

Consort

MANUAL
HANDLEIDING
MODE D'EMPLOI
ANLEITUNG



EV1450
EV2150
EV2310
EV2320
EV2650
EV3020
EV3330
EV3610
EV3620

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General informations

Introduction

This instrument is manufactured with the latest technology and needs no particular maintenance. **Consort** certifies that this instrument was thoroughly inspected and tested at the factory prior to shipment and found to meet all requirements defined by contract under which it is furnished. However, dimensions and other physical characteristics may differ.

The normal operating temperature should be between 0° and 40° C. Never use the instrument in a room with high humidity (>95 %) or at very low temperatures (condensation water!).

Manufacturer

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Parklaan 36	Fax (+32)(14)42 91 79
B2300 Turnhout	E-mail: info@consort.be
Belgium	

Warranty

This instrument (excluding all accessories) is warranted against defective material and workmanship for a period of thirty-six (36) months from the date of shipment ex factory. **Consort** will repair all defective equipment returned to it during the warranty period without charge, provided the equipment has been used under normal laboratory conditions and in accordance with the operating limitations and maintenance procedures in this instruction manual and when not having been subject to accident, alteration, misuse or abuse. A return authorisation must be obtained from **Consort** before returning any product for warranty repair on a freight prepaid basis!

Consort is not liable for consequential damages arising out of the use or handling of its products.

Servicing

In the event of this instrument being returned for servicing, the owner is requested **NOT** to send the following items unless they are suspect:

Manual
Cables
Accessories

If serious malfunctioning occurs, stop using the unit immediately and consult your local **Consort** dealer.

Keyboard

During **SETUP** or programming a procedure:

- ↑↓ = Buttons for entering a value or for selecting a function.
- ✓ = Button for programming and confirming the desired parameters.
Hold this button pressed to return to the main menu!
- ▶/■ = Button to
 - start the procedure (MANUAL or METHOD),
 - cancel while entering a parameter (SETUP),
 - return to the previous menu (SETUP).

During a **PROCEDURE**:

- ↑↓ = Buttons for selecting a display configuration.
- ✓ = Button to modify the parameters.
- ▶/■ = Button to stop or to pause the experiment.

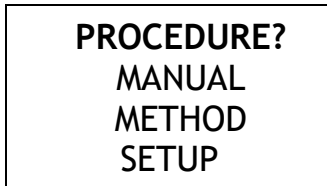
Very important

This electrophoresis power supply is a high technology instrument available in several versions. As it is capable of giving dangerous voltage levels by which high power is involved, we suggest that you take a few moments to read this manual thoroughly. Although this instrument is equipped with all necessary safety features against abuse and other accidental failures, caution should be exercised when working with high voltage equipment.

1. **Avoid to touch the outlets with any conducting object** and make sure there is a second person present for your safety in case of any severe electric shock.
2. Never touch any part of the assembly (power supply, leads or tank) before having switched off.
3. Never manipulate with wet hands.
4. Do not ground any of the outputs or the buffer in the tank.
5. Connect the outlets only to an insulated electrophoresis tank with safety cover.
6. Never make any other connections, such as e.g. putting several power supplies in series or in parallel.
7. In order to prevent electric shock, never open the back plate nor remove the cover.
8. Do not expose the unit to rain or any other liquid.
9. **Do not spill liquid or insert metal objects inside the unit.** Take care so that the power supply is not dropped to avoid damaging the cabinet which defeats safeguards or injuring yourself.
10. If the unit has been dropped or the cabinet has been damaged, unplug it and have it checked by an authorised service technician to restore the safeguards.
11. The fact that the unit operates satisfactorily does not imply that the unit is properly earthed or that it is completely safe. If in any doubt about the effective earthing of the unit, contact a qualified electrician.
12. **Never block the ventilation holes** or place the unit in any enclosure unless proper ventilation is provided.
13. Never place the unit near or over a radiator, heat register or stove.
14. Avoid locations where the instrument is exposed directly to the sun light.

