



## Rotating Unions and Bearingless Rotating Unions



**904, 1114, 1124, 1154 and 1159 series**

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## 1 For your Safety

This chapter provides information on the safe handling of *DEUBLIN* rotating unions.

- For your own safety and the safety of other people read this operating manual carefully and completely prior to working on or with *DEUBLIN* rotating unions.
- This operating manual exclusively describes the rotating unions of the manufacturer *DEUBLIN*. In the further description/explanation the name “*DEUBLIN*” is left out for a better readability.
- This operating manual is a material part of the specified rotating unions. The operator is responsible for the personnel to take note of this manual.
- Always use the latest version of the operating manual, available under [www.deublin.eu](http://www.deublin.eu).
- The operator of the rotating unions shall not make any modifications or attachments to and retrofitting of the rotating union without the manufacturer’s consent.
- Please follow the additional instruction “Installation” for a secure and correct installation of the rotating union. The installation instruction is included with the delivered union.

### 1.1 Intended Use

AutoSense™: The latest in a series of *DEUBLIN* innovations, this technology combines the best features of Pop-Off™ and controlled leakage designs. Like Pop-Off™ designs, AutoSense™ seals close when coolant pressure is applied to contain the coolant fluid, and “pop” apart in the absence of coolant pressure to allow unlimited dry running. Like controlled leakage designs, AutoSense™ seals handle pressurized dry air by creating a microscopic gap between the seal faces. AutoSense™ unions handle coolant, MQL, and dry air by sensing the kind of media and automatically changing seal operation in response. As with Pop-Off™ seals, a drain line generally is required. During stationary periods, compressed air can typically be used to clear the tool retaining area of chips. The rotating unions are designed for operation at an ambient temperature and a temperature of the medium starting from 3 °C up to 70 °C max.

#### Definition of the media:

- Coolant – is an emulsion consisting of water and oil-based additives
- Compressed air
- MQL – minimum quantity lubrication

Expect a functional-related leakage of up to 30 NI/min during operation with compressed air and MQL applications.

For information on operating parameters and dimensions of the rotating unions please refer to the catalogue or to the model-specific installation drawing.

The specified rotating unions are designed for non-explosive environments and non-inflammable media.

### 1.1.1 Application

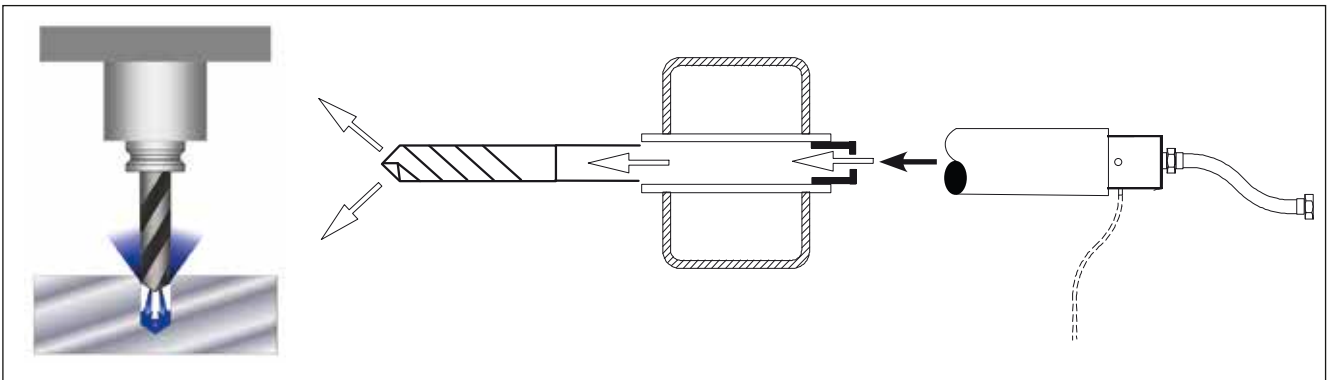


Fig. 1: Schematic diagram (single channel)

A rotating union is attached to one end of the spindle. The rotating union introduces the media into the shaft from where it is guided to the tool.

### 1.2 Misuse

This chapter provides information on known misuse of rotating unions.

The rotating unions are not suitable for the areas and applications described herein. Use in such areas or for such applications constitutes a misuse endangering people and machines and is therefore prohibited.

#### Prohibition for the following areas:

- Potentially explosive areas**  
The rotating unions shall not be used in potentially explosive areas, as they are not approved for the requirements in potentially explosive areas. Operation in such areas may cause explosions.
- Outdoor operation**  
Inadequate protection against weather conditions can result in premature failure.

