

Getting Started with OrigaBookst







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I. Welcome

The OrigaBooKst consists of up to 5 units including:

- one main unit (ref. 1) fitted with all sockets required for connections to the OGS100 or OGS200, electrode systems and other electrochemical instruments such as VoltaLab 80,
- up to 4 modular power units (ref. 2) to be added to the main unit.



Figure 1: OrigaBooKst

It boost the compliance current of your OGS100 or OGS200 system from $\pm 0.1 \text{ A}/17.5 \text{ V}$ or $\pm 2 \text{ A}/20 \text{ V}$ to either [$\pm 5 \text{ A}/\pm 20 \text{ V}$], [$\pm 10 \text{ A}/\pm 10 \text{ A}$], [$\pm 15 \text{ A}/\pm 20 \text{ V}$] or [$\pm 20 \text{ A}/\pm 20 \text{ V}$] depending on the number of modular power units connected to the main unit.

The electrodes (2, 3 or 4 electrodes) are connected to the OrigaBooKst. The OrigaBooKst is to be declared in the OrigaMaster 5 Instrument setup. A great majority of methods of your OGS100 or OGS200 are accessible when using the OrigaBooKst. The OrigaBooKst is an additional unit useful when high compliance currents are involved for instance with fuel cells.

2. Arrembling the OrigaBookrt power units

Depending on the power required, you need up to 4 power units to be connected to the main unit.

Each unit is fitted with a female socket (ref.4) on the right side and an associated male socket (ref.5) on the left side. The modules are assembled by plugging these sockets together.

Start plugging the first power module (ref.2) to the main unit (ref.2) then plug the other modules one by one.

The example below shows how to connect power unit no.2 (ref.3) to the assembly main unit (ref.1)/power unit no.1 (ref.2):



Figure 2: Assembling

3. Connecting the electrodes to the Origabookst

Connect the electrodes of the electrochemical cell to the main unit of the OrigaBooKst using a 2, 3 or 4-electrode setting. Generally a 3-electrode setting is used and connected as follows:

- The working electrode to the WORK BNC socket (ref. 2),
- The auxiliary electrode to the AUX BNC socket (ref. 1),
- The reference electrode to the REF BNC socket (ref. 3).

On high resistive electrolytes are used, you can ground the cell by placing it inside a metal casing connected to the GND socket (ref. 5).

If you want to measure temperatures using a temperature measuring probe (CTN or Pt-1000), connect it to RCA socket (ref. 4).



Figure 3: Connecting the electrodes

4. Connecting the OrigaBookst to the Origastat system

Connect the main power unit of the OrigaBooKst to the OrigaStat system (OGS100 or OGS200) as follows:

- The Analog I/O socket (ref. 1) of the OGS100 or OGS200 to the Analog I/O socket (ref. 4) of the OrigaBooKst main power unit,
- The COM1 serial socket (ref. 2) of the OGS100 or OGS200 to the COM2 or COM3 serial socket (ref. 5) of the OrigaBooKst main power unit,
- The USB socket (ref. 3) of the OGS100 or OGS200 to to an USB port on the PC using a standard USB 2.0 cable.



Figure 4: Connecting the Origastat system

Do not use the COM1 serial port of the OrigaBooKst. This port is dedicated to programmer or maintenance purposes!

5. Connecting the instruments to the mains

Connect the instruments to the mains:

• The main socket (ref. 1) of the OGS100 (or OGS200) to the mains using the line cord provided.



The main socket (ref. 2) of the OrigaBooKst main power to the mains using the line cord provided.



Figure 5: Connecting the mains

Declaring the OrigaBookst to OrigaMaster 5 6.

You must declare to OrigaMaster 5 the type of OrigaStat and OrigaBooKst system you have connected to the PC.

Origolyr Start OrigaMaster 5: Click the OrigaMaster 5 icon in the PC Desktop or 1. Poly select Start > All programs > OrigaLys > OrigaMaster 5 OrigaMaster 5. OrigaMaster 5



2. In the menu bar of OrigaMaster 5, select Settings then click the Configuration icon.



Figure 6: Declaring the OrigaBooKst (1/5)

OrigaMaster 5 scans the USB ports of the PC and displays a list of all OrigaStat 3. devices you have connected to.