Procedure?

This is the main menu that is shown after powering the device and has 3 options:



1. **MANUAL**
To start a regular procedure with fixed parameter limits for Voltage, Current, Power and Timer. See [Manual Programming](#).
2. **METHOD**
To start a procedure with multiple steps to vary the parameter limits automatically while running. This method also allows Voltage Gradient settings. See [Method Programming](#).
3. **SETUP**
To modify the settings of the [system](#), [detections](#) and [data-logging](#).

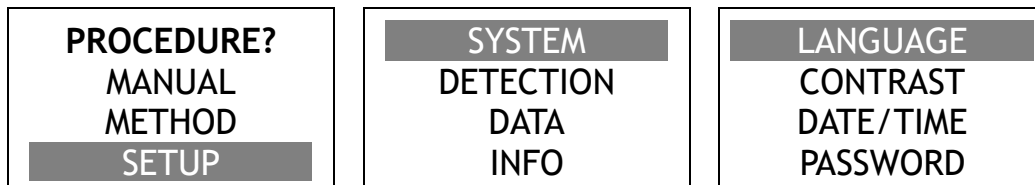
Setup

Use this menu to preset the system settings of the power supply for language, display contrast, real time clock, password, detections, data recording.

System: Language

The power supply has several languages built-in for the communication with the user.

1. Follow these steps to select **LANGUAGE** and press ✓:

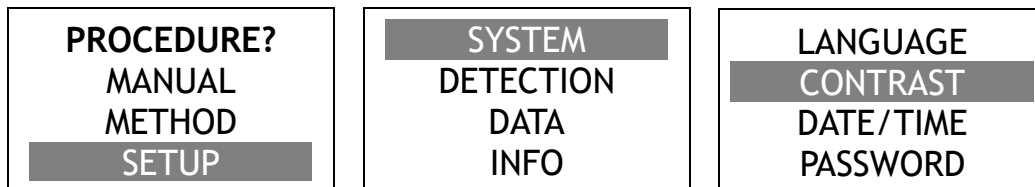


2. Select the desired language and press ✓.

System: Contrast

According to the location where the device is installed, it might be required to adjust the display contrast.

1. Follow these steps to select **CONTRAST** and press ✓:

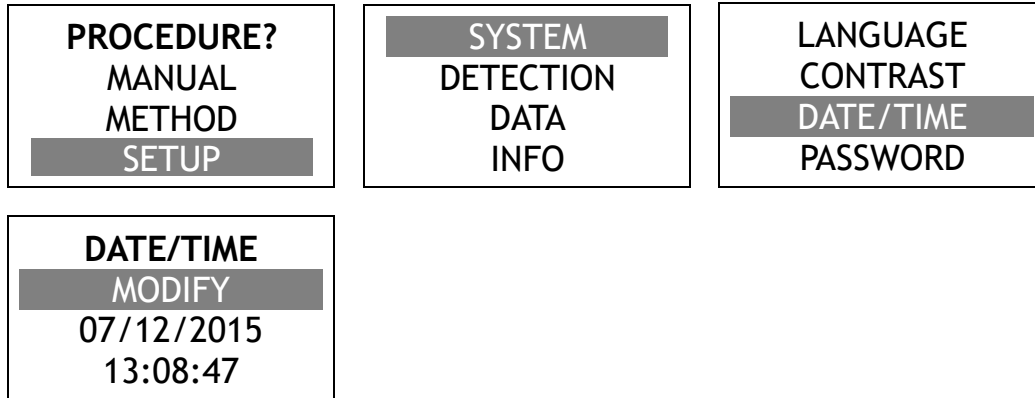


2. Adjust the contrast setting and press ✓ to confirm.

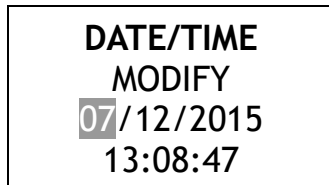
System: Date/Time

This device has a precise real time clock built in. The real time clock is used for GLP reports and data recording purposes. The date and the time can be adjusted.

