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1 Introduction

1.1 Foreword

Thank you for choosing an EFOY COMFORT fuel cell from SFC Energy AG. We hope you enjoy using your new energy supply system!

Before you use the fuel cell for the first time, please read this user manual and follow the installation instructions.

If you still have any questions about installing or using your fuel cell, please contact your local service partner or the EFOY hotline.

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1.2 Service contact details

Headquarters

SFC Energy AG

Eugen-Sänger-Ring 7

85649 Brunnthal-Nord

Germany

Hotline: +49 89 / 673 592 555

Freecall*: 00800 / 732 762 78

eMail: service@sfc.com

Web: www.efoy-comfort.com

*Calls can be placed free of charge from: Germany, Belgium, Denmark, France, Great Britain, Italy, the Netherlands, Norway, Austria, Sweden, Switzerland and Spain.

2 Safety Information

2.1 Explanation of safety alert signal words



DANGER!

Indicates an imminently hazardous situation, which, if not avoided, poses a high risk of death or serious physical injury.



WARNING!

Indicates a potentially hazardous situation, which, if not avoided, poses a medium risk of death or serious physical injury.



CAUTION!

Indicates a hazardous situation, which, if not avoided, poses a slight risk of mild or moderate physical injury or damage to property.



INFO:

Important information for the operator or user of the system.

2.2 General safety instructions

Read the user manual before commissioning the fuel cell, and keep the user manual close to the device at all times.

Follow all of the instructions in this user manual.



The EFOY COMFORT fuel cell must not be opened.

The EFOY fuel cartridge must not be opened or refilled using excessive force.

Modifications to the device constitute a safety hazard and may result in the loss of your operating license and nullify your warranty and guarantee.

Use original EFOY accessories only.

Safety Information



EFOY COMFORT fuel cells and EFOY fuel cartridges must not be stored at temperatures over 50°C/122°F and must not be operated at temperatures over 40°C/104°F.

Protect from heat and direct sunlight.

Operate the EFOY COMFORT fuel cell only as specified in the installation instructions, and in a well-ventilated space.



Keep EFOY COMFORT fuel cells that have been switched off in frost-free storage or use the automatic antifreeze feature.



Do not smoke in the vicinity of the EFOY COMFORT fuel cell or EFOY fuel cartridge. Protect from heat and ignition sources. Methanol is highly flammable!

A methanol spillage (e.g. after an accident or in the event of damage to the EFOY COMFORT fuel cell or EFOY fuel cartridge) poses a fire hazard.

Keep away from ignition sources and ensure good ventilation.

Leakage of a small quantity of methanol will evaporate, leaving no residue.



Keep all EFOY COMFORT fuel cells and EFOY fuel cartridges out of reach of children, even when empty or only partly full.



WARNING!

In exceptional cases, the exhaust gases emitted by the device may contain substances that are harmful to health!

Do not inhale exhaust gases directly for prolonged periods. Instead, use the exhaust tube provided to route the exhaust gas into the open air.



WARNING!

Damage in the event of an accident; risk of injury!

EFOY COMFORT fuel cells and EFOY fuel cartridges must be securely fastened to prevent damage in the event of an accident.



CAUTION!

The EFOY COMFORT fuel cell is not water-tight!

Ensure that no water can enter the fuel cell.

2.3 Safety instructions for methanol



INFO:

There is no risk of you coming into contact with methanol provided that you handle the device and fuel cartridges in accordance with the instructions.



DANGER!

Leakage of methanol fumes poses a fire hazard! Do not smoke when replacing the EFOY fuel cartridge and do not expose it to other ignition sources! Protect EFOY fuel cartridges from temperatures exceeding 50°C/122°F.

Leakage of a small quantity of methanol will evaporate, leaving no residue.



WARNING!

Methanol is highly flammable!

You receive methanol in safe, tested EFOY fuel cartridges, which prevent the contents from escaping if used correctly.

The storage and transport of methanol may be subject to statutory regulations.

For more information, refer to the safety sheet on methanol, available on our website at www.efoy-comfort.com.



WARNING!

Methanol is toxic when inhaled, swallowed or allowed to come into contact with the skin. Inhaling and swallowing methanol, or allowing it to come into contact with your skin carries a serious risk of irreversible damage.

Call a doctor immediately if you have direct physical contact with the substance, in the event of an accident, or if you feel unwell, and show the doctor the fuel cartridge label, the methanol safety data sheet, or the user manual.



CAUTION!

Impurities in methanol!

Original EFOY fuel cartridges contain methanol that has been approved by SFC. Even slight impurities or foreign particles in commercially available methanol may cause irreversible damage to the device, and may nullify the warranty or guarantee.

Use only original EFOY fuel cartridges!

2.4 Correct use

The EFOY devices produced by SFC Energy AG are automatic charging devices for 12 V lead accumulators (batteries), or SFC qualified Lithium Iron Phosphate batteries (LiFePO₄). Please note the following:

- The devices must only be used to charge accumulators (batteries) that conform to the technical specifications of the device (see chapter 6 "Specifications" on page 105).
- The devices must only be operated with original EFOY fuel cartridges.
- The devices are not intended to be used as an emergency power supply for medical, life-sustaining or agricultural systems.
- Devices with a defective or damaged housing must not be operated.
- The devices are not intended for industrial or permanent use.

2.5 Certification

Declaration of conformity



SFC Energy AG, Eugen-Sänger-Ring 7, 85649 Brunnthal-Nord, Germany, hereby declares that the EFOY COMFORT 80, EFOY COMFORT 140 and EFOY COMFORT 210 conform to the provisions of the EC Directive on electro-magnetic compatibility (2004/108/EC). The following harmonized norms apply:
DIN EN 61000-6-1, DIN EN 61000-6-3



Radio Frequency Interference (RFI) (FCC 15.105)

This equipment has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and

can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements (FCC 15.19)

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by SFC Energy may void the user's authority to operate this equipment.

Industry Canada Compliance Statement

This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in the interference-causing equipment standard entitled: "Digital Apparatus", ICES-003 of Industry Canada.

Seals of approval



The devices have been tested for electro-magnetic compatibility in accordance with ECE Regulation No. 10, and have been approved for use in motor vehicles.

Approval number: E24 10R-040718



The devices have undergone voluntarily testing by TÜV SÜD Industrie und Service GmbH for conformity with the basic requirements of IEC 62282-5, and have been awarded the seal of approval for product safety.



This product is intended and certified for Canada and the USA. The product was voluntarily tested according to the safety requirements CAN/CSA-C22.2 No. 60335-1/R: 2007, CAN/CSA-C22.2 No. E60335-2-29: 2006 and UL 60335-1: 2011 (supplemented by UL 1564/R: 2010-6, IEC 60335-2-29/A2: 2010, CSA America FC-3:2004, NFPA 1192: 2005, ANSI/RVIA 12 V: 2008, NFPA 70, UL 458/R: 2010-03).

