

Firmware: 17.09

Update 8th February 2016:

NEW COMMAND: MODBUS

Adjusted min. output current setting. No changes with factory settings!

Command: ?

SFC>?

Description:

Help menu for public commands.

Response:

command	description
?	display command overview
BATTERY	select battery type
BATTERYPROTECTION	control battery protection
BUTTON	software control of device
CARTRIDGE	set/view connected fuel cartridges/DuoCartSwitches
CONFIG	set customized operation parameters Changed values
DEFAULT	apply default operation parameters
ERROR	show ten most recent errors
FUELGAUGE	enable/disable fuel gauge
GET	get customized operation parameter
HYBRID	switch the device from automatic into hybrid mode for 15s
LANGUAGE	set language for panel
LOCKED	lock control contacts
MODBUS	configuration of software protocol NEW COMMAND!
REMOTE	remote control via software interface
RESET	restart the device
SERIAL	show the device's serial numbers
SET	set customized operation parameter
SFC	show current operation state
STDVALUE	show default values of operation parameters
VALUE	show current values of operation parameters
VER	show version of firmware

Command: BATTERY

SFC>BATTERY <type|list>

Description:

Set or view type of battery.

Possible transmission parameter:

Parameter	Description
LIST	List of adjustable battery types
#	Choose battery type # (# = 0, 1, 2, 3).

Example:

```
SFC>battery
3: LiFePO4
SFC>battery 0
0: Lead acid
SFC>battery 3
3: LiFePO4
SFC>battery list
0: Lead acid
1: Lead gel
2: AGM
3: LiFePO4
SFC>battery ?
select battery type
arguments: [0 | 1 | 2 | 3 | list]
SFC>
```

Command: BATTERYPROTECTION

SFC>BATTERYPROTECTION <Parameter>

Description:

Deactivation or activation of deep discharge protection.

Possible transmission parameter:

Parameter	Description
ON	Activation of deep discharge protection
OFF	Deactivation of deep discharge protection

Response:

Response	Description
ON	Activation of deep discharge protection
OFF	Deactivation of deep discharge protection
no valid parameter	No or no valid parameter entered

Command: BUTTON

SFC>BUTTON <Parameter>

Description:

Sets operating mode via serial port.

Possible transmission parameter:

Parameter	Description
AUTO	Button „Auto“
ON	Turn on fuel cell
OFF	Shut down fuel cell

Response:

Response	Description
OK	Parameter accepted and executed
no valid parameter	No or no valid parameter entered

Command: CARTRIDGE

```
SFC>CARTRIDGE [port:(OFF | M5 | M10 | M28 | DCS | SELECT | RESET)]
```

Description:

Configuration of connected fuel cartridges and/or DuoCartSwitch DCS1 and current information. Fuel cartridge connector 1 is located left; fuel cartridge connector 2 is located right at interface side view (only for EFOY Pro Duo)

Response (EFOY Pro):

```
SFC>CARTRIDGE 1:M10
-> M10 (25%) @ #1
SFC>CARTRIDGE 1:DCS
-> M10 (25%) @ #1.1
    M10 (100%) @ #1.2
SFC>CARTRIDGE 1.1:M5
-> M5 (50%) @ #1.1
    M10 (100%) @ #1.2
SFC>CARTRIDGE 1.2:M5
-> M5 (50%) @ #1.1
    M5 (100%) @ #1.2
SFC>CARTRIDGE 1.1:RESET
-> M10 (100%) @ #1.1
    M10 (100%) @ #1.2
SFC>CARTRIDGE 1.2:SELECT
    M10 (100%) @ #1.1
-> M10 (100%) @ #1.2
SFC>
```