1. Follow these steps to select **DATE/TIME** and press ✓:



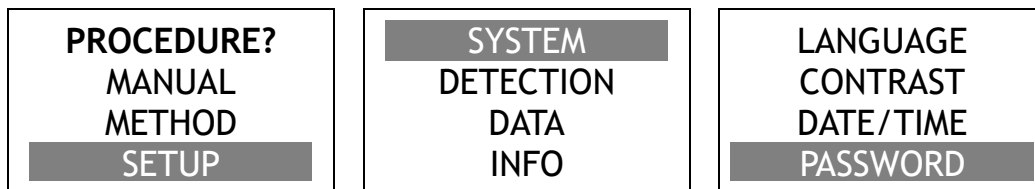
2. Set consecutively the date, month, year, hour, minute and seconds. Confirm each with ✓ or stop entering the other values by pressing ▶/■.



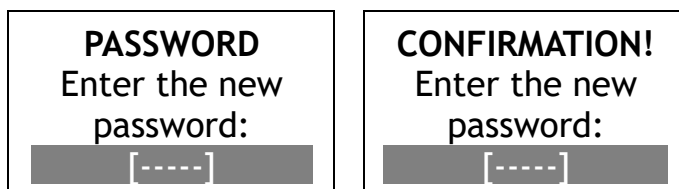
System: Password

When desired, a password can be set which will be requested when trying to modify the setup or the parameters of a procedure. The user can then only run or stop the experiment.

1. Follow these steps to select **PASSWORD** and press ✓:



2. A question to activate the password will appear. Choose YES and confirm to enable a password, set to NO to disable the password.
3. When enabled, the device will request twice the same combination of five keystrokes. This combination will be required to modify any setting.

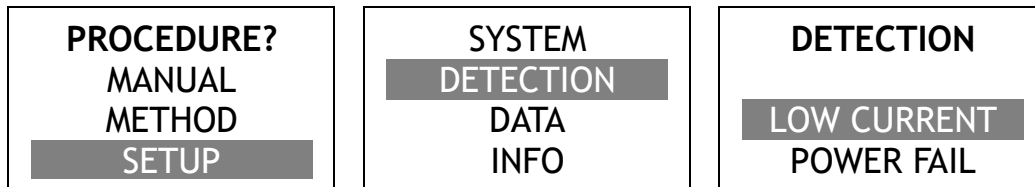


Detection

Choose **DETECTION** to alter the actions when a low current or a power failure is detected.

- **Low Current**
When a very low current is detected as soon as the Voltage limit has been reached, the power will shut down the procedure. An [audible error message](#) will be given.
- **Power Failure**
When the detection of a power failure is enabled, the power supply will continue to proceed the procedure if the timer was still running at the moment that the power failure occurred. After powering it again, the power supply will automatically proceed with the experiment for the remaining time.

1. Follow these steps to select **LOW CURRENT** and press ✓:



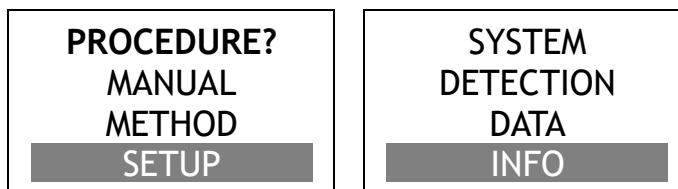
2. Decide whether or not the output voltage should shut down at a too low output current and press ✓.
3. Select **POWER FAIL** and press ✓.
4. Decide whether or not the instrument should proceed with the experiment for the remaining time after a power failure and press ✓.

Data

To be added, check our website (www.consort.be/wiki) for firmware updates of the instrument. This feature will allow to log all information about the executed procedures.