2.6 Warranty

The warranty period begins with the purchase of a new device. You can use your sales receipt as proof of this date. Please keep these documents safe. Our warranty services are based on the warranty conditions of SFC Energy AG that are valid for the relevant country at the time of purchase. Please note the attached conditions of warranty.

Service

Please contact our EFOY hotline in relation to any technical questions about EFOY COMFORT fuel cells. The contact details are provided in chapter 1.2 "Service contact details" on page 57.

EFOY certificate of warranty

The EFOY certificate of warranty gives you maximum security and reliability of service. For more information on the extended warranty, visit our website at www.efoy-comfort.com or contact our hotline. The contact details are provided in chapter 1.2 "Service contact details" on page 57.

The EFOY certificate of warranty is available directly from SFC Energy AG which manufactures the EFOY COMFORT fuel cells.

2.7 Waste disposal and transportation

Packaging and transportation

Your new device was packaged to ensure that it reached you safely. All materials used in the packaging are environmentally friendly and can be re-used.

We recommend that you keep the packaging in case it is needed for winter storage.

However, if you wish to dispose of the packaging, please help our planet by disposing of it in an environmentally responsible way and in accordance with the applicable local regulations.

Please note the instructions provided by SFC Energy AG when transporting the device. For information on this, refer to our website or contact the EFOY hotline. The contact details are provided in chapter 1.2 "Service contact details" on page 57.



WARNING!

Plastic wrapping and cardboard boxes pose a risk of suffocation!
Please keep all packaging out of reach of children.

Fuel cartridges

Completely empty fuel cartridges can be disposed of with your plastic waste. Dispose of partly full fuel tanks in the same way as other hazardous waste, such as solvents and paint.

Old devices

Old devices are more than just worthless rubbish! Environmentally responsible disposal can reclaim valuable raw materials, while protecting the environment.

Old electronic devices must not be disposed of in your household rubbish. Observe the local regulations.

For advice on returning old devices, please contact the EFOY hotline. The contact details are provided in chapter 1.2 "Service contact details" on page 57.

According to the European regulation 2012/19/EU, the EFOY COMFORT fuel cells are registered with the WEEE regulation Nr DE 85008411.

3 Operation

3.1 Quick overview

The following options are available:

- The mounting plates and cabling are already installed in your vehicle.
You are connecting the EFOY COMFORT fuel cell for the first time.
Please proceed to chapter 3.2 "Commissioning" on page 66.
- The device and a fuel cartridge are already installed.
Please proceed to chapter 3.2.7 "Operation via the operating panel" on page 68.
- The device is new and not yet installed.



The installation manuals are available in the Downloads area on our website at www.efoy-comfort.com



INFO:

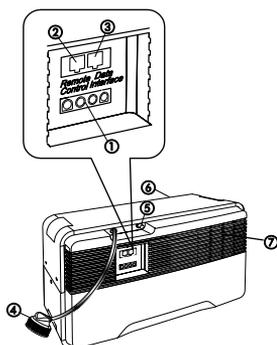
We recommend having the EFOY COMFORT fuel cell installed by a specialist dealer.

3.2 Commissioning

3.2.1 Tools

- Crosstip screwdriver

3.2.2 Connections



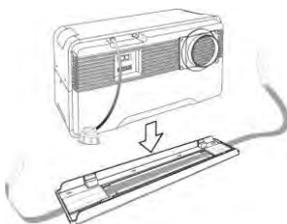
1. Connection for charge line
2. Connection for operating panel
3. Connection for data interface
4. Connection for EFOY fuel cartridge
5. Connection for exhaust hose and fill opening for service fluid
6. Cooling inlet (reverse)
7. Warm-air outlet and connection for off-heat duct

3.2.3 Using the EFOY COMFORT fuel cell



CAUTION!

If the EFOY COMFORT fuel cell is exposed to temperatures below 1°C without a battery connection and without a sufficient level of fuel in the EFOY fuel cartridge (antifreeze), it must be allowed to warm up for approx. 24 hours at room temperature before use.



1. Place the device onto the mounting plate.

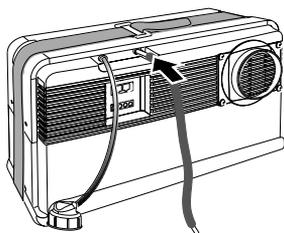


2. Thread the belt along the groove provided.
3. Tighten the belt so that the device is standing securely on the mounting plate.
4. Fasten the end of the belt using the hook and loop fastener.

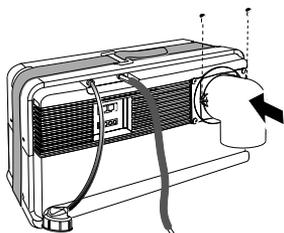
3.2.4 Connecting the fuel cartridge

For information on installing the EFOY fuel cartridge, see chapter 4.1.2 "Inserting the fuel cartridge" on page 95.

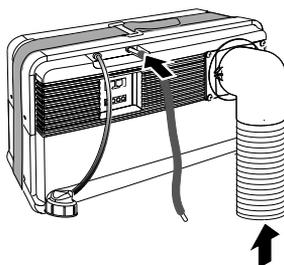
3.2.5 Connecting the exhaust hose and off-heat tube



1. Attach the insulated exhaust hose.

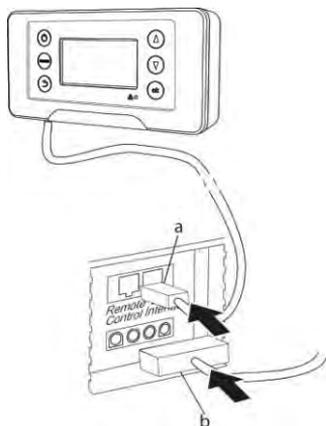


2. Insert the off-heat tube or off-heat bow.
3. If you use the off-heat bow, use both screws to secure it in place.



4. Next, insert the off-heat tube.

3.2.6 Connecting the charge line and data line



1. Insert the plug on the data line (1) into the connection socket marked "Remote Control" on the EFOY COMFORT fuel cell.
2. Insert the plug on the loading cable (2) into the socket connection provided on the EFOY COMFORT fuel cell.



INFO:

The device switches on as soon as the battery charge line is plugged in and the EFOY COMFORT fuel cell is connected to the battery.



INFO:

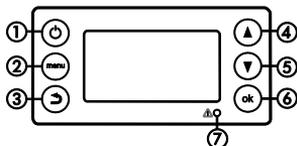
While the batteries are being changed or during maintenance operations on the batteries, the EFOY COMFORT should be switched off and the charging cable should be removed. Upon completion, the cable should be reconnected and the EFOY COMFORT will go into automatic mode.

3.2.7 Operation via the operating panel

3.2.7.1 Buttons and symbols on the operating panel

Buttons/LEDs

The buttons and LEDs have the following functions:



1.		Switch EFOY COMFORT fuel cell on/off
2.	[menu]	Display the main menu.
3.	[↶]	Scroll back one level in the menu.
4.	[▲]	Scroll up one line in the display.

Operation

5.	[▼]	Scroll down one line in the display.
6.	[ok]	Open the selected menu or confirm a selection.
7.		Red LED lights up to indicate a fault.

