EPS/HC Power Supplies and

control units with large graphic display

Overview of the programmable functions

Table of possible combinations

Content:

1   General

All functions described in this document are additional functions. That means they can be ordered together with the power supply, or be unlocked at a later time by purchasing and entering a special code supplied by the manufacturer.

Note:

Some additional functions like serial communication (RS-485), chopper timer, external set values require special hardware equipment. It is NOT possible to retrofit the chopper timer function to an existing Power Supply!

Not all combinations of functions are possible. It is also not possible to activate all functions at the same time.

For more information about the activation of additional functions, please do not hesitate to contact our sales team.

2   Ah counter

The Ah counter is unlocked as a standard function by the manufacturer. For control units with more than four additional functions or control units with Multi timer the Ah counter can be inapplicable.

Standard functions:

The Ah counter adds the emitted electric current and shows it in real time.

The units Ah, Amin and Asec are selectable. It is also possible to reset the counter reading to zero.

A total of 6 digits are available. When selecting a decimal point, the number is decreased by one digit since the decimal point itself needs one digit. Up to three digits before and two digits after the decimal point are selectable.

999999 => 9999.9 => 999.99 …

Two special units are available: - value in grams of silver
                                       - ten thousandth Ah

The forward and reverse current in Power Supplies with integrated pole changer will be added as a standard function.

3 Preset counter

<u>Standard function:</u>

This function allows to set a certain electric charge emit. If the preset current flow has been reached, the power supply can be switched off automatically and/or an acoustic alarm signal can sound. Additionally it is possible to activate a static relay output. This output has to be reset manually by pressing a certain key.

The desired direction of counting is selectable: down (downwards, preset value to zero) and up (upwards, zero to a preset value)

The units Ah, Amin and Asec are selectable. It is possible to reset the counter reading to zero.

A total of 6 digits are available. When selecting a decimal point, the number is decreased by one digit since the decimal point itself needs one digit. Up to three digits before and two digits after the decimal point are selectable.

999999 => 9999.9 => 999.99 …

Two special units are available: - value in grams of silver
                                       - ten thousandth Ah

The forward and reverse current in Power Supplies with integrated pole changer will be added as a standard function.

4   <u>Dosage impulse counter</u>

<u>Standard function:</u>

The Dosage impulse counter allows to set a certain electric charge emit cycle. If the certain electric charge emit cycle is reached it is possible to give out a relay output impulse (potential free contact) every time the value is reached.

The duration for the relay output impulse is free configurable.

The desired direction of counting is selectable: down (downwards, preset value to zero) and up (upwards, zero to preset value)

The units Ah, Amin and Asec are selectable. It is possible to reset the counter reading to zero.

A total of 6 digits are available. When selecting a decimal point, the number is decreased by one digit since the decimal point itself needs one digit. Up to three digits before and two digits after the decimal point are selectable.

999999 => 9999.9 => 999.99 …

Two special units are available: - value in grams of silver
                                             - ten thousandth Ah

The forward and reverse current in Power Supplies with integrated pole changer will be added as a standard function.

5   <u>Output power display</u>

The output power display shows the actual output power in Watts.
Up to three decimal digits will be displayed (floating point, automatic arithmetic shift / not configurable)

The output power display can be activated without an unlock code.
(Menu >> Additional settings)

6   Overload detection

The overload detection recognizes a short at the DC output within a few milliseconds.

Settings:

Voltage drop in % (from nominal value) within a certain time (50ms)

Once detected, the power supply is switched off immediately.

It is not possible to show the overload detection as a function in the operating display.
Once detected, a warning message will appear in the display.

7   Timer

Standard function:

Maximum possible time: 99 hours 59 minutes 59 seconds

This timer function allows to set a certain total time. If the set time is up, the power supply can be switched off automatically and/or an acoustic alarm signal can sound.

The counting direction is selectable: down (downwards, preset value to zero) and up (upwards, zero to preset value)
The timer is resettable to zero.

Advanced function:

This function allows to program two timers that are running one after the other. They can be used e.g. to switch between two different current and voltage set values.
Additional to this timer function a "cut off current", 0 to 100% of the set set point can be set

The start of the timer can also depend on the ramp characteristic:
The timer starts after a start ramp is finished respectively after having reached a certain set voltage.

8   Ramp function

Standard function:

Current or voltage ramps are possible.

Two types of ramps are configurable, the start ramp (at the beginning upwards) and the stop ramp (at the end of the process down to 0).
A runtime is to be specified for each ramp which defines the gradient of the ramps.
For both types it's possible to set a start value (**from**), an end value (**to**) and the duration time for the desired ramp.
That means: The ramp runs **from** the start value **to** the end value within the set time.

Time range for every ramp: 1 to 9999 seconds.

The display shows if a ramp is active or not and which one.

The start ramp begins by pressing the ON-key (it's possible to skip the start ramp by pressing the ON-key a second time) and the stop ramp begins by pressing the OFF-key (it's also possible to skip the stop ramp by pressing the OFF-key a second time).

The ramp function allows also to configure a cut off current at the end of the process (after stop ramp). This cut off current is freely definable.