Info

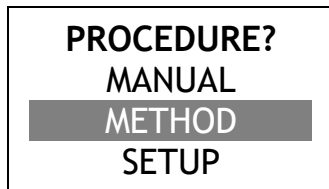
Choose **INFO** to find specific information about the device, the parameter limits, the firmware version and more:



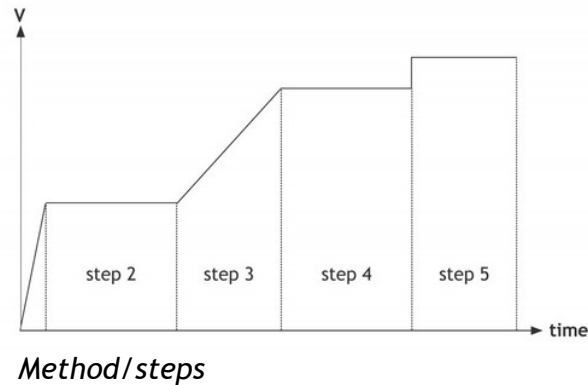
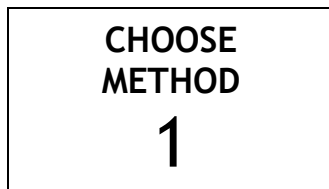
Method programming

Method programming permits to store up to 9 different methods, each with 9 steps, of frequently used parameters in the non-volatile memory for future recall. Each step is able to recall a next one, providing a flexible multiple step function for special techniques. The method mode also permits to program a linear voltage gradient for any step provided the limiting current or power is not attained. Parameters can be changed temporarily without interrupting the run.

1. Verify if the instrument is switched off.
2. Connect the electrophoresis tank to the instrument.
3. Switch the instrument on.
4. Select **METHOD** and press ✓:



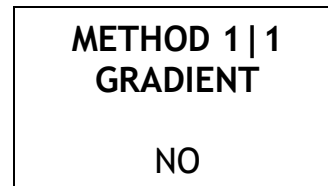
5. Select the desired method and press ✓:



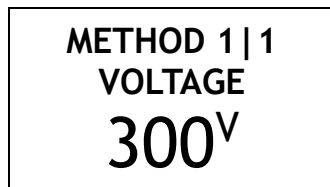
6. When previously multiple steps have been programmed, select the desired step and press ✓:



7. Decide whether or not a linear voltage gradient has to be performed and press ✓:

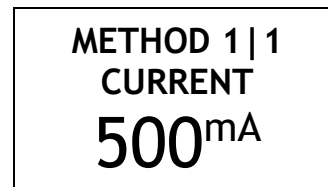


8. Enter the desired voltage limit and press ✓ :



When performing a voltage gradient, enter the desired end Voltage. The start Voltage is the end point of the previous step.

9. Enter the desired current limit and press ✓ :



This limit is automatically set to maximum and cannot be changed in case of a voltage gradient step.

10. Enter the desired power limit and press ✓:

METHOD 1 | 1
POWER
150^W

This limit is automatically set to maximum and cannot be changed in case of a voltage gradient step:

11. Enter the desired timer unit (h or kWh) and press ✓:

METHOD 1 | 1
TIMER UNIT
h

12. Enter the desired timer value and press ✓:

METHOD 1 | 1
TIMER
00:30^h

The value format is 'hh:mm' when entering a value in hours, a value with 2 decimals when entering kiloVolthours.

13. Decide if the experiment should automatically proceed with a next step, press ✓:

METHOD 1 | 1
END METHOD
NO

Choose NO to resume at point 6 with the next step, choose YES to stop after this step.

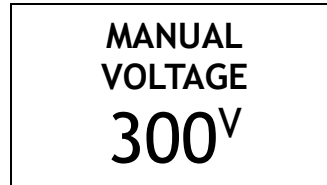
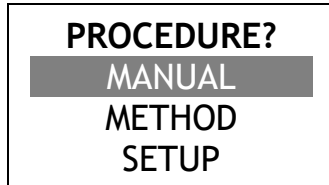
14. Press ▶/■ to start the experiment.

