Insert module in new Autolab cabinet

How to open new Autolab cabinet

- Switch off the Autolab and unplug mains power.
- Open the Autolab case by removing the two edges from the Autolab. Place a screwdriver in the hole at the bottom of the edges and they will come off easily.

- Unscrew the four indicated screws on the front of the Autolab:

- Unscrew the four indicated screws on the rear side of the Autolab:
- Take off the Autolab frame by moving the rear side out of the Autolab cabinet. Sometimes it helps if you push against the connectors of the PGSTAT module:

![Diagram of Autolab frame]

- Before removing the frame, first dismount the earth cable which is connected to the cabinet.
- Unscrew the front(s) and place the new module into the appropriate slot. Note that every module has a fixed position (sequence of modules).

- Insert the Analog bus (Green connector) on top of the module. The BIPOT, ECD and FRA modules need extra Coax-cables to be connected on top of the modules (see scheme on next pages).
- The FRA2 module needs to be calibrated (see next pages).
- The PX and ECN module have a separate delivered Analog bus, which has to be connected to the ADC164 (see next pages). If the reserved slot is already occupied by an FI20 or MUX module, the PX or ECN module can be placed in another free slot.
- The MUX module does not need any Analog bus connections and can be placed in any other free slot in case the reserved slot is occupied by an FI20, PX or ECN module.
- The ADC750 and SCANGEN need a cable connection if they are used together (see scheme on next pages).

- Tighten the screws at the front of the new modules.
Sequence of modules

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**ADC dipswitch settings**

Check the jumper settings on the ADC164 module. In most cases it is possible to do this with the ADC164 inserted. If not, disconnect all green connectors on top of the ADC164 module, unscrew front and take off the module. All jumpers must be off except jumper SW10. Proper settings:

Note: From AUT71000 the ADC164 is not equipped with dip-switches anymore.

- Replace frame in Autolab cabinet. Do not forget to connect the earth cable again.
- Tighten all screws again and put the edges in place.
- Replace the black label at the front of the Autolab with the appropriate label:

- Connect mains power.
- Switch Autolab on.
- Switch PC on. Select Hardware setup and activate inserted module.
- Perform tests as they are described in the Autolab Installation and Diagnostics manual.
**Analog bus description**

- **PGSTAT12, 30 or 100**
  - Conn 13: 5, 6
  - Conn 14: 4
  - Conn 15: 1
  - Conn 5: 10

- **BIPOT**
  - Conn 3: 6
  - Conn 4: 1

- **ECD**
  - Control Amplifier
  - Conn 4 PG30/100
  - Conn 1 PG12

- **DAC164**
  - Conn 1: 3
  - Conn 5: 1

- **DSG**
  - Conn 2

- **FRA2**
  - Conn 8

- **ADC**

- **SCANGEN**
  - Conn 4
  - Conn 3
  - Conn 2

- **ADC750**
  - Conn 5
  - Conn 101
  - Conn 100

- **ADC164**
  - Conn 6
  - Conn 5
  - Conn 4
  - Conn 2
  - Conn 3

- **FI20**
  - Conn 1
**PX/ECN analog bus connections**

ADC164

PX

ECN

- The PX module is connected to ADC channel 7.
- The ECN module is connected to ADC channel 8.
- Open the Sysdef40.inp file in Notepad and check the correct configuration:

```plaintext
15: ...
16: 11,9,16,15,1
17: 7,8,,
18: &HE,&HF,&H3,,
19: 10,-10, 65536, 50, 10000
20: ...
```

**FRA2 calibration**

- First install the FRA software by re-installing the Autolab software from the original disks or CD. Select the FRA software to be installed,
- The calibration file FRA2CAL.INI is delivered with the new FRA2-module.
- Copy this file into the c:\autolab folder (do NOT use the ‘Load calibration file’ option from the ‘File menu’),
- The file must be changed for the specific Autolab. Open the file with Notepad,