In the Configuration box, select the potentiostat in the list (ref.1) provided:

- OrigaStat 100 for the OGS100 model, 0
- OrigaStat 200 for the OGS200 model. 0

Origolys

Configuration	×
Potentiostat	OK Cancel
Additional unit	



4. In the Additional unit list, select OrigaBooKst.

Configuration	×
Potentiostat	OK Cancel
Additional unit	

Figure 8: Declaring the OrigaBooKst (3/5)

5. Enter the OrigaBooKst parameters:

OrigaBooKst	
Serial port	COM2:
Current Range	5 A 🔻
Cell configuration	Normal 3
Delay before disjunction	5 msec.
Bandwidth limit	

Figure 9: Declaring the OrigaBooKst (4/5)

• For Serial port (ref. 1), select the serial port (COM2 or COM3) used on the OrigaBooKst for communication with the OrigaStat and the PC. This is the OrigaBooKst socket used for connection to the OGS100 or OGS200 (see above paragraph 4).



- For Current range (ref. 2), select the maximum current range of the OrigaBooKst. Depending on the number of power units used it varies from 5 A to 20 A:
 - 5 A with 1 power unit,
 - 10 A with 2 power units,
 - 15 A with 3 power unit,
 - \circ $\,$ 20 A with 4 power units.
- For Cell configuration (ref. 3), select the type of electrode settings used (Normal 2, Normal 3, Normal 4, Inverted 2, Inverted 3 or Inverted 4). It depends on how the electrodes are connected to the OrigaBooKst.
- Enter the Delay before disjunction (ref. 4)

Usually, if the current measured becomes higher than the range selected, the electrodes are disconnected and the sequence in progress is stopped (disjunction of the system). Nevertheless, you can maintain the electrodes connected for a certain time (Delay before disjunction) if such a current overshoot occurs. By introducing a delay before disjunction, you prevent the sequence from being stopped after a sudden change in potential (or in current) especially when working in the low current range.

As a general rule, leave the value displayed by default (5 msec) and slightly increase the value in case of unwished disjunctions occur.

6. Click the OK button to close the Configuration box.

OrigaMaster 5 checks the instrument connections and displays a communication failure in case of problems.

If the communication is established, then you are ready to edit an experiment with the methods dedicated for your system OGS100 (or OGS200) with OrigaBooKst (5 A, 10 A, 15 A or 20 A).

7. In the menu bar of OrigaMaster 5, tick the Log in option. With this option selected, OrigaMaster 5 will automatically check the presence of an OrigaBooKst with the communication parameters previously entered. There is no need to enter these parameters again.

Origetur	🗋 💕 🕻	- 🎲 🖥									
U	Home	Seque	nce	Curve	Settings						
Configu	(iration Info	ormation	Settings	On/Off	Settings pl	H/mV	Reagents	Stirrer	Battery load	OCP mV	Log in
	In	strument			Cell		Burettes		OrigaMµ	Monitor	BooKster

Figure 10: Declaring the OrigaBooKst (5/5)

7. Using the OrigaBookst with a Voltalab 80

7.Ι **C**Οηηεςτης της ηγταυμεητ

Origalys

Connect the main power unit of the OrigaBooKst to the PGZ402 of the VoltaLab 80 as follows:

- The 4 BNC sockets (E (X) IN, I (Y) IN, Vg OUT and A/D IN) of the PGZ402 to the Analog I/O socket (ref. 1) of the OrigaBooKst main power unit,
- The COM1 serial socket of the PGZ402 to the COM1 serial port of the PC using a standard 9-pin female/9-pin female RS232 serial cable,
- The COM1 serial socket (ref. 2) of the OrigaBooKst to the COM2 serial port of the PC using a standard 9-pin female/9-pin female RS232 serial cable.
- The main socket (ref. 3) of the OrigaBooKst main power to the mains using the line cord provided.





Figure 11: Connecting the OrigaBooKst to a VoltaLab 80



7.2 SETTING UP THE PC JOFTWARE

Run VoltaMaster 4 on the PC then do the following:

- 1. Select the **File** menu then the **New sequence** command. The Laboratory logbook window of a new sequence is opened.
- 2. Select the **Settings** menu then the **Instrument setup** command.