- *At any time, you can return to the main menu by holding ✓ pressed.*
- *At any time, you can avoid programming unnecessary parameters. To do so, simply press ▶/■ instead of ✓ after entering the last relevant value and the instrument will immediately start the experiment keeping the other parameters to their previous values.*
- *To ensure that the desired parameter is kept constant, we suggest to pre-set all other parameters to its maximum.*
- *A blinking unit of the controlling parameter appears when the regulation is complete.*
- *The timer will always count down except when no timer value has been entered.*

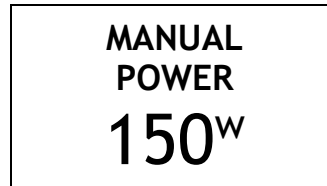
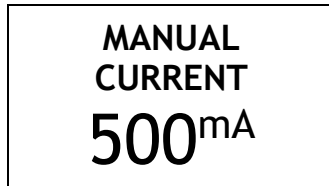
Manual programming

Manual programming permits to set voltage, current, power and time limits for a simple routine electrophoresis run. Parameters can be changed temporarily without interrupting the run.

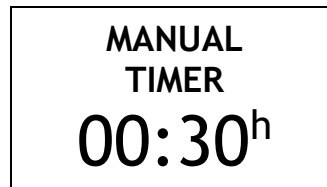
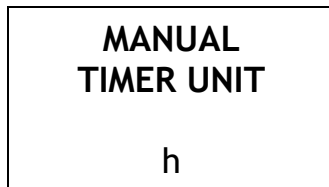
1. Verify if the instrument is switched off.
2. Connect the electrophoresis tank to the instrument.
3. Switch the instrument on.
4. Select **MANUAL** and press ✓:
5. Enter the desired voltage limit and press ✓ :



6. Enter the desired current limit and press ✓ :
7. Enter the desired power limit and press ✓ :



8. Enter the desired timer unit (h or kWh) and press ✓ :
9. Enter the desired timer value and press ✓ :



The value format is 'hh:mm' when entering a value in hours. The format is a value with 2 decimals when entering kiloVolthours. Set to zero when required to continue until ▶/■ is pressed or the power is switched off.

10. Press ▶/■ to start the experiment. See [Running Condition](#).

- At any time, you can return to the main menu by holding ✓ pressed.
- At any time, you can avoid programming unnecessary parameters. To do so, simply press ▶/■ instead of ✓ after entering the last relevant value and the instrument will immediately start the experiment keeping the other parameters to their previous values.
- To ensure that the desired parameter is kept constant, we suggest to pre-set all other parameters to its maximum.
- A blinking unit of the controlling parameter appears when the regulation is complete.
- The timer will always count down except when no timer value has been entered.

Running condition

Display

⚡ 600 V	85 mA 51 W 00:29:33 h
1 2	17/12/15 10:36:18

When running an experiment, the display allows to see the actual parameters. It is divided into three fields:

- The **upper left** field shows :
 - a blinking ⚡ symbol to indicate there is a possible dangerous condition on the output sockets. Avoid to contact the outlet sockets and cables!
 - the selected measured parameter. Use the **↑↓** keys to switch the parameter in this field.
- The **upper right** field shows the other 3 parameters.
- The **bottom** field shows date + time at the right and the actual method/step combination at the left when such a procedure is running, no indication when running a manual procedure. The bottom field line is also used for system messages when required.

The unit of the parameter that is being kept constant is given with blinking bold characters.

Buttons

The keys be used as follows:

- **↑↓** Buttons for selecting another parameter in the upper left corner of the display .
- **✓** Button to modify the parameters.
- **▶/■** Button to stop or to pause the procedure.

Adjusting parameters

It is possible to modify the parameters while running. These modifications are temporarily and are not stored in the non volatile memory. It is not possible to modify the settings of a voltage gradient step.

