

Off Grid Systems

EFOY Pro Series - 2nd generation

The new EFOY Pro series is designed to provide reliable energy for off grid applications. Connected to a off grid application, the EFOY Pro device will automatically charge batteries when required, providing reliable power 24h a day, 365 day per year.

Robust industrial construction
EFOY Pro devices offer a robust metal housing. The new OP2 operation panel offers a easy to use interface and allows to configure switch on and off voltage settings etc.

DUO version: Extended autonomy with 2 fuel connectors
The EFOY Pro Duo comes with 2 fuel connectors instead of one. Therefore it is possible to connect 2 fuel cartridges directly to the EFOY Pro Duo device. If more fuel autonomy is required, up to 4 fuel cartridges can be connected by using the optional external Duocartswitch DCS1. Using 2 external DCS1 it is possible to connect up to 4 x M28 fuel cartridges providing up to 120 kWh of electrical energy without user intervention.

One for all – charges 12V and 24V batteries
EFOY Pro is compatible with 12V and 24V batteries. The integrated charge control system identifies battery voltage and automatically adjusts the charging voltage.

Low fuel consumption
Fuel consumption is 0.9 liters of Methanol/kWh el.

Extended Temperature Range
EFOY Pro 2nd generation operates reliable at ambient temperatures ranging from -20°C to +50°C.

Constant Current versus Constant Power
EFOY Pro 2. generation devices operate in constant current mode. Therefore the output power will decrease over time. In the datasheet a max and min value is specified for the output power. The min output power value is the guaranteed output power after 4500h of operation. The new constant current mode offers a extended operation lifetime of the fuel cell system.

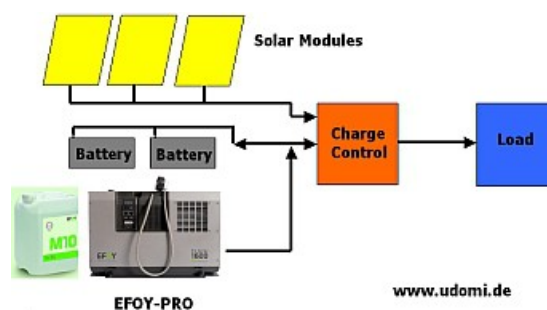
EFOY Pro 2nd generation – 4500h warranty
The EFOY Pro 2. generation devices warranty has been extended to 4500h or 24 months (1st generation EFOY Pro 3.000h).

Compatibility
EFOY Pro devices of the 2nd generation are almost fully compatible with the 1st generation. Overall dimensions and electrical interfaces are the same. Accessories such as DCS1, GSM-3 are also compatible – only exception is the new operation panel OP2 which is not compatible with 1st generation EFOY Pro units.

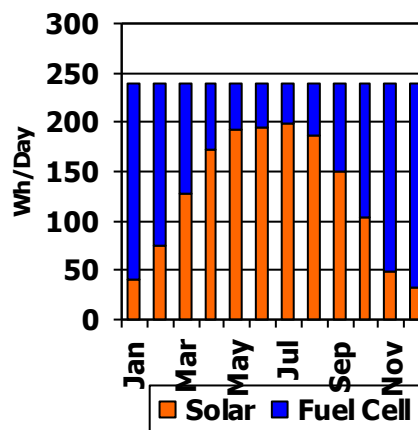
EFOY Pro 800 (DUO) replaces EFOY Pro 600
EFOY Pro 2400 (DUO) replaces EFOY Pro 1600/2200(XT)



EFOY-PRO-2400-DUO (110/80 Watt) with 2 fuel connectors



Fuel Cell – PV- Hybrid System



Typical energy contribution for Fuel Cell – PV - Hybrid System

EFOY Pro and solar cells – the winning combination
Combining EFOY Pro and solar cells is a powerful solution for off grid applications such as remote measuring systems, video surveillance or traffic control.