Response (only EFOY Pro Duo):

```
SFC>CARTRIDGE 2:OFF
-> M10 (25%) @ #1.1
    M10 (100%) @ #1.2
SFC>CARTRIDGE 2:DCS
-> M10 (25%) @ #1.1
    M10 (100%) @ #1.2
    M10 (100%) @ #2.1
    M10 (100%) @ #2.2
SFC>CARTRIDGE 1.1:M5
-> M5 (50%) @ #1.1
    M10 (100%) @ #1.2
    M10 (100%) @ #2.1
    M10 (100%) @ #2.2
SFC>CARTRIDGE 2:OFF
-> M5 (50%) @ #1.1
    M10 (100%) @ #1.2
SFC>CARTRIDGE 1.1:RESET
-> M5 (100%) @ #1.1
    M10 (100%) @ #1.2
SFC>CARTRIDGE 1.2:SELECT
    M5 (100%) @ #1.1
-> M10 (100%) @ #1.2
SFC>
```

The individual arguments:

port	Describes the fuel cartridge connector: 1: EFOY- fuel cartridge connector 1 1.1: DCS1- fuel cartridge connector 1 1.2: DCS1- fuel cartridge connector 2 2: EFOY- fuel cartridge connector 2 (only Pro Duo) 2.1: DCS2- fuel cartridge connector 1 (only Pro Duo) 2.2: DCS2- fuel cartridge connector 2 (only Pro Duo)
OFF	Only EFOY Pro Duo: deactivates an EFOY-fuel cartridge connector. Only one connector can be deactivated.
M5 M10 M28	Selects the connected fuel cartridge type at the fuel cartridge connector.
DCS	Configuration when using a DuoCartSwitch DCS1 at the selected fuel cartridge connector. Two DuoCartSwitch DCS1 connectable to EFOY Pro Duo.
RESET	Resets the consumption counter at selected fuel cartridge to 0.
SELECT	Activates the selected fuel cartridge connector.

Command: CONFIG

FW 17.09: Changed values: min. switch off current (ONLY EFOY Pro 2400 / 2400 Duo)

SFC>CONFIG

Description:

Permits modification of variable operating parameters. This command is conducted in dialogue, so there are no interim results.

Response (Lead acid, lead gel, AGM):

```
switch on voltage @ 12V (actual 12300mV, min 11000mV, max 13000mV)?
switch off voltage @ 12V (actual 14200mV, min 13500mV, max 14700mV)?
switch off current @ 12V (actual 4000mA, min 2000mA, max 10000mA)?
battery protection @ 12V (actual 11200mV, min 10500mV, max 12000mV)?
charge voltage (hybrid) @ 12V (actual 14700mV, min 13500mV, max 15500mV)?
switch on voltage @ 24V (actual 24600mV, min 22000mV, max 26000mV)?
switch off voltage @ 24V (actual 28400mV, min 27000mV, max 29400mV)?
switch off current @ 24V (actual 2000mA, min 1000mA, max 5000mA)?
battery protection @ 24V (actual 22400mV, min 21000mV, max 24000mV)?
charge voltage (hybrid) @ 24V (actual 29400mV, min 27000mV, max 31000mV)?
full charge duration (actual 180min, min 0min, max 300min)?
reaction time (actual 60s, min 2s, max 300s)? 90
maximum output time (actual 24h, min 2h, max 120h)?
altitude up to (actual 1500m, min 0m, max 2000m)?
switch on voltage @ 12V: 12.3V
switch off voltage @ 12V: 14.2V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.2V
charge voltage (hybrid) @ 12V: 14.7V
switch on voltage @ 24V: 24.6V
switch off voltage @ 24V: 28.4V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.4V
charge voltage (hybrid) @ 24V: 29.4V
full charge duration: 180.0min
reaction time: 90.0s
maximum output time: 24.0h
altitude up to: 1500.0m
```