If you do not have access to the **Instrument setup** command, it means that the monitor bar is activated. Disable the toolbar as follows: select the **Toolbar** menu then deselect the **Monitor Bar** option.

3. If the PGZ402 is connected to COM1 serial port of the PC, select VoltaLab PGZ402 and Potentiostat (X/Y/Vg). With these settings, the PGZ402 will carry out measurements on its Analog I/O terminals.

Instrument se	tup	? ×			
Serial port	Potentiostat				
1 🗄 🛛	oltaLab PGZ402				
Iest	Instrument Version				
Additional unit					
P	'otentiostat (X/Y/Vg) 📃				
Settings					
	<u> </u>	ncel			

Figure 12: OrigaBooKst with a VoltaLab 80 - Instrument setup

7.3 Εριτιής της γεφυεήςε

The VoltaMaster 4 « Run External Utility » method is used to communicate with OrigaBooKst. Several « Run External Utility » are required as they offer a limited set of command lines.

1. Select the **Parameters** menu then the **Sequence edition** command and edit a sequence as follows:



Figure 13: Editing Sequence edition

 The Settings parameters of each « Run External Utility » method must be edited as shown below. We suppose that the OrigaBooKst is connected to serial port COM2 of the PC.

Run Exter	rnal Utilit y	×
Run Exter Data Data Data Parity Stop Port Flow	Settings 38400 8 None 1 COM2 DTR/DS	Transmission Add CR Cmd delay 1 sec Reception Wait chai Save in file Result Unit Start 1 End
	OK	Annuler Aide

Figure 14: Run External Utility - Editing Settings parameters

- 3. Edit the Data parameters of the first « Run External Utility » method.
- The configuration shown below is constant (does not depend on your instrument) excepted for the « ri xA » command which results from the number of OrigaBooKst power units connected (here 1 power unit connected for a current of 5A).

o:	1			
Settings				*
				Y
ige Set	Bookster Mc	ode		
	Settings 2 ige Set	Settings	Settings	Settings 2 ge Set Bookster Mode

Figure 15: « Run External Utility no.1 » - Editing Data parameters

- 4. Edit the Data parameters of the second « Run External Utility » method.
 - \circ Selection of the regulation mode: « pot » for potentiostatic, « gal » for galvanostatic.
 - \circ \quad Selection of the configuration used for the electrode setup:
 - « cel on2 » : 2 electrodes AUX to GND
 - \ll cel on 3 \gg : 3 electrodes AUX to GND
 - \ll cel on 4 \gg : 4 electrodes AUX to GND
 - \ll cel rv2 \gg : 2 electrodes WORK to GND
 - \ll cel rv3 \gg : 3 electrodes WORK to GND
 - « cel rv4 » : 4 electrodes WORK to GND



ri 5A pwr on		*
rvg OV vgext rev		
4		
		_

Figure 16: « Run External Utility no.2 » - Editing Data parameters

5. Edit the « Pot. Interactive CV » method.

Warning: The OrigaBooKst imposes 3 times the preset potential programmed. In the example below, it means that the potential applied will vary 0 à +3000mV.



Figure 17: « Pot. Interactive CV » - Editing parameters

- 6. Edit the Data parameters of the third « Run External Utility » method.
 - $\circ~$ the « att » command corresponds to « Open Circuit at end ».
 - $\circ~$ the « cel off » command disconnects the electrodes. This command is equivalent to a switching off the "Cell" push button on the PGZ402 front panel.

att cel off		*
र		<u>_</u>

Figure 18: « Run External Utility no.3 » - Editing Data parameters

Run the sequence. The following screens are obtained for the 4-method sequence programmed above.

