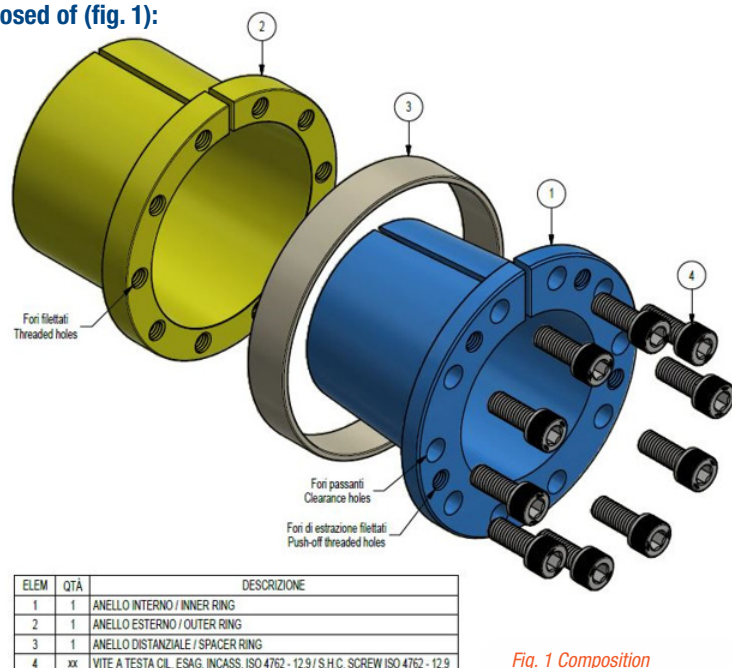


Fig. 1 Composition

# LOCKING ASSEMBLY MAV 5061

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 5061 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the slits in inner and outer rings are aligned. The unit is assembled correctly if there are no holes in the outer ring behind threaded holes in the inner ring. During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand-tighten at least two screws into the push-off threaded holes in the inner ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner and outer rings shall be completely supported by shaft respectively hub bore (fig. 2).** At this point, relocate the screws used to disengage the locking rings. Installation into hubs with shoulder requires a few mm's gap between outer ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit (fig. 4), until the **spacer ring is in full contact with inner ring's flange and face of the hub (fig. 3)**, fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.** During this step, a very light axial displacement of hub respect to shaft may occur.
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 4), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

NOTE: for connections subject to corrosion, slits in inner and outer rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

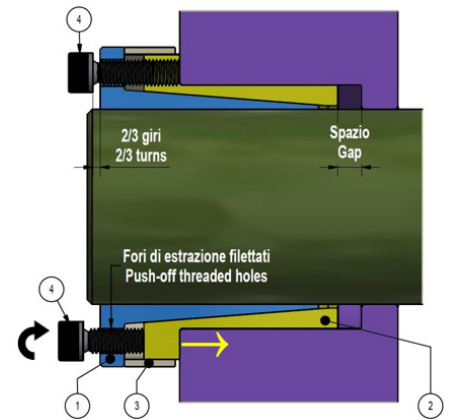


Fig. 2  
Disengagement of locking rings and positioning of Locking Assembly

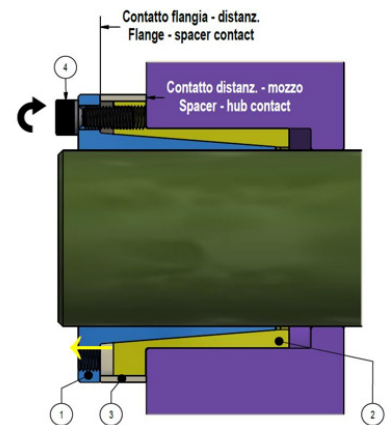


Fig. 3  
Pre-tightening

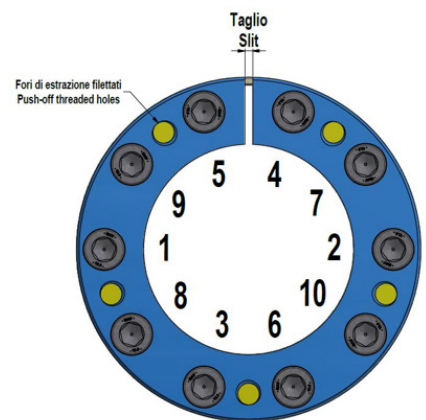


Fig. 4  
Example of tightening pattern

# LOCKING ASSEMBLY MAV 5061

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of locking rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off threaded holes in the inner ring. **Progressively tighten these screws in a crosswise pattern, using approx. 1/4 turns for several passes** until the outer ring is released (fig. 5). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

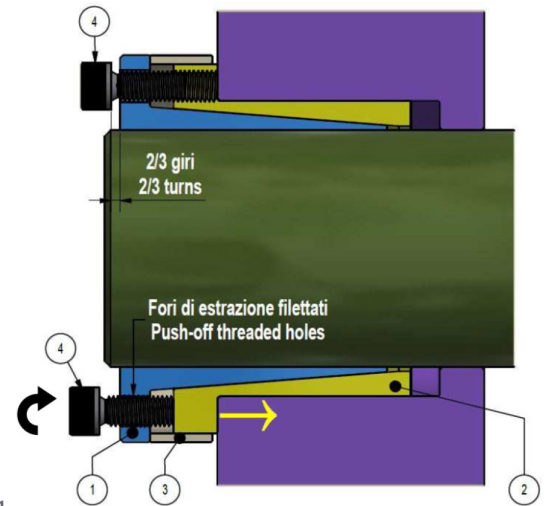


Fig. 5  
Release of outer ring

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLY MAV 6002

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance, and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 6002 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the slits in all rings are aligned. The unit is assembled correctly if there are no holes in the outer ring item [2] behind threaded holes in the inner ring item [1]. During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 1). Loosen all screws by two/three turns; then transfer and hand-tighten at least two screws item [4] (larger size) into the push-off threaded holes in the inner ring item [1].
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner and outer rings shall be completely supported by shaft respectively hub bore. The flange of inner ring shall be in full contact with the face of the hub.** At this point, relocate the screws used to disengage the locking rings. Installation into hubs with shoulder requires a few mm's gap between outer ring and shoulder.
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit (fig. 2), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws item [5] (smaller size) in a crosswise pattern (fig. 2), using approx. ¼ turns for several passes until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.**

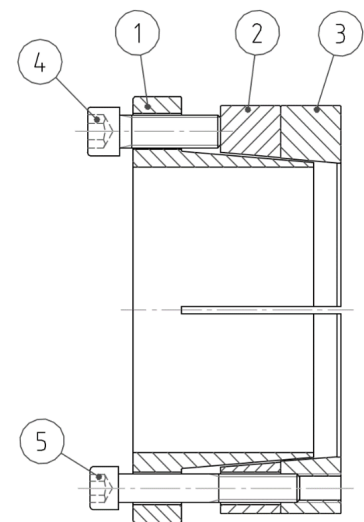


Fig. 1  
Disengagement of locking rings

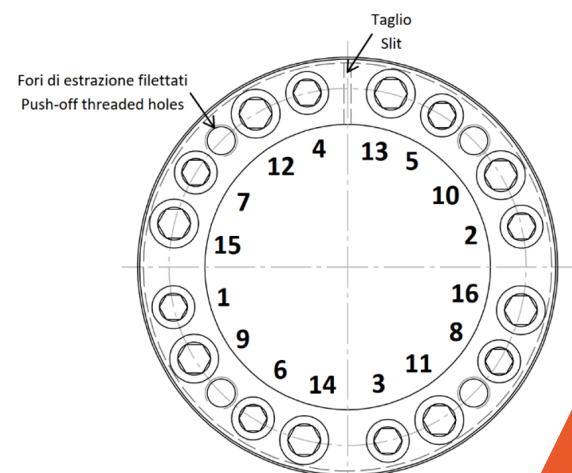


Fig. 2  
Example of tightening pattern

# LOCKING ASSEMBLY MAV 6002

## Installation and Removal Instructions



6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Repeat steps 5 and 6 for screws item [4] (larger size).
8. Reset the torque wrench to specified tightening torques (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence. The installation is completed if no screw can be turned further, otherwise repeat step 6.

### REMOVAL

#### SAFETY NOTICE

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

*IMPORTANT! The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

1. Check to ensure that axial movement of collars – necessary for release of connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Loosen all screws item [4] and transfer an adequate number of screws item [4] into all push-off threads located in flange of collar item [1].
3. Release collar item [2] by tightening all push-off screws in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes (see fig. 3).
4. Loosen all screws item [5] and release collar item [3] by re-tightening all push-off screws (see fig. 4) in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes.

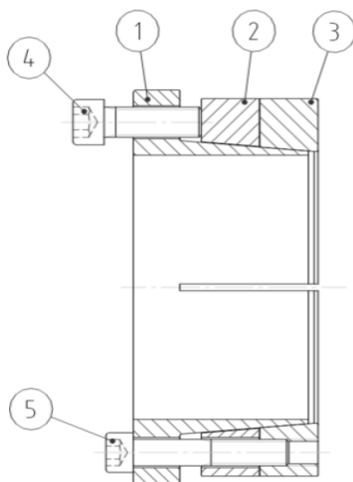


Fig. 3  
Release of outer ring item [2]

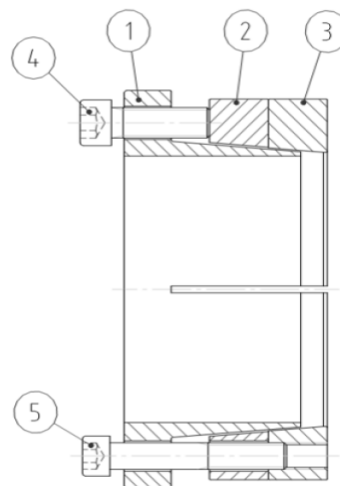


Fig. 4  
Release of outer ring item [3]

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLY MAV 6061

## Installation and Removal Instructions



MAV 6061 Locking Assemblies are supplied ready for installation. If the unit should be dismantled, make sure that all slits are aligned and outer collar item [3] is not reversed. The torque capacity of this device is based on a coefficient of friction of  $\mu=0.12$  for lightly oiled screws, tapers, shaft and hub contact areas. **Therefore, it is important NOT to use Molybdenum Disulfide (e.g., Molykote, Never-Seeze or similar lubricants) in any Locking Assembly installation.**

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface roughness:  $Ra \leq 3.2 \mu\text{m}$

### INSTALLATION - FIG 1

1. Make sure that locking screws, rings, shaft and hub contact surfaces are clean and lightly oiled, and that all slits are aligned and outer collar item [3] is not reversed.
2. Loosen all screws by minimum of 4 turns and transfer at least 3 screws to equally spaced push-off threads in front collar item [1], in order to disengage this part from outer collar item [3]. To disengage rear collar item [2] from taper interface, lightly tap heads of 3 equally spaced locking screws in front collar item [1] that have been engaged at least 4 turns into rear collar item [2]. These operations are required for easy installation of locking assembly.
3. Locking assembly can now be placed on shaft and inserted into hub bore by pushing against face of front collar item [1] while ensuring that rear collar item [2] is not engaged at tapers during this phase.
4. After installation of locking assembly, relocate locking screws used for separation of collars.
5. Hand tighten connection and assure that front collar item [1] is parallel with face of part to be attached to the shaft.
6. Use torque wrench and set it approximately 5% higher than specified tightening torque (Ma). Torque screws in a crosswise pattern, using only 1/4 turns for several passes until 1/4 turns can no longer be achieved.
7. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
8. Reset torque wrench to specified torque (Ma) and check all locking screws. No screw should turn at this point, otherwise repeat step 7 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: for installation subjected to extreme corrosion, the slits in collars item [1] and [2] as well as in outer collar item [3] should be sealed with a suitable caulking compound or equivalent. Likewise, push-off threads should also be protected with set screws or plastic plugs.

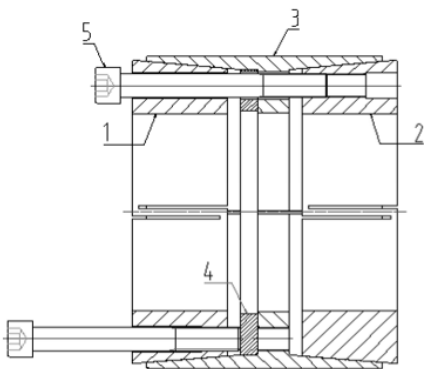


Fig. 1

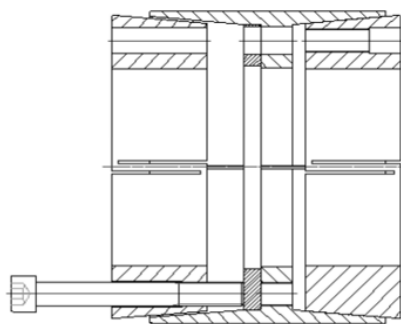


Fig. 2

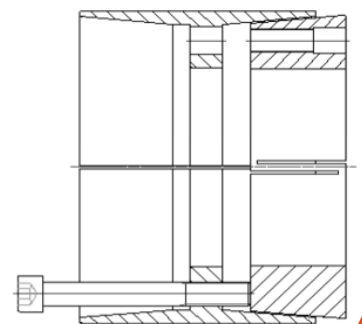


Fig. 3

# LOCKING ASSEMBLY MAV 6061

## Installation and Removal Instructions



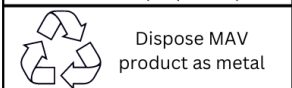
### REMOVAL - FIG 2 & 3

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

*IMPORTANT! The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

1. Check to ensure that axial movement of collars – necessary for release of connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Remove all locking screws and transfer the required number into all push-off threads in front collar item [1].
3. Release front collar item [1] by tightening all push-off screws in a crosswise pattern, not exceeding 1/4 turns for several passes. Remove front collar item [1] and dismantling ring item [4]. This latter is supplied with some threads (smaller than locking screws diameter) at the collar face for this purpose.
4. Transfer locking screws used for dismounting of front collar item [1] into all push-off threads in outer collar item [3]. Release rear collar item [2] by repeating procedure outlined in step 3.

Information for proper disposal:



# LOCKING ASSEMBLY MAV 6902

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 6902 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies are supplied ready for installation and are composed of (fig. 1):**

- One inner ring (slotted), with integrated push-off threaded holes
- One outer ring (slotted)
- One spacer ring
- One set of socket head cap screws ISO 4762 grade 12.9

#### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

#### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.8 \cdot Ma$  (max reduction by 20%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

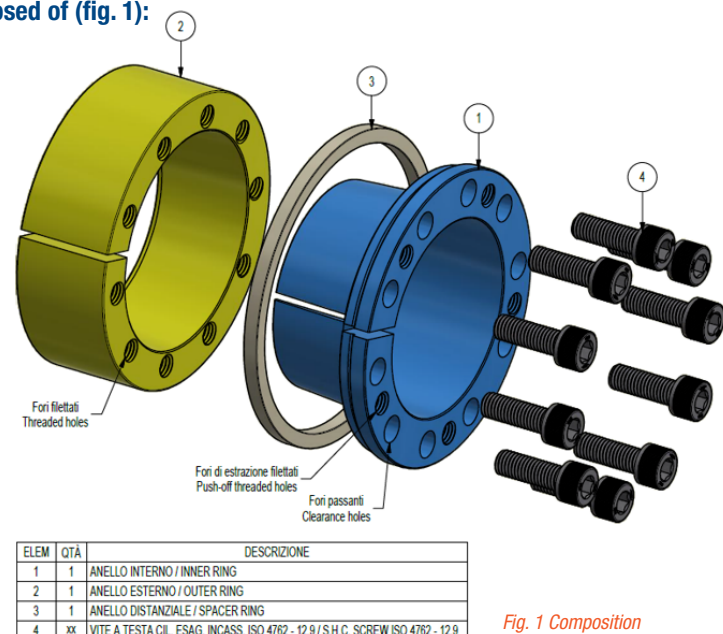


Fig. 1 Composition

# LOCKING ASSEMBLY MAV 6902

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 6902 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the slits in inner and outer rings are aligned. The unit is assembled correctly if there are no holes in the outer ring behind threaded holes in the inner ring. During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand-tighten at least two screws into the push-off threaded holes in the inner ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner and outer rings shall be completely supported by shaft respectively hub bore (fig. 2). The spacer ring shall be in full contact with inner ring's flange and face of the hub (fig. 2).** At this point, relocate the screws used to disengage the locking rings. Installation into hubs with shoulder requires a few mm's gap between outer ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. 1/4 turns for several passes until 1/4 turns can no longer be achieved.**  
Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence.  
The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

NOTE: for connections subject to corrosion, slits in inner and outer rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

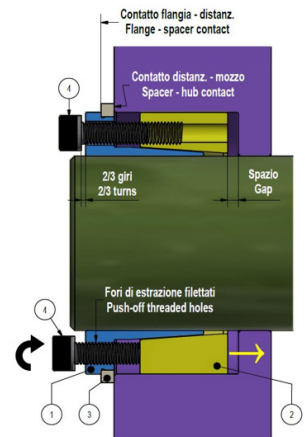


Fig. 2  
Disengagement of locking rings  
and positioning of Locking Assembly

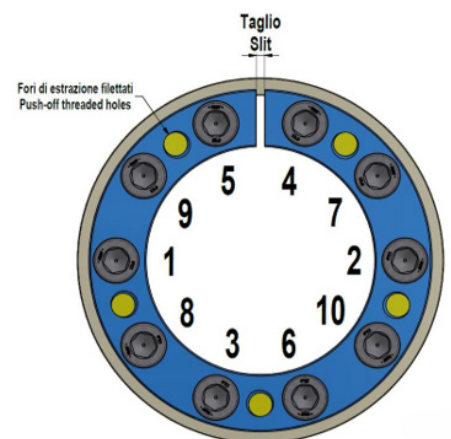


Fig. 3  
Example of tightening pattern

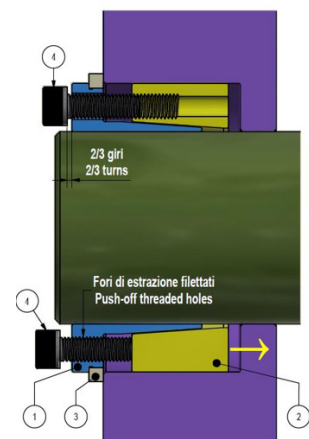


Fig. 4  
Release of outer ring

# LOCKING ASSEMBLY MAV 6902

## Installation and Removal Instructions



### REMOVAL

#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of locking rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off threaded holes in the inner ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the outer ring is released (fig. 4). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

Information for proper disposal:



Dispose MAV  
product as metal

# LOCKING ASSEMBLY MAV 6903

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Locking Assembly are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Locking Assemblies MAV 6903 provide a rigid, zero-backlash, frictional keyless connection between a shaft and hubs such as gears, pulleys, cams, levers, rotors and many others. They are suited for transmitting torque, axial load, bending moment and radial load, separately or in combination. Locking Assemblies MAV 6903 are specifically designed for axial locking of elements adjacent to the hub (e.g. bearings). During tightening, the displacement of the outer ring generates an axial force which, through the hub and spacer rings, is transmitted to the adjacent element. **Functional values in the catalog are rated considering that the hub does not move axially during tightening of the Locking Assembly.** Applied loads are transmitted via pressure and friction across the fitting surfaces between Locking Assembly, shaft and hub bore. In tightened condition, Locking Assemblies exert high radial pressure on shaft and in hub bore.