#### Prohibition for the following applications:

- Conveying of combustible media or hydrocarbons**  
Combustible media or hydrocarbons may ignite or cause explosions.
- Food**  
Food, cleaning and disinfectant residues cannot be removed from the rotating unions. People may suffer poisoning.
- Connection to a piping system with excessive pressure**  
If excessive pressure is applied to the rotating unions, supply pipes can come off and cause personal injury or property damage.
- Connection to fixed pipes**  
If connection is via fixed pipes, the rotating unions may leak and the ball bearings may get damaged.
- Conveying of media which are too hot**  
If the media exceed the maximum admissible temperature for the rotating union, the static seals (elastomeric seals) can be damaged which may result in leaky rotating unions and personal injury or property damage.
- Application in ambient temperatures/with medium temperatures below 3 °C**  
Rotating unions may be damaged if they are operated at temperatures (ambient or medium) below 3 °C.

**❑ Use of hydraulic oils**

The rotating unions of the series WZM – “AutoSense” are not approved for hydraulic oils. If you are using rotating unions for hydraulic oils, the rotating unions will be damaged and hydraulic oil may splash out. Persons may be injured.

**❑ Operation at the maximum speed and with maximum pressure**

Speed and pressure must be adjusted to each another so that the rotating unions are not damaged or fail prematurely (see model-specific installation drawing).

This list is not comprehensive and will be updated with results from product observation.

### 1.3 Safety Instructions

This chapter provides information on the hazards through rotating unions.

#### 1.3.1 Risk of injuries due to hot surfaces

The rotating unions may become hot during operation. If the skin makes contact with this heated rotating union, it can result in severe injuries.

- ❑ Before starting any works on the rotating unions, please allow the machine to cool down.
- ❑ Depending on the application case of the rotating unions, use safety gloves and PPE (Personal Protective Equipment) protecting against heat when handling the rotating union.

#### 1.3.2 Hazards due to rotating rotor

If you reach into the area of the union long hair or loose clothing might get caught in the rotor, it can result in severe injuries.

- ❑ Please ensure that it is impossible for persons to reach into the rotating rotor by accident.
- ❑ Please do not wear your long hair open, do not wear loose clothing, or pieces of jewellery when working on rotating components.

#### 1.3.3 Hazards by improper hoses

For the connection of the rotating union to the machine, you have to choose appropriate hoses for the respective medium, which meet, the specifications for the application.

If you use incorrect hoses, they may become porous or burst. This can cause personal injury and/or property damage to components of the machine.

- ❑ Use only hoses which are suitable for the media, the maximum system pressure and the maximum temperature for the machine.

#### 1.3.4 Hazards due to the media

When working on the rotating union, injuries can be caused by skin or eye contact with the media.

- ❑ Observe the safety instructions for the media. Observe the COSHH Safety Data Sheet for the media.

#### 1.3.5 Hazards by faulty installation

If the rotating unions are installed incorrectly, hoses and connections may become leaky. The medium can escape. Depending on the medium, personal injury or property damage to the components of the machine may occur.

- ❑ Before installing the rotating union ensure that no feed pressure and no residual pressure is applied to the pipeline system of the machine.
  - To ensure the safe and correct installation of the rotating union, observe the additional “Installation” instruction manual, which is included with the delivered union.
- ❑ Install the hoses to the rotating union prior to mounting it to the machine shaft. This does not apply to hoses with an SAE connection.



- Please make sure that the hoses for the media are connected in accordance with the channel configuration of the rotating union. Please observe the model-specific installation drawing regarding this.
- Install the rotating union to the machine using flexible hoses only, in order to avoid stress on the rotating union.
- Install the hoses free from stress.
- Install the rotating union in a way that the leaking medium can be carried away downward at the lowest point and that the drain line permanently slopes downwards at a minimum of 15°.

## 1.4 Structure of Pictograms

This chapter provides information on the meaning of the pictograms used in the manual.



Warning

### Warning

Potentially dangerous situation which may result in death or serious injury.



Note

### Note

Potentially harmful situation, in which the product or an object in its surroundings can be damaged.



Info

### Application notes

and other useful information.

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## 2 Information as to this Manual

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The copyright as to this manual remains with *DEUBLIN*. Subject to changes!

- You can download the latest version of this manual under [www.deublin.eu](http://www.deublin.eu).
- Always use the latest version of the operating manual.