Response (LiFePO4):

```
switch on voltage @ 12V (actual 12600mV, min 12000mV, max 13400mV)?
switch off voltage @ 12V (actual 14500mV, min 13800mV, max 14600mV)?
switch off current @ 12V (actual 4000mA, min 4000mA, max 10000mA)?
battery protection @ 12V (actual 11000mV, min 10500mV, max 12500mV)?
charge voltage (hybrid) @ 12V (actual 14600mV, min 13800mV, max 15500mV)?
switch on voltage @ 24V (actual 25200mV, min 24000mV, max 26800mV)?
switch off voltage @ 24V (actual 29000mV, min 27600mV, max 29200mV)?
switch off current @ 24V (actual 2000mA, min 2000mA, max 5000mA)?
battery protection @ 24V (actual 22000mV, min 21000mV, max 25000mV)?
charge voltage (hybrid) @ 24V (actual 29200mV, min 27600mV, max 31000mV)?
full charge duration (actual 180min, min 0min, max 300min)?
reaction time (actual 60s, min 2s, max 300s)? 90
maximum output time (actual 48h, min 2h, max 120h)?
altitude up to (actual 1500m, min 0m, max 2000m)?
switch on voltage @ 12V: 12.6V
switch off voltage @ 12V: 14.5V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.0V
charge voltage (hybrid) @ 12V: 14.6V
switch on voltage @ 24V: 25.2V
```

SIO-Command EFOY Pro 17.09



switch off voltage @ 24V: 29.0V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.0V
charge voltage (hybrid) @ 24V: 29.2V
full charge duration: 180.0min
reaction time: 90.0s
maximum output time: 48.0h
altitude up to: 1500.0m

Example:

In the dialogue shown above the „reaction time“ has been changed from 60s to 90s. If a parameter is not valid it will be ignored and keeps the setting from before.

Description of variable parameters:

switch on voltage:	Fuel cell starts at this battery voltage
switch off voltage:	Fuel cell turns off at this battery voltage (charge end voltage)
switch off current:	Fuel cell will shut off once current dips below this level.
reaction time	Time to elapse while the battery voltage is below switch on voltage.
maximum output time	If the switch-off criteria, voltage and current, have not been satisfied, the EFOY unit will shut off after generating the number of hours.
altitude up to	Altitude at installation
full charge duration:	An additional switch-off criteria for the EFOY unit when the switch-off current won't be achieved in adjusted time
battery protection	Switch on voltage for deep discharge protection in operation mode OFF.

Command: DEFAULT

SFC>DEFAULT

Description:

Resets the variable parameters to factory / standard settings

Response (Lead acid, lead gel, AGM):

```
switch on voltage @ 12V: 12.3V
switch off voltage @ 12V: 14.2V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.2V
charge voltage (hybrid) @ 12V: 14.7V
switch on voltage @ 24V: 24.6V
switch off voltage @ 24V: 28.4V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.4V
charge voltage (hybrid) @ 24V: 29.4V
full charge duration: 180.0min
reaction time: 60.0s
maximum output time: 24.0h
altitude up to: 1500.0m
SFC>
```

Response (LiFePO4):

```
switch on voltage @ 12V: 12.6V
switch off voltage @ 12V: 14.5V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.0V
charge voltage (hybrid) @ 12V: 14.6V
switch on voltage @ 24V: 25.2V
switch off voltage @ 24V: 29.0V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.0V
charge voltage (hybrid) @ 24V: 29.2V
full charge duration: 180.0min
reaction time: 60.0s
maximum output time: 48.0h
altitude up to: 1500.0m
```

Variable parameters:

switch on voltage:	Fuel cell starts at this battery voltage
switch off voltage:	Fuel cell turns off at this battery voltage (charge end voltage)
switch off current:	Fuel cell will shut off once current dips below this level.
charge voltage (hybrid):	Max. battery voltage in Hybrid mode
reaction time	Time to elapse while the battery voltage is below switch on voltage.

maximum output time	If the switch-off criteria, voltage and current, have not been satisfied, the EFOY unit will shut off after generating the number of hours.
altitude up to	Altitude at installation
full charge duration:	An additional switch-off criteria for the EFOY unit when the switch-off current won't be achieved in adjusted time
battery protection	Switch on voltage for deep discharge protection in operation mode OFF.