**Locking Assemblies are supplied ready for installation and are composed of (fig. 1):**

- One inner ring (slotted)
- One outer ring (slotted), with integrated push-off threaded holes
- One set of socket head cap screws ISO 4762 grade 12.9

#### Lubrication

Functional values are rated with **screws, locking rings, shaft and hub contact areas coated with a film of mineral or synthetic-base oil** with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DON'T USE low friction lubricants** based on molybdenum disulphide, graphite, copper and other similar compounds (e.g., Molykote®, Never-Seeze® or similar products).

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface finish:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$

#### Tightening torque

Functional values in the catalog are based on specified tightening torque (Ma). Tightening torque may be reduced up to  $0.8 \cdot Ma$  (max reduction by 20%). A given reduction of tightening torque leads to a proportional reduction of functional values.

After installation is completed, it is usually not necessary to re-check tightening torque after equipment has been in operation. However, loosening of the screws may occur in connections subject to severe operating conditions. In these instances, periodic check of screws tightening torque is recommended.

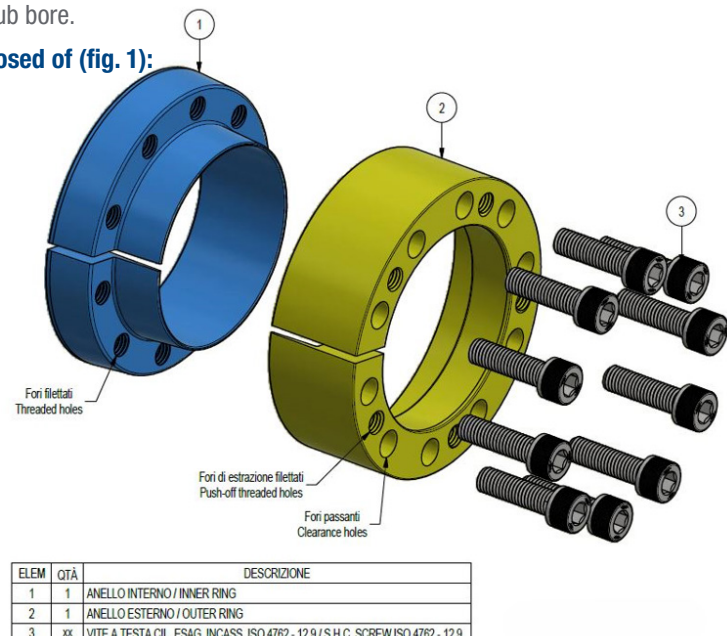


Fig. 1 Composition

# LOCKING ASSEMBLY MAV 6903

## Installation and Removal Instructions



### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Locking Assemblies MAV 6903 are supplied ready for installation. Should the unit be disassembled and re-assembled, make sure that the slits in all rings are aligned. The unit is assembled correctly if there are no holes in the inner ring behind threaded holes in the outer ring. During tightening of Locking Assembly, no axial displacement of hub respect to shaft will occur.

1. Make sure that screws, locking rings, shaft and hub contact areas are clean and coated with a film of oil.
2. For ease of installation, locking rings shall be disengaged (fig. 2). Loosen all screws by two/three turns; then transfer and hand-tighten at least two screws into the push-off threaded holes in the outer ring.
3. Insert Locking Assembly into the hub bore and make it slide onto the shaft, making sure that connected components are positioned as required. **Inner and outer rings shall be completely supported by shaft respectively hub bore (fig. 2). The rear face of the hub shall be in full contact with the adjacent element; the elements adjacent to the hub shall be axially fixed on the shaft (fig. 2).** At this point, relocate the screws used to disengage the locking rings. Installation into hubs with shoulder requires a few mm's gap between inner ring and shoulder (fig. 2).
4. Tighten the screws by hand in a crosswise pattern, starting with a screw located at 90° approx. respect to slit (fig. 3), until fitting clearances with shaft and hub bore are bridged and connected components are slightly locked, while making sure that hub is aligned as required using a dial indicator. **Better centering of hub from the beginning of installation is essential for better centering when installation is completed.**
5. Use a torque wrench set approx. 5% higher than specified tightening torque (Ma), or reduced within admissible value. **Progressively tighten the screws in a crosswise pattern (fig. 3), using approx. ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.
6. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of the screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, a very large number of passes would be needed to reach specified tightening torque.
7. Reset the torque wrench to specified tightening torque (Ma), or reduced within admissible value, and check all screws in either a clockwise or counterclockwise sequence.  
The installation is completed as long as no screw can be turned further, otherwise repeat step 6. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush.

NOTE: for connections subject to corrosion, slits in all rings should be sealed with a suitable caulking compound and push-off threads should be plugged. Locking Assembly may also be protected with specific covers.

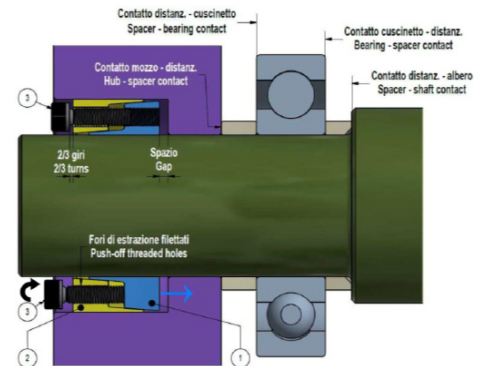


Fig. 2  
Disengagement of locking rings  
and positioning of Locking Assembly

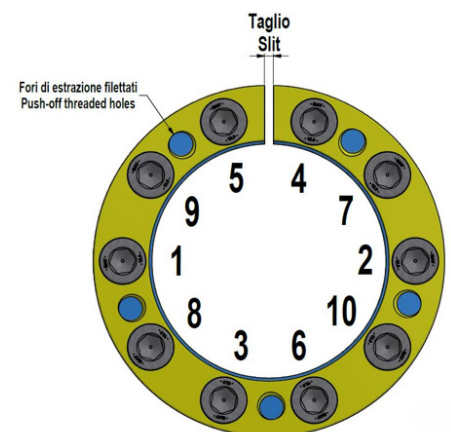


Fig. 3  
Example of tightening pattern

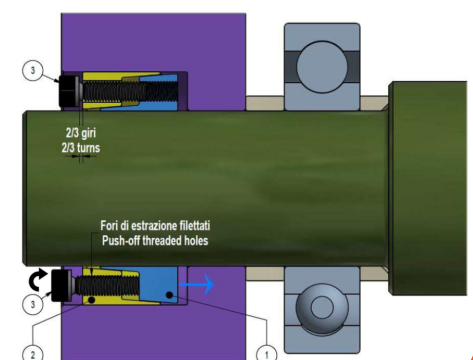


Fig. 4  
Release of inner ring

# LOCKING ASSEMBLY MAV 6903

## Installation and Removal Instructions



### REMOVAL

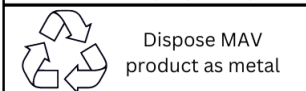
#### SAFETY NOTICE

Prior to initiating the removal procedure, check to ensure that no loads are acting on Locking Assembly, shaft or any connected component. Motor and drive train must be switched off and secured against accidental activation.

Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, in order to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.

1. Ensure that axial movement of locking rings – necessary for removal – is not restricted. Likewise, ensure that push-off threaded holes are in good conditions.
2. Loosen all screws by two/three turns; then transfer some screws into all push-off threaded holes in the outer ring. **Progressively tighten these screws in a crosswise pattern, using approx. ¼ turns for several passes** until the inner ring is released (fig. 4). Start with a screw located at 90° approx. respect to slit; screws adjacent to slit shall be tightened in a row.

Information for proper disposal:



# LOCKING ASSEMBLY MAV 7061

## Installation and Removal Instructions



MAV 7061 Locking Assemblies are supplied ready for installation. Should the unit be dismantled, re-assemble locking rings as shown in figure 1. Make also sure that slits in all locking rings are in-line. Torque capacity of this series is rated for lightly oiled screws, tapers, shaft and hub contact areas with mineral or synthetic-base oil, with low content of additives (specific corrosion-protection purpose products as well as products used to release oxidized connections are not recommended). **DO NOT USE Molybdenum Disulphide or low-friction lubricants (e.g. MOLYKOTE®, NEVER-SEEZ® or equivalent products).**

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface roughness:  $0,8 \leq Ra \leq 3,2 \mu\text{m}$

### INSTALLATION - FIG 1 & 2

During tightening of Locking Assembly, a slight axial displacement of hub respect to shaft may occur.

1. Make sure that locking screws, rings, shaft and hub contact surfaces are clean and lightly oiled and that unit is assembled correctly.
2. In order to disengage tapers for easy installation of Locking Assembly, loosen all screws items [5] by minimum 2 turns and transfer at least 2 screws into push-off threads in front inner ring item [1] and lightly tap the head of 3 equally spaced screws that are engaged into rear inner ring item [4].
3. Insert Locking Assembly into hub bore, then insert shaft. At this point, transfer screws used to separate locking rings back to their original position.
4. Hand tighten locking screws items [5], starting from a screw located at  $90^\circ$  approx. respect to slit. Make sure that front inner ring item [1] is parallel with face of hub.
5. Use a torque wrench and set it approx. 5% higher than specified tightening torque (Ma). Torque screws items [5] in a crosswise pattern, using only  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved. Start from a screw located at  $90^\circ$  approx. respect to slit; screws adjacent to slit shall be tightened in a row (see fig. 2 showing an example of tightening pattern).
6. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
7. Reset torque wrench to specified tightening torque (Ma). Check to ensure that none of the locking screws items [5] turn at this torque value, otherwise repeat Step 6 for 1 or 2 more passes. Once tightening procedure is completed, make sure that surfaces adjacent to slit are flush (front inner ring item [1] shall not be twisted). It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: for installation subjected to extreme corrosion, slits in locking rings shall be sealed with a suitable caulking compound or equivalent. Likewise, push-off holes shall be protected from corrosion.

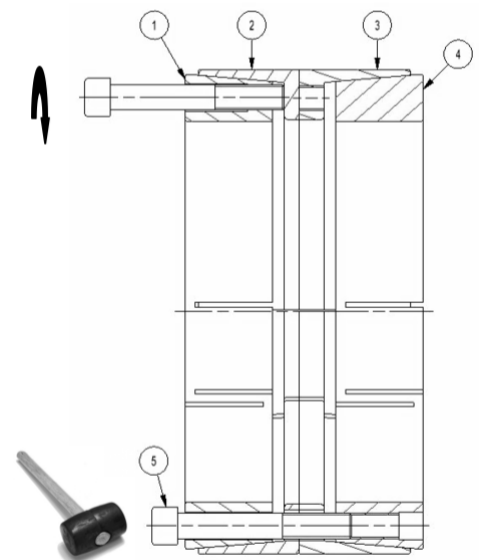


Fig. 1

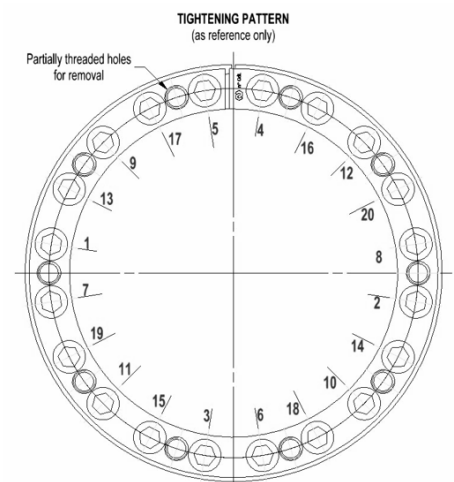


Fig. 2

# LOCKING ASSEMBLY MAV 7061

## Installation and Removal Instructions



### REMOVAL - FIG 3 & 4

**WARNING!** Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on Locking Assembly, shaft or any mounted components. Power switches shall be off and locked out.

**IMPORTANT!** The final user must ensure that end tips of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and threads in locking rings during push-off. Screws with ground flat and chamfered end tips are not supplied by MAV. The final user has to take charge of machining of end tips of screws.

1. Check to ensure that axial movement of locking rings – necessary for release of the connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Remove all locking screws items [5] and transfer some into all push-off threads in front inner ring item [1]. Release front inner ring item [1] by tightening all push-off screws in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes.
3. Remove front inner ring item [1] and front outer ring item [2] using the smaller threads if needed.
4. Transfer locking screws used for releasing of front inner ring item [1] into all push-off threads in rear outer ring item [3]. Release rear inner ring item [4] by tightening all push-off screws in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes.

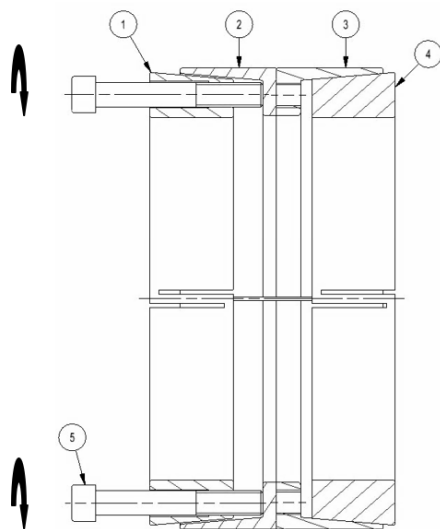


Fig. 3

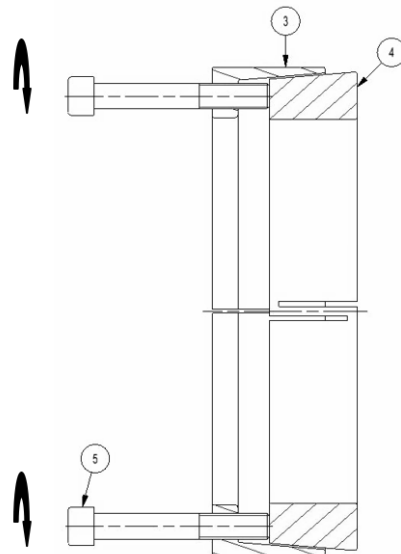


Fig. 4



# LOCKING ASSEMBLY MAV 7107

## Installation and Removal Instructions



MAV 7107 Locking Assemblies are supplied ready for installation. The torque capacity of these devices is based on a coefficient of friction of  $\mu=0.12$ , for lightly oiled screws, tapers, shaft and hub contact areas. **Therefore, it is important NOT to use Molybdenum Disulfide (e.g., Molykote, Never-Seeze or similar lubricants) in any Locking Assembly installation.**

Recommended shaft / hub bore tolerances: h8 / H8

Recommended shaft / hub bore surface roughness:  $Ra \leq 3.2 \mu\text{m}$

- Application type A – axially free hub (fig. 1). The hub must be provided with shoulder, and hub's seat for the locking assembly must be as wide as length of outer ring item [2]. Transmissible torque and contact pressures = 1,58 x values on catalog.
- Application type B – axially fixed hub (fig. 2). The hub must be located in contact with flange of inner ring item [1]. Rear flange item [4] is not supplied along with locking assembly. Application type B requires longer screws than those supplied with locking assembly. Transmissible torque and contact pressures = 1 x values on catalog.

### INSTALLATION

1. Make sure that locking screws, rings, shaft and hub contact surfaces are clean and lightly oiled.
2. For easy installation of locking assembly, make sure that tapers are not engaged. In case, disengage tapers manually.
3. Install the locking assembly, and position the screws into corresponding holes in the hub. Hand tighten locking screws in a crosswise pattern, until the connection is locked.
4. Use torque wrench and set it approximately 5% higher than specified tightening torque ( $M_a$ ). Torque screws in a crosswise pattern, using only 1/4 turns for several passes until 1/4 turns can no longer be achieved.
5. Still apply overtorque for 1-2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque ( $M_a$ ) and check all locking screws. No screw should turn at this point, otherwise repeat step 5 for 1 or 2 more passes. It is not necessary to re-check tightening torque after equipment has been in operation.

NOTE: for installation subjected to extreme corrosion, the slits in collars items [1] and [2] should be sealed with a suitable caulking compound or equivalent. Likewise, push-off threads should also be protected with set screws or plastic plugs.