### 3 Information on the Name Plate

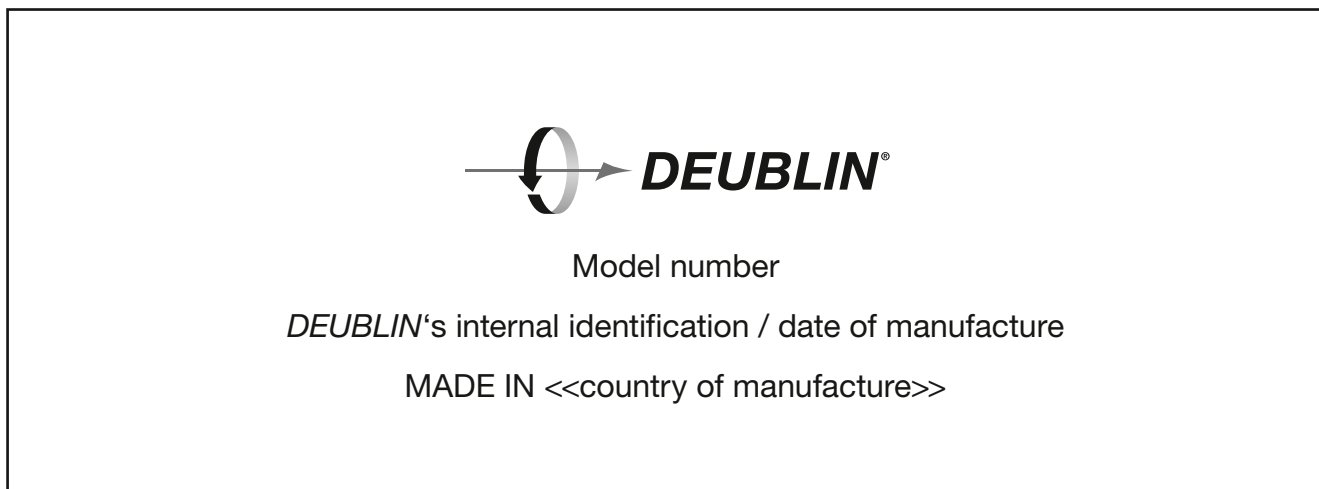


Fig. 2: Name plate

The coding of the model number is described in the catalogue. The model number corresponds to the order number.

### 4 Information on the Design

This chapter provides information as to which items have to be observed in the design in order to have a positive effect on the service life of the rotating union.



Info

You can obtain drawings of the rotating unions from *DEUBLIN* in order to integrate the rotating union in your drawing.

You will require the model-specific installation drawing of your rotating unions to implement it into your design and to operate the rotating unions in a safe manner.

**The model-specific installation drawing of the corresponding rotating union contains all data required to install and operate the rotating union.**

#### 4.1 Occurring axial force



Fig. 3: Overview over the model versions

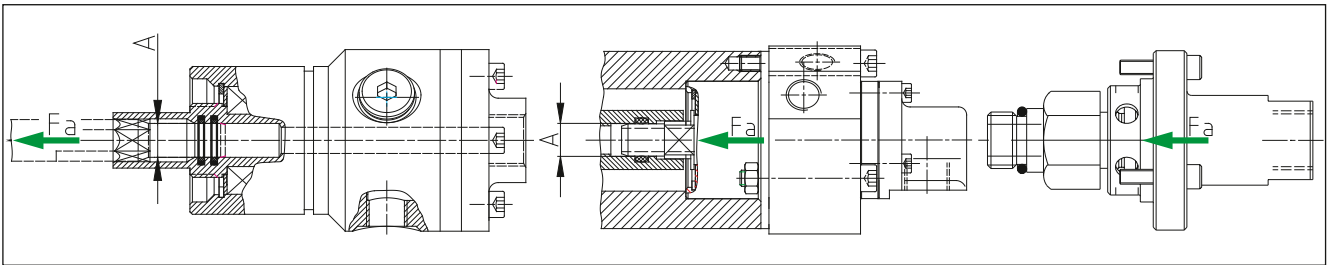


Fig. 4: Axial force

There are no axial forces that have to be additionally absorbed by the spindle bearing on rotor-supported models.

In the case of housing-supported models and models without bearings, the medium pressure at the effective diameter (A) results in an additional axial force (Fa) that has to be absorbed by the spindle bearing.

You will find details on the model specific installation drawing. Alternatively, you can calculate the axial force as follows:

$F_a$  = Axial force  
 $A$  = Area (see model-specific installation drawing)  
 $p$  = Coolant pressure in bar

$$F_a = A \times p$$

## 4.2 Filtering of the Medium

Unfiltered media with a particle size of more than 60 µm, increased wear of the rotating union.

Please use the following classes of liquid media:

- Class 5 in accordance with ISO 4406:2017 Code 17/15/12 or
- Class 6 in accordance with NAS 1638

Please use the following classes of compressed air:

- ISO 8573-1:2010 [6:4:4]

Determine the required filter performance data according to standard ISO 16889:2008 to achieve a maximum particle size of 60 µm.



The larger the amount of particles in the media, the higher the wear rate of the rotating union. The residual contamination load should be at a maximum of 100 mg/L respectively at a maximum of 50 mg/L when processing aluminium.

- Insert a filter in front of the rotating union which filters particles with a size of 60 µm and larger from the media.