Command: FUELGAUGE

SFC>FUELGAUGE {ON | OFF}

Description:

Controls the fuel cartridge level gauge at the operation panel OP2.

Response:

```
SFC>fuelgauge ON
ON
SFC>
```

Value specification:

ON	Fuel cartridge level gauge in the operation control device activated.
OFF	Fuel cartridge level gauge in the operation control device deactivated.

Command: GET

SFC>GET [LIST|id[:VAL|MIN|MAX|STD]]

Description:

Shows details of the variable parameters. With this command the same values can be displayed as with commands VALUES, LIMITS and STDVALUE.

Response (Lead acid, lead gel, AGM):

```
SFC>GET LIST
ID: 018,'switch on voltage @ 12V','mV'
ID: 019,'switch off voltage @ 12V','mV'
ID: 020,'switch off current @ 12V','mA'
ID: 046,'battery protection @ 12V','mV'
ID: 074,'charge voltage (hybrid) @ 12V','mV'
ID: 021,'switch on voltage @ 24V','mV'
ID: 022,'switch off voltage @ 24V','mV'
ID: 023,'switch off current @ 24V','mA'
ID: 047,'battery protection @ 24V','mV'
ID: 075,'charge voltage (hybrid) @ 24V','mV'
ID: 045,'full charge duration','min'
ID: 017,'reaction time','s'
ID: 049,'maximum output time','h'
ID: 024,'altitude up to','m'
```

Response (LiFePO4):

```
ID: 025,'switch on voltage @ 12V','mV'
ID: 026,'switch off voltage @ 12V','mV'
ID: 027,'switch off current @ 12V','mA'
ID: 048,'battery protection @ 12V','mV'
ID: 076,'charge voltage (hybrid) @ 12V','mV'
ID: 078,'switch on voltage @ 24V','mV'
ID: 079,'switch off voltage @ 24V','mV'
ID: 080,'switch off current @ 12V','mA'
ID: 081,'battery protection @ 24V','mV'
ID: 082,'charge voltage (hybrid) @ 24V','mV'
ID: 045,'full charge duration','min'
ID: 017,'reaction time','s'
ID: 077,'maximum output time','h'
ID: 024,'altitude up to','m'
```

The parameters in detail (example: ID 018):

GET LIST	Lists all variable parameters of the fuel cell.
GET 018:VAL or GET 018	Displays the current value of the parameter 'switch on voltage @ 12V' in mV.
GET 018:STD	Displays the standard value of the parameter 'switch on voltage @ 12V' in mV

GET 018:MIN	Displays the minimum value of the parameter 'switch on voltage @ 12V' in mV.
GET 018:MAX	Displays the maximum value of the parameter 'switch on voltage @ 12V' in mV.

Command: ERROR

SFC>ERROR

Description:

Shows the ten most recent errors in chronological order, starting with the latest error.