Off Grid Systems

Technical Specifications				
Device	EFOY-PRO-800	EFOY-PRO-800-DUO	EFOY-PRO-2400	EFOY-PRO-2400-DUO
Power max/min	45/25 Watt	45/25 Watt	110/80 Watt	110/80 Watt
Nominal Voltage	12V/24V	12V/24V	12V/24V	12V/24V
Charging current max/min	3.75A/2.1A@12V 1.88A/1.05A@24V	3.75A/2.1A@12V 1.88A/1.05A@24V	9.17A/6.7A@12V 4.58A/3.3A@24V	9.17A/6.7A@12V 4.58A/3.3A@24V
Recommended battery capacity	40-160Ah@12V 10-100Ah@24V	40-160Ah@12V 10-100Ah@24V	60-350Ah@12V 30-175Ah@24V	60-350Ah@12V 30-175Ah@24V
Warranty	2 years or 4.500 operation hours (related to min. power specified)			
Fuel Consumption	0.9l/kWh			
Fuel Cartridges	M5, M10, M28 (M28 adapter required) and MT60			
Noise Emission	25dB(A) at 7m distance, 42dB(A) at 1m distance			
Weight	8kg	8.3kg	9kg	9.3kg
Operating Temp.	-20°C ... +50°C			
Dimensions	L x W x H 433 x 188 x 278mm			

Accessories for EFOY-PRO-SET:

Included with shipment:

- Operation panel OP2 with cable
- Mounting plate
- Charge line
- Fuel cartridge holder with belt
- Exhaust hose EH1 (insulated)
- Off heat duct
- Service Fluid (included with BASIC)
- User manual (included with BASIC)

Optional:

- GSM-3 Modem and MUX-2
- Fuel Cartridge Sensor FS1
- M28 adapter
- Cluster Controller CC1 (for parallel operation of 2-5 EFOY systems)
- Interface adapter IA1
- Duocartswitch DCS1

Fuel Cartridges (Methanol)

- M5 cartridge (5 liters, app 4.5kWh)
- M10 cartridge (10 liters, app 11.1kWh)
- M28 cartridge (28 liters, app 31.1kWh)
- MT60 cartridge (60 Liters, app 66.6 kWh)



M10



M28



MT60



M28 Adapter

Fuel Cartridge	M5	M10	M28
Volume	5 liters	10 liters	28 liters
Weight	4.3kg	8.4kg	25kg
Dimensions (WxDxH)	190x145x283	231x185x318	370x285x395
Capacity	4.5kWh	9.1kWh	25.3kWh



Fuel Sensor FS1



Operation panel OP2




Duocartswitch DCS1



GSM-3

Product	Part#
EFOY-PRO-800-SET	EFOY-PRO-800-SET
EFOY-PRO-800-DUO-SET	EFOY-PRO-800-DUO-SET
EFOY-PRO-2400-SET	EFOY-PRO-2400-SET
EFOY-PRO-2400-DUO-SET	EFOY-PRO-2400-DUO-SET
EFOY-PRO-800-BASIC	EFOY-PRO-800-BASIC
EFOY-PRO-800-DUO-BASIC	EFOY-PRO-800-DUO-BASIC
EFOY-PRO-2400-BASIC	EFOY-PRO-2400-BASIC
EFOY-PRO-2400-DUO-BASIC	EFOY-PRO-2400-DUO-BASIC
Fuel Cartridge M5	M5
Fuel Cartridge M10	M10
Fuel Cartridge M28	M28
Fuel Cartridge MT60	MT60
Fuel Cartridge Sensor	FS1
GSM-3	GSM-3
MUX-2	MUX-2
Cluster Controller	CC1
Interface Adapter	IA1
M28 Adapter	M28-Adapter
Duocartswitch DCS1	DCS1

Off Grid Systems

Technical Specifications	EFOY PRO 12000 DUO
Nominal Power (max)	500 Watt
Nominal Power (min. after 3000h)	400 Watt (+/-10%)
Nominal Voltage	24/48V
Charge Current	20,8/16,7A@24V 10,4A/8,3A@48V
Recommended battery capacity	200Ah@24V 100Ah@48V
Warranty	24 Months or 3000h
Fuel Consumption	0.9l/kWh
Fuel Cartridge	M5/M10 and M28 (requires M28 Adapter) max. 4 Fuel Cartridges with 2 x DCS1
Noise Level	35 dB(A) at 7m distance, 52 dB(A) at 1 m distance
Weight	32kg
Dimensions	L x B x H 640 x 441 x 310mm
Ambient Temperature	-20°C ... + 50°C
	