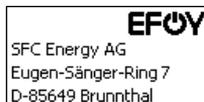
Symbols on the display

The display shows different symbols depending on the operating status and operating mode of the EFOY COMFORT fuel cell:

	Current battery voltage.
	Current charging current of the EFOY COMFORT fuel cell.
	Fill level of the fuel cartridge.  INFO: The fuel gauge for the fuel cartridge is just an indicator. Only replace the fuel cartridge once it has been completely emptied. Wait until error message 20/22 is displayed.
	If you want to operate the EFOY COMFORT fuel cell using an external controller, the external control function must be enabled (see chapter 3.4.4 "External control" on page 79). If this is not enabled, a padlock symbol appears on the info screen when an external device is connected.
	If external control is switched on, an open padlock appears at the bottom right of the display. The EFOY COMFORT is ready to receive a signal for external control. For more information on external control, see chapter 3.4.4 "External control" on page 79
	If you have switched external control on and the controller receives an external signal, "RC" (Remote Control) appears at the bottom right of the display.

3.2.7.2 Initial commissioning

Switch on

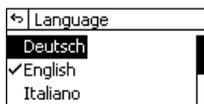


After connecting the EFOY COMFORT fuel cell for the first time, the intro screen appears on the display.

- Press [ok].

After a short wait, the language selection appears.

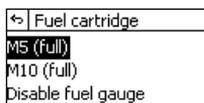
Selecting a language



1. Press [▲] [▼] to select the required language.
2. Press [ok] to confirm your selection.



Selecting a fuel cartridge



The fuel cartridge is then enabled.

1. Press [▲] [▼] to select the relevant fuel cartridge.
2. Press [ok] to confirm your selection.

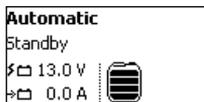


INFO:

If you have not connected a full fuel cartridge, you can disable the fuel gauge (see the "Fuel cartridge" chapter on page 84).

3.2.7.3 Info screen

During subsequent operation of the device, an info screen appears after switching the device on.



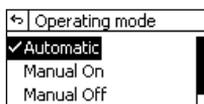
- Press  to access the operating mode.
- Press [menu] to access the main menu.
- Press [▼] to access the system information.

The first line indicates the operating mode selected, e.g., "Automatic" (see chapter 3.4 "Operating modes" on page 76).

The second line indicates the operating status (see "Operating status" on page 72).

The symbols at the bottom of the display indicate the battery charge condition and the fill level of the fuel cartridge (see "Symbols on the display" on page 69).

Operating mode



1. Press . The operating mode selection appears.
2. Press [▲] [▼] to select the operating mode (see chapter 3.4 "Operating modes" on page 76).
3. Press [ok] to confirm your operating mode selection.

Operating status

Start phase	The EFOY COMFORT fuel cell undergoes a start phase lasting up to 15 minutes. At the end of this phase, it has reached its full rated output.
Charging mode	The EFOY COMFORT fuel cell charges the battery.
Standby	As long as the battery is charged sufficiently, the EFOY COMFORT fuel cell remains in standby mode and monitors the battery voltage.
Shutdown procedure	The EFOY COMFORT fuel cell shuts down charging mode. To protect the components in the device, this procedure may take several minutes to complete.
Antifreeze	The EFOY COMFORT fuel cell remains active to protect itself from the effects of freezing.
Battery protection	The EFOY COMFORT fuel cell charges the battery automatically in order to prevent deep discharge of the battery.
Interruption	Operation is interrupted because the ambient temperature is too high. The EFOY COMFORT fuel cell switches on again automatically as soon as operation can be resumed.
Error	An error has been detected, and corresponding messages are displayed. For more information, see chapter 5 "Errors and solutions" on page 100.



INFO:

During normal operation, the EFOY COMFORT fuel cell briefly interrupts power generation several times each hour. A charging current of 0.0 A is displayed when this occurs.

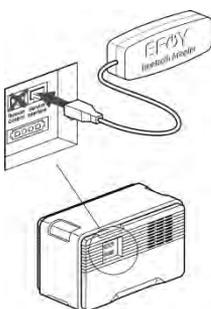
3.2.8 Operation using the EFOY App

Turn your smart phone or tablet into a remote control for your EFOY COMFORT with the EFOY app myEFOY function. Get all important data regarding your fuel cell, fuel cartridge and battery all on one screen.

Interesting statistics such as daily consumption or the average daily operating hours of the fuel cell are displayed clearly in the app. To operate your EFOY COMFORT with myEFOY, you will require a device which is Bluetooth 4.0 compatible with at least Android version 4.4 and iOS 8.0 the EFOY app, the EFOY Bluetooth adapter and the most recent firmware (Min. 15.13) installed on your EFOY COMFORT.



The EFOY app is free of charge and available in the App Store and Google Play Store.



Plug the EFOY Bluetooth Adapter into the Service Interface port of the EFOY COMFORT.

Enter the serial number to connect the fuel cell to your device.

For further information on the EFOY App's myEFOY feature and the EFOY Bluetooth Adapter, visit www.efoy-comfort.com.

3.3 Shutdown and dismantling

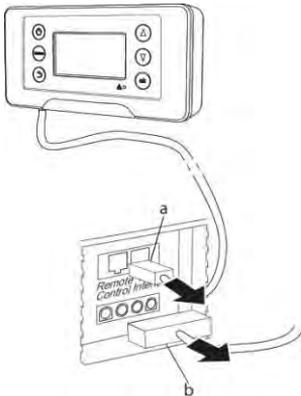
3.3.1 Switching off the fuel cell

Switch off the EFOY COMFORT fuel cell using the operating panel. This is described in chapter 3.4.3 "Manual Off" on page 78.

3.3.2 Removing the EFOY fuel cartridge

This is described in chapter 4.1.1 "Removing the fuel cartridge" on page 94.

3.3.3 Detaching the charge line and data line



1. Disconnect the charge line (2) and data line (1) for the operating panel from the EFOY COMFORT fuel cell.

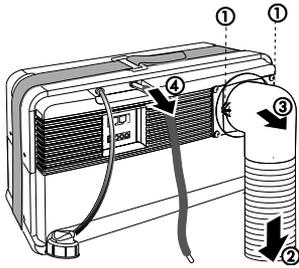


INFO:

Store the plugs and cables in a cool, dry place.

Operation

3.3.4 Detaching the exhaust hose and off-heat tube



1. Loosen the screws (1) on the off-heat bow.
2. Remove the off-heat pipe (2) or off-heat bow (3).
3. Disconnect the exhaust hose (4). Protect it from impurities and seal the exhaust outlet with the protective cap.
4. Loosen the belt holding the EFOY COMFORT fuel cell in place, and lift the EFOY COMFORT fuel cell off the mounting plate.



CAUTION!

Store the EFOY COMFORT fuel cell in a cool place, but at a temperature over 1°C/34°F. (See also the information on storage temperature in chapter 6 "Specifications" on page 105).



