SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. With more than 130 years of outstanding development, materials and technology expertise we offer a broad portfolio of high-quality products and intelligent solutions that contribute to our customers’ success.

With a production capacity of more than 140,000 tons and production sites in Europe, South America and Asia, SCHOTT Tubing is one of the world’s leading manufacturers of glass tubes, rods and profiles. More than 60 different glass types are produced in a large variety of dimensional and cosmetic specifications based on a standardized production process and a global quality assurance system. SCHOTT Tubing provides customized products and services for international growth markets such as pharmaceuticals and electronics as well as industrial and environmental engineering.
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A. Introduction

The following tutorial guide “Installation of the SCHOTT PBR Couplings” provides you with all the information that you need to successfully install your PBR couplings, open the couplings or replace the tubes. It begins with the tools and product types required, followed by a step-by-step guide including images for each step. If you would like additional information or assistance, please follow the link or QR code to watch our tutorial video.

http://www.us.schott.com/pbr-tutorial
B. Tools and Products

Required tools

The following tools are contained in the SCHOTT tool kit for the installation and dismantling of our tubular glass photobioreactor. There are two different tool kits available according to the coupling type used. The necessary tools for the particular instruction are depicted on top of each tutorial.

Defined value for torque:
- Standard coupling: 40 Nm
- Slim Coupling: 25 Nm

SCHOTT tool kit

Torque Wrench (Standard coupling: 40 Nm, Slim Coupling: 25 Nm)

Jaw Wrench

Coupling Opener

Dismantling Tool
B. Tools and Products

Product range

The SCHOTT couplings can be used for all PBR systems. All couplings types consist of one cage and two nuts – standard, slim, maintenance and adapter. See images below.

Helical System

1

2 + 3

4

5

1. U- or J-Bend
2. Nut
3. Cage
4. Coupling
5. Tubing

Fence System

1

2

3

1. Manifold
2. Coupling
3. Tubing

horizontal or vertical orientation
C. Instructions
Coupling installation

For a safe connection of the tubular glass parts you will need the torque wrench and the jaw wrench. These tools are used to tighten the couplings.

1. The connection of two tubes requires one coupling that consists of two blue nuts and one black cage.

2. Place the cages into warm water (approx. 50 °C / 122 °F) for a minimum of 15 minutes to allow an easier gliding of the cage over the tube end. The water will lubricate and expand the cage. Please do not use any other lubricants, such as oils or silicones.

3. After positioning the glass tubes slide the blue nuts over the adjacent tube ends. A correct orientation of the nuts is essential.

4. Now take the cage out of the water and push it over one tube end. It is essential to push the cage over the glass tube all the way to the spacer.
The other glass tube can now be pushed into the other end of the cage and both tubes are now in their final position. Push the nuts over the cage.

The jaw wrench should be placed accordingly on the right side of the coupling.

Take the correct torque wrench and place it on the left side of the coupling. Required torque for Standard Couplings is 40 Nm, for Slim Couplings it is 25 Nm. It is important to affix the draw-hook of the tool on the side averted to the body. Make sure there is enough space for the torque wrench to tighten.

Now turn the wrenches in opposing directions until the torque wrench tilts towards your body. The connection process is now completed.

Next push the U-Bend over two tube ends at the same time. Afterwards tighten the blue nuts as shown, before the U-Bend is fully mounted to the system.

Repeat these steps with all other couplings. For the connection of the tube levels please use the U-Bends. The installation of the couplings at the U-Bends is the same as shown before. First, affix two couplings to the U-Bend up to the spacers inside the cages.
C. Instructions
Coupling opening

For opening the couplings, the dismantling tool and the coupling opener are required. Please only use the provided tools for these steps. Note: For opening do not reverse the installation process. This will damage the coupling.

1. Assemble the coupling opener in the middle of the coupling and pull the nuts off the cage, see image on page 8. In case of difficulties with the dismantling the process can be assisted using a rubber mallet.

2. At this point, you may already be able to simply pull the tubes apart. If the tubes are difficult to remove from the cage, you can use the dismantling tool. Slip the nose of the tool into the slit of the cage and pry it open.

3. You can now pull one tube out of the cage and remove the cage from the other tube.

4. Finally wash all components with clean warm water so that they are ready to be reused or stored.
C. Instructions
Individual tube replacement

For this process, the dismantling tool, the torque wrench, the jaw wrench and the coupling opener are required. Please only use the provided tools for these steps. Note: Make sure to use the required torque depending on the coupling type: Standard = 40 Nm, Slim = 25 Nm.
1. For the replacement of single tubes, you need to use a green maintenance coupling. The difference to the blue standard couplings is the missing spacer in the middle of the cage, that allows you to push the cage completely over the tube.

2. For replacing a tube you will need one standard coupling that is to be pushed over one end of the replacement tube.

3. Push the nut and the cage of the maintenance coupling completely over the other end of the new tube. Slide the other green nut over the end of the already installed tube.

4. Now take the tube and push the standard coupling at a very flat angle into the already installed tube of the system. Be sure to avoid glass to glass contact on the other end.

5. Now push the cage of the maintenance coupling halfway over the other tube.

6. The gap between the tubes must be located in the middle of the coupling. You can now close both couplings with the provided tools.  
   Note: Make sure to use the required torque depending on the coupling type: Standard = 40 Nm, Slim = 25 Nm
Let’s bring light to algae.