Response:

```
Nr    42 Err 184 Wert 0 Ubat 12.0V Ust 11.8V Iaus -0.1A Ist 0.0A Tst 70C Tint 27
C Twt 55C FuellSt 72 StBtrb  92h SysTime 2010-09-14 09:15:00
Nr    41 Err 184 Wert 0 Ubat 11.8V Ust 12.6V Iaus -0.1A Ist 0.0A Tst 71C Tint 27
C Twt 66C FuellSt 75 StBtrb  75h SysTime 2010-09-13 15:57:02
Nr    40 Err 184 Wert 0 Ubat 12.2V Ust 11.8V Iaus -0.1A Ist 0.0A Tst 73C Tint 29
C Twt 51C FuellSt 74 StBtrb  71h SysTime 2010-09-10 14:46:10
Nr    39 Err 141 Wert 2 Ubat 13.1V Ust 11.1V Iaus 7.1A Ist 10.0A Tst 75C Tint 41
C Twt 68C FuellSt 57 StBtrb  71h SysTime 2010-09-10 14:17:06
Nr    38 Err 184 Wert 0 Ubat 11.7V Ust 11.7V Iaus -0.1A Ist 0.0A Tst 68C Tint 28
C Twt 50C FuellSt 88 StBtrb  69h SysTime 2010-09-10 13:03:40
Nr    37 Err 184 Wert 0 Ubat 11.8V Ust 11.7V Iaus -0.1A Ist 0.0A Tst 76C Tint 28
C Twt 51C FuellSt 73 StBtrb  69h SysTime 2010-09-10 12:09:38
Nr    36 Err 184 Wert 0 Ubat 11.8V Ust 11.8V Iaus -0.1A Ist 0.0A Tst 75C Tint 29
C Twt 55C FuellSt 90 StBtrb  69h SysTime 2010-09-10 11:53:06
Nr    35 Err 184 Wert 0 Ubat 11.8V Ust 12.5V Iaus -0.1A Ist 0.0A Tst 73C Tint 28
C Twt 48C FuellSt 80 StBtrb  68h SysTime 2010-09-10 11:11:44
Nr    34 Err 184 Wert 0 Ubat 11.8V Ust 12.5V Iaus -0.1A Ist 0.0A Tst 71C Tint 28
C Twt 48C FuellSt 71 StBtrb  68h SysTime 2010-09-10 11:02:34
Nr    33 Err 184 Wert 0 Ubat 11.9V Ust 12.0V Iaus -0.1A Ist 0.0A Tst 72C Tint 28
C Twt 52C FuellSt 70 StBtrb  68h SysTime 2010-09-10 10:59:36
SFC>
```

Value specification	Description
Nr	Sequential error number
Err	Error code
Wert	Error value
Ubat	Battery voltage
Ust	Stack voltage
Iaus	Output current
Ist	Stack current
Tst	Stack temperature
Twt	Heat exchanger temperature
FuellSt	Filling level intermediate tank
StBtrb	Stack operating hours
SysTime	System time

Command: HYBRID

```
SFC>HYBRID [ [ " ]Parameter[ " ] ]
```

Description:

Switch the device from automatic into hybrid mode for 15s. If the fuel cell is not in operation mode „automatic“ (e.g. On, Off, Error) this command has no effect. The command has to be triggered continuously to keep the fuel cell in the hybrid mode.

Possible transmission parameter:

A transmission parameter is optional; it is displayed in the operating panel display in the first line. If there are spaces in the text, the text must be typed in quotation marks.

Example:

```
SFC>HYBRID "Solar Hybrid"
```

or

```
SFC>HYBRID SolarHybrid
```

Response:

Same as [Command SFC](#).

Command: LANGUAGE

SFC>LANGUAGE <Parameter>

Description:

Changes the language on the operating panel or displays the language currently selected.

Possible transmission parameter:

Parameter	Description
SHOW	Shows all available languages
<Language>	Sets the selected language
<no parameter>	Displays the actual language

Response:

Response	Description
OK	Language accepted and adopted
DEUTSCH (Deutsch) ENGLISH (English) ITALIANO (Italiano) ESPAÑOL (Español) FRANCAIS (Français) NEDERLANDS (Nederlands)	List of all available languages after SHOW
<Language>	Displays the actual language in operating panel
no valid parameter	No valid parameter entered

Command: LOCKED

SFC>LOCKED <Parameter>

Description:

Changes or indicates the current status of the software lock. In factory settings the software lock is active, so the fuel cell is prevented against external signals like remote, hybrid or cluster controller. If there is a signal during active software lock, a lock symbol is displayed in the operating panel display in the bottom right. If the software lock is deactivated, an open lock is displayed. If there is a signal of a cluster controller, a cluster symbol is displayed.