INFO:

Use a suitable box for storing the EFOY COMFORT fuel cell, e.g., the box in which it was delivered. The EFOY COMFORT fuel cell must be stored in an upright position only.

3.4 Operating modes

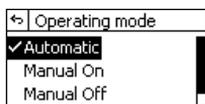
The EFOY COMFORT fuel cell can be operated in one of the following modes:

- Automatic
- Manual On
- Manual Off
- External control on

There are two ways of accessing the "Operating mode" menu:

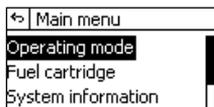
- Direct access
- Access from the main menu

Selecting an operating mode via direct access

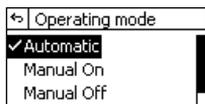


1. Press  on the operating panel.
2. Press [] [] to select the required operating mode in the "Operating mode" menu.
3. Press [ok] to confirm your selection.

Selecting an operating mode from the main menu



1. Press [menu] to access the main menu.
2. Press [ok] to confirm your menu option selection.
3. Press [] [] to select the "Operating mode" menu option.
4. Press [ok] to confirm your selection.
5. Press [] [] to select the required operating mode in the "Operating mode" menu.
6. Press [ok] to confirm your selection.



Operation

3.4.1 Automatic

Automatic mode starts as soon as you connect the device to the battery. The device monitors the battery voltage independently.

The EFOY COMFORT fuel cell switches on automatically if the lead acid battery voltage drops below 12.3 V. The battery is then charged until the cut-off threshold of 14.2 V is reached.

When the device is started, it goes through a start phase, which may last up to 15 minutes. It only reaches its full rated output after this phase.



INFO:

If the device fails to start, check that the cover lid is not still attached to the exhaust hose connector. Remove the cover lid.



INFO:

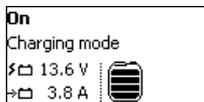
To ensure optimal battery maintenance, the charging current must not be stopped abruptly when the cut-off threshold is reached. For this reason, the EFOY COMFORT fuel cell continues charging the battery for up to 3 hours at a reduced current after the configured cut-off threshold is reached. The length of the recharging period depends on the battery voltage and power consumption.



INFO:

During normal operation, the EFOY COMFORT fuel cell briefly interrupts power generation several times each hour. A charging current of 0.0 A is displayed when this occurs.

3.4.2 Manual On



1. Press  on the control panel and select the "Operating mode" menu option.
2. Press [] [] to choose „Manual On“ and press [] .

You can switch the device on manually if the voltage of the lead-acid battery is below 13.2 V. After the start phase, the device is in "Charging mode".

The device operates independently of the switch-on threshold, and charges the battery until the cut-off threshold is reached. After the charging cycle, the EFOY COMFORT will be in Automatic mode.

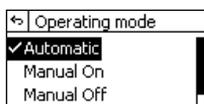
Please note: The EFOY COMFORT fuel cell can only start if it is connected to an intact battery and a filled fuel cartridge. The EFOY COMFORT fuel cell does not switch on if the battery is damaged or has been deeply discharged.



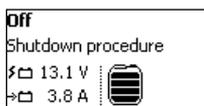
INFO:

If the device fails to start, check that the cover lid is not still attached to the exhaust hose connector. Remove the cover lid.

3.4.3 Manual Off



1. Press  on the operating panel, or select "Operating mode" in the main menu. The operating mode selection appears.
2. Select the "Manual Off" operating mode.
3. Press [ok] to confirm your selection.



4. Wait until the shutdown procedure has finished and "Shutdown procedure" is no longer displayed on the info screen.



INFO:

To protect the components, the device should not be switched off until it has been running for at least 30 minutes since it was started. If the device is switched off before this period has elapsed, it will continue running for the remainder of the required running time. The message "Shutdown procedure" is shown on the display. Do not disconnect the fuel cartridge or battery during the shutdown procedure.



INFO:

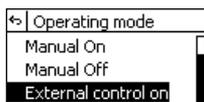
The battery protection and automatic antifreeze functions remain active after the device is switched off.

3.4.4 External control

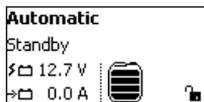
You can control the EFOY COMFORT fuel cell externally using a switching contact, e.g. a solar charger. To do this, the "External control" operating mode must be enabled.

External control is switched on if an open padlock is displayed at the bottom right of the display.

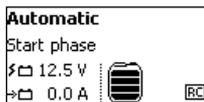
Switching on external control



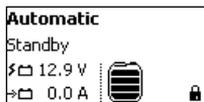
1. Press on the operating panel, or select "Operating mode" in the main menu. The operating mode selection appears.
2. Select the "External control on" operating mode.
3. Press [ok] to confirm your selection.



An open padlock is displayed at the bottom right of the display. The EFOY COMFORT is ready to receive a signal for external control.



If the controller receives an external signal, "RC" (Remote Control) is displayed at the bottom right of the display.



INFO:

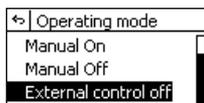
If you have not enabled external control, a closed padlock is displayed at the bottom right of the display when an external signal is being received.



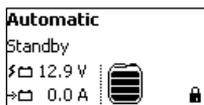
INFO:

Please contact your specialist dealer for information on using the external control function.

Switching off external control



1. Press  on the operating panel, or select "Operating mode" in the main menu. The operating mode selection appears.
2. Select the "External control off" operating mode.
3. Press [ok] to confirm your selection.



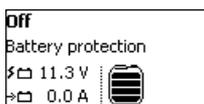
No symbol is displayed at the bottom right of the display.

3.5 Battery protection

The EFOY COMFORT fuel cell has automatic battery protection when the EFOY COMFORT fuel cell is switched off.

Battery protection is activated automatically if the battery voltage drops below a certain level (11,2 V for lead-acid batteries and 11 V for LiFePO₄ batteries) for more than 15 minutes. "Battery protection" mode ends as soon as the voltage reaches 12.8 V.

The battery protection function provides deep discharge protection for the battery, even when the EFOY COMFORT fuel cell is switched off and does not take over the charging function.



If you want to switch off the EFOY COMFORT fuel cell after the battery protection function has started, press . The function is re-enabled automatically when the device is switched on or is operated in automatic mode.



CAUTION!

If you stop protective charging manually, battery protection is disabled until the next time the fuel cell is started. Deep discharge may damage your battery.



INFO:

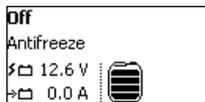
Please check your system if the fuel cell repeatedly switches back to battery protection. Either the battery has already been damaged or too much energy has been discharged.



INFO:

Battery protection only works if a full EFOY fuel cartridge is connected.

3.6 Automatic antifreeze feature



The device has an intelligent automatic antifreeze feature. This operating status switches on automatically as soon as the temperature drops below 3°C/37.4°F, even if the fuel cell is in "Manual Off" operating mode. This prevents the device from freezing. If the device is operating in antifreeze mode, the message "Antifreeze" is shown in the second line of the display.



CAUTION!