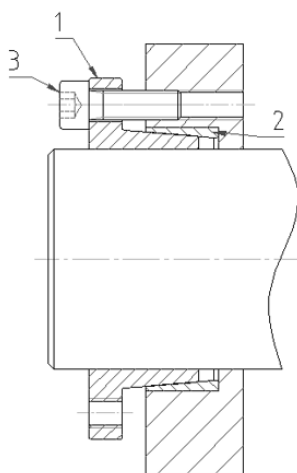


Fig. 1

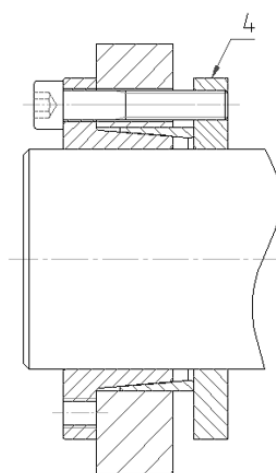


Fig. 2

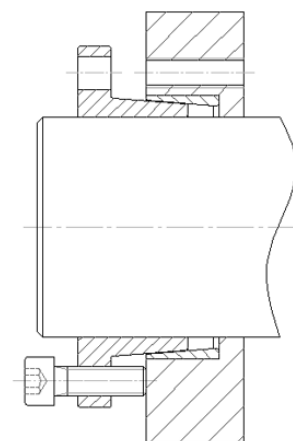


Fig. 3

# LOCKING ASSEMBLY MAV 7107

## Installation and Removal Instructions

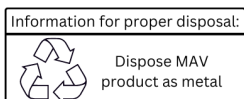


### REMOVAL - FIG 3

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Locking Assembly, shaft or any mounted components.**

*IMPORTANT! The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws, collar threads and hub's face during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

1. Check to ensure that axial movement of collars – necessary for release of connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
2. Remove the four locking screws and transfer two into the push-off threads of inner ring item [1].
3. Release the connection by tightening the push-off screws, not exceeding 1/4 turns for several passes.



# MAV CONE INTEGRATED FLANGE COUPLINGS FOR APRON FEEDER SPROCKET CONNECTIONS

## Installation and Removal Instructions



Flanged inner ring, outer ring, locking screws and flange screws of the Coupling are supplied lubricated with a film of ordinary machine oil (mineral / synthetic base oil with low content of additives,  $\mu=0.12-0.14$ ). The tapered surfaces of inner and outer rings are greased with MoS<sub>2</sub> based lubricant Dow Corning® Molykote G-Rapid Plus ( $\mu=0.05$ ). The Couplings shall not be dismantled before installation.

Before mounting the Coupling, carefully solvent clean the shaft, the Coupling's bore and the Coupling's flange face from any trace of lubricant ( $\mu=0.15$ ). This step is critical, as any lubricant on the shaft/bore/flange face contact surfaces will greatly reduce the torque capacity of the connection. Prior to tightening of locking screws it is necessary to remove wooden spacers that may have been used during shipping. The Coupling may be supplied with an O-Ring between inner and outer rings, for protection from dirt during operation. Do not remove the O-Ring.

### INSTALLATION

**Important: never tighten the locking screws prior to shaft installation, as the inner ring can be permanently contracted even at relatively low tightening torques.**

1. Put the flange screws aside.
2. Position the Coupling onto the shaft. After confirming the correct position, hand-tighten 3 or 4 evenly spaced locking screws.
3. Use a calibrated torque wrench and set it approximately 5% higher than specified locking screw tightening torque. Tighten the locking screws in either a clockwise or counterclockwise sequence, using approx. ¼ turns (even if initially some locking screws require a very low tightening torque to achieve ¼ turns) for several passes until ¼ turns can no longer be achieved.
4. Continue to apply overtorque for 2 or 3 more passes. This is required to compensate for a system-related relaxation of locking screws, since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset the torque wrench to specified tightening torque and check all locking screws. No screw should turn at this point, otherwise repeat Step 4 for more passes.
6. Once the Coupling is fixed onto the shaft, position the counterface of the sprocket against the Coupling's flange face. Insert the flange screws into the clearance holes of the sprocket and corresponding tapped holes of the Coupling's flange.
7. After confirming the correct position of the sprocket, hand-tighten 3 or 4 evenly spaced flange screws.
8. Use a calibrated torque wrench and set it at specified flange screw tightening torque. Tighten the flange screws in either a clockwise or counterclockwise sequence, until specified tightening torque is achieved.

### REMOVAL

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the Coupling, shaft or any mounted components.**

**DO NOT completely remove locking screws before outer ring is disengaged. A sudden separation of outer ring could involve high separation forces that may result in permanent injury or death. Be certain that outer ring is disengaged before completely removing locking screws.**

**IMPORTANT!** The final user must ensure that ends of locking screws used for removal are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.

1. Remove all flange screws and separate the Coupling from the sprocket.
2. Loosen all locking screws in several stages by using approx. ¼ turns, following either a clockwise or counterclockwise sequence, until the Coupling can be moved on the shaft. If the Coupling does not release, transfer an appropriate number of locking screws into the partially threaded holes in the face of the Coupling's inner ring. Progressively tighten these screws, following either a clockwise or counterclockwise sequence, until the Coupling can be moved on the shaft.

# MAV CONE INTEGRATED FLANGE COUPLINGS FOR APRON FEEDER SPROCKET CONNECTIONS

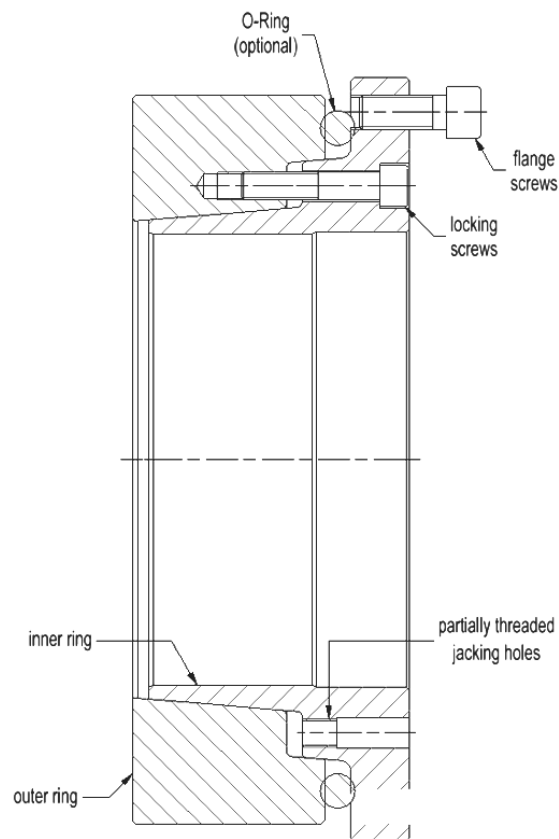
## Installation and Removal Instructions



### RE-INSTALLATION OF THE COUPLING

In relatively clean operating conditions, the Coupling may be reused without prior cleaning. In all other cases, the Coupling requires thorough cleaning and re-lubrication as follows.

- Ordinary machine oil (mineral / synthetic base oil with low content of additives) on locking screws and flange screws.
- Dow Corning® Molykote G-Rapid Plus (or equivalent) on inner and outer ring's tapers.



Information for proper disposal:



Dispose MAV  
product as metal

# FLANGE COUPLING MAV FC2008

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to machinery or persons resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Flange Coupling are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on the Coupling, shafts or any connected components. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Flange Couplings MAV FC2008 provide a frictional **rigid connection between two shafts**. **Tight alignment of drive and driven shafts is required.**

**Flange Couplings MAV FC2008 are supplied ready for installation and are composed of:**

- Two Shrink Discs MAV 2008
- One male coupling flange
- One female coupling flange
- One set of flange bolts (hex head screws grade 10.9 + nuts grade 10)

#### Use and Lubrication

Application loads are transmitted via friction across the fitting surface between shaft and flange bore. This surface must be carefully cleaned from any trace of lubricant prior to mounting flange onto shaft, to obtain a lubricant-free and dry steel-on-steel contact. **Any lubricant on the shaft/flange bore interface will greatly reduce the capacity of the connection.**

Application loads are then transmitted via friction across mating faces of the flanges (bolted connection). These faces must be carefully cleaned from any trace of lubricant, to obtain a lubricant-free and dry steel-on-steel contact. **Any lubricant on mating faces of the flanges will greatly reduce the capacity of the connection.**

Flange bolts must be lubricated with a film of ordinary machine oil (mineral/synthetic base oil with low content of additives). **DON'T USE low friction lubricants** based on  $\text{MoS}_2$ , graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products)

Recommended tolerances of shafts: if not specified otherwise by customer, refer to Shrink Disc table of tolerances according to MAV catalog. Otherwise, according to customer's specs.

Recommended surface finish of shafts:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$ .

Tight clearance fits are typical of all functional surfaces. Mounting of all parts to be achieved without heating or others forced installations.

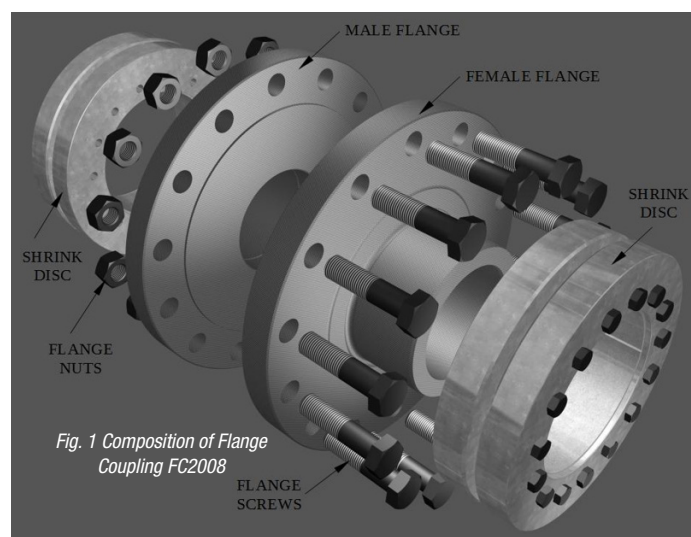


Fig. 1 Composition of Flange Coupling FC2008

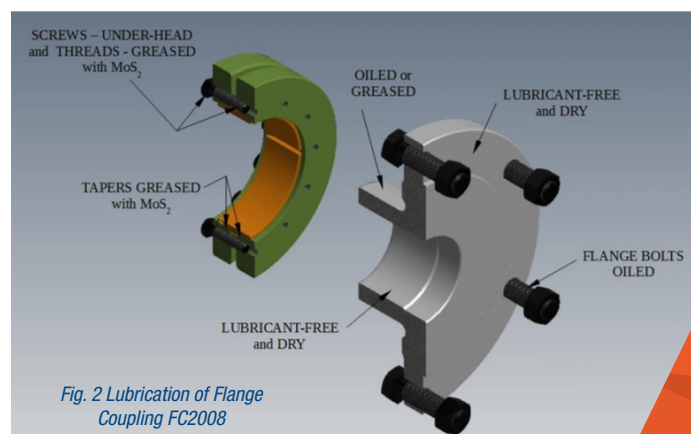


Fig. 2 Lubrication of Flange Coupling FC2008

# FLANGE COUPLING MAV FC2008

## Installation and Removal Instructions



### INSTALLATION

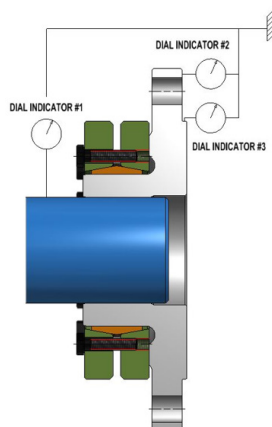
Each coupling half, composed of one flange and one Shrink Disc MAV 2008, will be fixed first on each shaft. The two coupling half assemblies will be aligned and finally bolted together.

#### Installation Of Each Coupling Half

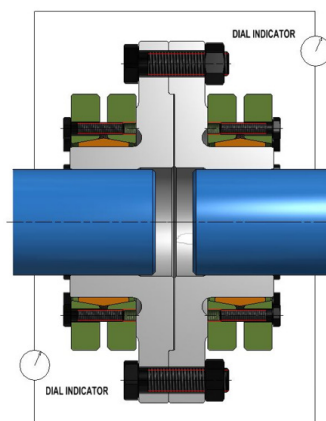
Shrink Discs MAV 2008 are supplied ready for installation. However, prior to tightening of locking screws it is necessary to remove spacers that may have been used during shipping.

**IMPORTANT. Never tighten locking screws prior to shaft installation, as inner ring of Shrink Disc and/or flange's hub can be permanently contracted even at relatively low tightening torques.**

1. Clean flange's hub OD and Shrink Disc bore. Lightly lubricate hub OD before assembling Shrink Disc onto hub.
2. Carefully solvent clean and dry shaft and flange's hub bore of any lubricant prior to mounting hub onto shaft. This step is critical, as any lubricant on the shaft/hub bore interface will greatly reduce the capacity of the Shrink Disc connection.
3. Insert Shrink Disc onto flange until it bottoms out, then make the coupling half assembly slide onto shaft by using suitable lifting equipment. **The shaft must support completely the toleranced section of flange's hub bore. Shaft end must not protrude from face of flange.** After confirming correct position of the coupling half assembly, hand-tighten 3 or 4 evenly spaced locking screws and make sure that outer collars of Shrink Disc are parallel. Hand-tighten remaining locking screws. At the end of this stage, a light connection is achieved. Flange will not move axially respect to shaft during next tightening steps.
4. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque MA. Tighten locking screws in either a clockwise or counterclockwise sequence, using approx. ¼ turns (even if initially some locking screws require a very low tightening torque to achieve ¼ turns) for several passes until ¼ turns can no longer be achieved.
5. Continue to apply overtorque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque (MA) and check all locking screws. No screw should turn at this point, otherwise repeat Step 5 for 1 or 2 more passes. Once the screws are tightened, check the parallelism of outer collars, considering that maximum allowed error is 0.35% of the outer diameter of Shrink Disc. A larger error could cause loss of pressure and, as a consequence, reduced performances.
7. Using dial indicators, check flange runout as illustrated in Figure 3.  
Indicator #1 Max 0.015 mm TIR (total indicator reading) for every 100 mm shaft diameter.  
Indicator #2 Max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.  
Indicator #3 Max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.  
Make sure runout values do not exceed listed limits. If runout is excessive, installation procedure must be repeated and flange runout rechecked. Excessive runout may generate additional stress in the coupling half assembly, promoting its premature failure.



*Fig. 3 Coupling half installed (MAV 2008 tightened) – check of runout*



*Fig. 4 Flange Coupling installed – check of runout*

# FLANGE COUPLING MAV FC2008

## Installation and Removal Instructions



### Connection Of The Two Coupling Half Assemblies

- Carefully remove any trace of lubricant from mating faces of the flanges, to obtain a lubricant-free and dry contact. Make sure that flange bolts are oiled. **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).
- With suitable lifting equipment, move drive/motor assembly into position parallel and in line with driven shaft using centering surfaces as a guide. **Centering surfaces should match without need of shrinking. Should it be necessary, don't proceed further with flanges connection** (additional stress may be generated, leading to premature failure). Adjust and recheck again the position of coupling half assemblies until correct alignment is confirmed, allowing a clearance fit between centering surfaces.
- Make sure that all flange bolt holes are aligned.
- Install and hand tighten all flange bolts.
- Set a calibrated torque wrench to specified tightening torque. **Tighten all flange bolts while allowing the drive/motor assembly to move as required to draw coupling half assemblies together (flexible support)**. Continue tightening until flanges are mated and all flange bolts are torqued to specified tightening torque.
- At this point, torque arm can be fastened to the bed frame and lifting equipment removed. For safety reasons (support of drive in case of emergency), it is recommended lifting equipment to be removed only after connection of Flange Coupling is completed.
- Using dial indicators per Figure 4, make sure that runout values are within 0.070 mm TIR (total indicator reading) for every 100 mm shaft diameter.

**RECOMMENDATION:** This kind of application is usually subjected to aggressive environment. Therefore, once connection of the two coupling half assemblies is completed, it is recommended to paint the outside of Flange Coupling with a suitable varnish.

## REMOVAL

### Removal of the Two Coupling Half Assemblies

- Do not disconnect torque arm or tie rod until Coupling is completely disconnected.**
- Use suitable equipment to remove the weight of drive/motor assembly from Coupling and driven shaft. Lifting of drive must be done very carefully: make sure that loads are balanced to prevent swinging down of drive when Coupling is disconnected.
- Loosen all flange bolts in sequence and remove them.
- Separate the two coupling half assemblies.

### Removal of Each Coupling Half (Releasing of Shrink Disc MAV 2008)

**WARNING! DO NOT completely remove locking screws before locking rings are disengaged. A sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.**

- Loosen all locking screws in several stages by using approx. ½ turns, following either a clockwise or counterclockwise sequence, until Shrink Disc can be moved on flange's hub. Shrink Disc, hub and shaft will return to their original fit clearances and can be disassembled.

# FLANGE COUPLING MAV FC2008

## Installation and Removal Instructions



### REUSE OF USED COUPLINGS

Before reuse, clean all components of the Coupling – Shrink Discs, flanges and all screws and nuts – and check their conditions. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, please contact MAV S.p.A. for advise. If in good conditions, Couplings require thorough cleaning and re-lubrication before reuse.

1. Disassemble all components of the Coupling and clean them thoroughly.
2. Re-lubricate Shrink Discs as follows:
  - Dow Corning® Molykote BR 2 Plus (or equivalent) on locking screw threads and under-head.
  - Dow Corning® Molykote G-Rapid Plus (or equivalent) on tapers of inner or outer rings.
3. Re-assemble Shrink Discs MAV 2008.
4. Re-lubricate flange screws and nuts with ordinary machine oil (mineral/synthetic base oil with low content of additives).
5. Follow these instructions for a new installation.

Information for proper disposal:



Dispose MAV  
product as metal

# FLANGE COUPLING MAV FCH2008

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to machinery or persons resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Flange Coupling are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on the Coupling, shafts or any connected components. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

Flange Couplings MAV FCH2008 provide a frictional **rigid connection between two shafts**. **Tight alignment of drive and driven shafts is required.**

**Flange Couplings MAV FCH2008 are supplied ready for installation and are composed of (see figure 1):**

- Two Shrink Discs MAV 2008
- One male coupling flange
- One female coupling flange
- One set of flange bolts (hexagonal head screws grade 10.9 + nuts grade 10)

Flange Couplings MAV FCH2008 are available in two models (see figures 2 and 3).