IP Protection	IP20
Data-Interface	RS232 (Text protocol or Modbus) RJ45 and connector (A,B, GND)
Standby Power Consumption	150mA@24V

Off Grid Systems

EFOY-OUTDOOR-Solutions

The EFOY-OUTDOOR solutions are an extension of the EFOY Pro system, designed to back up PV-Systems and to supply small off-grid industrial equipment. The EFOY Pro as well as the other components such as lead acid battery, Methanol tank and hybrid charge controller are installed in a robust outdoor housing.

Depending on the application different OUTDOOR solutions are offered. Make your choice between ProCube, EnergyBox, OUTDOOR-ALU box, OUTDOOR-EXPLORER case and the OUTDOOR-CABINET. All OUTDOOR solutions offer EFOY-SOLAR Hybrid capabilities.

The optional GSM-3 module provides remote control and monitoring of the EFOY Pro fuel cell system. In case of low Methanol fuel level or an error the system will automatically inform you via email or SMS. It is also possible to change system parameters from remote via our M2M (machine-to-machine) Internet portal using a standard Webbrowser. With the MUX-2 device it is possible to connect the GSM-3 with the EFOY PRO fuel cell and the SS-MPPT-15L charge controller to get additional informations such as load current, solar in current etc. The GSM-GPS-2 module provides additional GPS tracking capability. With GPS tracking the user always knows where the EFOY Pro system is located this may be very helpful when the Methanol cartridge has to be replaced etc.

Applications:

All year power supply as PV-Fuelcell Hybrid, or as self-sufficient unit.

- Remote weather stations
- Traffic control
- Measuring stations
- Camping, Outdoor, sailing etc.

Customized solutions on request.



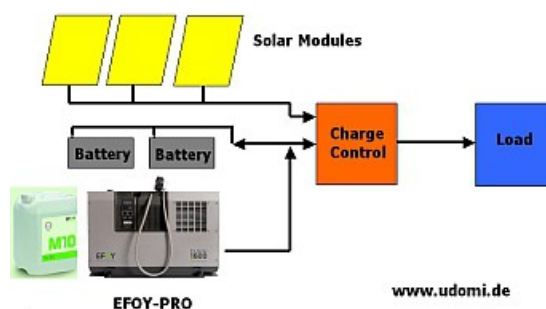
ProCube2030



ProCube2060



EFOY-OUTDOOR-CABINET-GFP-XL



Off Grid Systems

Configuration	ProCube2030	ProCube2060A
Box Dimensions (LxWxH)	800x600x410mm (Aluminum powder coated)	937x787x480mm (Aluminum)
Weight (empty)	15kg	17,5kg
EFOY-PRO	EFOY-PRO-800/2400 (DUO)	EFOY-PRO-800/2400 (DUO)
Methanol Cartridges	1 x M28 or 2 x M10	2 x M28
Battery Size	1 x SPB12-100/LFP12-1000 or 2 x SPB12-55/LFP12500 (24V)	2 x SPB12-100/LFP121000
Ambient Temp.	-20°C to +50°C	-20°C to +50°C
IP Protection	IP33	IP33
Options	GSM-3, FS1, Solar Modules	PS-MPPT-25M, GSM-3, MUX-2, Solar Modules

Includes:

- ProCube2030 includes solar charge controller (Steca Solsum 10.10F)
- ProCube 2060A optional with PS-MPPT-25M

Product Description	Part#
EFOY ProCube2030	EFOY-PROCUBE-2030
EFOY ProCube2060	EFOY-PROCUBE-2060A
EFOY-PRO-800	EFOY-PRO-800-BASIC
EFOY-PRO-800-DUO	EFOY-PRO-800-DUO-BASIC
EFOY-PRO-2400	EFOY-PRO-2400-BASIC
EFOY-PRO-2400-DUO	EFOY-PRO-2400-DUO-BASIC
Fuel Cartridge M10	M10
Fuel Cartridge M28	M28
Fuel Cartridge Low Sensor	FS1
M28 Adapter	M28-Adapter
Solar Charge Controller 25A	PS-MPPT-25M
Battery 12V/55Ah AGM	SPB12-55
Battery 12V/80Ah AGM	SPB12-100
Battery 12V/50Ah LiFePo	LFP12-500
Battery 12V/100Ah LiFePo	LFP12-1000
Remote Monitoring Solution for EFOY PRO	GSM-3
Multiplexer MUX-2 to connect EFOY PRO and PS-MPPT-25M to GSM-3	MUX-2