The automatic antifreeze feature only works when the fuel cell is connected to a filled EFOY fuel cartridge and an intact battery. The automatic antifreeze feature does not run if the voltage drops below 9 V and the device is switched off. Please note that the EFOY COMFORT fuel cell must be protected against frost. Repeated freezing may cause irreversible damage to the device.



INFO:

For a five-month winter period in Central Europe, the device requires approx. 10 liters/2.64 gallons of methanol in antifreeze mode.



INFO:

If you do not use your vehicle/boat in winter, you can also remove the EFOY COMFORT fuel cell and store it in a warm place (see chapter 3.3 "Shutdown and dismantling" on page 74)

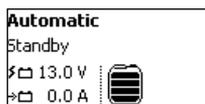


INFO:

Never leave the EFOY COMFORT fuel cell in your vehicle/boat during the winter without connecting it to a fuel cartridge and battery.

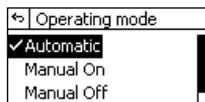
3.7 Navigating in the operating panel menu

3.7.1 Info screen



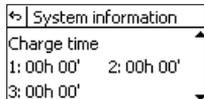
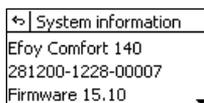
- Press  to access the operating mode.
- Press [menu] to access the main menu.
- Press [▼] to access the system information.

Operating mode



1. Press [▲] [▼] to select the operating mode (see chapter 3.4 "Operating modes" on page 76).
2. Press [ok] to confirm your operating mode selection.

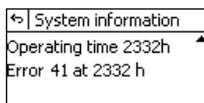
System information



1. Press [▲] [▼] to display the lower screen area.

The second screen displays information about the duration of charging cycles in different modes.

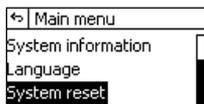
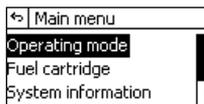
- (1) Average charge duration in automatic mode.
- (2) Average charge duration in manual mode.
- (3) Average charge duration in remote mode.



The third screen displays operating time and error information. The error messages are explained in chapter 5.1 "Error message on the display" on page 100.

2. Press [↵] to return to the info screen.

3.7.2 Main menu



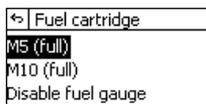
- Press [menu]. The main menu appears.
- Press [▲] [▼] to select a submenu.
- Press [ok] to access the selected submenu.
- Press [↵] to return to the info screen.

You can select the following menu options in the main menu:

Operating mode

This is described in detail in chapter 3.4 "Operating modes" on page 76.

Fuel cartridge



- Press [▲] [▼] to select the connected fuel cartridge.
- Press [ok] to confirm your selection.



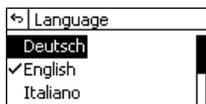
INFO:

If you have not connected a full fuel cartridge, disable the fuel gauge by selecting "Disable fuel gauge" in the menu.

System information

For a detailed description, see "System information" on page 83.

Language

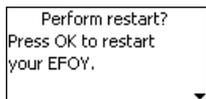


- Press [▲] [▼] to select the language.
- Press [ok] to confirm the language selection.



System reset

The reset function allows you to restart the EFOY COMFORT fuel cell:



- Press [ok] to confirm the restart.
- Press [↶] to cancel the restart and return to the main menu.

3.7.3 Expert menu



- Press and hold [ok] and [menu] at the same time for two seconds. The expert menu appears.
- Press [▲] [▼] to select a submenu.
- Press [ok] to access the selected submenu.
- Press [↶] to return to the expert menu.

You can select the following menu options in the expert menu:

- Battery type
- Battery parameters
- Battery protection
- Factory defaults

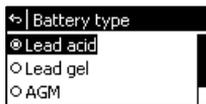
This option allows you to undo all the settings made in the expert menu. Press [ok] to confirm or [↶] to cancel.



INFO:

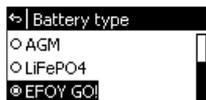
All settings in the Exert Menu are only valid for EFOY COMFORT models with Firmware Version 15.12 or higher.

3.7.3.1 Battery type

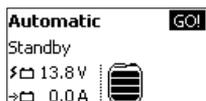


You can select the following batteries in the "Battery type" menu:

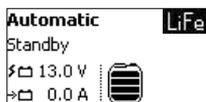
- Lead-acid
- Lead Gel
- AGM
- LiFePO4 (Lithium iron phosphate)
- EFOY GO!



- Press [ok] to access to select a battery type.



By choosing the LiFePO4 or EFOY GO! battery type, an icon will be shown on the Infoscreen



CAUTION!

Incorrectly set battery type may damage the battery. This may nullify your warranty.

Only use the precise values permitted for the battery parameters and battery protection settings (see page 91).

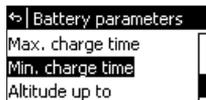
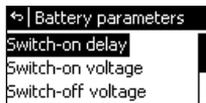


INFO:

The factory defaults for all battery types are based on experience and the parameters for the LiFePO4 batteries are tested and approved only with specific batteries. Please refer to your dealer or follow the advice of the battery manufacturer.

The battery type can only be changed if the EFOY COMFORT is not charging.

3.7.3.2 Battery parameters



You can select the following options in the "Battery parameters" menu:

- Switch-on delay
- Switch-on voltage
- Switch-off voltage
- Switch-off current
- Absorption time
- Max. charge time
- Min. charge time
- Altitude up to
- Factory defaults

This option allows you to undo all the battery parameter settings. Press [ok] to confirm or [↵] to cancel.

- Press [ok] to access the selected submenu.



CAUTION!

Incorrectly set operating parameters may damage the battery. This may nullify your warranty.

Only use the precise values permitted for the battery parameters and battery protection settings (see page 91).



INFO:

The EFOY COMFORT fuel cell switches off automatically. This fully-automatic function is controlled by the two operating parameters of battery voltage and charging current. In order for the EFOY COMFORT to switch off, the voltage must drop below the set switch-off voltage level, and the current must drop below the set maintenance charge. The factory defaults for lead-acid batteries are a switch-off voltage of 14.2 V and a maintenance charge of 2.0 A (4.0 A for the EFOY COMFORT 210). This means that the EFOY COMFORT switches off as soon as the battery reaches a voltage of 14.2 V and the charging current drops below 2.0 A.