**Model A:** shrink discs with hexagonal head cap screws; access for tightening from outside.

**Model B:** shrink discs with socket head cap screws; access for tightening from inner face of flange.

### Use and Lubrication

Application loads are transmitted via friction across the fitting surfaces of shaft and flange bore. These surfaces must be carefully cleaned from any trace of lubricant prior to mounting flange onto shaft, to obtain a lubricant-free and dry steel-on-steel contact.

**Any lubricant on the shaft/flange bore interface will greatly reduce the capacity of the connection.**

Application loads are then transmitted via friction across mating faces of the flanges (bolted connection). These faces must be carefully cleaned from any trace of lubricant, to obtain a lubricant-free and dry steel-on-steel contact. **Any lubricant on mating faces of the flanges will greatly reduce the capacity of the connection.**

Flange bolts must be lubricated with a film of ordinary machine oil (mineral/synthetic base oil with low content of additives). **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).

Recommended tolerances of shafts: if not specified otherwise by customer, refer to Shrink Disc table of tolerances according to MAV catalog. Otherwise, according to customer's specs.

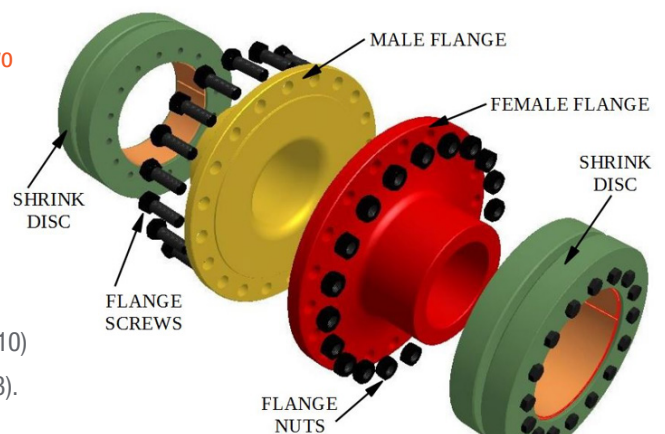


Fig. 1 Composition of Flange Coupling FCH2008

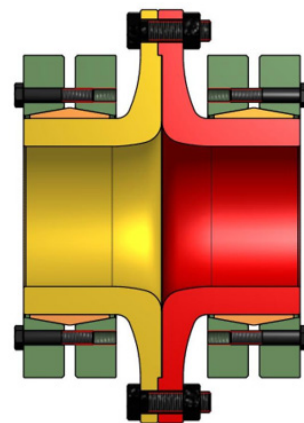


Fig. 2 Flange Coupling FCH2008 model A

# FLANGE COUPLING MAV FCH2008

## Installation and Removal Instructions



Recommended surface finish of shafts:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$ .

Tight clearance fits are typical of all functional surfaces. Mounting of all parts to be achieved WITHOUT HEATING or OTHERS FORCED INSTALLATIONS.

### INSTALLATION

Each coupling half, composed of one flange and one Shrink Disc MAV 2008, will be fixed first on each shaft. The two coupling half assemblies will be aligned and finally bolted together.

#### Installation of Each Coupling Half (Tightening of Shrink Disc MAV 2008)

Shrink Discs MAV 2008 are supplied ready for installation. However, prior to tightening of locking screws it is necessary to remove spacers that may have been used during shipping.

**IMPORTANT. Never tighten locking screws prior to shaft installation, as inner ring of Shrink Disc and/or flange's hub can be permanently contracted even at relatively low tightening torques.**

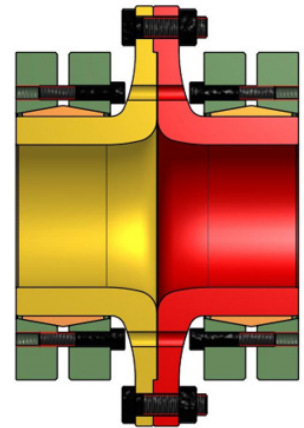


Fig. 3 Flange Coupling FCH2008 model B

1. Clean flange's hub OD and Shrink Disc bore. Lightly lubricate hub OD before assembling Shrink Disc onto hub.
2. Carefully solvent clean and dry shaft and flange's hub bore of any lubricant prior to mounting hub onto shaft. This step is critical, as any lubricant on the shaft/hub bore interface will greatly reduce the capacity of the Shrink Disc connection.
3. Insert Shrink Disc onto flange until outer faces of Shrink Disc and flange are flush (see figure 5), then make the coupling half assembly slide onto shaft by using suitable lifting equipment. **The shaft must support completely the toleranced section of flange's hub bore. Shaft end must not protrude from face of flange.** After confirming correct position of the coupling half assembly, hand-tighten 3 or 4 evenly spaced locking screws and make sure that outer collars of Shrink Disc are parallel.  
Hand-tighten remaining locking screws. At the end of this stage, a light connection is achieved. Flange will not move axially respect to shaft during next tightening steps.
4. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque MA. Tighten locking screws in either a clockwise or counterclockwise sequence, using approx.  $\frac{1}{4}$  turns (even if initially some locking screws require a very low tightening torque to achieve  $\frac{1}{4}$  turns) for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
5. Continue to apply overtorque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.
6. Reset torque wrench to specified torque MA and check all locking screws. No screw should turn at this point, otherwise repeat Step 5 for 1 or 2 more passes. Once the screws are tightened, check the parallelism of outer collars, considering that maximum allowed error is 0.35% of the outer diameter of Shrink Disc. A larger error could cause loss of pressure and, as a consequence, reduced performances.
7. Using dial indicators, check flange runout as illustrated in figure 6.  
Indicator #1 Max 0.015 mm TIR (total indicator reading) for every 100 mm shaft diameter.  
Indicator #2 Max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.  
Indicator #3 Max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.  
Make sure runout values do not exceed listed limits. If runout is excessive, installation procedure must be repeated and flange runout rechecked. Excessive runout may generate additional stress in the coupling half assembly, promoting its premature failure.

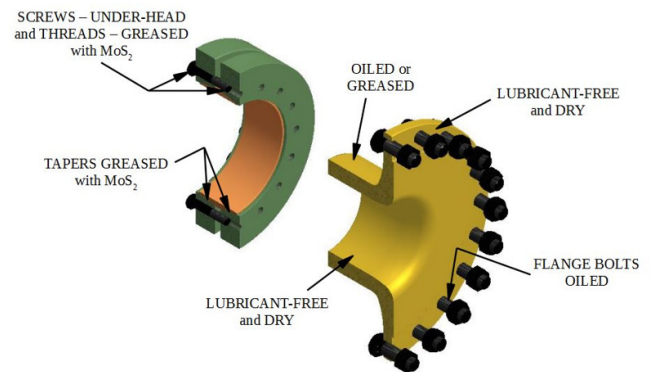


Fig. 4 Lubrication of Flange Coupling FCH2008

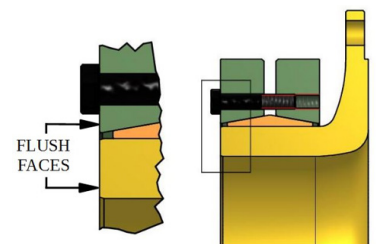


Fig. 5 Positioning of shrink disc

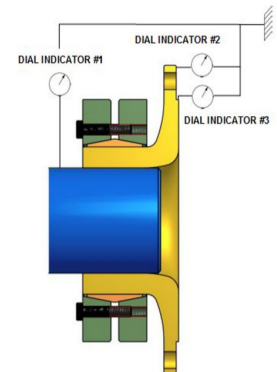


Fig. 6 Coupling half installed (MAV 2008 tightened) - check of runout

# FLANGE COUPLING MAV FCH2008

## Installation and Removal Instructions



### Connection of the Two Coupling Half Assemblies

- Carefully remove any trace of lubricant from mating faces of the flanges, to obtain a lubricant-free and dry contact. Make sure that flange bolts are oiled. **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).
- With suitable lifting equipment, move drive/motor assembly into position parallel and in line with driven shaft using centering surfaces as a guide. **Centering surfaces should match without need of shrinking. Should it be necessary, don't proceed further with flanges connection** (additional stress may be generated, leading to premature failure). Adjust and recheck again the position of coupling half assemblies until correct alignment is confirmed, allowing a clearance fit between centering surfaces.
- Make sure that all flange bolt holes are aligned.
- Install and hand tighten all flange bolts.
- Set a calibrated torque wrench to specified tightening torque. **Tighten all flange bolts while allowing the drive/motor assembly to move as required to draw coupling half assemblies together (flexible support)**. Continue tightening until flanges are mated and all flange bolts are torqued to specified tightening torque.
- At this point, torque arm can be fastened to the bed frame and lifting equipment removed. For safety reasons (support of drive in case of emergency), it is recommended lifting equipment to be removed only after connection of Flange Coupling is completed.
- Using dial indicators per Figure 7, make sure that runout values are within 0.070 mm TIR (total indicator reading) for every 100 mm shaft diameter.

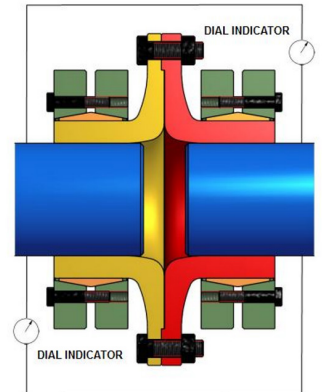


Fig. 7 Flange Coupling installed – check of runout

**RECOMMENDATION:** This kind of application is usually subjected to aggressive environment. Therefore, once connection of the two coupling half assemblies is completed, it is recommended to paint the outside of Flange Coupling with a suitable varnish.

## REMOVAL

### Removal of the Two Coupling Half Assemblies

- Do not disconnect torque arm or tie rod until Coupling is completely disconnected.**
- Use suitable equipment to remove the weight of drive/motor assembly from Coupling and driven shaft. Lifting of drive must be done very carefully: make sure that loads are balanced to prevent swinging down of drive when Coupling is disconnected.
- Loosen all flange bolts in sequence and remove them.
- Separate the two coupling half assemblies.

### Removal of Each Coupling Half (Releasing of Shrink Disc MAV 2008)

**WARNING! DO NOT completely remove locking screws before locking rings are disengaged. A sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.**

- Loosen all locking screws in several stages by using approx. ½ turns, following either a clockwise or counterclockwise sequence, until Shrink Disc can be moved on flange's hub. Shrink Disc, hub and shaft will return to their original fit clearances and can be disassembled.

## REUSE OF USED COUPLINGS

Before reuse, clean all components of the Coupling – Shrink Discs, flanges and all screws and nuts – and check their conditions. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, please contact MAV S.p.A. for advise. If in good conditions, Couplings require thorough cleaning and re-lubrication before reuse.

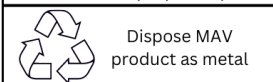
# FLANGE COUPLING MAV FCH2008

## Installation and Removal Instructions



1. Disassemble all components of the Coupling and clean them thoroughly.
2. Re-lubricate Shrink Discs as follows:
  - Dow Corning® Molykote BR 2 Plus (or equivalent) on locking screw threads and under-head
  - Dow Corning® Molykote G-Rapid Plus (or equivalent) on tapers of inner or outer rings.
3. Re-assemble Shrink Discs MAV 2008.
4. Re-lubricate flange screws and nuts with ordinary machine oil (mineral/synthetic base oil with low content of additives).
5. Follow these instructions for a new installation.

Information for proper disposal:



# FLANGE COUPLING MAV LC4171 WITH INTERNAL LOCKING ASSEMBLY MAV 4171

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation, and removal of this product must be done by skilled personnel, familiar with the product, the application, and all hazards involved.
- Suitable safety devices should be provided, and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of the Coupling are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on the Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.

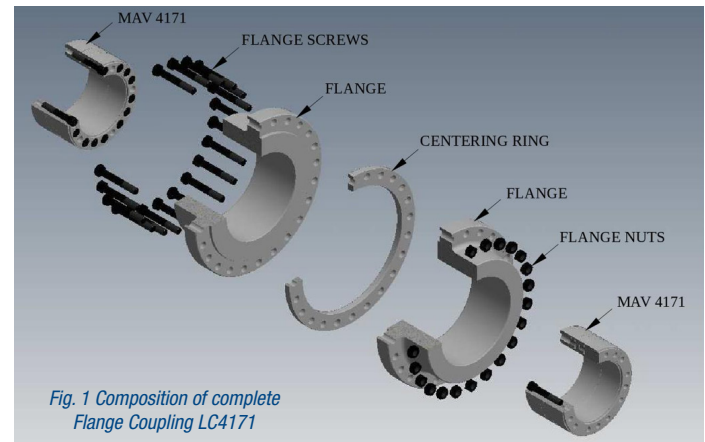


Fig. 1 Composition of complete Flange Coupling LC4171

### GENERAL INFORMATION

Flange Couplings MAV LC4171 provide a frictional **rigid connection between two shafts**. **Tight alignment of drive and driven shafts is required.**

**Flange Couplings MAV LC4171 are supplied ready for installation and are composed of:**

- Two Locking Assemblies MAV 4171, with functional surfaces and screws oiled at factory. A clamp is wrapped around the outer ring 2 to facilitate mounting of the flange. The clamp must be removed just prior to completing the insertion of the flange onto the Locking Assembly.
- Two flanges, oiled at factory.
- One centering ring, secured to one flange with clamps. The clamps must be removed only prior to connecting the two flanges.
- One set of flange bolts (screws + nuts), oiled at factory.

### Use and Lubrication

Application loads are transmitted via friction across **fitting surfaces between shaft, Locking Assembly MAV 4171 and flange bore**. **These surfaces must be lubricated with a film of mineral or synthetic base oil** with low content of additives, for a friction coefficient of 0.12 min. **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).

Application loads are then transmitted via friction across the mating surfaces of the flanges and the centering ring (bolted connection). **Mating surfaces of the flanges and centering ring must be carefully cleaned from any trace of lubricant, to obtain a grease-free and dry contact**, for a friction coefficient of 0.15 min. **Flange bolts must be lubricated with a film of mineral or synthetic base oil** with low content of additives. **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).

Recommended tolerances of shafts: according to customer's specs.

Recommended surface finish of shafts:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$ .

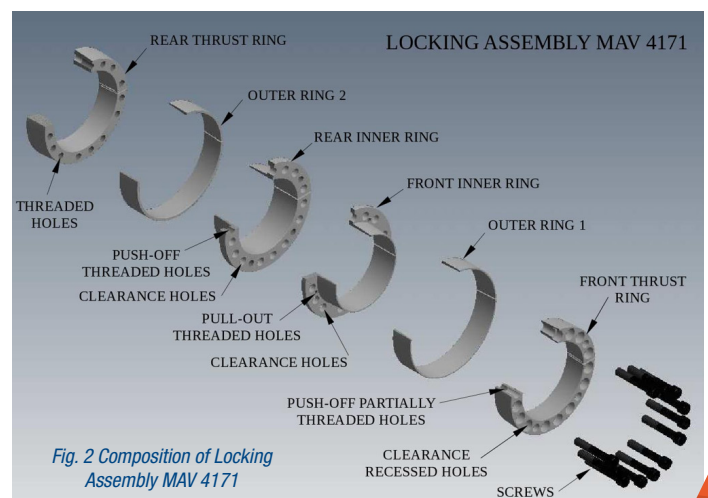


Fig. 2 Composition of Locking Assembly MAV 4171

# FLANGE COUPLING MAV LC4171 WITH INTERNAL LOCKING ASSEMBLY MAV 4171

## Installation and Removal Instructions



Tight clearance fits are typical of all functional surfaces. Mounting of all parts to be achieved WITHOUT HEATING or OTHERS FORCED INSTALLATIONS.

### INSTALLATION

#### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on the Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

Each coupling half, composed of one Locking Assembly MAV 4171 and one flange, will be fixed first on each shaft. The two coupling half assemblies will be aligned and finally bolted together.

#### Installation of Each Coupling Half

1. If necessary, take the Locking Assembly MAV 4171 apart from the flange. Make sure that the centering ring is secured to one flange during tightening of the Locking Assembly MAV 4171. Make sure that screws, rings, shaft and flange bore contact surfaces are clean and oiled and that all collar slits are aligned (fig. 6). **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).
2. **For ease of installation, locking rings shall be disengaged.** Loosen all screws by few turns, transfer some of them into the push-off threads for hand-tightening. Lightly hammer the other screws.
3. Position the Locking Assembly MAV 4171 onto the shaft with slit facing down and make the flange slide onto the Locking Assembly. Once insertion of the flange is almost completed, remove the clamp wrapped around the outer ring 2 and complete positioning of the flange. **The flange must be supported by suitable lifting equipment.** After confirming the correct position, relocate the screws used for disengagement of the rings and hand-tighten 3 or 4 evenly spaced screws. At the end of this stage, a light connection is achieved. The flange will not move axially respect to the shaft during the next tightening steps.
4. Set a calibrated torque wrench approximately 5% higher than the specified tightening torque. **Progressively tighten the screws in a crosswise pattern (fig. 5), using ¼ turns for several passes** until ¼ turns can no longer be achieved. Start with the screw located at approx. 180° from the slit. The screws adjacent to the slit shall be tightened sequentially (fig. 5).
5. Still apply overtorque for a few more passes. This is required to compensate for a system-related relaxation of screws, since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach the specified tightening torque.
6. Reset the torque wrench to the specified tightening torque and check all screws. No screw should turn at this point, otherwise repeat step 5.
7. Using dial indicators, check the runout of the shaft and of each coupling flange (fig. 7). Indicator #1 Max 0.015 mm TIR (total indicator reading) for every 100 mm shaft diameter. Indicator #2 Max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter. Indicator #3 Max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter. **The runout must not exceed the admissible limits.** If excessive, the installation procedure must be repeated, and flange runout rechecked. Excessive runout may generate additional stress in the coupling half assembly, promoting its premature failure.