Possible transmission parameter:

Parameter	Description
<no parameter>	Shows actual setting
ON	Activates software lock
OFF	Deactivates software lock

Response:

Response	Description
ON	Software lock is active
OFF	Software lock is not active
OK	Parameter accepted and executed
no valid parameter	No valid parameter entered

Command: MODBUS

FW 17.09: New command

SFC>MODBUS <Parameter>

Description:

Changes communication protocol to MODBUS RTU. WARNING! If MODBUS RTU communication is activated, the communication via HyperTerminal is blocked until the protocol is set back to SIO / clear text.

Possible transmission parameter:

Parameter	Description
ON	Activates MODBUS RTU communication

SFC> MODBUS ON

-No respond, protocol changed to MODBUS RTU-

Command: MODBUS ADDRESS

SFC>MODBUS ADDRESS <Parameter>

Description:

Set an address for the EFOY Pro unit before implementation into a RS 485 network. Addresses between 1 and 247 can be set.

Possible transmission parameter:

Parameter	Description
MODBUS ADDRESS	Shows possible addresses (1 - 247)
MODBUS ADDRESS ?	Shows possible addresses (1 - 247)
MODBUS ADDRESS #	Sets address to value # (# = 1 - 247)

Example:

```
SFC> MODBUS ADDRESS
MODBUS ADDRESS [1 - 247]
SFC>
```

```
SFC> MODBUS ADDRESS ?
MODBUS ADDRESS [1 - 247]
SFC>
```

```
SFC> MODBUS ADDRESS 32
32
SFC>
```

Command: MODBUS CONFIG

SFC>MODBUS CONFIG <Parameter>

Description:

Shows and changes settings of MODBUS configuration like parity and stop bits.

Possible transmission parameter:

Parameter	Description
MODBUS CONFIG	Shows actual configuration
MODBUS CONFIG ?	Shows possible configurations
MODBUS CONFIG #	Choose setting to # (# = 1, 2, 3, 4)

#	Text output	Description
1	9600 8,E,1	Baud rate: 9600, Data bits: 8, Even parity, Stop bits: 1
2	9600 8,O,1	Baud rate: 9600, Data bits: 8, Odd parity, Stop bits: 1
3	9600 8,N,2	Baud rate: 9600, Data bits: 8, No parity, Stop bits: 2
4	9600 8,N,1	Baud rate: 9600, Data bits: 8, No parity, Stop bits: 1

Example:

```
SFC> MODBUS CONFIG
1: 9600 8,E,1
SFC>
```

```
SFC> MODBUS CONFIG ?
-> 1: 9600 8,E,1 (Baud rate: 9600, Data bits: 8, Even parity, Stop bits: 1)
2: 9600 8,O,1 (Baud rate: 9600, Data bits: 8, Odd parity, Stop bits: 1)
3: 9600 8,N,2 (Baud rate: 9600, Data bits: 8, No parity, Stop bits: 2)
4: 9600 8,N,1 (Baud rate: 9600, Data bits: 8, No parity, Stop bits: 1)
SFC>
```

```
SFC> MODBUS CONFIG 2
2: 9600 8,O,1
SFC>
```

Command: REMOTE

SFC>REMOTE <Parameter>

Description:

This command is an alternative for a remote on signal of an external control. A virtual remote on signal is set via the serial interface. The fuel cells reaction is similar.

Possible transmission parameter:

Parameter	Description
<no parameter>	Shows actual setting
ON	Activates virtual remote on signal
OFF	Deactivates virtual remote on signal

Response:

Response	Description
ON	virtual remote on signal is active
OFF	virtual remote on signal is not active
OK	Parameter accepted and executed
no valid parameter	No valid parameter entered

Command: RESET

SFC>RESET

Description:

This command executes a system reset. The system data are saved before the reset.

Response:

None because of system reset

Command: SERIAL

SFC>SERIAL

Description:

Displays system- and stack number of the fuel cell.