Permitted value ranges for battery parameters (Lead-acid, AGM, Gel)	Factory defaults	Min.	Max.	User-defined value:
Switch-on delay	60 s	2 s	300 s	
Switch-on voltage	12.3 V	11.0 V	13.0 V	
Switch-off voltage	14.2 V	13.5 V	14.7 V	
Switch-off current				
- 80i	2.0 A	0.5 A	10.0 A	
- 140i	2.0 A	1.0 A	10.0 A	
- 210i	4.0 A	2.0 A	10.0 A	
Absorption time	180 min	0 min	300 min	
Max. charge time	24 h	2 h	120 h	
Min. charge time	30 min	30 min	180 min	
Altitude up to	1500 m	0 m	2000 m	

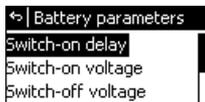
Permitted value ranges for battery parameters (LiFePO4)	Factory defaults	Min.	Max.	User-defined value:
Switch-on delay	60 s	2 s	300 s	
Switch-on voltage	12.6 V	12.0 V	13.4 V	
Switch-off voltage	14.5 V	13.8 V	14.6 V	
Switch-off current				
- 80i	2.0 A	0.5 A	10.0 A	
- 140i	2.0 A	1.0 A	10.0 A	
- 210i	4.0 A	2.0 A	10.0 A	

Operation

- EFOY COMFORT 80/140	2.0 A	1.0 A	10.0 A	
- EFOY COMFORT 210	4.0 A	4.0 A	10.0 A	
Absorption time	180 min	0 min	300 min	
Max. charge time	24 h	2 h	120 h	
Min. charge time	30 min	30 min	180 min	
Altitude up to	1500 m	0 m	2000 m	

Permitted value ranges for battery parameters EFOY GO!	Factory defaults	Min.	Max.	User- defined value:
Switch-on delay	60 s	2 s	300 s	
Switch-on voltage	12.4 V	12.0 V	13.4 V	
Switch-off voltage	14.4 V	13.8 V	14.6 V	
Switch-off current				
- 80i	2.0 A	0.5 A	10.0 A	
- 140i	2.0 A	1.0 A	10.0 A	
- 210i	4.0 A	2.0 A	10.0 A	
Absorption time	60 min	0 min	300 min	
Max. charge time	24 h	2 h	120 h	
Min. charge time	30 min	30 min	180 min	
Altitude up to	2000 m	0 m	2000 m	

Switch-on delay

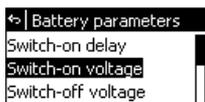


The EFOY COMFORT fuel cell does not start immediately if the switch-on voltage only drops below the set threshold level temporarily. The device only starts automatically if the switch-on voltage is still below this threshold level after the switch-on delay. For example, with the factory default of 12.3 V for lead-acid batteries, the switch-on voltage must drop below 12.3 V for at least 60 seconds in order for the EFOY COMFORT fuel cell to start.

If loads with a high rate of power consumption are operated temporarily, this value must be set in accordance with the operating times of these loads.

You can find the permitted value range for the switch-on delay in the table on page 88.

Switch-on voltage

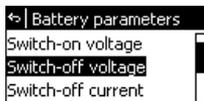


The EFOY COMFORT fuel cell switches on at the set voltage and charges the battery.

Setting too high a value for the switch-on voltage results in frequent starting of the EFOY COMFORT fuel cell. Setting too low a value for the switch-on voltage results in damage to the battery. Past experience indicates that 12.3 V is a good value for lead-acid batteries.

You can find the permitted value range for the switch-on voltage in the table on page 88.

Switch-off voltage

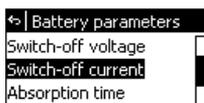


If the battery voltage reaches the set level, the EFOY COMFORT fuel cell switches off, provided that the value set for the "Maintenance charge" parameter has also been reached.

Please note your battery's end-of-charging voltage. Note the charging recommendations provided by the battery manufacturer.

You can find the permitted value range for the switch-off voltage in the table on page 88.

Switch-off current

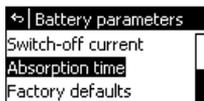


The EFOY COMFORT fuel cell switches off if the current drops below the set switch-off current after reaching the switch-off voltage.

If you want the battery voltage to serve as the only switch-off parameter, set the maximum value, as the current is always below this value in EFOY COMFORT fuel cells.

You can find the permitted value range for the maintenance charge in the table on page 88.

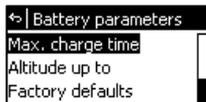
Absorption time



This function serves as an additional switch-off criterion for EFOY COMFORT fuel cells if the switch-off current is not reached within the set time period.

You can find the permitted value range for the absorption time in the table on page 88.

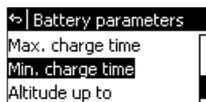
Maximum charge time



If the switch-off criteria, voltage and current, have not been satisfied, the EFOY COMFORT will shut down after defined operating hours. Once the switch-on criteria have been satisfied, the EFOY COMFORT unit will turn on again, which can be immediately after the maximum charge time.

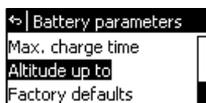
This switch-off criterion prevents unlimited charge cycles caused by various factors like defective batteries.

Minimum charge time



The EFOY COMFORT fuel cell calculates the average duration of a charging cycle. If this duration drops below the present value, it indicates the error, too old, defective or battery too small. This can equally be an indication that incorrect battery parameters have been selected. A warning is displayed on the operating panel. Several short charging cycles can damage the EFOY COMFORT fuel cell and/or the battery. Please contact your local dealer to solve the problem.

Altitude up to



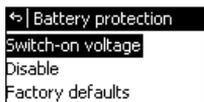
The EFOY COMFORT fuel cell is set by default for a use up to an altitude of 1500 meter. For use at a higher altitude for a longer period, we recommend to increase the value.

3.7.3.3 Battery protection

The EFOY COMFORT fuel cell has automatic battery protection, even when the EFOY COMFORT fuel cell is switched off. By default, battery protection switches on when the battery voltage drops below 11.2 V (lead-acid batteries for min. 60 seconds).

Operation

The battery protection function provides deep discharge protection for the battery, even when the fuel cell is switched off and the charging function does not take over.



You can select the following menu options in the "Battery protection" menu:

- Switch-on voltage
- Enable/Disable
- Factory defaults

This option allows you to undo all the battery protection settings. Press [ok] to confirm or [↵] to cancel.



CAUTION!

Incorrectly set operating parameters may damage the battery. This may nullify your warranty.

Please only use the precise values permitted for the battery parameter and battery protection settings.



CAUTION!

If you stop protective charging manually, battery protection is disabled until the next time the fuel cell is started. Deep discharge may damage your battery.

Permitted value ranges for switch-on voltage lead-acid, gel, AGM batteries and EFOY GO!	Factory defaults	Min.	Max.	User-defined value:
Battery protection (12 V)	11.2 V	10.5 V	12.0 V	

Permitted value ranges for switch-on voltage LiFePO4 Batteries	Factory defaults	Min.	Max.	User-defined value:
Battery protection (12 V)	11 V	10.5 V	12.5 V	

4 Maintenance and Service

Under normal operating conditions, the EFOY COMFORT fuel cell is maintenance-free.

**WARNING!**

Do not open the EFOY COMFORT fuel cell! Unauthorized opening of the EFOY COMFORT fuel cell interferes with safe operation of the device and nullifies the warranty and guarantee. The EFOY COMFORT fuel cell does not contain any parts that you can maintain or repair yourself.

4.1 Replacing fuel cartridges

**INFO:**

If the fuel cartridge is empty, the message "Please replace the fuel cartridge" is displayed on the operating panel. The fuel cartridge can be changed while the device is in operation.