**RECOMMENDATION:** This kind of application is usually subjected to aggressive environment. Therefore, once tightening of coupling half assembly is completed, it is recommended to fully protect front and rear outer sides of the Locking Assembly MAV 4171 with a suitable caulking compound (typ. waxes or silicone based sealants). Slits, holes, screw heads and critical contact areas for releasing will be protected

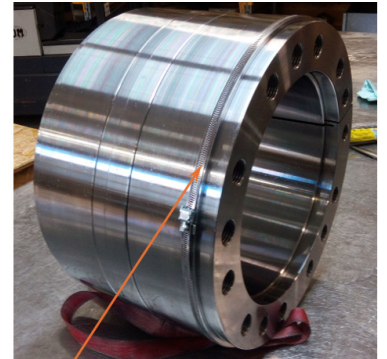


Fig. 3 Clamp around outer ring 2

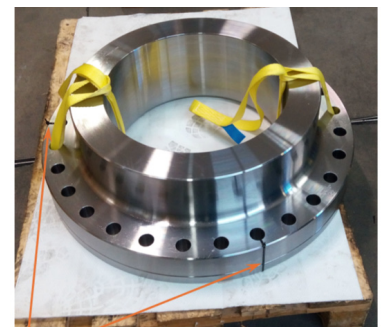


Fig. 4 Clamps securing centering ring to flange

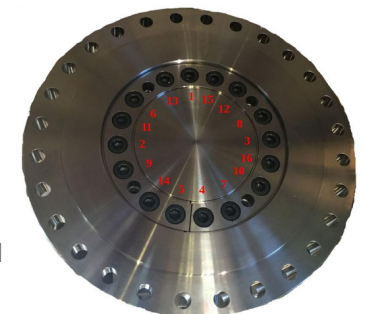


Fig. 5 Detail of screws tightening pattern (as example)

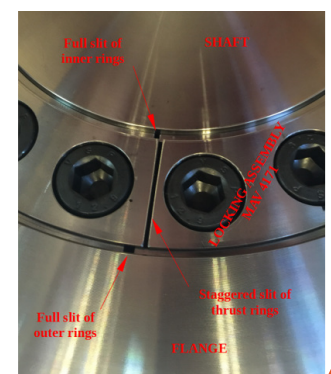


Fig. 6 Detail of slits alignment

# FLANGE COUPLING MAV LC4171 WITH INTERNAL LOCKING ASSEMBLY MAV 4171

## Installation and Removal Instructions



and removal operation will be facilitated. **Make sure that layer thickness of applied caulking compound will not protrude from flanges inner face, as well as shafts end. Approaching and correct positioning of the coupling half assemblies and shafts must not be restricted.**

### Connection Of The Two Coupling Half Assemblies

- Carefully remove any trace of lubricant from the mating faces of the flanges and centering ring, to obtain a grease-free and dry contact. Make sure that flange bolts are oiled. **DON'T USE low friction lubricants** based on  $\text{MoS}_2$ , graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).
- With suitable lifting equipment, move the drive/motor assembly into position parallel and in line with the driven shaft using the centering surfaces as a guide. **Centering surfaces must match without need of shrinking. Should it be necessary, don't proceed further with flanges connection** (additional stress may be generated, leading to premature failure). Adjust and recheck again the position of the coupling half assemblies until correct alignment is confirmed, allowing a clearance fit between the centering surfaces.
- Make sure that all flange bolt holes are aligned and remove the clamps.
- Install and hand tighten all flange bolts.
- Set a calibrated torque wrench to the specified tightening torque. **Tighten all flange bolts while allowing the drive/motor assembly to move as required to draw the coupling half assemblies together (flexible support).** Continue tightening until the flanges are mated and all flange bolts are torqued to the specified tightening torque.
- At this point, the torque arm can be fastened to the bed frame and the lifting equipment removed. **For safety reasons (support of drive in case of emergency), it is recommended that the lifting equipment is removed only after connection of the Flange Coupling is completed.**
- Using dial indicators (fig. 8), make sure that runout values are within 0.070 mm TIR (total indicator reading) for every 100 mm shaft diameter.

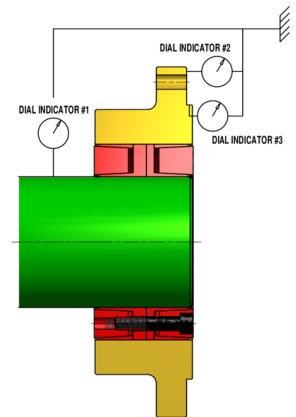


Fig. 7 Coupling half installed (MAV 4171 tightened) – check of runout

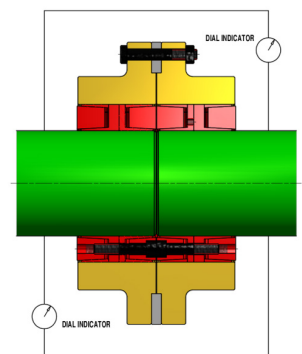


Fig. 8 Flange Coupling installed – check of runout

**RECOMMENDATION:** This kind of application is usually subjected to aggressive environment. Therefore, once the connection of the two coupling half assemblies is completed, it is recommended to paint the outside of Flange Coupling with a suitable varnish.

## REMOVAL

### SAFETY NOTICE

**Prior to initiating the installation procedure, check to ensure that no loads are acting on the Coupling, shafts or any connected component. Motor and drive train must be switched off and secured against accidental activation.**

### Removal of the Two Coupling Half Assemblies

### SAFETY NOTICE

**Do not disconnect the torque arm or tie rod until the Coupling is completely disconnected.**

**Use suitable equipment to remove the weight of the drive/motor assembly from the Coupling and the driven shaft. Lifting of the drive must be done very carefully: make sure that loads are balanced to prevent swinging down of the drive when the Coupling is disconnected.**

- Loosen all flange bolts in sequence and remove them.
- Separate the two coupling half assemblies, making sure that the centering ring will not fall (it is recommended that the centering ring is secured to one flange).

# FLANGE COUPLING MAV LC4171 WITH INTERNAL LOCKING ASSEMBLY MAV 4171

## Installation and Removal Instructions



### Removal of Each Coupling Half (Releasing of Locking Assembly MAV 4171)

*Some locking screws will be used for removal. The user shall make sure that the end tip of these screws is ground flat and chamfered, to prevent damage to the threads and allow their removal from push-off threaded holes. Screws with ground flat and chamfered end tip are not included in the scope of delivery.*

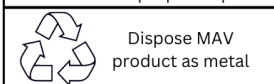
3. Remove rust, dirt, sealants if used, and make sure that axial movement of the thrust rings – necessary for release of the connection – is not restricted. Likewise, ensure that the push-off threads are in good conditions.
4. Loosen all locking screws and transfer the required number into all push-off threads of the front thrust ring.
5. Release the front thrust ring by **progressively tightening all push-off screws in a crosswise pattern, not exceeding ¼ turns for several passes. IMPORTANT! The screws may bend.** Check to ensure that bending is not excessive, or use shorter screws, with ground flat and chamfered end, of grade 12.9 (shorter screws not supplied by MAV). Remove the front thrust ring.
6. Remove the outer ring 1 and the front inner ring. To facilitate this operation, the front inner ring is provided with some pull-out threads. The diameter of these threads is smaller than the diameter of the locking screws. Threaded bars or screws used for pulling-out are not supplied by MAV.
7. Transfer the locking screws used for releasing of the front thrust ring into all push-off threads of the rear inner ring.
8. Release the rear thrust ring by **progressively tightening all push-off screws in a crosswise pattern, not exceeding ¼ turns for several passes. IMPORTANT! The screws may bend.** Check to ensure that bending is not excessive, or use shorter screws, with ground flat and chamfered end, of grade 12.9 (shorter screws not supplied by MAV).
9. Releasing operation is now completed. The rear inner ring, outer ring 2 and rear thrust ring can be removed.

### REUSE OF USED COUPLINGS

Before reuse, clean all components of the Coupling – flanges, centering ring, Locking Assemblies MAV 4171 and all bolts and nuts – and check their conditions. Permanent deformations, ovalizations, dents, corroded areas, are not admitted. If in doubt, please contact MAV S.p.A. for advice. If in good conditions, the Coupling requires thorough cleaning and re-lubrication before reuse.

1. Re-lubricate all components of the Coupling with mineral or synthetic base oil with low content of additives.
2. Re-assemble the Locking Assembly MAV 4171.
3. After confirming that flange bolt holes of the centering ring and one flange are aligned, use clamps to tightly secure the centering ring to the mating flange.
4. Follow these instructions for a new installation. Before proceeding with the connection of the two coupling half assemblies, carefully remove any trace of lubricant from the mating faces of the flanges and the centering ring.

Information for proper disposal:



# FLANGE COUPLING MAV LC7161 WITH INTERNAL LOCKING ASSEMBLY MAV 7161

## Installation and Removal Instructions



### GENERAL RECOMMENDATIONS AND WARNINGS

- Before installing or handling this product, read instructions carefully and completely. Due to possible danger to persons or machinery resulting from improper use of this product, it is very important to follow correct procedures. Proper installation, maintenance and operation procedures must be observed. All instructions included in this manual must be followed carefully. Handling, installation and removal of this product must be done by skilled personnel, familiar with the product, the application and all hazards involved.
- Suitable safety devices should be provided and applicable safety rules should be observed as specified in safety codes. Those are neither the responsibility of MAV S.p.A., nor are provided by MAV S.p.A.
- Contravention of install and safety instructions will void all claims under warranty.
- During storage or handling operations, use only tested and approved handling and/or lifting tools. Make always sure that components of Flange Coupling are secured against slipping, falling or rolling.
- Prior to initiating installation or removal procedures, check to ensure that no loads are acting on the Coupling, shafts or any connected components. Motor and drive train must be switched off and secured against accidental activation.

### GENERAL INFORMATION

#### Composition

Flange Couplings MAV LC7161 are supplied ready for installation and are composed of:

- Two Locking Assemblies MAV 7161, with rings and screws oiled at factory

Each MAV 7161 is supplied assembled into each coupling flange at factory.

- One male coupling flange, oiled at factory
- One female coupling flange, oiled at factory
- One set of flange bolts (screws + nuts), oiled at factory

#### Use and Lubrication

Flange Couplings MAV LC7161 provide a frictional **rigid connection between two shafts**. **Tight alignment of drive and driven shafts is required**. Application loads are transmitted via friction across fitting surfaces of shaft, Locking Assembly MAV 7161 and flange bore. These surfaces shall be lubricated with a film of ordinary machine oil (mineral/synthetic base oil with low content of additives). **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products), **as they will greatly reduce the capacity of the connection**.

Application loads are then transmitted via friction across mating faces of the flanges (bolted connection). These faces shall be carefully solvent-cleaned from any trace of lubricant, to obtain a lubricant-free and dry steel-on-steel contact. **Any lubricant on mating faces of the flanges will greatly reduce the capacity of the connection**.

Flange bolts shall be lubricated with a film of ordinary machine oil (mineral/synthetic base oil with low content of additives). **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).

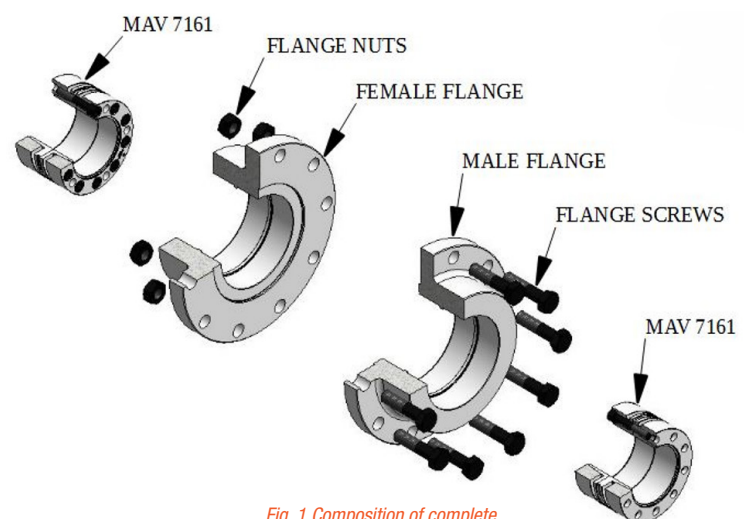


Fig. 1 Composition of complete Flange Coupling LC7161

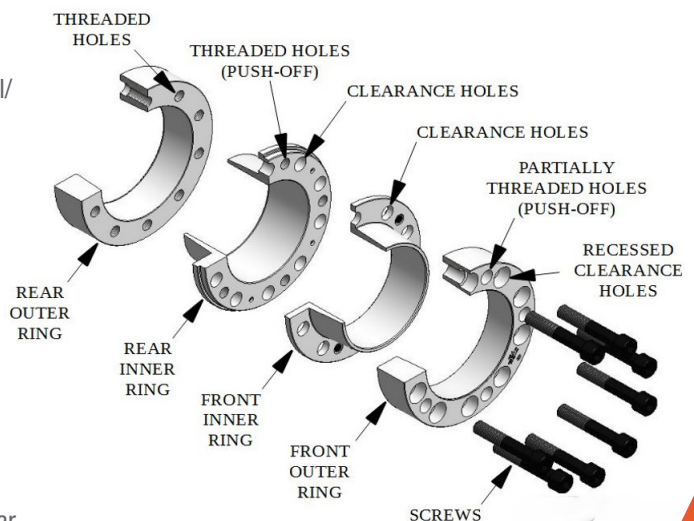


Fig. 2A Composition of Locking Assembly MAV 7161

# FLANGE COUPLING MAV LC7161 WITH INTERNAL LOCKING ASSEMBLY MAV 7161

## Installation and Removal Instructions



Recommended tolerances of shafts: according to customer's specs.

Recommended surface finish of shafts:  $0.8 \leq Ra \leq 3.2 \mu\text{m}$ .

Tight clearance fits are typical of all functional surfaces. Mounting of all parts to be achieved WITHOUT HEATING or ANY OTHER FORCED INSTALLATION.

### INSTALLATION

#### Installation Of Each Coupling Half

Each coupling half, composed of one Locking Assembly MAV 7161 and one flange, is assembled at factory. Male and female coupling halves may be bolted together at factory for shipping purpose. Should this be the case, separate the two halves before installation. Each coupling half will be fixed first on each shaft. The two coupling half assemblies will be aligned and finally bolted together.

1. Make sure that screws and rings of Locking Assembly MAV 7161, as well as shaft and flange bore contact surfaces are clean and lightly oiled. **DON'T USE low friction lubricants** based on  $\text{MoS}_2$ , graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).
2. Check to ensure that slits of all locking rings are aligned. A light misalignment will be noticed in case staggered slits are machined in front and rear outer rings (see Figures 3a and 3b).
3. Loosen all screws by few turns, transfer some of them into push-off threads of front outer ring for hand-tightening. Lightly hammer the other screws. These operations might be necessary to ensure that rings are disengaged, for ease of installation.
4. By using suitable lifting equipment, slide the complete coupling half with the slits in the Locking Assembly MAV 7161 facing vertically downwards onto the shaft (Figure 4a), until the axial position as shown in Figure 4b is achieved. Relocate screws used for disengagement of rings.
5. Hand-tighten 3 or 4 evenly spaced screws uniformly and crosswise, until a light connection is achieved.
6. Using dial indicators, check the runout of shaft and coupling flange as illustrated in Figure 5.  
Indicator #1 - Runout max 0.015 mm TIR (total indicator reading) for every 100 mm shaft diameter.  
Indicator #2 - Runout max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.  
Indicator #3 - Runout max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.  
Make sure runout values do not exceed listed limits. If runout is excessive, installation procedure shall be repeated from step 5.
7. Set a calibrated torque wrench approximately 5% higher than specified tightening torque. Torque screws in a crosswise pattern, using  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved. According to Figure 6, start with the screw located at approx.  $180^\circ$  from slit; screws adjacent to slit to be torqued sequentially.
8. Continue to apply overtorque for 2 or 3 more passes. This is required to compensate for a system-related relaxation of screws, since tightening of a given screw will always relax adjacent screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.

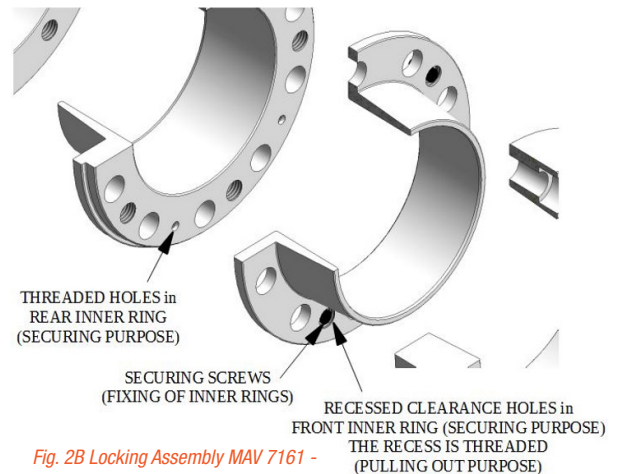


Fig. 2B Locking Assembly MAV 7161 - Detail of inner rings

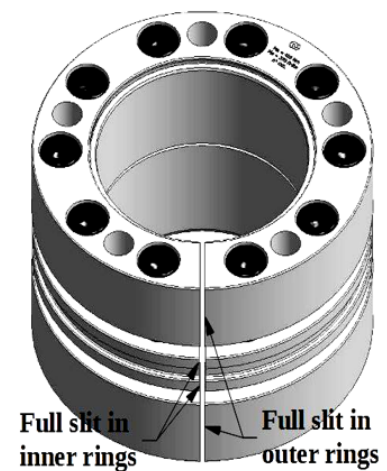


Fig. 3A Detail of slits alignment (full slit)

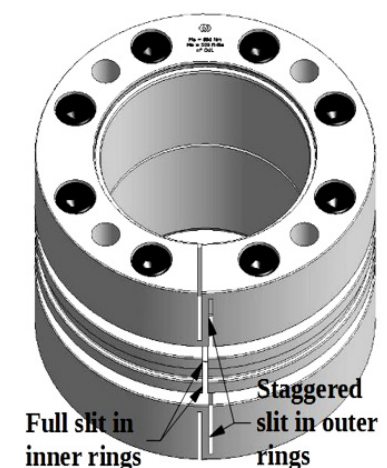


Fig. 3B Detail of slits alignment (staggered slit)

# FLANGE COUPLING MAV LC7161 WITH INTERNAL LOCKING ASSEMBLY MAV 7161

## Installation and Removal Instructions



9. Reset the torque wrench to specified tightening torque and check all screws. No screw should turn at this point, otherwise repeat step 8 for more passes.
10. Using dial indicators, check the runout of shaft and coupling flange as illustrated in Figure 5.
  - Indicator #1 - Runout max 0.015 mm TIR (total indicator reading) for every 100 mm shaft diameter.
  - Indicator #2 - Runout max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.
  - Indicator #3 - Runout max 0.035 mm TIR (total indicator reading) for every 100 mm flange outer diameter.