Example response:

```
SFC>serial
EFOY : 281301-1305-12345
stack: 151010052-12345678
SFC>
```

Command: SET

```
SFC>SET id:value|MIN|MAX|STD
```

Description:

Changes values of variable parameters. With this command the same values can be changed as with commands CONFIG and DEFAULT. A list of the variable parameters can be viewed with command GET.

Response:

```
SFC>SET 018:12100  
12100  
SFC>SET 018:STD  
12300  
SFC>
```

Variable parameters (Example: ID 018):

SET 018:x	Sets the parameter 'switch on voltage @ 12V' to x mV.
SET 018:STD	Sets the parameter 'switch on voltage @ 12V' to the standard value.
SET 018:MIN	Sets the parameter 'switch on voltage @ 12V' to the feasible minimum value.
SET 018:MAX	Sets the parameter 'switch on voltage @ 12V' to the feasible maximum value.

Command: SFC

SFC>SFC

Description:

Permits monitoring of the current operating status by displaying the various parameters.

Response:

```
battery voltage 13.36V
output current -0.03A
operation time (charge mode) 14.6h
operating state: auto off
operating mode: auto
cumulative output energy 1548.1Wh
no error
cartridge level above sensor or no sensor (cartridge 1 consumed 0.5871)
Note: Supply problem at fuel connector #1.1 #1.2 Please check fuel connector. If this
problem occurs again please contact your service partner.
```

Response	Text output	Description
battery voltage	XX.XXV	Actual battery voltage
output current	X.XXA	Actual output current or rather power consumption of the fuel cell.
operation time (charge mode)	XXXX.Xh	Operating stack hours
operating state:	error	Error
	remote on	Remote on signal activated
	remote off	No remote on signal and fuel cell in hybrid mode
	auto on	Auto on operation
	slave on	Slave operation (only with Cluster Controller)
	on	On operation
	freeze protection	Freeze protection mode
	shut down	Shut down process
	off	Fuel cell off
	auto off	Fuel cell in automatic mode, but not charging.
operating mode:	battery protection	Fuel cell OFF, deep discharge protection active
	on	Userstatemachine in 1
	off	Userstatemachine in 0
	auto	Userstatemachine in automatic mode
cumulative output energy	hybrid	Userstatemachine in hybrid mode
<Errormessage> no error	Shows energy output in operated hours	Shows actual error message, which is displayed on the operating panel. If there is no error, „no error“ is shown.

cartridge level	below sensor	Cartridge level is below sensor (only with fuel cartridge sensor FS1)
	above sensor or no sensor	Cartridge level is above sensor (only with fuel cartridge sensor FS1)
	(cartridge x consumed y.yyyl)	Activated fuel cartridge and calculated methanol consumption.
<Warning> no warning	Shows actual warning messages. If there is no warning, „no warning“ is shown.	
Note: <Warning>	<p>Following warning messages can appear:</p> <ul style="list-style-type: none"> - Note: Cooling insufficient. Please check installation and air supply The output power of the EFOY Pro is reduced during high temperature, Please verify the installation paying attention to the cooling air supply. - Note: Supply problem at fuel connector X.Y Please check fuel connector. If this problem occurs again please contact your service partner. If one or several fuel connectors have a problem drawing methanol from the fuel cartridges this message will occur. The EFOY Pro continues to operate using the remaining intact fuel connectors. - Note: Firmware out of date! Please update the firmware! This note is only a reminder to check, if there is a new firmware available. The fuel cell will operate without any problem. Only with FW 17.07. 	

Command: STDVALUE

SFC> STDVALUE

Description:

Displays the standard default settings of all operating parameters on the terminal interface but does not set them for actual operation.