- Press **✓** :

⚡ 600 V	1000 mA 150 W 00:29:33 h
↑↓=ADJUST, ✓=NEXT	

- The display shows the preset values for V, mA and W. The timer remains counting down when a timer value has been set.
- Choose the limit to adjust with the **✓** button.
- Adjust the value with the **↑↓** buttons.
- The display will return automatically to the normal run mode when no button is pressed for 5 seconds.

End of procedure

- The procedure will stop automatically when the timer has reached its end value. A signal will sound during 10 seconds. The sound signal can be ended by pressing a button.
- The procedure can also be stopped by pressing ▶/■. The power supply will then be in a paused condition. It allows to modify the run parameters and/or to view the gel. When pressing ▶/■ again, the power supply will continue the procedure where paused. To stop the procedure completely, hold ✓ pressed until the main menu appears.
- The power supply will remain showing the display of the running condition until the voltage has lowered to a safety value.
- When the procedure has finished, a report will be shown on the display. Scroll the display lines with the ↑↓ buttons to see it completely. Press ✓ or ▶/■ to return to the main menu.

Alarm messages

In case a problem or a hazardous situation is detected, the power supply will interrupt the experiment with one of the following errors. A sound will also be produced that can be stopped by pressing any key. The hazardous situations require that the power supply needs to be switched off before starting the experiment again.

- **GROUND LEAKAGE**
A dangerous ground leakage is present (check thoroughly the complete assembly). Your power supply is **NOT** defective! See [Frequently Asked Questions](#) at the end of this manual.
- **SHORT-CIRCUIT**
Connected tank is short-circuited or has a very low resistance (check thoroughly the complete assembly). Your power supply is **NOT** defective! See [Frequently Asked Questions](#) at the end of this manual.
- **OVERLOAD**
Connected tank has a too low resistance (check specifications). Your power supply is **NOT** defective! See [Frequently Asked Questions](#) at the end of this manual.
- **LOW CURRENT**
The output current is very low (switch the alarm off in the [SETUP](#) menu). Your power supply is **NOT** defective! See [Frequently Asked Questions](#) at the end of this manual.
- **TECHNICAL PROBLEM**
Failure in the electronics. See *Support* on www.consort.be. You could also try a general RESET: switch the instrument on while holding ✓ pressed. Attention! All stored programs and data will be erased!

USB Digital Port

This power supply has a digital USB port allowing to interface with a computer. Programs can read and control the power supply completely. More information can be found on our support website.

Driver

The driver can be downloaded using the link for the USB drivers on our website:
<http://www.consort.be/downloads/software/>.

Frequently Asked Questions

What are the relations between Voltage, Current, Power and Resistance?

Power (W) = Voltage (V) x Current (A)

Resistance (Ω) = Voltage (V) / Current (A)

How does a power supply react after pressing RUN?

The internal generator will start building up the high voltage at the output terminals while voltage and current are constantly measured and power calculated. When one of the pre-set parameters is exceeded, the generator stops and will keep that parameter constant.

How important is the resistance of an electrophoresis unit?

The resistance of an electrophoresis unit depends on its size, gel thickness, amount of buffer, buffer conductivity and temperature. This resistance will normally decrease in time due to a slowly increasing temperature. Electrophoresis units which have a resistance below the minimum load resistance of a power supply will trigger an alarm! Read the output voltage and current during a run to measure the resistance and use above formula to calculate the value.

How to keep a constant voltage during a run?

Program the desired voltage and a higher current and power than the maximum expected values:

Current > Voltage / Resistance

Power > Voltage x Current

How to keep a constant current during a run?

Program the desired current and a higher voltage and power than the maximum expected values:

Voltage > Current x Resistance

Power > Voltage x Current

How to keep a constant power during a run?

Program the desired power and a higher voltage and current than the maximum expected values:

Voltage > Current x Resistance

Current > Voltage / Resistance

Why are my output values different from those of a similar experiment?

Either your programmed parameters are not equal to those described or the resistance of your electrophoresis unit is different (see above). It cannot be due to e.g. an other model of power supply as the relations between Voltage, Current, Power and Resistance are monitored in the same way by any instrument (the electrical laws cannot be disregarded!).