🖆 testbookster01.EXP - Laboratory logbook :1	
testbookster01.EXP - Laboratory logbook :2	_D×
Oi Di Si Si WWR Set Bookster Configuration Ci Set Bookster Configuration CoM1 Set Bookster Configuration CoM1 Set Bookster Configuration	Next

Figure 19: Running sequence (1/4)

Origolys

📓 testboo	kster01.EXP - Lab	oratory logbook :1						
Logbook	Initial data							
Operator Date :	📓 testbookstert)1.EXP - Laboratory logi	ook :2				=10)2	×
Specificz Working Referenc Auxiliary Commen				Set Bookster Mode		×I		
				OK OK				
					Next]		

Figure 20: Running sequence (2/4)

Currents and potentials displayed values must be multiplied by a coefficient:

- Currents are to be multiplied by 5 for a 5 A OrigaBooKst,
- \circ ~ Currents are to be multiplied by 10 for a 10 A OrigaBooKst,
- \circ ~ Currents are to be multiplied by 15 for a 15 A OrigaBooKst,
- $_{\odot}$ $\,$ Currents are to be multiplied by 20 for a 20 A OrigaBooKst,
- Potentials are to be multiplied by 3 whatever the OrigaBooKst in use.

In the following example displayed below:

- \circ The current measured is equal to 511.6 mA x 5 = 2.558 A
- \circ The potential imposed is equal to 870 mV x 3 = 2.61 V







Figure 22: Running sequence (4/4)



7.5 ΤΗΕ RJ232 COMMANDS

7.5.1 RJ232 Format

At powering on the system, the default RS232 parameters are: 38400 bauds, 8 data, One Stop Bit, No parity

7.5.2 Juntax of the R1232 commands

Notes:

The command characters string is defined within brackets [cmde]. All commands end with a $\langle cr \rangle$ (code ASCII 13)

• Identification

0

0

- [hello] : initiates communication with the master device (Answer boost)
 - [ver] : Prints date and time of the software version
- [hard] : Prints PCB and processor references
- [maker] : Prints Manufacturer name
- [product] : Prints Product name
 - [SN] : Reads in flash the serial number (PL+RN) of instrument

• Configuration of OrigaBooKst

- [pwr c] : Switch on/off the power units
- [ri x] : Selection of the I current (GamI_x)
- [ovlit n] : Delay before disjunction (10 30000 ms)
- [aos c] : Anti-oscillation filter system (off / on)
- [sum c] : Coupling 2 OrigaBooKst (off / on)

• Configuration of measurement cell

- [cel x] : Cell Configuration (Cellule_x)
- [pot] : Potentiostatic regulation mode
- [gal] : Galvanostatic regulation mode
- [att] : Standby mode
- [trv] : Working mode

• Pilot generator

- [rvg x] : Pilot range (VgINT_GamX)
- [vgext x] : Configuration of external pilot generator (VgEXT_x)
- [vgd n] : Pilot DC voltage (in volt)
- [igd n] : Pilot DC current (in mA)
- Status
 - [imax] : Reads back the current available depending on the number of power units detected
 - [pwr?] : Reads back the powering status of the power units
 - [ri?] : Reads back the I current range in use (GamI_x)
 - [mod] : Reads back the regulation mode in use (POT / GAL)
 - [trv?] : Reads back the mode in use (off / on)
 - [rvg?] : Reads back the pilot range in use
 - [vgext?] : Reads back the configuration of the external generator in use
 - [alm] : Reads back the alarm status (alm_xxx)
 - [clrAlm] : Resets the alarms to zero

Measurements

0

 [m c] : Mesures the E(mV) and/or I(mA) and/or Vs(mV) and/or Rth(ohms) (1 to 4 parameters separated by a spacing character)

- 7.5.3 Syntax of the RS232 parameters
 - Type [... c]: Characters string
 - Type [... x]
 - \circ Cellule_x: off / on2 / on3 / on4 / rv2 / rv3 / rv4
 - GamI_x: 5A / 10A / 15A / 20A
 - \circ VgINT_GamX: 0V / 1V / 15V
 - \circ VgEXT_x: off / dir / rev
 - Type [... n]: Numerical data

7.5.4 Jyntax of the R1232 answers

- "syntax error"
- "argument error"
- "parameters number error"
- "context error"
- "ok"
- "boost"
- "Fatal error: Undefined Response"
- Type alm_xxx : 48 characters max (with <cr>)
 - o **"ok"**
 - 。 "I=OVL"
 - "I=OVL,E=OVL,Vs=OVL,BASE=ThermBRK,POWER=ThermBRK"