Response (Lead-acid, lead-gel, AGM):

```
switch on voltage @ 12V: 12.3V
switch off voltage @ 12V: 14.2V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.2V
charge voltage (hybrid) @ 12V: 14.7V
switch on voltage @ 24V: 24.6V
switch off voltage @ 24V: 28.4V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.4V
charge voltage (hybrid) @ 24V: 29.4V
full charge duration: 180.0min
reaction time: 60.0s
maximum output time: 24.0h
altitude up to: 1500.0m
```

Response (LiFePO4):

```
switch on voltage @ 12V: 12.6V
switch off voltage @ 12V: 14.5V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.0V
charge voltage (hybrid) @ 12V: 14.6V
switch on voltage @ 24V: 25.2V
switch off voltage @ 24V: 29.0V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.0V
charge voltage (hybrid) @ 24V: 29.2V
full charge duration: 180.0min
reaction time: 60.0s
maximum output time: 48.0h
altitude up to: 1500.0m
```

Variable parameters:

switch on voltage:	Fuel cell starts at this battery voltage
switch off voltage:	Fuel cell turns off at this battery voltage (charge end voltage)
switch off current:	Fuel cell will shut off once current dips below this level.
charge voltage (hybrid):	Max. battery voltage in Hybrid mode
reaction time	Time to elapse while the battery voltage is below switch on voltage.

maximum output time	If the switch-off criteria, voltage and current, have not been satisfied, the EFOY unit will shut off after generating the number of hours.
altitude up to	Maximum altitude to installation
full charge duration	An additional switch-off criteria for the EFOY unit when the switch-off current won't be achieved in adjusted time
battery protection	Switch on voltage for deep discharge protection in operation mode OFF.

Command: VALUE

SFC> VALUE

Description:

Displays the current set of operating parameters without modifying them.

Response (Lead-acid, lead-gel, AGM):

```
switch on voltage @ 12V: 12.3V
switch off voltage @ 12V: 14.2V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.2V
charge voltage (hybrid) @ 12V: 14.7V
switch on voltage @ 24V: 24.6V
switch off voltage @ 24V: 28.4V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.4V
charge voltage (hybrid) @ 24V: 29.4V
full charge duration: 180.0min
reaction time: 60.0s
maximum output time: 24.0h
altitude up to: 1500.0m
SFC>
```

Response (LiFePO4):

```
switch on voltage @ 12V: 12.6V
switch off voltage @ 12V: 14.5V
switch off current @ 12V: 4.0A
battery protection @ 12V: 11.0V
charge voltage (hybrid) @ 12V: 14.6V
switch on voltage @ 24V: 25.2V
switch off voltage @ 24V: 29.0V
switch off current @ 24V: 2.0A
battery protection @ 24V: 22.0V
charge voltage (hybrid) @ 24V: 29.2V
full charge duration: 180.0min
reaction time: 60.0s
maximum output time: 48.0h
altitude up to: 1500.0m
SFC>
```

Variable parameters:

switch on voltage:	Fuel cell starts at this battery voltage
switch off voltage:	Fuel cell turns off at this battery voltage (charge end voltage)
switch off current:	Fuel cell will shut off once current dips below this level.
charge voltage (hybrid):	Max. battery voltage in Hybrid mode
reaction time	Time to elapse while the battery voltage is below switch on voltage.

maximum output time	If the switch-off criteria, voltage and current, have not been satisfied, the EFOY unit will shut off after generating the number of hours.
altitude up to	Maximum altitude to installation
full charge duration	An additional switch-off criteria for the EFOY unit when the switch-off current won't be achieved in adjusted time
battery protection below	Switch on voltage for deep discharge protection in operation mode OFF.

Command: VER

SFC>VER

Description:

Indicates the firmware version, firmware date

Response (after successful system configuration):

```
Firmware EFOY Pro 2400 Duo [E-|P-]iV13 17.06I12V/24V QB (90%) date 2012-11-11
SFC>
```

Response (without successful system configuration):

```
Firmware EFOY [E-|P-] 17.06 date 2012-11-11
SFC>
```