EFOY fuel cartridges are intended for single use only and cannot be refilled.

4.1.1 Removing the fuel cartridge

**DANGER!**

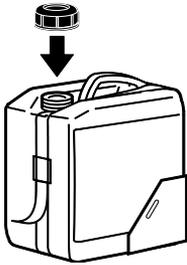
Leakage of methanol fumes poses a fire hazard!

Do not smoke when replacing the EFOY fuel cartridge and do not expose it to other ignition sources! Protect EFOY fuel cartridges from temperatures exceeding 50°C/122°F.

Please refer to the information about methanol provided in chapter 2.3 "Safety instructions for methanol" on page 60.

**INFO:**

Protect the fuel cartridge and the fuel cartridge connector on the device from impurities.



1. Unscrew the fuel cartridge connector from the empty EFOY fuel cartridge.
2. Open the belt.
3. Remove the empty EFOY fuel cartridge.
4. Use the screw cap to seal each EFOY fuel cartridge securely after use.

4.1.2 Inserting the fuel cartridge



CAUTION!

Impurities in methanol!

Original EFOY fuel cartridges contain methanol that has been approved by SFC. Even slight impurities or foreign particles in commercially available methanol may cause irreversible damage to the EFOY fuel cell, and may render the warranty or guarantee null and void.

Use only original EFOY fuel cartridges.



WARNING!

Use only original EFOY fuel cartridges!

Please refer to the information about methanol provided in chapter 2.3 "Safety instructions for methanol" on page 60.

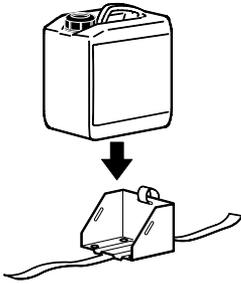


Keep all EFOY COMFORT fuel cells and EFOY fuel cartridges out of reach of children, even when empty or only partly full.



INFO:

EFOY fuel cartridges have a limited shelf life. Please see the data on the label with the format: „EXP: MM/YYYY“.



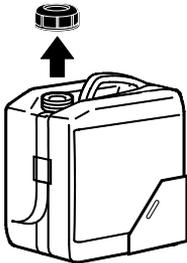
1. Insert a new, full, and sealed original EFOY fuel cartridge into the fuel cartridge holder.

**INFO:**

Always place the fuel cartridge in the fuel cartridge holder with the connector facing upwards.



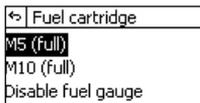
2. Fasten the belt on the fuel cartridge holder. Only connect EFOY fuel cartridges to the EFOY COMFORT fuel cell if they are secured with a fuel cartridge holder.



3. Do not remove the child-proof screw cap until the new EFOY fuel cartridge has been inserted into the fuel cartridge holder.

**INFO:**

Keep the screw cap in a safe place.



4. Screw the fuel cartridge connector onto the new EFOY fuel cartridge.
5. Press [ok] on the operating panel so that the red warning light and error message are no longer displayed.
6. Press [▲] [▼] on the operating panel to select the installed fuel cartridge (see "Selecting a fuel cartridge" on page 84).
7. Press [ok] to confirm your selection.

4.2 Adding service fluid

If the service fluid level is low, the message: "Please refill service fluid" is displayed on the operating panel.



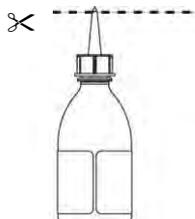
INFO:

If this message is displayed frequently, check that the air supply at the installation location is sufficient. There is no need to add service fluid under normal operating conditions.

Use original EFOY service fluid only.

Switch off the EFOY COMFORT fuel cell before refilling with service fluid. Disconnect the charge line.

Make sure that no dirt or foreign bodies enter the fill opening.

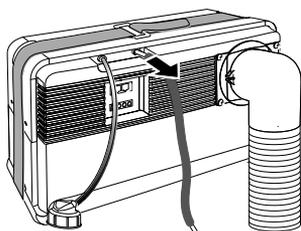


1. Use a clean pair of scissors to cut off the tip of the bottle.

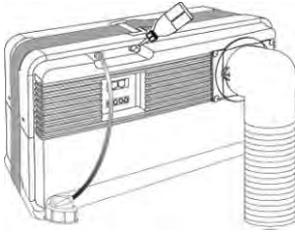


INFO:

The service fluid bottle is for one time use only.



2. Disconnect the exhaust hose from the device.

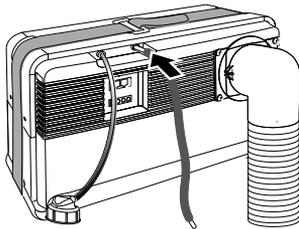


3. Insert the tip of the bottle into the connection nozzle on the device and slowly squeeze the entire contents into the opening.

**INFO:**

Never refill the fuel cell with more than one bottle of service fluid at a time.

4. Use a cloth to wipe away any excess service fluid that may spill over.



5. Reattach the exhaust hose.
6. Reconnect the charge line to the EFOY COMFORT fuel cell.
7. When you have finished filling the device, press [ok].
The message is deleted and the EFOY COMFORT fuel cell returns to its previous operating status, e.g. automatic mode.
8. Be sure to order your next refill of EFOY Service Fluid from your specialist dealer in plenty of time.

4.3 Firmware update

Be sure to check on a regular basis (at least once a year) which updates are available for your firmware.

A firmware update of the EFOY COMFORT fuel cell is possible at any time with built-in fuel cell and in a few minutes.

Simply connect the EFOY Updater to your EFOY COMFORT fuel cell to perform the update.

For information on the current firmware and the updater, contact your specialist dealer or visit our website (see chapter 1.2 "Service contact details" on page 57).

5 Errors and solutions

5.1 Error message on the display

In the event of interruptions and errors, the operating panel displays warning messages on the display panel, including an error code and instructions on how to resolve the error.

By following these instructions, you can quickly and easily eliminate some of the errors that may occur.

Error message on the display	Error code	Solution
Service is required. Protect device against frost! Please contact the EFOY hotline or hotline@sfc.com .	1 10 15 31 76 83	Please contact the hotline. Contact details are provided in chapter 1.2 "Service contact details" on page 57.
A restart is required. If the error reoccurs, please contact the EFOY hotline or hotline@sfc.com . Press OK for restart.	13 14 17 70 73 75 80 84	Select the "System reset" option in the main menu to restart the device (max. twice). If the error still occurs, please contact the hotline. Contact details are provided in chapter 1.2 "Service contact details" on page 57.