If an additional timer is activated, the timer starts right after the elapsed or skipped start ramp. If the timer is up and the rectifier stop has been configured, the timer will then activate the stop ramp.

9   Multi timer / Programs / DC-Steps

Standard-function:

The Multi timer allows to program a complex current or voltage characteristic by setting up to fourteen (14) nodal points. The runtime from node to node is freely definable from 500 milliseconds up to 595 hours – 59 minutes – 999 milliseconds.

It is possible to save three different characteristics (Program 1, Program 2, Program 3) which can be recalled by function keys.

The display shows the step number, balance time of the actual step and the complete balance time.

Since this function needs nearly the complete display, it is possible that other active functions cannot be displayed at the same time.

Advanced function:

It is possible to preset custom configurations (Infinite loop, Selective cleaning ,Color scheme, etc.).

10   Current or voltage monitoring

Standard function:

The current or voltage monitoring will be set by a reference value. Both will be monitored up to this reference value.

Two tolerance ranges must be set: Warning and alarm.
(Adjusting range for both: 0 to 100% of reference value)

As soon as one value is beyond the limit, a relay is activated together with an audible alarm (both configurable)

Configurable actions: Relay output, audible alarm, security rectifier shutoff.

Advanced function:

Quick setting: Press a key to quickly overtake the actual output value as the reference value.

11 Pole changer

Standard function:

The signal to change polarity is triggered by a potential free miniature relay contact.

Changing polarity can also be done manually (keypress) or automatically using programmable timers for positive (anode) and negative (cathode) polarity.

The actual polarity is monitored in the display.

Advanced function:

different types of pole changers can be configured:

- motor driven (mechanical) pole changer; Blocking control (to disable the Power Supply while the pole changer is in action) and voltage measurement at the DC output

- motor driven, (all features as described above) but additional sense of both end switches of the pole changer.

- electronic pole changer without current interruption while the pole changer is in action (up to 300A DC)

For mechanical pole changers only: The pole changer will get into action only when the voltage on the bus bars has dropped below 2V. This is to avoid arcs that may damage the pole changer's contacts when in action under load. That means, although the pole changer has been triggered, it waits until the pole changer contacts are almost voltage free.

The external pole changer (contactor / motor pole changer) can also be controlled by an active 24V-DC signal from the control unit.

12   <u>External control via analog signals</u>

<u>Standard function:</u>

The control of the Power Supply can be switched from internal control to external control.
In external control, the values for current and voltage must be set using the analog signal input clamps. The arrow keys of the internal control panel are deactivated in external mode.

The standard analog input signals are 0V…10V for 0…100% of the current and 0…100% of the voltage. To switch on, a potential free contact must be used.

The read back values for current and voltage are always present at the analog output terminal clamps regardless if set to internal or external mode. The standard values are 0V…10V for current and voltage.

<u>Advanced function:</u>

The external values, inputs as well as outputs (read back) can optionally be galvanic isolated (electrically separated) by an integrated isolation amplifier. The isolation amplifier is also available with converted signals (e.g. from 0V - 10V signals to 4mA - 20mA, etc.).

Automatic switch to constant current operation when in external mode is possible.

If the serial communication function (RS-485) and the external control function are both activated, both functions will be blocked against each other. It is either controlled by RS-485 or external values.

13   External control via BUS (serial communication RS-485)

Standard function:

The control can be switched by keypress to serial communication control
(auto mode (RS-485)). The input of all set values by keys and menus are
disabled. All values of voltage and current and other functions are
controlled by the serial communication.

The communication telegram transmits all set values, actual values,
statuses, warnings and alarms.

The RS-485 serial communication can be connected by a SUB-D
connector (9 pin), by a 16 pin connector with terminal clamps or by a
round 4 pin connector.

Advanced function:

It is possible to additionally mount a PROFIBUS$^{®}$ interface.

Option:
Control of the rectifier/control unit by 485-RB (BUS) connected with a
network cable (CAT. 5) with RJ45 plug. It is possible to control up to 15
rectifiers using a 485-RB gateway via external control or PROFIBUS$^{®}$.

If the serial communication function (RS-485) and the external control
function are both activated, both functions will be blocked against each
other. It is either controlled by RS-485 or external values.

14 <u>Chopper timer</u>

<u>Standard function:</u>

The chopper timer function allows to let the rectifier work similar to a
Pulse-Power-Supply with certain limitations.

- frequency 0…50Hz, controlled by current set values

- a 50Hz capable pulse Power Supply is necessary

- only pulse pause function possible (no negative pulse)

The menu allows settings for the pulse and pulse pause times. The current
value is controlled (value ON / value OFF).

If the chopper timer is controlled by serial communication it is possible to
set a current value for the pause time (offset pulse, current can be >0).

The time range for the ON and OFF time is free and independent from
each other definable within 10ms up to 999.99 seconds.

The display shows the actual balance time of the active pulse or pause.

As an optional possibility the chopper timer can be used with standard
rectifiers with 0.5Hz.
The adjustable time range for the ON and OFF time will then be 1000
milliseconds up to 999.99 seconds.

