GEM 10x10cm detector

with XY readout

Product by : PCB workshop (EN-ICE-DEM bat.102)

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External Dimensions:
- Dimension: 230x230x30 mm
- Fixation: 4 holes of diam. 6mm separated by 200x200 mm
- Volume (gas): 157x157x12 mm (~300 cm³)

External Connections:
- X readout for GEM: 2x connectors 130 pins « Panasonic » AXK6SA3677YG
- Y readout for GEM: 2x connectors 130 pins « Panasonic » AXK5SA3277YG
- High tension for Drift: 10x pads Ni/Au for self made welding
- Gas connectors: 2x fast connectors 2/3, 2x adapters fast connectors 4/6

Parts:
- Baseplate with honeycomb (mesh 5 cm) 10x10 cm wide 3.2 mm thick (epoxy +2x kapton 5/50/5):
  - XY printed board (256 X-tracks, 256 Y-tracks)
  - External Connectors (4x 130 pins)
  - M3 nylon screws, GEM and Drift support

Figure 1: XY readout
- 2 O-ring joints for sealing Viton (fluoro carbone)
- Frame spacer with gas connectors 2/3 (epoxy)
- Top with honeycomb window (mesh 5 cm) 10x10 cm (epoxy and inox inserts A4)

![Figure 4: Top with honeycomb and inox inserts](image)

- 28x inox screws A4 (ISO 3506) 6 pans (imbus) to close the detector
- 100x epoxy washers (0,2 mm thickness) for z spacing between GEM and Drift
- 2x M3 gas connections fast connectors 2/3 « legris »
- 2x gas fast connectors adaptators 4/6
- 4x M3 nylon nut for internal elements support

![Figure 5: Accessories](image)
Internal Connections

Self made welding of internal elements on Ni/Au pads

Assembly plan :

1. XY readout
2. Connector type « panasonic »
3. Inox screws
4. Sealing Kapton
5. External fixation hole 6 mm diameter
6. Ni/Au connections pads for drift/gem
7. Nylon screws for internal support
8. Electric mass
Mounting procedure:

1. Open the detector from the bottom with a 6 pans key (imbus) 2.5 mm.
2. Take care of the honeycomb which is fragile.
3. Adjust the space between the elements with washers (10 washers = 1.97±0.05 mm).

4. Put the internal element (GEM, Drift, etc.) on the 4 nylon screws.

![Figure 7: Z space with washers](image1)

![Figure 8: Internal element mounted on a screw (here it's a GEM)](image2)
5. Repeat step 3 and 4 for the other internal elements.

Figure 9: 2 different internal elements (here a GEM and a drift)

6. Gently tighten the nylon screws. DO NOT USE FORCE!

Figure 10: final fixation with nylon a nut
7. Check the cleanliness of the baseplate, the entretoise, top and 2 o-ring joint.

8. Do the internal electrical connections.

9. Put the 2 o-ring joints in frame spacers grooves.

10. Align the frame spacer on the baseplate with inox screws

Figure 11: frame spacer with o-ring joint

Figure 12: frame spacer on the baseplate with inox screws
11. Put the top on the inox screws

![Figure 13: top on the frame spacer with inox screws](image1)

12. Close the detector with 28 inox M3 screws 6 pans (imbus)

![Figure 14: self made clamping](image2)

13. Tight until the top, the frame spacer and the baseplate are in contact

![Figure 15: top, frame spacer and baseplate are in contact (VS fig 13)](image3)
Connections informations

Internal
- Connect the elements (GEM, Drift, etc.) to the internal pads.

External
- Connect the 4 connectors « Panasonic ».
- Self made welding high tension connectors.
- Connect the gas with the black adapters (2/3->4/6 Gaz) fast connectors.
- Fix the detector on an external support with holes (diam. 6 mm, distance 200x200 mm)

GEM’s caracterisations
GEM 100x100 mm:
1. Washed and passivated
2. Dryed at 70°C for 60 minutes prior to testing
3. Electric validation conditions :
   a. : leak current <10 nA @ 600V hygrometry <50%