### 4.3 Connecting Options of the Rotating Union at the Machine Shaft

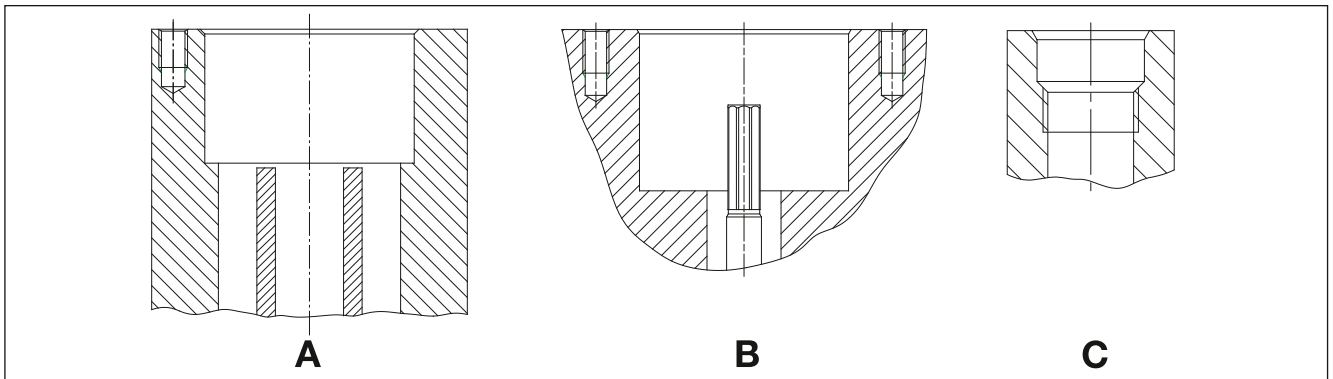


Fig. 5: Possible machine shafts

This shows 3 ways of connecting the rotating union's rotor to the end of the shaft (or draw bar). Depending on the version of the shaft end, the rotor of the rotating union is connected by:

- (A)** The support bore of the shaft
- (B)** External profile of the draw bar
- (C)** By a threaded, piloted interface connection

The rotor provides the connection between the rotating union and the shaft. For this reason it is important to design the shaft and the transfer pipe with the corresponding accuracy and to observe the specifications of the model-specific installation drawing of the rotating union. Deviations may result in leakages, vibration, and to a shortened service life of the rotating unions.

The rotating unions can be installed on the shaft vertically (rotor pointing in a downwards direction) or horizontally.



#### Component damage due to incorrect installation

When installing the rotating unions vertically with the rotor pointing in an upward direction, the union may be damaged.

- Please contact *DEUBLIN* if you wish to install rotating unions vertically with the rotor pointing in an upward direction.



#### Component damage due to unconnected leakage/ventilation lines

On a rotating union with "AutoSense" technology, function-related leakage occurs. This has to be drained away. Leakage that is not drained away will damage the rotating unions and possibly other components of the machine.

For all models where the leakage passage is integral with the housing, the housing path has to be designed so that the leakage can drain away freely under gravity.

- In the case of housing with fan:** The fan generates a vacuum; therefore a ventilation line to compensate for the vacuum needs to be incorporated in the design. For this, you have to route the ventilation line from the housing.

Should you have any questions, please contact *DEUBLIN*.

### 4.4 Options of Hose Installation

The following examples show how to install the hoses at the rotating unions.

These connecting options ensure that the hoses do not transfer stress to the rotating unions when the machine shaft moves.

- Please pay attention to the chapter "1.3 Security Advices" regarding the design.
- For models where a leakage fitting is supplied, we recommend installing a leakage line.

#### 4.4.1 Connection of hose to the rotating union

The hoses must be installed without stress and bends so that they do not apply any forces to the rotating union. The following figures show examples of installations.



If you wish to connect the rotating unions to the machine, you have to create the connection by using flexible hoses. During operation, the flexible hoses prevent the development of lateral loads on the bearings of the rotating unions.

Fig. 6: Connect the hoses so that they run in a downward direction

Please observe the installation instructions supplied with the rotating union during installation.



If the hoses are to be guided away from the rotating unions vertically and bent by 90°, connect the hoses as shown.

The angled connector prevents lateral loads on the bearings in the event that the supply hose is pressurised.