<u>Note:</u> The Power Supply itself cannot be retrofit with 50Hz pulse capability!

15 External ON, External release

External ON:

Standard function:

If the external ON function is activated the rectifier has to be switched on by closing a potential free contact (tank switch, security switch). If this contact is opened while the rectifier is running it will be switched off immediately .

During the external ON function is activated the ON key is deactivated. Only the OFF key is still activated to switch of manually. The external ON function works similar to the external release function, see below.

This function cannot be combined with the external release function.

External release:

Standard function:

If the external release function is activated, it is indispensable that a potential free contact (tank switch, security switch) is closed to switch on the rectifier by the normal ON key. If this contact will be opened while the rectifier is in operation, it will be switched off immediately .

This function cannot be combined with the external ON function, see above.

If the serial communication function (RS-485) and one of the external control function are both activated, both functions will be blocked against each other. It is either controlled by RS-485 or external values.

16 Two switch OFF levels

The switch OFF function for the rectifier uses two different varieties (only valid for rectifiers with blocking function).

1. Level: BLOCKING

2. Level: OFF

Press the OFF key one time: BLOCKING active, DC output disabled.

The red LED in the OFF key is flashing and the electronic of the rectifier is still switched on (standby only) for a fast restart.

To switch off the rectifier electronic:
Press OFF key a second time:

The red LED in the OFF key is constantly illuminated.

1 x OFF: DC Output deactivated via BLOCKING function

2 x OFF: Rectifier electronic is switched off.

17 Display configuration

There are two available display languages: English and German.

The Display is able to picture up to six additional functions to the normal current and voltage display.

The display configuration allows to picture the unlocked functions, vary their order and separator.

18 Quick menu

The quick menu enables a fast access to important parameters of the additional functions without calling up the settings menu.

The quick menu is limited to four functions due to the four "F" keys used for this function.

19 Unlock functions

All listed functions above are additional functions. These functions can be initially purchased together with the power supply or later by a purchasable release code.

Note:

Some additional functions (serial communication(RS-485), chopper timer, external set values) may require a special hardware equipment.

Not all combinations of functions are possible. It is also not possible to activate all functions at the same time.

For more information about the activation of additional functions, please do not hesitate to contact our sales team.

20 Table of combination

Table of possible combinations

	Ah-counter	Preset-counter	Dosage-pulse-counter	Timer	Ramp	Multi timer	I / U-monitoring	Pole changer	External set values	External ON	External release	Chopper timer	Output power display	Overload detection
Ah-counter		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Preset-counter	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dosage-pulse-counter	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Timer	✓	✓	✓		✓	X	✓	✓	✓	✓	✓	✓	✓	✓
Ramp	✓	✓	✓	✓		X	✓ 2)	X	X	✓	✓	X	✓	✓
Multi timer	✓	✓	✓	X	X		X	✓	X	✓	✓	X	✓	(✓)
I / U-monitoring	✓	✓	✓	✓	✓ 2)	X		X	✓	✓	✓	X	✓	✓
Pole changer	✓	✓	✓	✓	X	✓	X		✓	(4)	✓	X	✓	✓
External set values	✓	✓	✓	✓	X	X	✓	✓		✓	✓	X	✓	✓
External ON	✓	✓	✓	✓	✓	✓	✓	(4)	✓		X	✓	✓	✓
External release	✓	✓	✓	✓	✓	✓	✓	✓	✓	X		✓	✓	✓
Chopper timer	✓	✓	✓	✓	X	X	X	X	X	✓	✓		✓	✓
Output power display	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Overload detection	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	

The pole changer function can be combined with the multi timer function in electronic version only.

✓ = Combination available

(✓) = Combination is under consideration

X = Combination not available

1) = only for internal set values
2) = monitoring is deactivated when ramping
3) = not in serial communication mode
4) = without end switches only

For the control via RS485-BUS, RS485-RB or PROFIBUS® it is essential that:

Once the control is switched to auto mode, the listed functions in the table are deactivated, also the switch ON and OFF function by keypad. The Ah-counter and the preset-counter shows the actual values in the display in auto and manual mode. If the control is switched back to manual mode, the functions and combinations are available as shown in the table.

<u>Please note:</u>

From version 09_026 (1009-03-16) the RS485-RB function is possible together with the multitimer (DC steps), for one single device in BUS mode.

21 Table of combination groups

Examples:

Ah counter
Preset counter
Dosage impulse counter
Timer
Ramp

Ah counter
Preset counter
Dosage impulse counter
Timer
Chopper timer

Ah counter
Preset counter
Ramp
Serial communication (RS-485)

Ah counter
Preset counter
Timer
Pole changer

Ah counter
Preset counter
Timer
Ramp
Voltage monitoring (deactivated by ramp function)

Ah counter
Preset counter
Pole changer
Serial communication (RS-485)

Multi timer
Pole changer
Serial communication (RS-485)

Ah counter
Preset counter
External set values + external ON function

Ah counter
Preset counter
Dosage impulse counter
Timer
I / U monitoring
External set values + external ON function

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