Off Grid Systems

Configuration	EFOY-OUTDOOR-CABINET-SMALL	EFOY-OUTDOOR-CABINET-GFP-XL
Dimensions (HxWxD)	845x635x300mm	1250x750x420
EFOY Pro Systems	EFOY-PRO-800/2400 (DUO)	EFOY-PRO-800/2400 (DUO)
Methanol Cartridges	2 x M10	2 x M28
Battery Sizes	1 x SPB12-55 or LFP12500	Up to 4 x SPB12-100 or LFP121000
Ambient Temp.	-20°C to + 50°C	-20°C to + 50°C
Options	GSM-3, MUX-2, SS-MPPT-15L, Solar Modules	GSM-3, MUX-2, SS-MPPT-15L/PS-MPPT-25M, Solar Modules

EFOY-OUTDOOR-CABINET-GFP includes:

- Outdoor cabinet (plastic).
- Electrical installation, ready to connect EFOY Pro, GSM-3, FS1 and battery
- External connectors for solar modules and load
- Air in- and outlet for cooling
- Exhaust outlet (anti freeze)

Product	Partl#
OUTDOOR CABINET SMALL	EFOY-OUTDOOR-CABINET-GFP-SMALL
OUTDOOR CABINET XL	EFOY-OUTDOOR-CABINET-GFP-XL
EFOY-PRO-800-BASIC	EFOY-PRO-800-BASIC
EFOY-PRO-800-DUO-BASIC	EFOY-PRO-800-DUO-BASIC
EFOY-PRO-2400-BASIC	EFOY-PRO-2400-BASIC
EFOY-PRO-2400-DUO-BASIC	EFOY-PRO-2400-DUO-BASIC
Fuel Cartridge M10	M10
Fuel Cartridge M28	M28
M28 Adapter	M28 Adapter
Fuel Cartridge Sensor	FS1
Solar Charge Controller 15A	SS-MPPT-15L
Solar Charge Controller 25A	PS-MPPT-25M
Battery 00Ah/12V AGM	SPB12-100
Battery 55Ah/12V AGM	SPB12-55
Battery 12V/50Ah LiFePo	LFP12500
Battery 12V/100Ah LiFePo	LFP121000
Remote Monitoring for EFOY Pro	GSM-3
Multiplexer MUX-2 to connect EFOY PRO and SS-MPPT-15L/PS-MPPT-25M to GSM-3	MUX-2



OUTDOOR-CABINET-GFP-SMALL



OUTDOOR-CABINET-GFP-SMALL



OUTDOOR-CABINET-GFP-XL



OUTDOOR-CABINET-GFP-XL

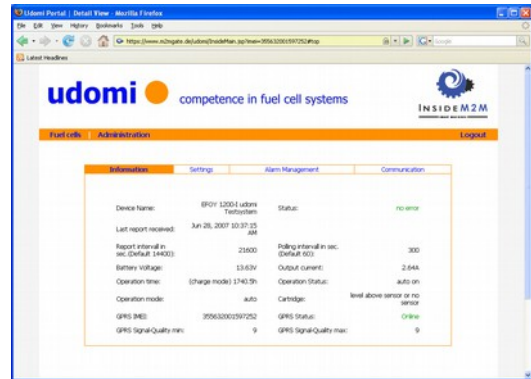
Off Grid Systems

GSM-3 - Off-Grid-Monitor

For EFOY Pro (1st and 2nd Generation)

The udomi off grid monitor is perfectly suited to monitor and control EFOY Pro fuel cell systems in remote locations with GSM coverage. Installation is easy. Just connect the GSM-3 module with the Data Interface of the EFOY Pro unit, insert a SIM card and the EFOY Pro unit will automatically connect with the udomi off grid monitor. Using your standard webbrowser you then can monitor and control the EFOY Pro fuel cell. In case of low fuel level or an error, the system will automatically inform your service personnel via SMS and/or Email. In case of an error it is possible to communicate with the EFOY Pro via the udomi-m2m-portal. This increases reliability and saves time and money.