Errors and solutions

Error message on the display	Error code	Solution
Please make sure the exhaust hose is not clogged, bent or frozen. Press OK for re-start.	11 18	Please check the installation of the exhaust hose and position it so that no condensation can gather. Do not bend the exhaust hose. If necessary, clean the exhaust hose and protect the opening from becoming clogged. Shorten the exhaust hose if condensation is gathering in it.
Fuel cartridge empty. Please replace the fuel cartridge, and press OK.	20 22	Connect a new fuel cartridge. See chapter 4.1 "Replacing fuel cartridges" on page 94.
Please refill service fluid Press OK for re-start.	30	Make sure that the off-heat can escape without obstruction and that the ambient temperature is below 40°C/104°F. Please ensure that the opening for supply air has a cross-section of at least 80 cm ² /31,5 sq in (160 cm ² /62 sq in for EFOY COMFORT 210). Then refill the fuel cell with service fluid (see chapter 4.2 "Adding service fluid" on page 97).
Interruption: Cooling insufficient. Please check installation and air supply!	32	The cooling air is insufficient or the ambient air is too warm. Please check whether the room in which the fuel cell is installed has sufficient ventilation, or whether the openings for the air supply in the EFOY COMFORT fuel cell are blocked.

Error message on the display	Error code	Solution
<p>Interruption: Device frozen. Please defrost device slowly for at least 24h at room temperature.</p>	40	<p>The device was exposed to temperatures below 1°C/34°F without a connected battery and/or an EFOY fuel cartridge that was not filled sufficiently. It must be allowed to defrost for approx. 24 hours at room temperature.</p>
<p>Interruption: Surroundings too warm. Please wait for the device to cool down.</p>	41	<p>The ambient temperature is too high. The device will start automatically if the temperature drops to below 40°C/104°F.</p>
<p>Battery voltage low. Please check battery connection and load battery.</p>	50 52	<p>Please check the cabling and fuses, and check whether a suitable battery is connected. Check the battery voltage. If it is too low, please load the battery with a battery charger. Please also check other loading devices for defects, e.g. alternator or charge controller.</p>
<p>Battery voltage high. If applicable, please check additional charging devices.</p>	51 53	<p>Please check the cabling and fuses, and check whether a suitable battery is connected. Please also check other loading devices for defects, e.g. alternator or charge controller.</p>
Error message on the display	Error code	Solution

Errors and solutions

<p>Please disconnect fuel cartridge connection, shake cartridge firmly and reconnect. Restart device at most 2 times. Press OK for restart.</p>	72	<p>Check the fuel cartridge connection and, if necessary, check for any contamination and remove it. Then please perform a system reset (max. twice). If the error still occurs, please contact the hotline. Contact details are provided in chapter 1.2 "Service contact details" on page 57.</p>
<p>EFOY GO! cannot be charged currently. Please refer to the user manual of the EFOY GO!</p>		<p>The EFOY GO! includes a lithium battery (LiFePO₄), which cannot be charged below 0°C. If this is recognized by the EFOY COMFORT, the charging is interrupted, and the EFOY COMFORT switches in the manual off mode. A warning is displayed. The frost protection mode is not affected. Please confirm the warning once the temperature has increased. The EFOY COMFORT returns to Automatic Mode.</p>

<p>Battery defective, too small or too old. Please check the battery and contact EFOY-Hotline or service@sfc.com</p>		<p>The on-board electrical system including the battery has to be checked. The EFOY COMFORT has measured charging cycles which were too short. This is an indication of a defective, too old or too small battery. The battery parameters may also need to be reviewed. Please refer to chapter 6, „Specifications“ on page 105, for information about the recommended battery capacities. Please contact your local dealer to check the electrical system and in particular the performance of the battery. Charging cycles which are too short can damage the EFOY COMFORT fuel cell.</p>
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5.2 Errors without display messages

Possible error	Solution
<p>Nothing is displayed on the operating panel.</p>	<p>Check that the operating panel is connected (see chapter 3.2.6 "Connecting the charge line and data line" on page 68).</p>
<p>The device does not start. Nothing is displayed on the operating panel.</p>	<p>No battery or the wrong battery is connected. Battery may be deeply discharged. Check the pins, polarity and cables (see the EFOY COMFORT installation manual in the Downloads area on our website at www.efoy-comfort.com).</p> <p>Connect a charged battery in order to start the device.</p>
<p>If the problem recurs:</p>	<p>Please contact the hotline, see chapter 1.2 "Service contact details" on page 57.</p>

6 Specifications

Performance data

Product	EFOY COMFORT 80	EFOY COMFORT 140	EFOY COMFORT 210
Max. charge capacity	960 Wh/day 80 Ah/day	1728 Wh/day 144 Ah/day	2520 Wh/day 210 Ah/day
Max. nominal power ¹	40 W	72 W	105 W
Expected nominal power at 3000h ¹	30 W	60 W	85 W
Max. charging current at 12 V	3.3 A	6.0 A	8.8 A
Nominal voltage	12 V		
Switch-on voltage ²	< 12.3 V		
Cut-off threshold ²	> 14.2 V		
Required starting voltage	9 V		
Quiescent power consumption	15 mA		
Methanol consumption	0.9 l/kWh (0,24 US gal/kWh)		
Recommended batteries ³	12 V lead batteries (lead acid, lead gel, AGM or LiFePO4)		
	40 - 160 Ah	60 - 250 Ah	80 - 350 Ah
Recommended for the following energy requirements/day	Up to 60 Ah	Up to 115 Ah	Up to 180 Ah

¹ The nominal power varies by +/- 10%, decreases with the operating hours.

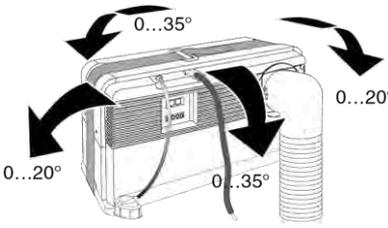
² Factory default – can be changed via the operating panel (expert mode).

³ The default values are the optimal values preset ex works. If the battery capacities differ significantly, please contact your specialist dealer.

General data

Product	EFOY COMFORT 80	EFOY COMFORT 140	EFOY COMFORT 210
Sound pressure level at a distance of 7 m	25 dB(A)		
Weight	7.1 kg / 15.7 lbs	7.9 kg / 17.4 lbs	8.5 kg / 18.7 lbs
Dimensions	44.3 x 20.2 x 28.8 cm (17.4 x 7.9 x 11.3 in)		

Installation requirements

Space requirement (LxWxH)	68 x 38 x 34 cm (minimum) / 26.8 x 15 x 13.4 in
Inclination - along the direct axis - along the quadrature axis 	Continual: 35° Temporary (<10 minutes): 45° Continual: 20°
Protection class	IP-21
Operating temperature	-20 to +40°C / -4°F to +104°F)
Starting temperature	+5 to +40°C / +41°F to +104°F)
Storage temperature	+1 to +45°C / +34°F to +113°F)



INFO:

The specifications are subject to change without notice.

Specifications

Fuel cartridge

Fuel cartridges	M5*	M10
Volume	5 liters	10 liters (2.64 US gal)
Weight	4.3 kg	8.4 kg / 18.5 lbs
Dimensions (L x B x H)	19.0 x 14.5 x 28.3 cm	23.0 x 19.3 x 31.8 cm (9.1 x 7.6 x 12.5 in)

*not available in all countries



INFO:

The installation manual for the EFOY COMFORT fuel cell and other manuals are available in the Downloads area on our website at www.efoy-comfort.com.

