

PMUX-S



16 Channel Multiplexing Device

(Operation Manual)

Caution!!!

Please read the [risk assessment document](#) before operating the potentiostat.

Prevent the inputs of the potentiostat from electrostatic discharge (ESD)! ESD may damage the potentiostat. ESD-related damages are not covered by the warranty of the potentiostat. The user must make sure to discharge his-/herself from any electrical charge before touching the potentiostat (TIP: use grounded ESD-matts).

Maintain the maximum input voltage of the device and the selected voltage range.

Use electrically insulated thermocouples.

Do not expose the PMUX-S and RMUX card to heat.

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1 Introduction

The PMUX-S power multiplexer is used to simultaneously contact the ZENNIUM series potentiostat with up to 16 individual cells. The measurements are carried out sequentially. For medium power applications, our power potentiostats can also be connected. The PMUX-S can be used for cell currents up to ± 5 A.

The PMUX-S power multiplexer routes one of 16 individual cells to a ZENNIUM series, PP series or EL series potentiostat in full 4-electrode setup. The inactive cells are open circuit.

Up to four PMUX-S multiplexers can be installed in a ZENNIUM X or ZENNIUM PRO potentiostat which allows simultaneous connection to up to 64 electrochemical cells.

1.1 Packing List

- PMUX-S power multiplexer
- RMUX addon card (only for controlling PMUX-S!)
- Control cable SUBD44 to SUBD25 (RMUX -> PMUX-S)
- 16 twisted cell cable sets (4 lines each: red/black, blue/green), 1m, 2mm
- Connection cable set for potentiostat (depending on the type of potentiostat)
- This manual

The RMUX addon card is configured for controlling the PMUX-S power multiplexer. **It can't be used for RMUX16 multiplexing even with RMUX16 CS cable set!**

The type of electrochemical workstation (or serial number) must be specified when ordering.

2 Technical Data

Channels:	16 (full 4-electrode setup)
Maximal Current:	± 5 A
Connector:	D-SUB 25 (RMUX control in) 2mm banana jackets (cell connections)
Maximum PMUX-S Supported:	4 (64 channels in total)

3 Installation

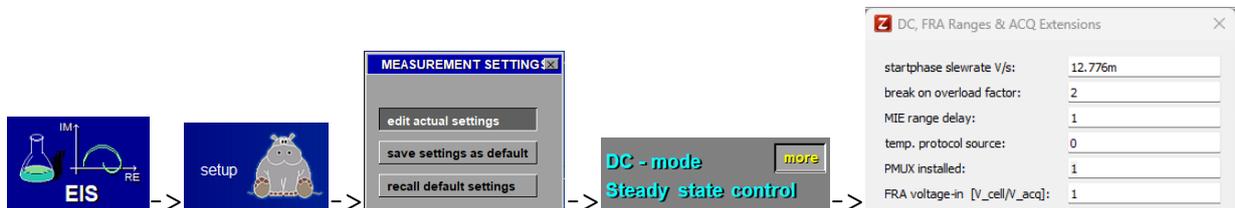
For the installation of the RMUX controller card:

1. Switch off the ZENNIUM PRO/X and disconnect it from mains
2. Remove one of the empty slot front panels named extension by twisting the four screws at the top and the bottom
3. Plug in the RMUX card and fasten the two screws at the top and the bottom of its front panel
4. Connect the PMUX-S to the RMUX card with the control cable
5. Connect the ZENNIUM PRO/X to mains and switch it on

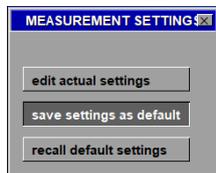
The hardware installation is finished now. The Thales software will detect the RMUX card automatically when started.

3.1 Setup PMUX-S Current Limit

The Thales software has a initial current limit of ± 500 mA for RMUX channels. To enable the full PMUX-S ± 5 A range edit the global measurement setup. Change the PMUX installed entry from "0" to "1" as described below.



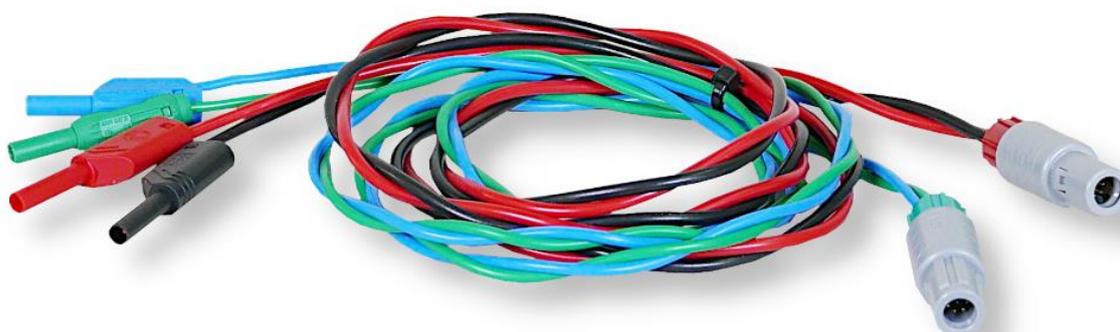
This changes can be saved permanently:



4 Connection

Caution! Before connecting either the PMUX-S to the ZENNIUM PRO/X or the cells to the PMUX-S, switch off the potentiostat!