Make sure runout values do not exceed listed limits. If runout is excessive, installation procedure shall be repeated and flange runout rechecked. Excessive runout may generate additional stress in the coupling half assembly, promoting its premature failure.

**RECOMMENDATION:** This kind of application is usually subjected to aggressive environment. Therefore, once tightening of coupling half assembly is completed, it is recommended to fully protect front and rear outer sides of the Locking Assembly MAV 7161 with a suitable caulking compound (typ. waxes or silicone based sealants). Slits, holes, screw heads and critical contact areas for releasing will be protected and removal operation will be facilitated. **Make sure that layer thickness of applied caulking compound will not protrude from flanges inner face, as well as shafts end.** Approaching and correct positioning of coupling half assemblies and shafts shall not be restricted.

### Connection Of The Two Coupling Half Assemblies

11. Carefully remove any trace of lubricant (solvent cleaning) from mating faces of flanges, to obtain a lubricant-free and dry contact. Make sure that flange bolts are oiled. **DON'T USE low friction lubricants** based on MoS<sub>2</sub>, graphite, copper and other similar components (e.g., Molykote, Never-Seeze or similar products).
12. With suitable lifting equipment, move drive/motor assembly into position parallel and in line with driven shaft using centering surfaces as a guide. **Centering surfaces should match without need of shrinking. Should it be necessary, don't proceed further with flanges connection** (additional stress may be generated, leading to premature failure). Adjust and recheck again the position of coupling half assemblies until correct alignment is confirmed, allowing a clearance fit between centering surfaces.
13. Make sure that all flange bolt holes are aligned.
14. Install and hand tighten all flange bolts.
15. Set a calibrated torque wrench to specified tightening torque. **Tighten all flange bolts while allowing the drive/motor assembly to move as required to draw coupling half assemblies together (flexible support).** Continue tightening until flanges are mated and all flange bolts are torqued to specified tightening torque.
16. At this point, torque arm can be fastened to the bed frame and lifting equipment removed. For safety reasons (support of drive in case of emergency), it is recommended lifting equipment to be removed only after connection of Flange Coupling is completed.
17. Using dial indicators per Figure 7, make sure that runout values are within 0.070 mm TIR (total indicator reading) for every 100 mm shaft diameter.

**RECOMMENDATION:** This kind of application is usually subjected to aggressive environment. Therefore, once connection of the two coupling half assemblies is completed, it is recommended to paint the outside of Flange Coupling with a suitable varnish.

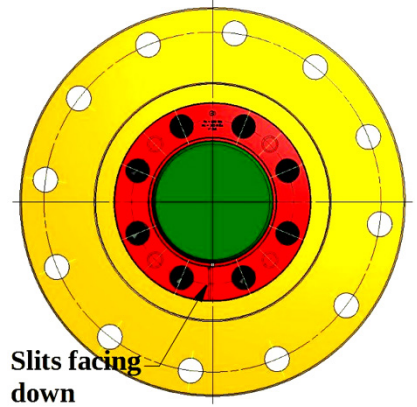


Fig. 4A Positioning of Locking Assembly MAV 7161

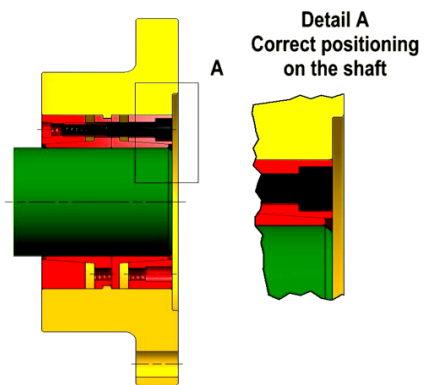


Fig. 4B Positioning of shaft

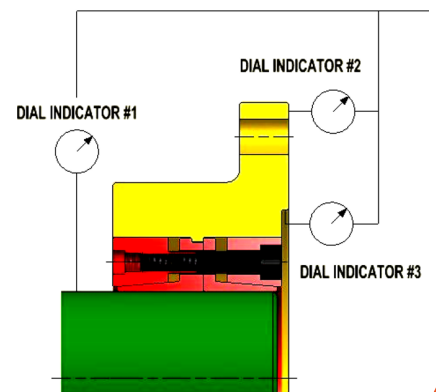


Fig. 5 Coupling half installed – check of runout

# FLANGE COUPLING MAV LC7161 WITH INTERNAL LOCKING ASSEMBLY MAV 7161

## Installation and Removal Instructions

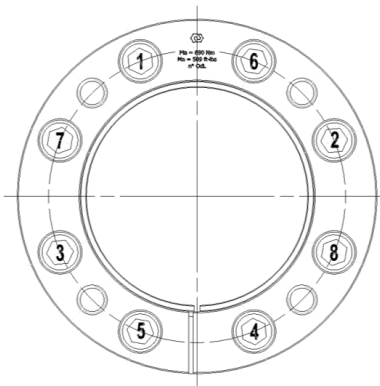


Fig. 6 Detail of screws tightening pattern (as example)

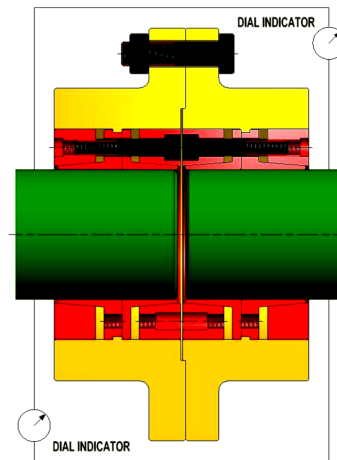


Fig. 7 Flange Coupling installed – check of runout

## REMOVAL

### Removal Of The Two Coupling Half Assemblies

1. Do not disconnect torque arm or tie rod until Coupling is completely disconnected.
2. Use suitable equipment to remove the weight of drive/motor assembly from Coupling and driven shaft. Lifting of drive must be done very carefully: make sure that loads are balanced to prevent swinging down of drive when Coupling is disconnected.
3. Loosen all flange bolts in sequence and remove them.
4. Separate the two coupling half assemblies.

### Removal Of Each Coupling Half (Releasing Of Locking Assembly Mav 7161)

**IMPORTANT!** The final user must ensure that end of locking screws used for removal is ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.

5. Remove rust, dirt, sealants if used, and make sure that axial movement of outer rings – necessary for release of the connection – is not restricted. Likewise, ensure that push-off threads are in good conditions.
6. Loosen all locking screws and transfer the required number into all push-off threads of front outer ring.
7. Release front outer ring by tightening all push-off screws in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes. Remove front outer ring.
8. Remove securing screws used to fix the two inner rings. Screw the required number of locking screws into threaded recesses for pulling out of front inner ring. Remove front inner ring.
9. Transfer locking screws used for releasing of front outer ring into all push-off threads of rear inner ring.
10. Release rear outer ring by tightening all push-off screws in a crosswise pattern, not exceeding  $\frac{1}{4}$  turns for several passes. Don't remove rear outer ring and rear inner ring.

**WARNING!** Rear outer ring and rear inner ring are now free: make always sure that intended rings are secured against falling, which may cause permanent injury.

11. Releasing operation is now completed. The coupling half is loose and can be removed from shaft.

# FLANGE COUPLING MAV LC7161 WITH INTERNAL LOCKING ASSEMBLY MAV 7161

## Installation and Removal Instructions



### REUSE OF USED COUPLINGS

Before reuse, all parts of the Coupling – flanges, rings of MAV 7161 and all screws and nuts – shall be disassembled and their conditions checked. In order to disassemble rear inner ring and rear outer ring of MAV 7161 from coupling flange, push intended rings together towards flange's hub side (not towards flanged side) and take them away. **WARNING! Make always sure that intended rings are secured against falling, which may cause permanent injury.** Permanent deformations, ovalizations, dents, corroded areas, are not admitted. In case of doubts, please contact MAV S.p.A. for advise. If in good conditions, Couplings require thorough cleaning and re-lubrication before reuse.

1. Clean and re-lubricate all parts of the Coupling with a film of ordinary machine oil (mineral/synthetic base oil with low content of additives).
2. Insert rear inner ring into flange bore from hub side, until it bottoms against step shoulder in flange's bore (see Figure 8).
3. Insert front inner ring into flange bore from flanged side until it bottoms against step shoulder in flange's bore and face of rear inner ring (see Figure 8).
4. Make sure that clearance holes of front and rear inner rings are aligned, as well as securing holes and slits.
5. Make sure that faces of front and rear inner rings are in contact.
6. Insert fixing screws without tightening.
7. Make sure that bores of front and rear inner rings are concentric. Light hammering may help in this operation.
8. Tighten fixing screws at specified torque.
9. Insert rear outer ring, making sure that threaded holes are aligned with clearance holes of front and rear inner rings. Slits shall be aligned as well.
10. Insert front outer ring, making sure that recessed clearance holes are aligned with threaded holes of rear outer ring. Slits shall be aligned as well.
11. Insert locking screws.
12. Re-assembling operation of each coupling half is now completed.
13. Follow these instructions for a new installation.

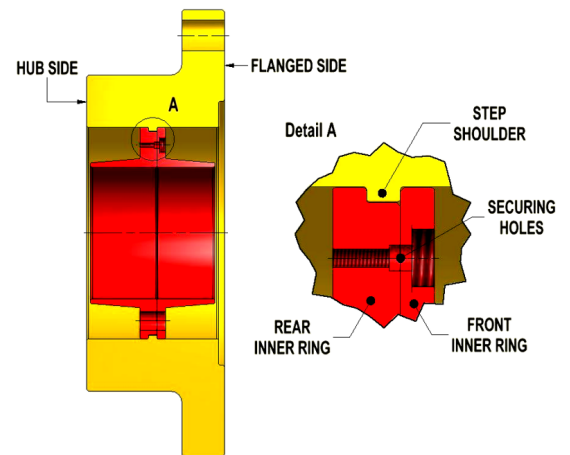


Fig. 8 Re-assembling of inner rings of Locking Assembly MAV 7161

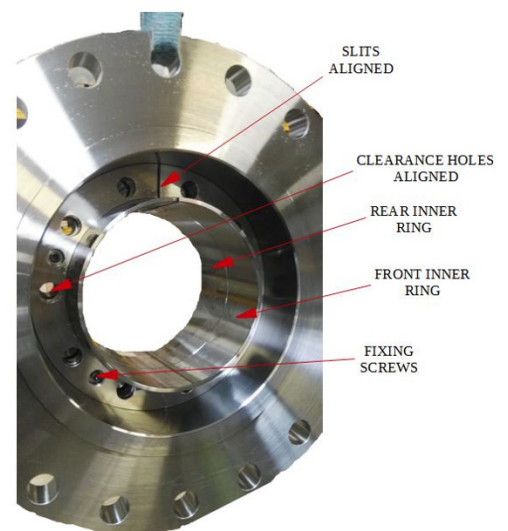
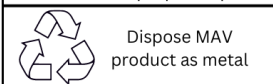


Fig. 9 Re-assembling of each coupling half after step 8



Fig. 10 Re-assembling of each coupling half after step 11

Information for proper disposal:



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-00 - SHAFT 220, 260

### Installation and Removal Instructions



#### Designation of products:

- MAV SI SPROCKET INTEGRATED COUPLING D04-00 SHAFT 220,00 (MAV p/n SI-022000-D04-00)
- MAV SI SPROCKET INTEGRATED COUPLING D04-00 SHAFT 260,00 (MAV p/n SI-026000-D04-00)

## INSTALLATION

### Installation of Coupling onto Shaft

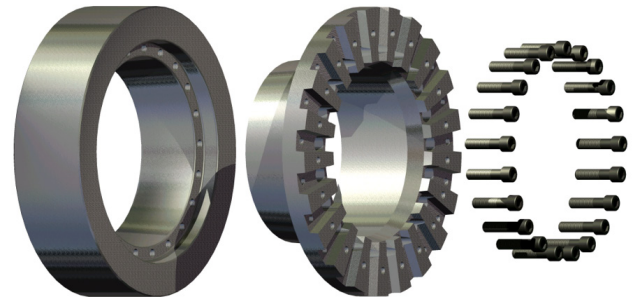
Inner and outer rings, assembled together with socket head cap screws, will be mounted first. Leave sprocket segments, counter flange and their assembling screws apart. Intended couplings are designed for shaft tolerance of quality h8 and surface roughness  $0.8 \mu\text{m} \leq \text{Ra} \leq 3.2 \mu\text{m}$ .

**IMPORTANT!** Do not tighten the locking screws into outer ring prior to shaft installation, as inner ring of coupling can be permanently contracted even at relatively low tightening torques.

#### Lubrication notes:

- Outer ring's locking screws M16x65: slightly oiled with ordinary machine oil<sup>(1)</sup> (delivery condition)
- Tapered surfaces: slightly oiled with ordinary machine oil<sup>(1)</sup> (delivery condition)
- Contact surface between shaft and coupling bore: grease-free and dry (NOT supplied in this condition)

<sup>(1)</sup> Mineral / synthetic base oil, with low content of additives. Products for protection from oxidation, as well as for releasing of oxidized connections are not recommended.



1. Carefully solvent clean and dry shaft and coupling bore. Any lubricant on contact surface between shaft and coupling bore will reduce the torque capacity of the connection.
2. Insert shaft into coupling bore. After confirming correct position of the coupling, hand-tighten three (3) or four (4) equally spaced locking screws (size M16x65 placed at  $\varnothing 316$  mm PCD) into outer ring, until fitting clearance is recovered. Hand-tighten remaining locking screws.
3. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque  $M_A$  (280 Nm, engraved on inner ring's flange). Tighten in either a clockwise or counter clockwise sequence, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all locking screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.

### Installation of Sprocket Segments

#### IMPORTANT

- Each segment of the sprocket is stamped with a capital letter above MAV's logo and screw's tightening torque.
- Letters are different for each sprocket.
- Position of segments of the same sprocket can be mixed, but mixing of segments of different sprockets is not allowed. (Ex.: all segments stamped with A must remain together)



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-00 - SHAFT 220, 260

### Installation and Removal Instructions



- Letters and logo must remain visible towards the outside (do not turn segments on the other side).
- Assembling screws M14x80 & M14x90: slightly oiled with ordinary machine oil<sup>(1)</sup> (delivery condition)

<sup>(1)</sup> Mineral / synthetic base oil, with low content of additives. Products for protection from oxidation, as well as for releasing of oxidized connections are not recommended.

1. Secure first segment on the coupling, by lightly tightening three (3) assembling screws (shorter size, M14x80) in the series of holes placed at external PCD (Ø408 mm).
2. Repeat procedure of step 1 for each segment of the sprocket.
3. Position remaining assembling screws (shorter size, M14x80), and lightly tighten them (**DO NOT** tighten to specified torque at this stage – we recommend to apply a maximum torque of approximately 20% of the given  $M_A$ ).



#### Installation of Counter Flange

1. Position counter flange on sprocket.
2. Position assembling screws (longer size, M14x90) in the series of holes placed at intermediate PCD (Ø365 mm), and tighten them lightly.
3. Use torque wrench and set it approximately 5% higher than specified tightening torque  $M_A$  (190 Nm, engraved on sprocket segments and counter flange). Torque screws alternating one screw of a given segment and one screw of the counter flange, using approx. ¼ turns for several passes until ¼ turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.

*Being this integrated coupling a totally new product, never tested in the field, checking of tightening of counterflange and sprocket screws after the first 50 operating hours is recommended. Repeat checking on a regular basis.*

## REMOVAL

#### SAFETY NOTICE

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the coupling, or connected parts.**

***IMPORTANT!** The final user must ensure that ends of screws - used for removal of counter flange, sprocket and locking rings - are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

#### Removal of Counter Flange

***WARNING ! DO NOT completely remove all assembling screws before counter flange is released. Possible sudden separation of counter flange could involve high separation forces that may result in permanent injury or death. Be certain that counter flange is released before completely removing its assembling screws.***

1. Loosen assembling screws of the counter flange (longer size, M14x90) placed at intermediate PCD (Ø365 mm), without removing them completely.
2. Remove some of these screws, position them in the push off holes placed at internal PCD (Ø310 mm), and tighten them in several stages by using approx. ¼ turns, without exceeding  $M_A$ . As soon as counter flange comes apart, remove all remaining assembling screws.
3. Remove counter flange.

# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-00 - SHAFT 220, 260

### Installation and Removal Instructions



#### Removal of Sprocket Segments

**WARNING ! DO NOT completely remove all assembling screws before a given sprocket segment is released. Possible sudden separation of a sprocket segment could involve high separation forces that may result in permanent injury or death. Be certain that sprocket segment is released before completely removing its assembling screws.**

1. Loosen assembling screws of a given sprocket segment (shorter size, M14x80) placed at external PCD ( $\emptyset$ 408 mm), without removing them completely.
2. Use counter flange assembling screws (longer size, M14x90), position them in the push off holes placed at internal PCD ( $\emptyset$ 340 mm), and tighten them in several stages by using approx.  $\frac{1}{4}$  turns, without exceeding  $M_A$ . As soon as sprocket segment comes apart, remove all assembling screws.
3. Remove sprocket segment.