- Monitoring and control of EFOY Pro fuel cell via Webbrowser
- Sends SMS/Email automatically when fuel level is low or system error occurs
- Errors can be diagnosed and fixed online (in most cases it is not required to send service personal to fuel cell location)
- EFOY Pro fuel cell can be reconfigured online
- Monthly communication traffic (GPRS) is typically 2MB
- GSM-2-GPIO includes 6 digital alarm inputs and 2 relays outputs for additional functions.



udomi-off-grid-monitor

Demo access at:

www.m2mgate.de/udomi/

user: demo

password: demo

With the optional Meterbus Adapter the GSM-3 modem can be used to remotely monitor the SS-MPPT-15L. For simultaneous monitoring of EFOY PRO and SS-MPPT-15L use the MUX-2 device (see next page).

GSM-3 for EFOY-PRO



Off Grid Systems

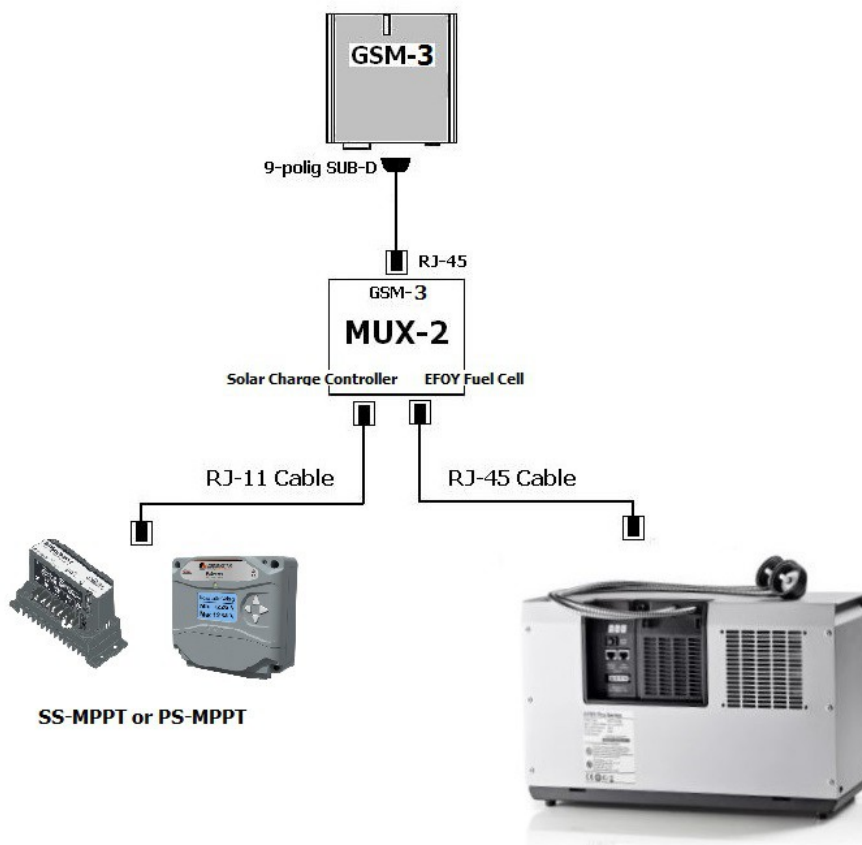
MUX-2 connects EFOY PRO and SS-MPPT-15L/PS-MPPT-XX with GSM-3 modem (Energy Manager)

With the MUX-2 device users of the GSM-3 modem can now remotely monitor EFOY PRO fuel cell and the SS-MPPT-15L/PS-MPPT-XX solar charge controller together. With this solution the user has all informations of his off grid power system available on the the udomi off grid monitor website. Battery voltage, load current, solar input current, fuel cell charge current and many other informations are available to monitor and optimize your off grid power system.