Fig. 7: Hoses bent by 90°

#### 4.4.2 Hose installation for vertically/horizontally installed rotating unions

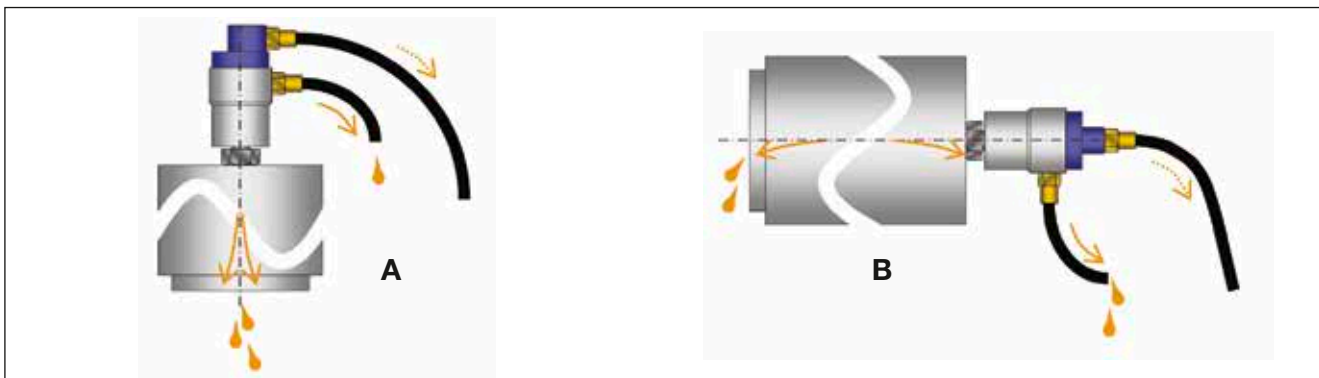
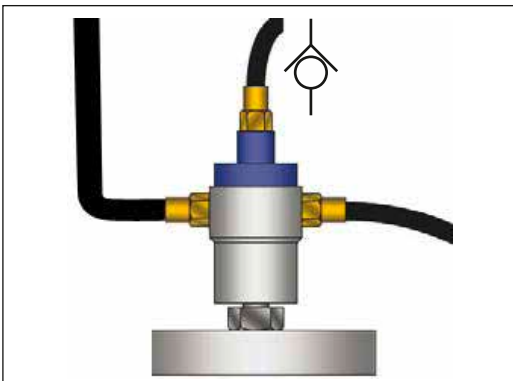


Fig. 8: Horizontal and vertical connection options

If the rotating unions are installed on the shaft vertically **(A)** or horizontally **(B)**, the supply lines should be guided as illustrated. This is the only way to ensure that no coolant will escape from the supply line into the rotating unions, for example, during a tool change.

#### 4.4.3 Check valve for limited leakage



If the supply line is guided to the rotating union from above, *DEUBLIN* recommends installing a check valve (switching pressure < 0.5 bar), better would be a 3/2-way valve upstream as near to the rotating union as possible, to keep the volume of coolant flowing from the supply hose and escaping as leakage as low as possible during the tool change.

Fig. 9: Connection example



#### Component damage due to over-pressure in the shaft

When using a closed tool or a tool holder without internal coolant supply: During a tool change, the tool holder has the same effect as a piston. The existing air in the shaft is compressed. If a check valve is installed, the seal faces of the rotating unions will be closed. With the shaft rotating and the lack of liquid media, the seal faces are subject to increased wear and will be damaged.

- Please use a 3/2-way valve instead of the check valve.
- For dry machining assure that there is no over-pressure trapped in the shaft.
- Please contact *DEUBLIN* should you have any questions.

#### 4.4.4 Hose connection in case of additional axial movement of the machine shaft



If the rotating unions are installed to machine shafts with an oscillating (axial) movement, the hoses must be stress-free in both final positions. Example of supply lines connected radially and axially.

Fig. 10: Supply lines connected radially

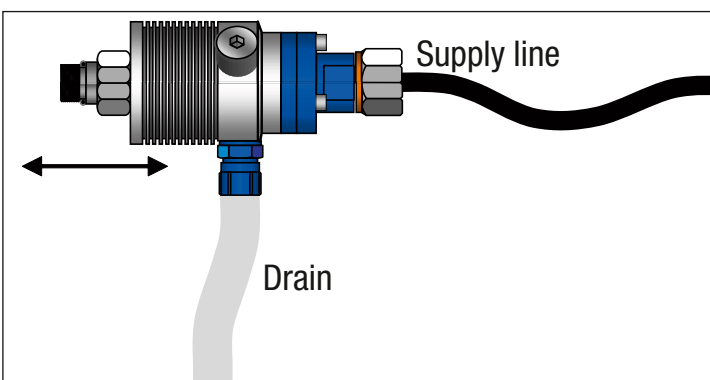


Fig. 11: Supply lines connected axially

#### 4.4.5 Connection of a leakage line

If the rotating unions with sealing technology “AutoSense” are pressurised (exception: pressurisation with compressed air where the seal remain slightly parted), the seals close within the rotating unions. If the pressure is switched off, the mechanical seal opens. The leakage volume occurring due to functional-related reasons is drained away via the relief bore using a separate leakage line.

The leakage volume depends on the following:

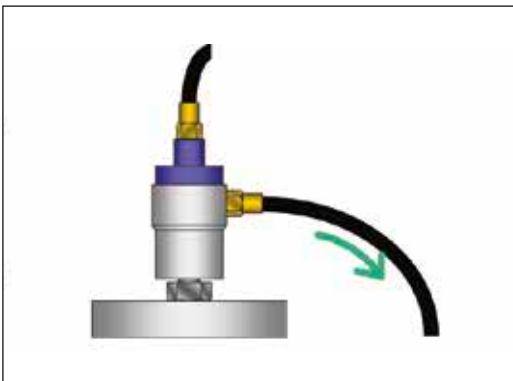
- Cooling lubricant and its viscosity
- Installation position of the rotating union
- Routing of the supply line
- Position of the cooling lubricant valve and the check valve respectively 3/2-way valve



Info

Relief bores that are not required have to be sealed with the supplied sealing plugs.