#### Removal of Coupling From Shaft

**WARNING ! DO NOT completely remove outer ring's locking screws before locking rings are disengaged. Possible sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.**

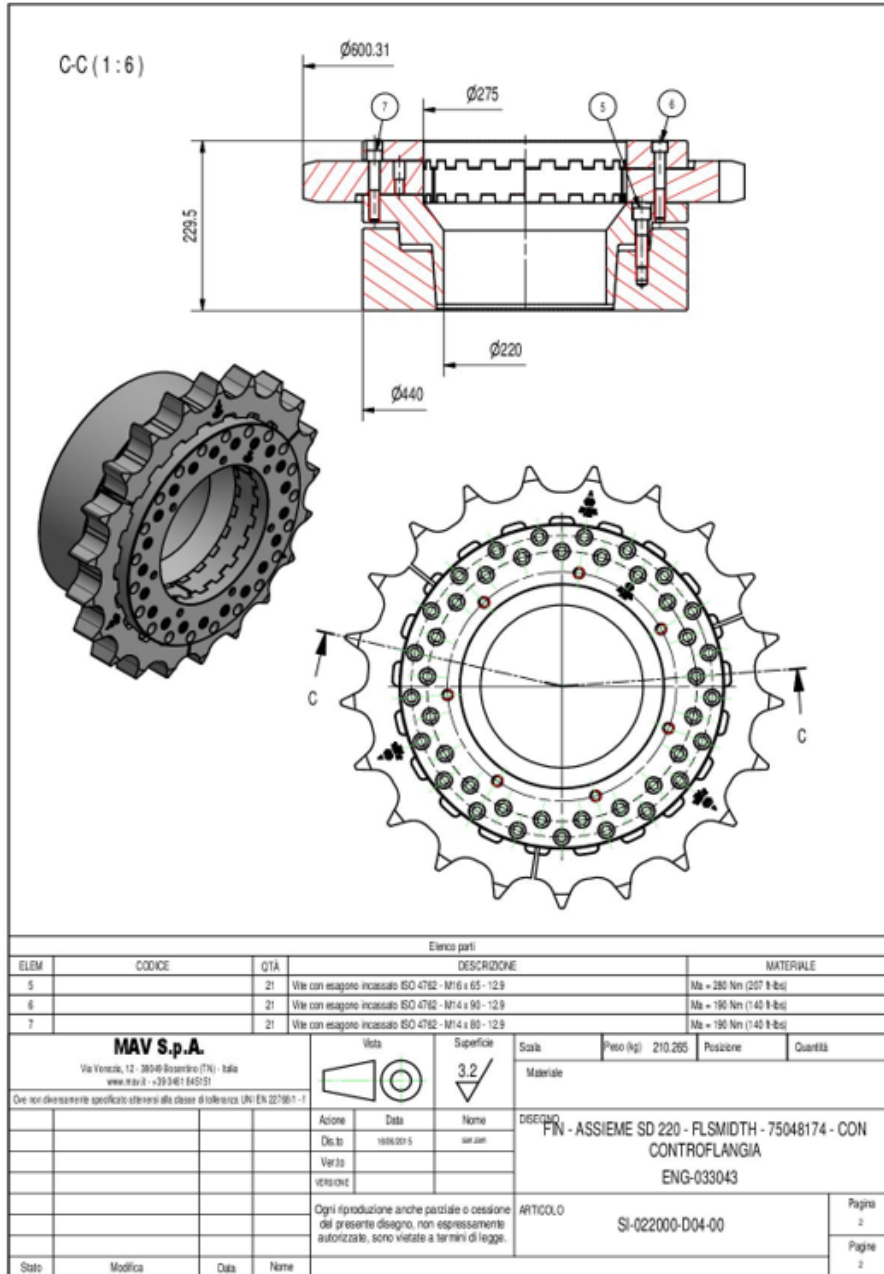
For easier dismantling, make sure that any corrosion is removed from shaft and coupling.

4. Loosen locking screws of the outer ring (size M16x65) placed at  $\emptyset$ 316 mm PCD, without removing them completely.
5. Use counter flange assembling screws (longer size, M14x90), position them in the push off holes of the inner ring - **placed at intermediate PCD ( $\emptyset$ 365)** - and tighten those screws in several stages by using approx.  $\frac{1}{4}$  turns, following either a clockwise or counter clockwise sequence, until the rings are disengaged.
6. Remove coupling from shaft.

# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-00 - SHAFT 220, 260

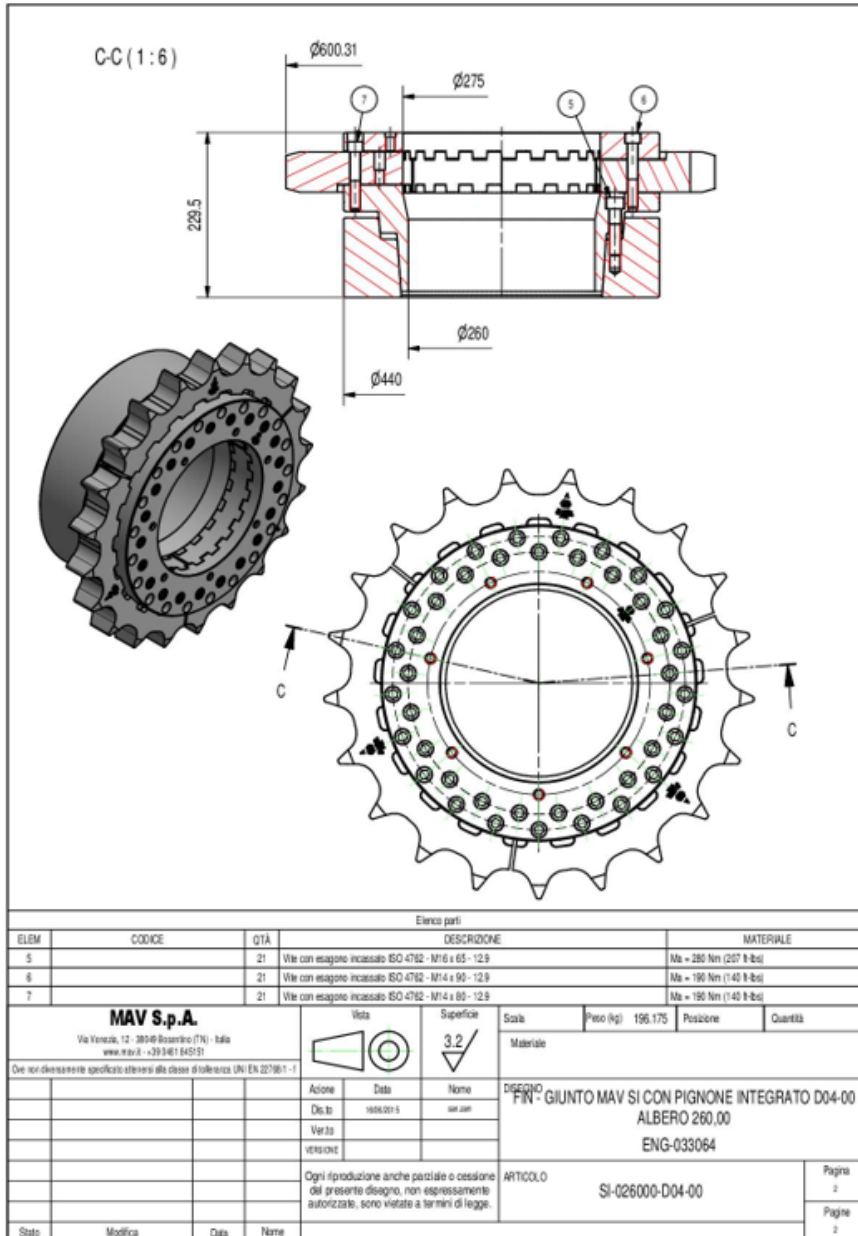
### Installation and Removal Instructions



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-00 - SHAFT 220, 260

### Installation and Removal Instructions



Information for proper disposal:



Dispose MAV product as metal

# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-01, D04-02 - SHAFT 220, 260

### Installation and Removal Instructions



#### Designation of products:

- MAV SI SPROCKET INTEGRATED COUPLING D04-01 SHAFT 220,00 #47742 (MAV p/n SI-022000-D04-01)
- MAV SI SPROCKET INTEGRATED COUPLING D04-01 SHAFT 260,00 #47742 (MAV p/n SI-026000-D04-01)
- MAV SI SPROCKET INTEGRATED COUPLING D04-02 SHAFT 260,00 #48382 (MAV p/n SI-026000-D04-02)

## INSTALLATION

### Installation of Coupling onto Shaft

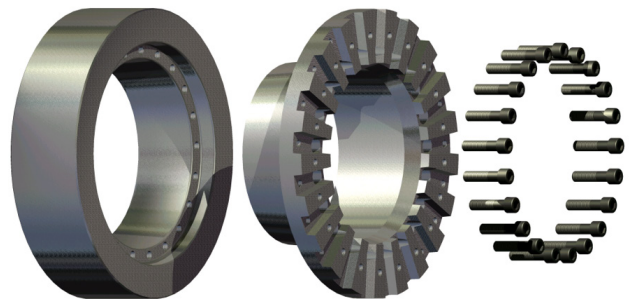
Inner and outer rings, assembled together with socket head cap screws, will be mounted first. Leave sprocket segments, counter flange and their assembling screws apart. Intended couplings are designed for shaft tolerance of quality h8 and surface roughness  $0.8 \mu\text{m} \leq \text{Ra} \leq 3.2 \mu\text{m}$ .

**IMPORTANT!** Do not tighten the locking screws into outer ring prior to shaft installation, as inner ring of coupling can be permanently contracted even at relatively low tightening torques.

#### Lubrication notes:

- Outer ring's locking screws supplied oiled with ordinary machine oil<sup>(1)</sup>
- Tapered surfaces supplied oiled with ordinary machine oil<sup>(1)</sup>
- Contact surface between shaft and coupling bore: grease-free and dry

<sup>(1)</sup> Mineral / synthetic base oil, with low content of additives. Products for protection from oxidation, as well as for releasing of oxidized connections are not recommended.

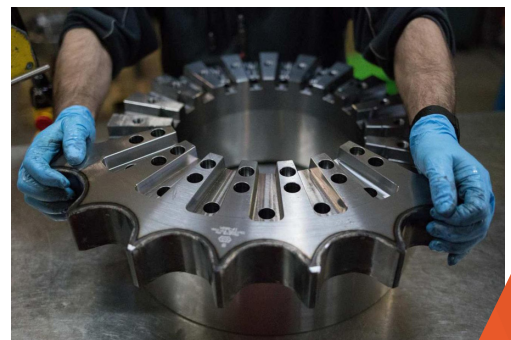


1. Carefully solvent clean and dry shaft and coupling bore. Any lubricant on contact surface between shaft and coupling bore will reduce the torque capacity of the connection.
2. Insert shaft into coupling bore. After confirming correct position of the coupling, hand-tighten three (3) or four (4) equally spaced locking screws (size M16x70 placed at  $\varnothing 316$  mm PCD) into outer ring, until fitting clearance is recovered. Hand-tighten remaining locking screws.
3. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque  $M_A$  (355 Nm, engraved on inner ring's flange). Tighten in either a clockwise or counter clockwise sequence, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all locking screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.

### Installation of Sprocket Segments

#### IMPORTANT

- Each segment of the sprocket is stamped with a capital letter above MAV's logo and screw's tightening torque.
- Letters are different for each sprocket.
- Position of segments of the same sprocket can be mixed, but mixing of segments of different sprockets is not allowed. (Ex.: all segments stamped with A must remain together)
- Letters and logo must remain visible towards the outside (do not turn segments on the other side).



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-01, D04-02 - SHAFT 220, 260

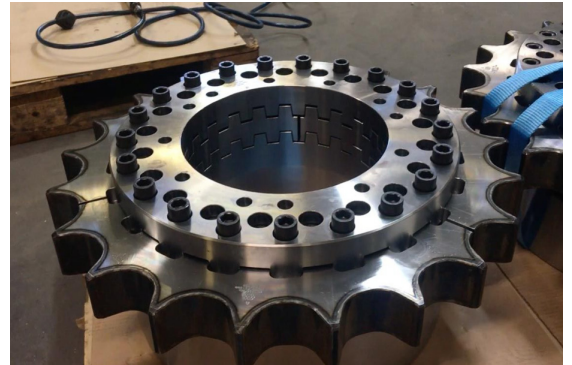
### Installation and Removal Instructions



1. Secure first segment on the coupling, by lightly tightening three (3) assembling screws (shorter size, M16x70) in the series of holes placed at intermediate PCD ( $\varnothing 360$  mm). Locate screws in central and sides holes.
2. Repeat procedure of step 1 for each segment of the sprocket.
3. Position remaining assembling screws (shorter size, M16x70), and lightly tighten them (**DO NOT** tighten to specified torque at this stage – we recommend to apply a maximum torque of approximately 20% of the given  $M_A$ ).

#### Installation of Counter Flange

1. Position counter flange on sprocket.
2. Position assembling screws (longer size, M16x90) in the series of holes placed at external PCD ( $\varnothing 400$  mm), and tighten them lightly.
3. Use torque wrench and set it approximately 5% higher than specified tightening torque  $M_A$  (210 Nm, engraved on sprocket segments and counter flange). Torque screws alternating one screw of a given segment and one screw of the counter flange, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.



*Being this integrated coupling a totally new product, never tested on the field, we suggest to check tightening of counter flange and sprocket screws after the first 50 working hours. Repeat checking on a regular basis.*

## REMOVAL

### SAFETY NOTICE

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the coupling, or connected parts.**

*IMPORTANT! The final user must ensure that ends of screws - used for removal of counter flange, sprocket and locking rings - are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

#### Removal of Counter Flange

*WARNING! DO NOT completely remove all assembling screws before counter flange is released. Possible sudden separation of counter flange could involve high separation forces that may result in permanent injury or death. Be certain that counter flange is released before completely removing its assembling screws.*

1. Loosen assembling screws of the counter flange (longer size, M16x90), without removing them completely.
2. Remove some of these screws, position them in the push off holes placed at internal PCD ( $\varnothing 305$  mm), and tighten them in several stages by using approx.  $\frac{1}{4}$  turns, without exceeding  $M_A$ . As soon as counter flange comes apart, remove all remaining assembling screws.
3. Remove counter flange.

#### Removal of Sprocket Segments

*WARNING ! DO NOT completely remove all assembling screws before a given sprocket segment is released. Possible sudden separation of a sprocket segment could involve high separation forces that may result in permanent injury or death. Be certain that sprocket segment is released before completely removing its assembling screws.*

# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D04-01, D04-02 - SHAFT 220, 260

### Installation and Removal Instructions



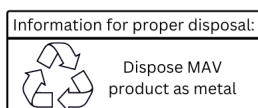
1. Loosen assembling screws of a given sprocket segment (shorter size, M16x70), without removing them completely.
2. Use counter flange assembling screws (longer size, M16x90), position them in the push off holes placed at internal PCD ( $\varnothing 305$  mm), and tighten them in several stages by using approx.  $\frac{1}{4}$  turns, without exceeding  $M_A$ . As soon as sprocket segment comes apart, remove all assembling screws.
3. Remove sprocket segment.

#### Removal of Coupling From Shaft

**WARNING! DO NOT completely remove outer ring's locking screws before locking rings are disengaged. Possible sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.**

For easier dismantling, make sure that any corrosion is removed from shaft and coupling.

1. Loosen locking screws of the outer ring (size M16x70 placed at  $\varnothing 316$  mm PCD), without removing them completely.
2. Use counter flange assembling screws (longer size, M16x90), position them in the push off holes of the inner ring - **placed at external PCD ( $\varnothing 400$ )** - and tighten those screws in several stages by using approx.  $\frac{1}{4}$  turns, following either a clockwise or counter clockwise sequence, until the rings are disengaged.
3. Remove coupling from shaft.



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D06-00 – SHAFT 260

### Installation and Removal Instructions



#### Designation of products:

- MAV SI SPROCKET INTEGRATED COUPLING D06 SHAFT 260,00 #309635 (MAV p/n SI-026000-D06-00)

## INSTALLATION

### Installation of Coupling onto Shaft

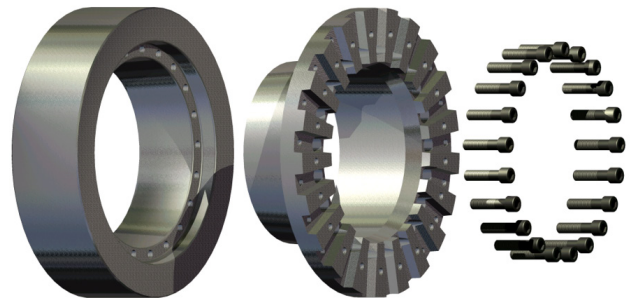
Inner and outer rings, assembled together with socket head cap screws, will be mounted first. Leave sprocket segments, counter flange and their assembling screws apart. Intended couplings are designed for shaft tolerance of quality g6 and surface roughness  $0.8 \mu\text{m} \leq \text{Ra} \leq 3.2 \mu\text{m}$ .

**IMPORTANT!** Do not tighten the locking screws into outer ring prior to shaft installation, as inner ring of coupling can be permanently contracted even at relatively low tightening torques.

#### Lubrication notes:

- Outer ring's locking screws supplied oiled with ordinary machine oil<sup>(1)</sup>
- Tapered surfaces supplied oiled with ordinary machine oil<sup>(1)</sup>
- Contact surface between shaft and coupling bore: grease-free and dry

<sup>(1)</sup> Mineral / synthetic base oil, with low content of additives. Products for protection from oxidation, as well as for releasing of oxidized connections are not recommended.



1. Carefully solvent clean and dry shaft and coupling bore. Any lubricant on contact surface between shaft and coupling bore will reduce the torque capacity of the connection.
2. Insert shaft into coupling bore. After confirming correct position of the coupling, hand-tighten three (3) or four (4) equally spaced locking screws (size M20x80 placed at  $\varnothing 337$  mm PCD) into outer ring, until fitting clearance is recovered. Hand-tighten remaining locking screws.
3. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque  $M_A$  (690 Nm, engraved on inner ring's flange). Tighten in either a clockwise or counter clockwise sequence, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all locking screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.