The PMUX-S functions are controlled through the internal system bus, whereas the connections of the analog signals have to be set up externally. For that purpose, a potentiostat connection cable is shipped with the PMUX-S. There are different available potentiostat connection cables depending on the type of potentiostat used with the PMUX-S power multiplexer device.



This is the potentiostat connection cable for using the PMUX-S with the main potentiostat of a ZENNIUM PRO/X.

The type of electrochemical workstation (or serial number) must be specified when ordering.

5 Cell Connections

The PMUX-S is shipped with 16 cell cable sets.



Each cable set consists of two twisted cable pairs (red/black, green/blue). The color coding is as follows:

Black - working electrode

Blue – working electrode sense

Green - reference electrode

Red - counter electrode

Caution! If an PMUX-S channel is used with a ZENNIUM PRO/X main potentiostat, please make sure that nothing is connected to the BNC outlets.

6 Front Panel

The RMUX card has a two-digit 7-segment display. This display shows the number of the channel which shows the currently selected PMUX-S channel. The 7-segment display is deactivated, when no PMUX-S channel is selected (all channels are open-circuit).

7 Software Control

After the installation Thales will detect the RMUX card automatically during its start-up procedure.

7.1 Using ZENNIUM Series Potentiostat

It will enable the selection of the PMUX-S channels in all RMUX compatible software sections when using the Zennium series potentiostat.

7.1.1 Testsampling & Control Potentiostat

Main Menu -> EIS Menu -> Control Potentiostat

To select a PMUX-S channel in the Testsampling page click on the DEVICE button:



An input window will open which allows you to set the number of the active channel. "0" will select the ZENNIUM PRO/X potentiostat outlets, the numbers "1" to "4" will select the corresponding RMUX4 channel.

7.1.2 Series Measurements

To set up a series measurement which scans through a definable number of channels go to the Define Series Measurement page:

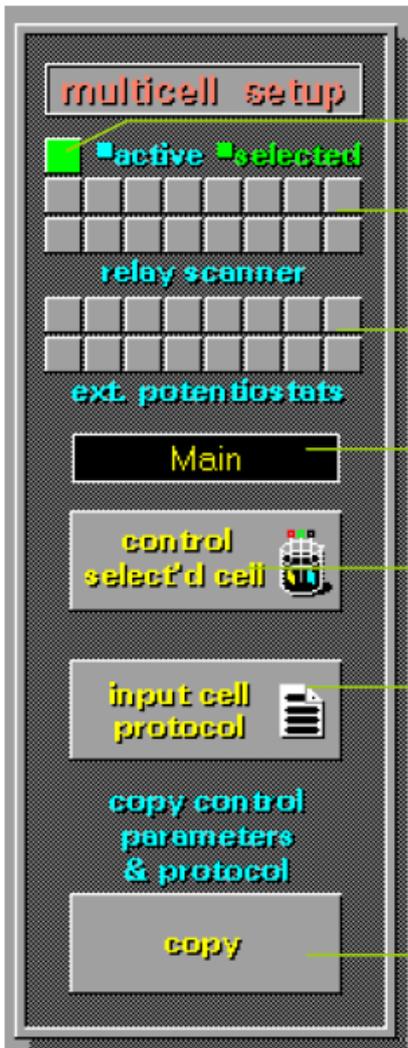
Main Menu -> EIS Menu -> Define Series Measurement



Select the option Loop Multiple Cells.



The right-hand side of the window will show the Multicell Setup, then:



The right-hand side of the window will show the Multicell Setup, then:

Main potentiostat

RMUX4 channels 1 - 16

EPC42 channels 1 - 16

Displays selected channel

Opens Testsampling page

Opens comment window

Copies all control parameters & protocol

The squares on the top indicate the status of each channel:

grey -> inactive

blue -> active

green -> selected

The upper row shows the channels 1 to 8 (from left to right), the lower row shows the channels 9 to 16 (from left to right).

By clicking with the mouse on a square you cycle through the above mentioned states of a channel: inactive -> active -> selected -> inactive -> ...

The upper two rows are showing the RMUX4 channels, the lower two rows show the channels of external potentiostats connected through EPC42 cards. The single square above the RMUX4 rows represents the main potentiostat. You may select one of these by clicking on it.

The box below displays the name of the selected channel. Clicking on Control Selected Cell opens the Testsampling page. Here you may configure the selected channel as described in the chapter Testsampling & Potentiostatic Control.

Input Cell Protocol opens a window where you may input your comments which will be saved along with the measurement data.

The Copy button copies the cell parameters and the protocol entries of the selected channel to all active cells. This is useful if all channels must have the same parameters.

7.1.3 Integration into SCRIPT

Using the different channels of a PMUX-S power multiplexer in an user-defined SCRIPT routine, the individual channels are selected like additional devices with the DEV% command described in the manual [SCRIPT an introduction](#) in chapter 3.5.

7.2 Using PP/EL Series Potentiostats

When using the PMUX-S with an external potentiostat controlled over EPC interface the channel selection differs from measuring with the Zennium series potentiostats.

In general, the PMUX-S channel must be selected first and then the Thales software must be switched back to the channel of the external potentiostat PP/EL. The multiplexer routing is retained when switching to the external potentiostat. The RMUX 7-segment display will still show the last PMUX-S channel.

To create convenient measurements in this configuration, the help of SCRIPT is required. Further information on integration of PMUX-S channels in a SCRIPT procedure please read the manual [SCRIPT an introduction](#).