What about connecting more than one unit to the same power supply?

The outlets being in parallel each electrophoresis unit will be supplied with exactly the same voltage. However, current and power may differ due to differences between them even when exactly the same model, gel, buffers, etc... are used. Therefore, it is recommended to run several electrophoresis units only in the constant voltage mode on the same power supply.

Mind also that adding tanks will increase the current and the power. These parameters may be limited by the power supply and cause it to switch over to constant current or constant power.

Specifications

	EV1450	EV2310	EV2650	EV2320
VOLTAGE	0...400 V	0...300 V	0...600 V	0...3000 V
CURRENT	0...500 mA	0...1000 mA	0...500 mA	0...150 mA
POWER	0...50 W	0...150 W	0...150 W	0...150 W
PARAMETER RANGE	1...100% of full scale	1...100% of full scale	1...100% of full scale	1...100% of full scale
TIMER	0...99:59 h	0...99:59 h	0...99:59 h	0...99:59 h
VOLT-HOURS	0...99.99 kWh	0...99.99 kWh	0...99.99 kWh	0...99.99 kWh
DISPLAY	LCD, 160x32 pixels	LCD, 160x32 pixels	LCD, 160x32 pixels	LCD, 160x32 pixels
SETUP RESOLUTION	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W
PROGRAMS	9x9 set of parameters	9x9 set of parameters	9x9 set of parameters	9x9 set of parameters
OUTPUTS	4 (4 mm sockets)	4 (4 mm sockets)	4 (4 mm sockets)	4 (4 mm sockets)
MINIMUM LOAD RESISTANCE	30 Ω	10 Ω	30 Ω	600 Ω
NO LOAD DETECTION	✓	✓	✓	✓
GROUND LEAKAGE DETECTION	✓	✓	✓	✓
OVERLOAD DETECTION	✓	✓	✓	✓
COMPUTER CONTROL	✓	✓	✓	✓
PASSWORD PROTECTION	✓	✓	✓	✓
DATA-LOGGING	300000 values	300000 values	300000 values	300000 values
INTERVAL	event or 1..60 seconds	event or 1..60 seconds	event or 1..60 seconds	event or 1..60 seconds
REAL TIME CLOCK	✓	✓	✓	✓
USB INTERFACE	✓	✓	✓	✓
AMBIENT TEMPERATURE	0...40°C	0...40°C	0...40°C	0...40°C
RELATIVE HUMIDITY	0...95%, non condensing	0...95%, non condensing	0...95%, non condensing	0...95%, non condensing
POWER REQUIREMENTS	210-250 VAC, 50/60 Hz, 75 W 100-125 VAC, 50/60 Hz, 75 W	210-250 VAC, 50/60 Hz, 200 W 100-125 VAC, 50/60 Hz, 200 W	210-250 VAC, 50/60 Hz, 200 W 100-125 VAC, 50/60 Hz, 200 W	210-250 VAC, 50/60 Hz, 200 W 100-125 VAC, 50/60 Hz, 200 W
DIMENSIONS (WxDxH)	24x20x13 cm	24x20x13 cm	24x20x13 cm	24x20x13 cm
WEIGHT	3.1 kg	4.3 kg	4.3 kg	4.3 kg