#### 4.4.6 Leakage connection for vertically installed rotating unions

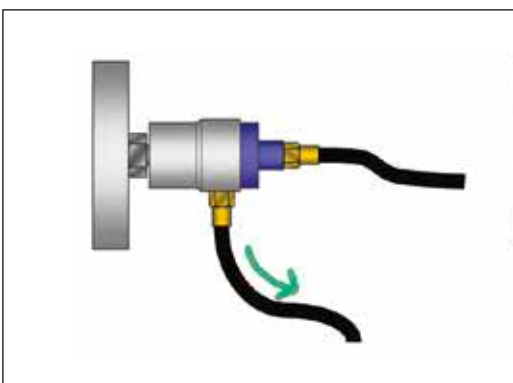


Lay the leakage hose in a downward inclined angle (at least 15°) so that the leakage can be drained away.

The internal diameter of the leakage hose has to be at least 8 mm.

Abb. 12: Connecting the leakage hose

#### 4.4.7 Leakage connection for horizontally installed rotating unions



Position the rotating unions in a way that you are always able to connect the leakage line to a relief bore / channel at the 6 o'clock position (at the lowermost point).

You must lay the leakage hose in a downward angle (at least 15°) so that the leakage can be drained away.

The internal diameter of the leakage hose has to be at least 8 mm.

Abb. 13: Connecting the leakage hose

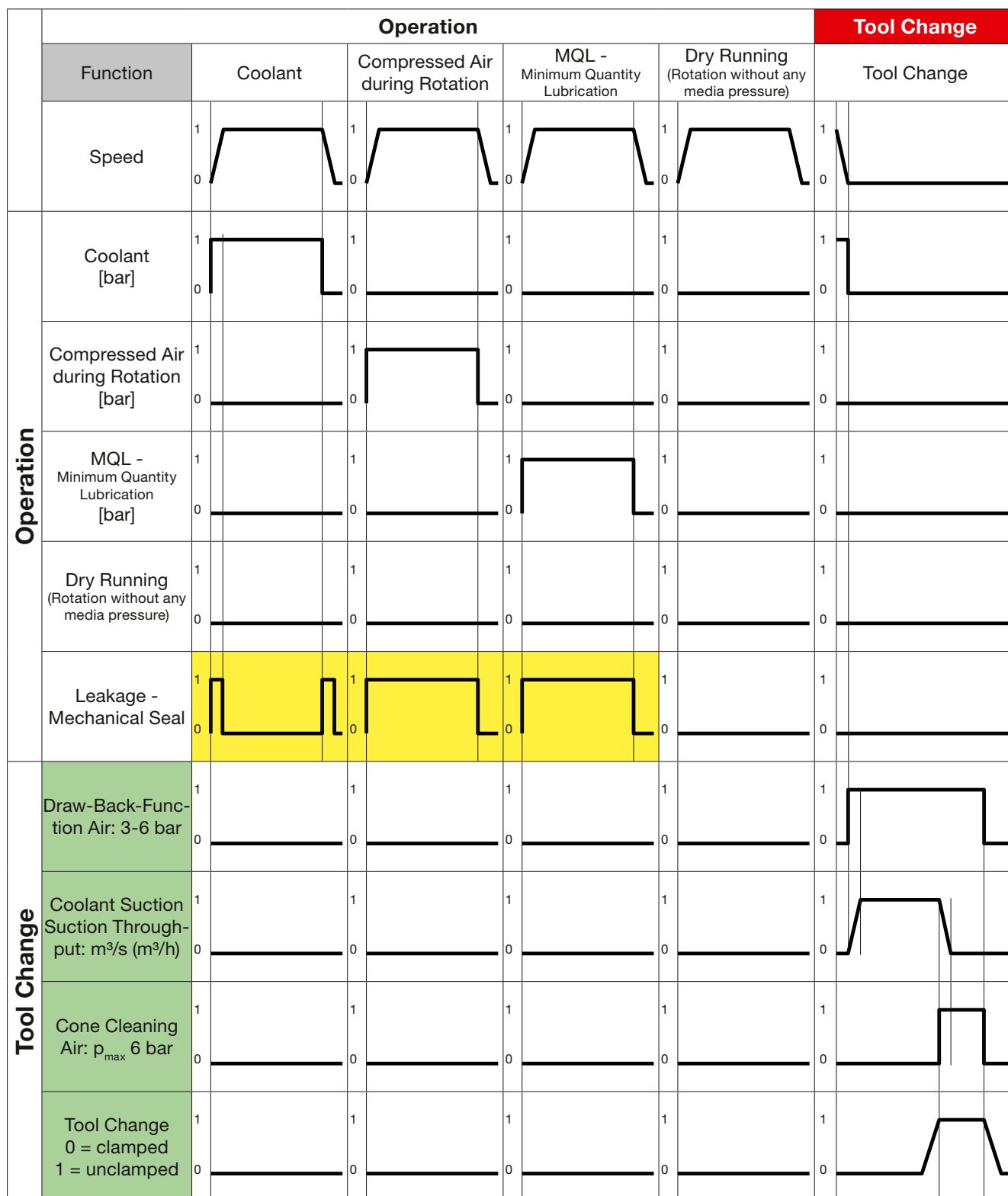
### 4.5 Draw-Back Function

The *DEUBLIN* 1159 series is specially designed to be used with spindles that can utilize an air actuation port to close the primary seals in the union to minimize or prevent leakage during a particular machining cycle that would otherwise allow the seals to separate and leak. Examples of such machining cycles may include:

