Technical support - CMBR – Stacking

Ring benders may be stacked to multiply performance by gluing on a “mounting ring” with nonconductive epoxy glue and put on top of each other using a special part inserted in the centre hole.

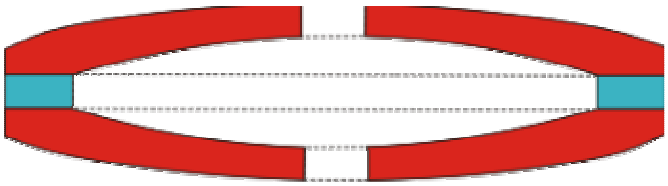
The special part of selected material (see p.2) inserted in the centre hole is called “centre hole insert”. The mounting rings may be manufactured in aluminium, but other material such as ceramic for instance can be used. In the eventuality of operation in a non quasi-static mode, the overall resonance frequency of the assembly has to be watched out as it will noticeably decrease with the assembly height.

1. Stacking

1.1 Stacking of two CMBR

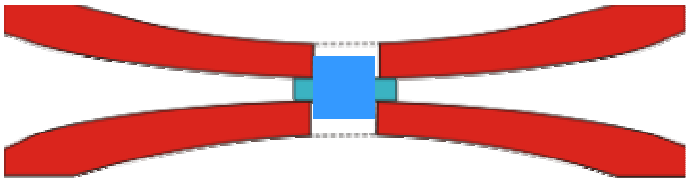
Two different configurations can be considered when stacking only two ring benders:

- **Face to face (F2F)**



This configuration requires the use of a mounting ring (see below).

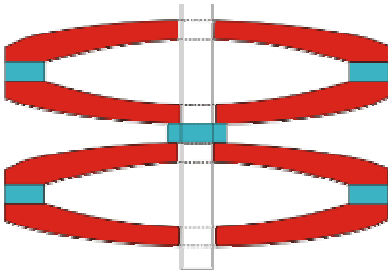
- **Back to back (B2B)**



This configuration requires the use of a centre hole insert ring (see below).

1.2 Stacking of more than two CMBR

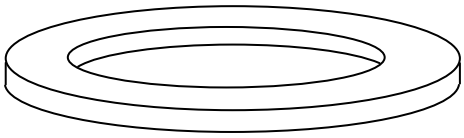
It is operated as a combination of both F2F and B2B.
It might be necessary to compensate for the axial play. Maximum height of the stack will depend on guiding.



Noliac A/S • Hejreskovvej 18 • DK-3490 Kvistgaard • Denmark • Phone: +45 4912 5030 • Fax:+ 45 4912 5031 • Web: www.noliac.com

1.3 Mounting ring

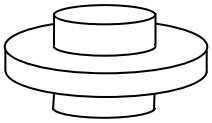
- Gluing of the CMBR on mounting rings must be operated as explained in “Technical support - CMBR - mount and connect”.
- Gluing of the CMBR on mounting rings is likely to reduce overall performances available from the ring bender as a minor clamping of its active area is to be expected.
- Due to the non-planarity of the ring benders, it is recommended to use rings and not discs.
- Particular attention must be paid to the material used for the mounting rings, as a conductive material could create a short circuit if in contact with CMBR external electrodes (chamfering of either the actuator or the mounting ring is an option).



1.4 Centre hole insert

Different scenarios (gluing or mechanical clamping) are possible for the centre hole insert.
Noliac recommends gluing of a non conductive workpiece.

- Gluing of the CMBR on the insert must be operated as explained in “Technical support - CMBR - mount and connect”.
- Gluing of the CMBR on mounting rings is likely to reduce overall performances available from the ring bender as a minor clamping of its active area is to be expected.
- Pre-stressing of the assembly is a solution that can avoid gluing centre hole parts.



Noliac A/S • Hejreskovvej 18 • DK-3490 Kvistgaard • Denmark • Phone: +45 4912 5030 • Fax:+ 45 4912 5031 • Web: www.noliac.com

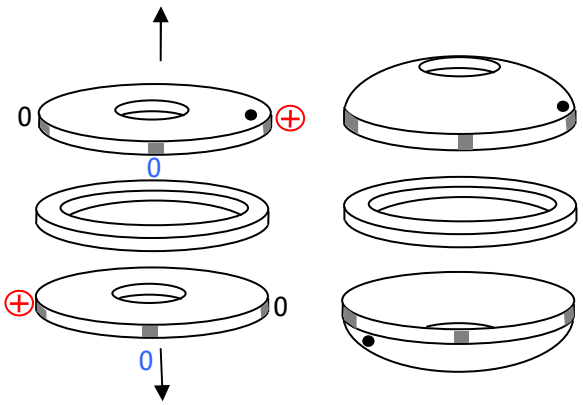
2 Assembly wiring

2.1 Stacking of two benders

- **Face to face**

Suggestion of wiring in the given configurations is as follows:

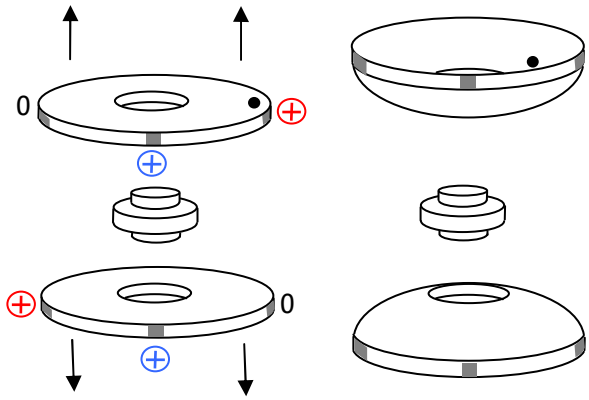
As ring actuators bend in only one direction, one solution consists in connecting each one of them in a *single side voltage control* (see "Technical support - CMBR - mount and connect").
Blue and Black wires can be connected to the ground, while Red wire is at V_{max}.
Note that if both benders are powered by the electrical driver, total capacitance of the assembly will add up.



- **Back to back**

Suggestion of wiring in the given configurations is as follows:

As ring actuators bend in only one direction, one solution consists in connecting each one of them in a *single side voltage control* (see "Technical support - CMBR - mount and connect").
Blue wire can be connected to the ground, while Blue and Red wire are at V_{max}.
Note that if both benders are powered by the electrical driver, total capacitance of the assembly will add up.



2.2 Stacking of more than two CMBR

A particular care has to be paid to cables if the assembly is made of more than two benders.
We recommend initiating a technical discussion with Noliac.

Noliac A/S • Hejreskovvej 18 • DK-3490 Kvistgaard • Denmark • Phone: +45 4912 5030 • Fax:+ 45 4912 5031 • Web: www.noliac.com