**Fragment of the FRA2CAL.INI file, bold zeros must be adapted:**

```plaintext
......
FRA2 Channel 2= .9637107
[CFCalib]
C1=0
C2=0
[System]
Autolab number=AUT00000
Calibration revision=1.0
Calibration Serial Number=1
NofRegions=7
[CalibRegion1]
BeginFreq=
......
```
- The Autolab number must be changed to the serial number of the connected Autolab (i.e. AUT71085, see rear side of Autolab),
- Save FRA2CAL.INI file and exit Notepad,
- C1 and C2 must be measured. The Autolab dummy cell and a Faraday cage are needed. If you do not have a Faraday cage or if you are not able to calibrate, you can fill in the typical values for C1 and C2 given in the table. This will however affect the accuracy,

<table>
<thead>
<tr>
<th>Type</th>
<th>C1</th>
<th>C2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGSTAT12</td>
<td>26.0</td>
<td>1.0</td>
</tr>
<tr>
<td>PGSTAT30</td>
<td>16.0</td>
<td>0.5</td>
</tr>
<tr>
<td>PGSTAT302</td>
<td>16.0</td>
<td>0.3</td>
</tr>
<tr>
<td>PGSTAT100</td>
<td>16.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

- Measure C1 and C2
- Note: Follow this procedure strictly in order to retrieve proper results,
- Close FRA-software (when active),
- Be sure C1 and C2 are set to zero in the FRA2CAL.INI file,
- Start up FRA-software,
- Load the procedure ‘PGCAL_1.pfr’ from delivered disk,
- Connect the dummy cell (e) (10k Ohm) and place the dummy cell inside a Faraday cage. Connect the green ground lead to the Faraday cage and NOT to the Dummy cell,

- Start the measurement and wait until it has been finished. Ignore the message ‘current range is too low for the frequency’,
- Select ‘Fit and Simulation’ (Data presentation, Analysis) and open the circuit-file ‘PGCAL_1.ecc’,
- Start the fit,
- Determine C1: C1 = value for L * 10 (* 10⁹), so if L gives 1.674 nH, C1 will be 16.7. Round value to one decimal place. Check if the value is close to the typical value given in the table,
- Exit ‘Fit and Simulation’ and exit the FRA-software,
- Edit FRA2CAL.INI and adjust C1 to the measured value,
- Save FRA2CAL.INI and exit Notepad,

- Start up FRA-software again,
- Load the procedure ‘PGCAL_2.pfr’ from delivered disk,
- Disconnect the dummy cell and leave the leads open in the Faraday cage. CE and RE must be connected together as well as WE and S. Be sure RE/CE and WE/S are not connected together,
- Start the measurement and wait until it has been finished,
- Select ‘Fit and Simulation’ (Data presentation, Analysis) and open the circuit-file ‘PGCAL_2.ecc’,
- Start the fit,
- The fitted value for C is the value for C2 in µF. Round value to one decimal place. Check if the value is close to the typical value given in the table,
- Exit ‘Fit and Simulation’ and exit the FRA-software,
- Edit FRA2CAL.INI and adjust C2 to the measured value,
- Save FRA2CAL.INI and exit Notepad,

- **Test FRA calibration**
- To check if the FRA has been calibrated properly run the FRATEST procedure on the normal dummy cell, explained in the ‘Installation and Diagnostics guide’. After this, Fit the data with the circuit-file ‘FRATEST.ecc’:
  - Wait until measurement has been finished,
  - Open ‘Fit and Simulation’ (Data presentation, Analysis),
  - Load circuit-file ‘Fratest.ecc’ from delivered disk,
  - Press ‘Fit’-button
  - When the fit is ready chi-square should read about 1e-4 (typical)
  - R1 should be approximately 100 Ohm with a maximum error of 0.100 %
  - R2 should be approximately 1 kOhm with a maximum error of 0.100 %
  - C1 should be approximately 1 µF with a maximum error of 0.100 %
- If the values are out of range, something is wrong with the installation or with the calibration. Please check the complete installation procedure. Set C1 and C2 to zero again before you start a fresh calibration.

- **Important : Always send the adjusted FRA2CAL.INI file to Eco Chemie by Email (autolab@ecochemie.nl, subject Autolab serial number) or on disk. This is important for future service. If not sent back, we are not able to service this instrument properly.**