- Pressurizing the air actuation port while pulling a vacuum on the media port during a tool change to evacuate residual coolant in the spindle, thus minimizing the amount of coolant leaked out the front of the spindle into the work space or tool holder
- Pressurizing the air actuation port during a tool change cycle when rotation is stopped to close the pop-off seals, thus minimizing coolant leakage across seal faces

An example of a machine cycle which utilizes this function is shown below:

## Sequence Diagram



## 5 Installation

The union installation is described in an additional manual which is supplied with each rotating union. Please follow the additional instruction "Installation" for a secure and correct installation of the rotating union. The instruction "Installation" is available online under [www.deublin.eu](http://www.deublin.eu).

- Ensure that the person installing the rotating union receives the following information:
  - Position and location of the rotating union in the machine
  - Information on the media
  - Plan for connection of hoses
  - Position of leakage line
  - Information on the leakage line (optional)
  - model-specific installation drawing

## 6 Information on the Operation



Note

### **Damage due to service with high-viscous media**

If the union is used for "non" approved media, (see chapter 1.1) for example cutting oil, or similar high viscous fluids, leakage or malfunction of the union may occur.

- Please ensure that approved media, only, pass through the union.

## 7 Storage



Note

### **Damage of component due to incorrect storage**

If you store the rotating unions incorrectly, they become leaky or get damaged.

- Store the rotating unions in a dry space between 3 °C and 40 °C.
- Store rotating unions for two years at the most.

## 8 Maintenance

This chapter provides information on how to extend the service life of the rotating unions by means of maintenance.

Regular inspections are required if malfunctions of the *DEUBLIN* rotating union can cause risk to health or environment.



Info

Anti-friction bearings in rotating unions are lubricated for the entire duration of their service life. Subsequent lubrication is not required.

## 8.1 Maintenance Intervals

Check rotating union for leak-tightness.



### Risk of injuries due to applied line pressure

If you have to work on the rotating union and feed pressure of the medium is applied or there is residual pressure in the piping system of the machine, the medium can escape under pressure when releasing the connections. You and other people may suffer severe injuries.

- Ensure that no feed pressure is applied.
- Ensure that there is no residual pressure in the piping system.



### Risk of injury due to hot surfaces

The rotating unions may become hot during operation. If the skin makes contact with this heated rotating union, this can result in severe injuries.

- Before starting to work on the rotating union, allow the machine to cool down.
- Use safety gloves and PPE (Personal Protective Equipment) protecting against heat or cold depending on the application of the rotating unions.

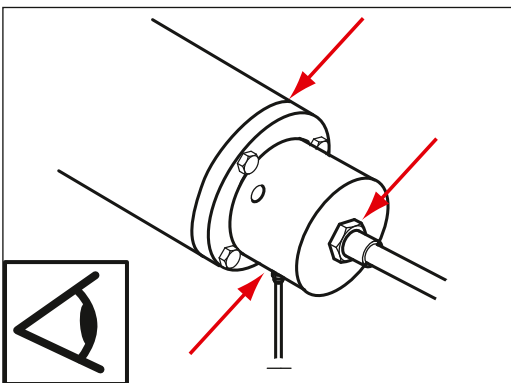


Fig. 14: Inspect visually

Carry out daily visual inspections in order to check whether leakages occurred at the connections (see arrows). The aforementioned refers to leakages not related to functional-related causes occurring during the tool change.

If you detect leakage:

1. Stop the machine.
2. Replace the defective hoses with new ones.
3. Seal leaking connections.
4. If the rotating union is worn and leaks, replace it with a new one, or return the union to *DEUBLIN* for overhaul / service.

## 9 Trouble Shooting

This chapter provides the following information:

1. Which problem may occur?
2. What can be the cause of the problem?
3. How can you eliminate this problem?



Please do not open the rotating unions for repair works.  
The aforementioned will forfeit the claim for material defect liability.

## 9.1 Potential Causes for Errors and their Elimination



### Risk of injuries due to applied line pressure

If you have to work on the rotating union and feed pressure of the medium is applied or there is residual pressure in the piping system of the machine, the medium can escape under pressure when releasing the connections. You and other people may suffer serious injuries.

- Ensure that no feed pressure is applied.
- Ensure that there is no residual pressure in the piping system.