- Measurement of all currents in and out of the battery allows to determine the state of charge of the battery (SOC).
- Load output of SS-MPPT-15L/PS-MPPT-XX can be switched on/off remotely
- Charging parameters for EFOY PRO fuel cell and can be changed via the udomi off grid manager to adapt for different battery types etc.



MUX-2



Off Grid Systems (Energy Manager)

Information	Settings	Alarm management	Communication	Remote On/Off	Firmware	Administration
Fuel cell: Device name: ██████████ Report interval in sec.(Default 3600): 3600 Status: no error Warning: no warning Charge current: 3.44A Battery voltage: 26.81V Actual power: 92.23W Accumulated energy: 356708.0Wh Ah load (24h): 33.2 Ah Operating mode: auto Operating status: auto on Operating hours: (charge mode) 4081.0h Cartridge: cartridge 1 consumed 21.42l Uoelt: ██████████ Uoelt timestamp (UTC+2): Jan 1, 2009 12:00:01 AM Battery type: ██████████		Solar controller: Poling interval in sec. (Default 60): 60 Status: LOAD_OK Charge status: Bulk_Charge Charge current: 2.55 A Battery voltage: 26.79 V Load current: 1.8 A Load voltage: 26.75 V Ah load (24h): 24.2 Ah Ah charge (24h): 2.6 Ah Array voltage: 34.04 V LVD voltage: 23 V Temperature heatink: 34 °C Temperature battery: 24 °C Alarm: 0 Last report received (UTC+2): Sep 30, 2014 10:46:47 AM				
GPRS IMEI: 3566120-██████████ GPRS signal quality min: 2 Phone number: ██████████ Cell information (MCC-MNCC-LAC-CELL): 262-3-2383-6071		GPRS status: Online GPRS signal quality max: 14 SIM card ID: ██████████ Valid until: 30.04.2016				
<input type="button" value="Request actual data"/>						
Fuel cell - Save reports as csv- or xls-file: From: <input type="text" value=""/> To: <input type="text" value=""/> <input type="button" value="Export CSV"/> <input type="button" value="Export XLS"/>						
Fuel cell - Save LOG as csv or excel file: From: <input type="text" value=""/> To: <input type="text" value=""/> <input type="button" value="Export CSV"/> <input type="button" value="Export XLS"/>						
Solar controller - Save reports as csv- or xls-file: From: <input type="text" value=""/> To: <input type="text" value=""/> <input type="button" value="Save CSV"/> <input type="button" value="Save XLS"/>						
From: <input type="text" value="22/09/2014"/> To: <input type="text" value="27/09/2014"/> <input type="button" value="Refresh"/>						

Off Grid Systems

Off Grid Solar Modules

E400M32

32-cell PV module with 100 Watt Peak
Dimensions (LxWxH): 1037x527x46mm
Weight: 8.4kg
Junction box with cable and MC4 connector

LX-160M

36-cell PV module with 160 Watt Peak
Dimensions (LxWxH): 1482x676x35mm
Weight: 11.5kg
Junction box with cable and MC4 connector



SW80



LX-160M

Off Grid Systems

Solar Charge Controller (MPPT)

SS-MPPT-15L

12/24V MPPT Solar charge controller with 15A max. load and charge current



PS-MPPT-25/40M

12/24V MPPT Solar charge controller with 25 or 40A max load and charge current.



AGM Batteries

SPB12-55

Solar Battery (AGM - Absorbant Glass Mat) 12V/55Ah (C10). Dimensions: LxBxH 229x138x213mm. M6 thread terminal. Weight: 19,5kg.



SPB12-100

Solar Battery (AGM - Absorbant Glass Mat) 12V/100Ah (C10). Dimensions: LxWxH 330x171x220mm. M6 thread terminal. Weight: 32kg.



LiFePo Batteries

LFP12500

LiFePo 12V/50Ah (inkl. BMS) - Temperature Range -20°C to + 60°C (Discharge) - M6 Terminal - Dimensions: LxWxH 229x138x213mm, Weight: 8 kg.



LFP121000

LiFePo 12V/100Ah (inkl. BMS), Temperature Range -20°C to + 60°C (Discharge) - M8 Terminal - Dimensions: LxWxH 330x171x220mm, Weight: 14,3 kg.