### Installation of Sprocket Segments

#### IMPORTANT

- Each segment of the sprocket is stamped with a capital letter above MAV's logo and screw's tightening torque.
  - Letters are different for each sprocket.
  - Position of segments of the same sprocket can be mixed, but mixing of segments of different sprockets is not allowed. (Ex.: all segments stamped with A must remain together)
  - Letters and logo must remain visible towards the outside (do not turn segments on the other side).
1. Secure first segment on the coupling, by lightly tightening three (3) assembling screws (shorter size, M14x90) in the series of holes placed at intermediate PCD ( $\varnothing 390$  mm). Locate screws in central and sides holes.
  2. Repeat procedure of step 1 for each segment of the sprocket.



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D06-00 - SHAFT 260

### Installation and Removal Instructions



3. Position remaining assembling screws (shorter size, M14x90), and lightly tighten them (**DO NOT** tighten to specified torque at this stage – we recommend to apply a maximum torque of approximately 20% of the given  $M_A$ ).

#### Installation of Counter Flange

1. Position counter flange on sprocket.
2. Position assembling screws (longer size, M14x120) in the series of holes placed at external PCD ( $\varnothing 440$  mm), and tighten them lightly.
3. Use torque wrench and set it approximately 5% higher than specified tightening torque  $M_A$  (135 Nm, engraved on sprocket segments and counter flange). Torque screws alternating one screw of a given segment and one screw of the counter flange, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.



*Being this integrated coupling a totally new product, never tested on the field, we suggest to check tightening of counter flange and sprocket screws after the first 50 working hours. Repeat checking on a regular basis.*

## REMOVAL

#### SAFETY NOTICE

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the coupling, or connected parts.**

*IMPORTANT! The final user must ensure that ends of screws - used for removal of counter flange, sprocket and locking rings - are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

#### Removal of Counter Flange

*WARNING! DO NOT completely remove all assembling screws before counter flange is released. Possible sudden separation of counter flange could involve high separation forces that may result in permanent injury or death. Be certain that counter flange is released before completely removing its assembling screws.*

1. Loosen assembling screws of the counter flange (longer size, M14x120), without removing them completely.
2. Remove some of these screws, position them in the push off holes placed at internal PCD ( $\varnothing 337$  mm), and tighten them in several stages by using approx.  $\frac{1}{4}$  turns, without exceeding  $M_A$ . As soon as counter flange comes apart, remove all remaining assembling screws.
3. Remove counter flange

#### Removal of Sprocket Segments

*WARNING ! DO NOT completely remove all assembling screws before a given sprocket segment is released. Possible sudden separation of a sprocket segment could involve high separation forces that may result in permanent injury or death. Be certain that sprocket segment is released before completely removing its assembling screws.*

1. Loosen assembling screws of a given sprocket segment (shorter size, M14x90), without removing them completely.
2. Use counter flange assembling screws (longer size, M14x120), position them in the push off holes placed at internal PCD ( $\varnothing 337$  mm), and tighten them in several stages by using approx.  $\frac{1}{4}$  turns, without exceeding  $M_A$ . As soon as sprocket segment comes apart, remove all assembling screws.
3. Remove sprocket segment.

# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D06-00 - SHAFT 260

### Installation and Removal Instructions

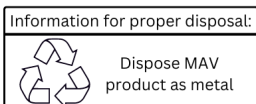


#### Removal of Coupling From Shaft

*WARNING! DO NOT completely remove outer ring's locking screws before locking rings are disengaged. Possible sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.*

For easier dismantling, make sure that any corrosion is removed from shaft and coupling.

1. Loosen locking screws of the outer ring (size M20x80 placed at  $\varnothing 337$  mm PCD), without removing them completely.
2. Use counter flange assembling screws (longer size, M14x120), position them in the push off holes of the inner ring - placed at external PCD ( $\varnothing 440$ ) - and tighten those screws in several stages by using approx.  $\frac{1}{4}$  turns, following either a clockwise or counter clockwise sequence, until the rings are disengaged.
3. Remove coupling from shaft.



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D09-00 - SHAFT 360

### Installation and Removal Instructions



#### Designation of products:

- MAV SI SPROCKET INTEGRATED COUPLING D09-00 SHAFT 360,00 #47742 (MAV p/n SI-036000-D09-00)

## INSTALLATION

### Installation of Coupling onto Shaft

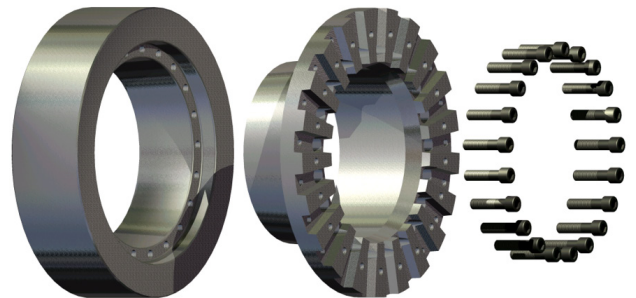
Inner and outer rings, assembled together with socket head cap screws, will be mounted first. Leave sprocket segments, counter flange and their assembling screws apart. Intended couplings are designed for shaft tolerance of quality h8 and surface roughness  $0.8 \mu\text{m} \leq \text{Ra} \leq 3.2 \mu\text{m}$ .

**IMPORTANT!** Do not tighten the locking screws into outer ring prior to shaft installation, as inner ring of coupling can be permanently contracted even at relatively low tightening torques.

#### Lubrication notes:

- Outer ring's locking screws supplied oiled with ordinary machine oil<sup>(1)</sup>
- Tapered surfaces supplied oiled with ordinary machine oil<sup>(1)</sup>
- Contact surface between shaft and coupling bore: grease-free and dry

<sup>(1)</sup> Mineral / synthetic base oil, with low content of additives. Products for protection from oxidation, as well as for releasing of oxidized connections are not recommended.

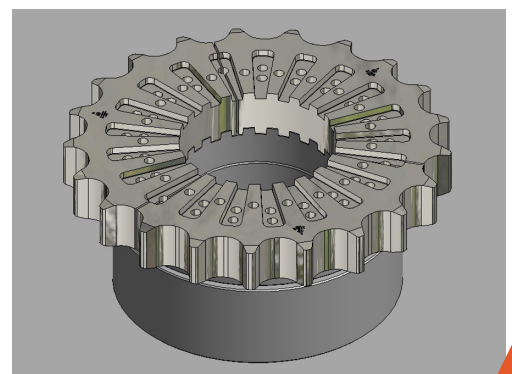


1. Carefully solvent clean and dry shaft and coupling bore. Any lubricant on contact surface between shaft and coupling bore will reduce the torque capacity of the connection.
2. Insert shaft into coupling bore. After confirming correct position of the coupling, hand-tighten three (3) or four (4) equally spaced locking screws (size M27x110 placed at  $\varnothing 445$  mm PCD) into outer ring, until fitting clearance is recovered. Hand-tighten remaining locking screws.
3. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque  $M_A$  (1800 Nm, engraved on inner ring's flange). Tighten in either a clockwise or counter clockwise sequence, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all locking screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.

### Installation of Sprocket Segments

#### IMPORTANT

- Each segment of the sprocket is stamped with a capital letter above MAV's logo and screw's tightening torque.
- Letters are different for each sprocket.
- Position of segments of the same sprocket can be mixed, but mixing of segments of different sprockets is not allowed. (Ex.: all segments stamped with A must remain together)
- Letters and logo must remain visible towards the outside (do not turn segments on the other side).



# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D09-00 - SHAFT 360

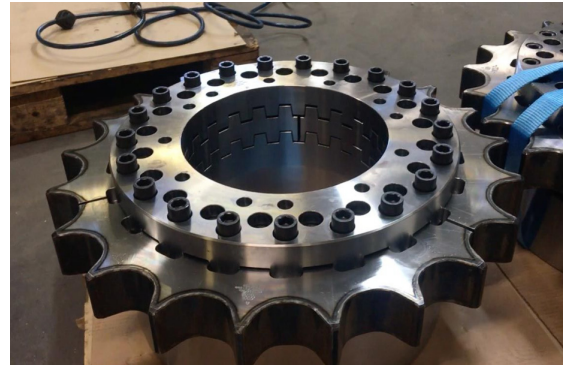
### Installation and Removal Instructions



1. Secure first segment on the coupling, by lightly tightening three (3) assembling screws (shorter size, M24x140) in the series of holes placed at internal PCD ( $\varnothing 530$  mm). Locate screws in central and sides holes.
2. Repeat procedure of step 1 for each segment of the sprocket.
3. Position remaining assembling screws (shorter size, M24x140), and lightly tighten them (**DO NOT** tighten to specified torque at this stage – we recommend to apply a maximum torque of approximately 20% of the given  $M_A$ ).

#### Installation of Counter Flange

1. Position counter flange on sprocket.
2. Position assembling screws (longer size, M24x200) in the series of holes placed at external PCD ( $\varnothing 610$  mm), and tighten them lightly.
3. Use torque wrench and set it approximately 5% higher than specified tightening torque  $M_A$  (710 Nm, engraved on sprocket segments and counter flange). Torque screws alternating one screw of a given segment and one screw of the counter flange, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.



*Being this integrated coupling a totally new product, never tested on the field, we suggest to check tightening of counter flange and sprocket screws after the first 50 working hours. Repeat checking on a regular basis.*

## REMOVAL

### SAFETY NOTICE

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the coupling, or connected parts.**

***IMPORTANT!** The final user must ensure that ends of screws - used for removal of counter flange, sprocket and locking rings - are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

#### Removal of Counter Flange

***WARNING!** DO NOT completely remove all assembling screws before counter flange is released. Possible sudden separation of counter flange could involve high separation forces that may result in permanent injury or death. Be certain that counter flange is released before completely removing its assembling screws.*

1. Loosen assembling screws of the counter flange (longer size, M24x200), without removing them completely.
2. Remove some of these screws, position them in the push off holes placed at most internal PCD ( $\varnothing 445$  mm), and tighten them in several stages by using approx.  $\frac{1}{4}$  turns, without exceeding  $M_A$ . As soon as counter flange comes apart, remove all remaining assembling screws.
3. Remove counter flange.

#### Removal of Sprocket Segments

***WARNING !** DO NOT completely remove all assembling screws before a given sprocket segment is released. Possible sudden separation of a sprocket segment could involve high separation forces that may result in permanent injury or death. Be certain that sprocket segment is released before completely removing its assembling screws.*

# MAV SI SPROCKET INTEGRATED COUPLINGS

## SPROCKET D09-00 - SHAFT 360

### Installation and Removal Instructions



1. Loosen assembling screws of a given sprocket segment (shorter size, M24x140), without removing them completely.
2. Use counter flange assembling screws (longer size, M24x200), position them in the push off holes placed at internal PCD (Ø530 mm), and tighten them in several stages by using approx. ¼ turns, without exceeding  $M_A$ . As soon as sprocket segment comes apart, remove all assembling screws.
3. Remove sprocket segment.

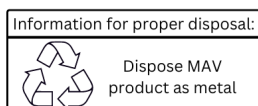
#### Removal of Coupling From Shaft

**WARNING! DO NOT completely remove outer ring's locking screws before locking rings are disengaged. Possible sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.**

**IMPORTANT! In order to release the locking rings, a set of different screws shall be used. These screws are not supplied by MAV. The user has to take charge of procuring of these screws. The set of jacking screws is composed of twenty-one (21) hexagonal head cap screws DIN 933 / ISO 4017 (full threaded), size M24x100, grade 10.9 or 12.9. End tip of intended screws shall be ground flat and chamfered by final user.**

For easier dismantling, make sure that any corrosion is removed from shaft and coupling.

1. Loosen locking screws of the outer ring (size M27x110 placed at Ø445 mm PCD), without removing them completely.
2. Use twenty-one (21) jacking screws (hex head cap, size M24x100, full threaded), position them in the push off holes of the inner ring - **placed at external PCD (Ø610)** - and tighten those screws in several stages by using approx. ¼ turns, following either a clockwise or counter clockwise sequence, until the rings are disengaged.
3. Remove coupling from shaft.



# MAV SI SPROCKET INTEGRATED COUPLINGS

## Installation and Removal Instructions



### INSTALLATION

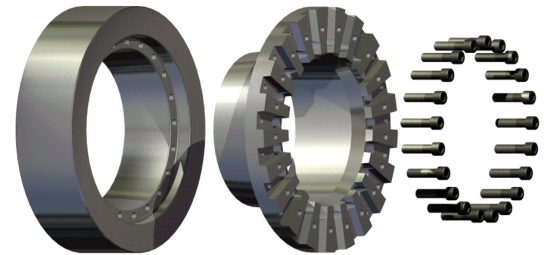
#### Installation of Coupling onto Shaft

Inner and outer rings, assembled together with socket head cap screws, will be mounted first. Leave sprocket segments, counter flange and their assembling screws apart. Intended couplings are designed for shaft tolerance of quality h8 and surface roughness  $0.8 \mu\text{m} \leq \text{Ra} \leq 3.2 \mu\text{m}$ .

*Important: do not tighten the locking screws into outer ring prior to shaft installation, as inner ring of coupling can be permanently contracted even at relatively low tightening torques.*

#### Lubrication notes:

- Outer ring's locking screws supplied oiled with ordinary machine oil<sup>(1)</sup>
- Tapered surfaces supplied oiled with ordinary machine oil<sup>(1)</sup>
- Contact surface between shaft and coupling bore: grease-free and dry



<sup>(1)</sup> Mineral / synthetic base oil, with low content of additives. Products for protection from oxidation, as well as for releasing of oxidized connections are not recommended.

1. Carefully solvent clean and dry shaft and coupling bore. Any lubricant on contact surface between shaft and coupling bore will reduce the torque capacity of the connection.
2. Insert shaft into coupling bore. After confirming correct position of the coupling, hand-tighten three (3) or four (4) equally spaced locking screws into outer ring, until fitting clearance is recovered. Hand-tighten remaining locking screws.
3. Use torque wrench and set it approximately 5% higher than specified locking screw tightening torque  $M_A$  (engraved on inner ring's flange). Tighten in either a clockwise or counter clockwise sequence, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all locking screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.

#### Installation of Sprocket Segments

##### IMPORTANT

- Each segment of the sprocket is stamped with a capital letter above MAV's logo and screw's tightening torque.
- Letters are different for each sprocket.
- Position of segments of the same sprocket can be mixed, but mixing of segments of different sprockets is not allowed. (Ex.: all segments stamped with A must remain together)
- Letters and logo must remain visible towards the outside (do not turn segments on the other side).



1. Secure first segment on the coupling, by lightly tightening three (3) assembling screws (shorter size) in the most external series of holes. Locate screws in central and sides holes.
2. Repeat procedure of step 1 for each segment of the sprocket.
3. Position remaining assembling screws (shorter size), and lightly tighten them (**DO NOT** tighten to specified torque at this stage – we recommend to apply a maximum torque of approximately 20% of the given  $M_A$ ).

# MAV SI SPROCKET INTEGRATED COUPLINGS

## Installation and Removal Instructions



### Installation of Counter Flange

1. Position counter flange on sprocket.
2. Position assembling screws (longer size) in the central series of holes, and tighten them lightly.
3. Use torque wrench and set it approximately 5% higher than specified tightening torque  $M_A$  (engraved on sprocket segments and counter flange). Torque screws alternating one screw of a given segment and one screw of the counter flange, using approx.  $\frac{1}{4}$  turns for several passes until  $\frac{1}{4}$  turns can no longer be achieved.
4. Continue to apply over-torque for 1 or 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over-torquing, an infinite number of passes would be needed to reach specified tightening torque.
5. Reset torque wrench to specified torque  $M_A$  and check all screws. No screw should turn at this point, otherwise repeat step 4 for 1 or 2 more passes.



*Being this integrated coupling a totally new product, never tested on the field, we suggest to check tightening of counter flange and sprocket screws after the first 50 working hours. repeat checking on a regular basis.*

## REMOVAL

### SAFETY NOTICE

**Prior to initiating the following removal procedure, check to ensure that no torque or thrust loads are acting on the coupling, or connected parts.**

*IMPORTANT! The final user must ensure that ends of screws - used for removal of counter flange, sprocket and locking rings - are ground flat and slightly chamfered to prevent damage to screws and collar threads during push-off. Screws with ground flat and chamfered end are not supplied by MAV. The final user has to take charge of machining of end of screws.*

### Removal of Counter Flange

*WARNING ! DO NOT completely remove all assembling screws before counter flange is released. Possible sudden separation of counter flange could involve high separation forces that may result in permanent injury or death. Be certain that counter flange is released before completely removing its assembling screws.*

1. Loosen assembling screws of the counter flange, without removing them completely.
2. Remove some of these screws, position them in the push off holes, and tighten them in several stages by using approx.  $\frac{1}{4}$  turns. As soon as counter flange comes apart, remove all remaining assembling screws.
3. Remove counter flange.

### Removal of Sprocket Segments

*WARNING ! DO NOT completely remove all assembling screws before a given sprocket segment is released. Possible sudden separation of a sprocket segment could involve high separation forces that may result in permanent injury or death. Be certain that sprocket segment is released before completely removing its assembling screws.*

1. Loosen assembling screws of a given sprocket segment, without removing them completely.
2. Use counter flange assembling screws (longer size), position them in the push off holes, and tighten them uniformly in several stages without exceeding  $M_A$ . As soon as sprocket segment comes apart, remove all assembling screws.
3. Remove sprocket segment.

# MAV SI SPROCKET INTEGRATED COUPLINGS

## Installation and Removal Instructions



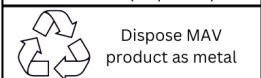
### Removal of Coupling From Shaft

*WARNING ! DO NOT completely remove outer ring's locking screws before locking rings are disengaged. Possible sudden separation of locking rings could involve high separation forces that may result in permanent injury or death. Be certain that locking rings are disengaged before completely removing locking screws.*

For easier dismantling, make sure that any corrosion is removed from shaft and coupling.

1. Loosen locking screws of the outer ring, without removing them completely. Do not torque over  $\frac{1}{4}$  turn.
2. Use counter flange assembling screws, position them in the push off holes of the inner ring - placed at central PCD - and tighten those screws in several stages by using approx.  $\frac{1}{4}$  turns, following either a clockwise or counter clockwise sequence, until the rings are disengaged.
3. Remove coupling from shaft.

Information for proper disposal:





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