Error	Potential causes	Elimination
Rotating union is leaky after installation (except for compressed air service).	Incorrect installation.	<ol style="list-style-type: none"> <li>1. Stop the machine.</li> <li>2. Ensure that the connections are sealed according to the manual "Installation".</li> <li>3. Ensure that all hoses are installed without stress.</li> <li>4. Ensure that all seal faces are clean.</li> </ol>
	Seal faces of the rotating union are damaged.	<ol style="list-style-type: none"> <li>1. Pack rotating union.</li> <li>2. Send rotating union to <i>DEUBLIN</i> for overhaul/service.</li> </ol>
	Rotating union is defective.	
	If applicable: O-rings on the rotor are damaged or positioned incorrectly.	<ol style="list-style-type: none"> <li>1. Stop the machine.</li> <li>2. Drain medium.</li> <li>3. Remove rotating union.</li> <li>4. If the O-rings on the rotor are damaged, replace defective O-rings.</li> <li>5. Ensure that the O-rings are positioned correctly (see model-specific installation drawing), correct the positions, if applicable.</li> </ol>
Rotating union leaks before the end of the expected service life.	Medium is contaminated	<ol style="list-style-type: none"> <li>1. Stop the machine.</li> <li>2. Drain medium.</li> <li>3. Send rotating union to <i>DEUBLIN</i> for overhaul/service, if required.</li> <li>4. Mount new filter.</li> <li>5. Flush the piping system of the machine.</li> <li>6. Fill in new medium.</li> </ol>
	Rotating union is not designed for the respective application.	<ol style="list-style-type: none"> <li>1. Ensure that the correct <i>DEUBLIN</i> Rotating Union is used.</li> <li>2. Contact <i>DEUBLIN</i> if required.</li> </ol>
Rotating union runs untrue or wobbles.	Thread and/or concentricity outside the admissible tolerance.	<ol style="list-style-type: none"> <li>1. Stop the machine.</li> <li>2. Remove rotating union.</li> <li>3. Manufacture new thread or flange.</li> <li>4. Install rotating union.</li> </ol>
	Rotating union is mounted incorrectly.	
Rotating union shows leakage between shaft end i.e. transfer pipe and rotor.	Seals are damaged.	<ol style="list-style-type: none"> <li>1. Decommission the machine.</li> <li>2. Send rotating union for overhaul / service to <i>DEUBLIN</i>.</li> <li>3. Check shaft end and transfer pipe for burrs, remove burr, if applicable.</li> </ol>



## 9.2 Pack Rotating Union for Transport

The rotating union has to be protected against mechanical impact and humidity during transport to ensure that the rotating union will arrive at *DEUBLIN* without being damaged.

1. Dismount the rotating union in reverse order of the installation (see Installation).
2. Ensure that the rotating union is free from the respective media.
3. Use a cardboard box which is suitable for the weight of the rotating union.
4. Cushion the base of the cardboard box with a soft material, e.g. air bubble film.
5. Wrap the rotating union with a soft material, e.g. air bubble film.
6. Ensure that no packing material or dirt can penetrate the opening of the rotating union.
7. Position the rotating union in the middle of the cardboard box.
8. Fill the free space around the rotating union with newspaper or another suitable material.
9. Close the cardboard box by means of tape.

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## 10 Disposal

### 10.1 Dispose of Packaging

- Dispose of the packaging (cardboard box and plastics) according to the national standards, regulations and directives.

### 10.2 Dispose of Rotating Union

Mainly, the rotating unions consist of metals, which can be reused within the reclamation of scrap. Decontaminate unions / parts and dispose of in an “Environmentally Friendly” way.

- Dismount the rotating union in reverse order to the installation (see Installation).
- Flush the rotating union.
- Collect the dirty flushing media.
- Dispose of the collected flushing media according to the national standards, regulations and directives.
- Please observe the instructions of the media manufacturer.
- Dispose of the rotating union according to the national standards, regulations and directives.

In case of repair, *DEUBLIN* disposes of all used parts.

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## 11 Spare Parts

The rotating unions have a limited service life and include wearing parts. All static and dynamic sealing elements of a component are considered wearing parts, as well as ball bearings. There are no spare parts to be ordered for the rotating unions.

The function of the rotating unions can only be provided for when all components are adjusted and aligned to each other. Thus, the professional overhaul / service may only be carried out by *DEUBLIN*.



Info

### Note

Rotating unions and bearingless unions of this series cannot be repaired by the customer himself but must be sent to *DEUBLIN* for repair. Before repaired rotating unions leave the premises, they will be subjected to an operational check. The repaired rotating union is returned with a standard “*DEUBLIN* Warranty” valid for 12 months.

## Reliability

Many years' experience, ongoing liaison with customers, innovations sourced inhouse and from suppliers place *DEUBLIN* in a position providing reliable Rotating Unions at the highest level.

When it comes to concrete applications, maximum service life is guaranteed by matching the sealing to the respective medium.

The service life is also equally maximized by maintaining cleanliness when storing and handling the Rotating Union and by adhering to the guidelines issued by *DEUBLIN* in respect of the conditions on the customer's premises.

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