	EV3020	EV3610	EV3150	EV3330	EV3620
VOLTAGE	0...300 V	0...600 V	0...1200 V	0...3000 V	0...6000 V
CURRENT	0...2000 mA	0...1000 mA	0...500 mA	0...300 mA	0...150 mA
POWER	0...300 W	0...300 W	0...300 W	0...300 W	0...300 W
PARAMETER RANGE	1...100% of full scale	1...100% of full scale	1...100% of full scale	1...100% of full scale	1...100% of full scale
TIMER	0...99:59 h	0...99:59 h	0...99:59 h	0...99:59 h	0...99:59 h
VOLT-HOURS	0...99.99 kWh	0...99.99 kWh	0...99.99 kWh	0...99.99 kWh	0...99.99 kWh
DISPLAY	LCD, 160x32 pixels	LCD, 160x32 pixels	LCD, 160x32 pixels	LCD, 160x32 pixels	LCD, 160x32 pixels
RESOLUTION	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W	1 V, 1 mA, 1 W
PROGRAMS	9x9 set of parameters	9x9 set of parameters	9x9 set of parameters	9x9 set of parameters	9x9 set of parameters
OUTPUTS	4 (4 mm sockets)	4 (4 mm sockets)	4 (4 mm sockets)	4 (4 mm sockets)	4 (4 mm sockets)
MINIMUM LOAD RESISTANCE	5 Ω	15 Ω	70 Ω	600 Ω	1200 Ω
NO LOAD DETECTION	✓	✓	✓	✓	✓
GROUND LEAKAGE DETECTION	✓	✓	✓	✓	✓
OVERLOAD DETECTION	✓	✓	✓	✓	✓
COMPUTER CONTROL	✓	✓	✓	✓	✓
PASSWORD PROTECTION	✓	✓	✓	✓	✓
DATA-LOGGING	300000 values	300000 values	300000 values	300000 values	300000 values
INTERVAL	event or 1..60 seconds	event or 1..60 seconds	event or 1..60 seconds	event or 1..60 seconds	event or 1..60 seconds
USB INTERFACE	✓	✓	✓	✓	✓
AMBIENT TEMPERATURE	0...40°C	0...40°C	0...40°C	0...40°C	0...40°C
RELATIVE HUMIDITY	0...95%, non condensing	0...95%, non condensing	0...95%, non condensing	0...95%, non condensing	0...95%, non condensing
POWER REQUIREMENTS	210...250 VAC, 50/60 Hz, 360 W 100...125 VAC, 50/60 Hz, 360 W				
DIMENSIONS (WxDxH)	31x26x13 cm	31x26x13 cm	31x26x13 cm	31x26x13 cm	31x26x13 cm
WEIGHT	9.4 kg	9.4 kg	9.4 kg	9.4 kg	9.4 kg

WARRANTY CERTIFICATE

This instrument (excluding all accessories) is warranted against defective material and workmanship for a period of thirty-six (36) months from the date of shipment ex factory.

Accessories and breakable items such as electrodes are not warranted unless proven to be defective before shipment.

The original purchase order numbers, Consort invoice numbers and serial numbers of the products must be provided.

CONSORT will repair all defective equipment returned to it during the warranty period without charge (CIF Turnhout prepaid by sender), provided the equipment has been used under normal laboratory conditions and in accordance with the operating limitations and maintenance procedures described in the instruction manual and when not having been subject to accident, alteration, misuse or abuse.

If the products have been used with or have come into contact with fluids, an MSDS (material safety data sheet) must be supplied prior to issuing a return authorisation.

A return authorisation must be obtained from **CONSORT** before returning any product for warranty repair on a freight prepaid basis!



DECLARATION OF CONFORMITY

We declare under our sole responsibility that the product

**Electrophoresis Power Supplies
content of the type numbers**

**EV1450 EV2150 EV2310
EV2320 EV2650 EV3020
EV3330 EV3610 EV3620**

*to which this declaration relates is in conformity
with the following standards of the European Directives*

LOW VOLTAGE DIRECTIVE 2006/95/EC

EN61010-1

EMC DIRECTIVE 2004/108/EC

EN61326-1

ROHS DIRECTIVE 2011/65/EU

EN50581: 2012

Consort bvba

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Name Jan De Ceuster
Title Director
Date 21 November 2015

Signature

The electro-magnetic susceptibility has been chosen at a level that gains proper operation in residential areas, on business and light industrial premises and on small-scale enterprises, inside as well as outside of buildings. All places of operation are characterised by their connection to the public low voltage power supply system.