

MAVO-PDA

Power disturbance analysis through SW-Update for energy analyzer MAVOWATT® 45

3.348.770.03
2/7.96

The image shows a MAVOWATT 45 energy analyzer with several data displays overlaid on it. On the left is the physical device. In the center is a graph of a signal $x(t)$ over time t , showing a sinusoidal wave with a disturbance. On the right are three data windows:

- PDA oU1** (T 12:02:44): Shows a graph of u_1 with a peak value of 315.0 and a minimum of 213.4.
- PDA THDU1** (T 22:14:38): Shows a graph of u_1 with a peak value of 1.092 and a minimum of -1.090.
- PDA StatU** (S 22:11:29): A table showing statistics for U1, U2, and U3.
- PDA Event** (S 01:08:13): A table showing event logs for oI3, oI2, and oI1.

PDA StatU			
	U1	U2	U3
o	0	0	0
u	0	0	0
d	0	0	0

PDA Event			
	oI3	oI2	oI1
01:08:12	2,402		
01:08:12		2,388	
01:08:12			2,404
01:08:11	2,402		
01:08:11		2,388	
01:08:11			2,404
01:08:11	2,402		
01:08:11		2,388	
01:08:11			2,404
01:08:10	2,402		

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1 Installation

1.1 Allocation of a password prior to installation

With the use of a DOS PC, activate the MAVO-PDA option as follows:

- ⇒ Note the serial number of your unit, see label on the bottom of the case.
- ⇒ If the serial number on the label is not accessible or illegible, proceed as follows:
 - Connect the unit to the line voltage.
 - Switch the unit on. Note the LC display. The serial number is shown on the LC display under the company logo when the unit is initialized.
- ⇒ Enter the serial number in the attached registration card.
- ⇒ Return the filled-in registration card to the given address and/or fax number.
The password for the MAVO-PDA option which we enter in the registration card will then be forwarded to you.

1.2 Initial installation of the MAVO-PDA option

Transfer the actual equipment software from the disk inserted in the PC to the energy analyzer MAVOWATT 45 before you enter the password for the execution of the MAVO-PDA software. To do this, proceed as follows:

- ⇒ Disconnect the printer.
- ⇒ Connect the MAVOWATT 45 energy analyzer to the line without switching it on.
- ⇒ Connect the interface marked RS-232 to the serial port of your PC (e.g. COM1) via the interface cable included with the supply.
- ⇒ Switch the energy analyzer on.
- ⇒ After initializing, set the switch to L1.
- ⇒ Insert the disk included with the supply into the disk drive of your PC.
- ⇒ Change to the drive in which the program disk is inserted.



Note

Start the program from the DOS level!

- ⇒ Start the transfer of the program from the PC with **LOAD <Enter>**

The progress of the initializing routine is shown on the screen of the PC by ; ; ; ; ; ; . The transfer of the program is shown on the screen by continuous dots (.) on several lines. When the transfer is ended, the cursor rests at the prompt of the actual disk drive.

The energy analyzer is automatically restarted.

- ⇒ Set the switch on the energy analyzer to PDA.

Enabling the MAVO-PDA option

- ⇨ Start the recognition routine on the PC with the **PDAKEY <Enter>**. Shortly thereafter you are prompted to enter the password. It consists of a multidigit number, eventually with sign.
- ⇨ Enter the password made known to you. Press **<Enter>**.

After enable, the information "PDA-Option unlocked" appears on the monitor of your PC.

- ⇨ Switch the energy analyzer off.
- ⇨ Connect the printer in place of the interface cable.

After switching the energy analyzer on again, it is ready for operation.



Note

Future updates do not require to again enable the MAVO-PDA option.



Note

After the transfer, check the measuring and equipment parameters. They could have been changed because of the transfer!

Setting the measuring and equipment parameters after the transfer

When transferring the software to the MAVOWATT 45, equipment parameters and measuring parameters that cannot be correlated are set back to their basic values.

That is why we recommend to successively check the parameters after transfer and/or set them as follows:

1. Screen contrast

- ⇨ Switch the unit off.
- ⇨ Set the function switch to *MENU*.
- ⇨ Switch the unit on.

When the run of the start program is ended, the cursor automatically flashes at the first setting position for the contrast so that you can directly change it with the Δ or ∇ key.

- ⇨ Confirm the setting with *Enter*.

2. Equipment parameters

Contrast:	60 (see above for setting)
Language:	German
Time:	Actual CET
Date:	Actual date
System type:	2/4-wire
Tariff 1 from:	06:00 ↓: 0,000
Tariff 1 from:	06:00 ↑: 0,000
Tariff 2 from:	22:00 ↓: 0,000
Tariff 2 from:	22:00 ↑: 0,000
Tariff 3 from:	06:00 ↓: 0,000
Tariff 3 from:	06:00 ↑: 0,000

3. Measuring parameters

Switch positions L1, L2 and L3

Sample: 0001
Iratio: 1,000
Uratio: 1,000
Printer: off
Interval: 0001

Switch positions E and P

Period: 3600
Zconst.(4 - 6): 1,000
Sync.: Time
Pfset: 1,00
Printer: off
Delete: yes

Measured quantities at the corresponding switch position

SEL 1	SEL 2	SEL 3	SEL 4
U1	U1	U1	U1
U2			
U3			
I1			
I2			
I3			
f			

2 Applications

The major importance of a reliable supply from public utility systems requires special observation of the disturbances in supply systems caused by consumers. The load condition of the consumers connected to the electrical systems is not constant. High connection impedances in combination with large load changes cause changes of the essential characteristics of the supply voltage. They may bear a disturbing effect on both the function of electrical and electronic equipment (undervoltage and/or overvoltage) and the human perception (varying intensity of room illumination).

The standard DIN EN 50160 specifies the characteristics of the supply voltage in public utilities systems for low-voltage and medium-voltage systems at the service entrance to the customer. The standard DIN EN 61000 describes disturbances in supply systems caused by electrical facilities. The great number of the phenomena encountered requires both classification of the events and standardization of the evaluation methods. Some phenomena are hardly predictable in practice (transient events) so that, also in the standard, they are understood to be a criterion.

The analysis and evaluation methods employed in the MAVO-WATT 45 primarily aim at a complete monitoring and classification of the voltage and current fluctuations which occur under normal operating conditions within defined sampling intervals as well as their quantitative documentation. It contains characteristics allowing for an inference from disturbances in electrical supply systems and the reliability of the supply under normal operating conditions. The graphic display, however, is to be taken as information on the signal trend which can be observed when an event takes place.

To evaluate the influence of electrical facilities on their electromagnetic environment, both the phase voltages and the phase currents are recorded.

3 Description

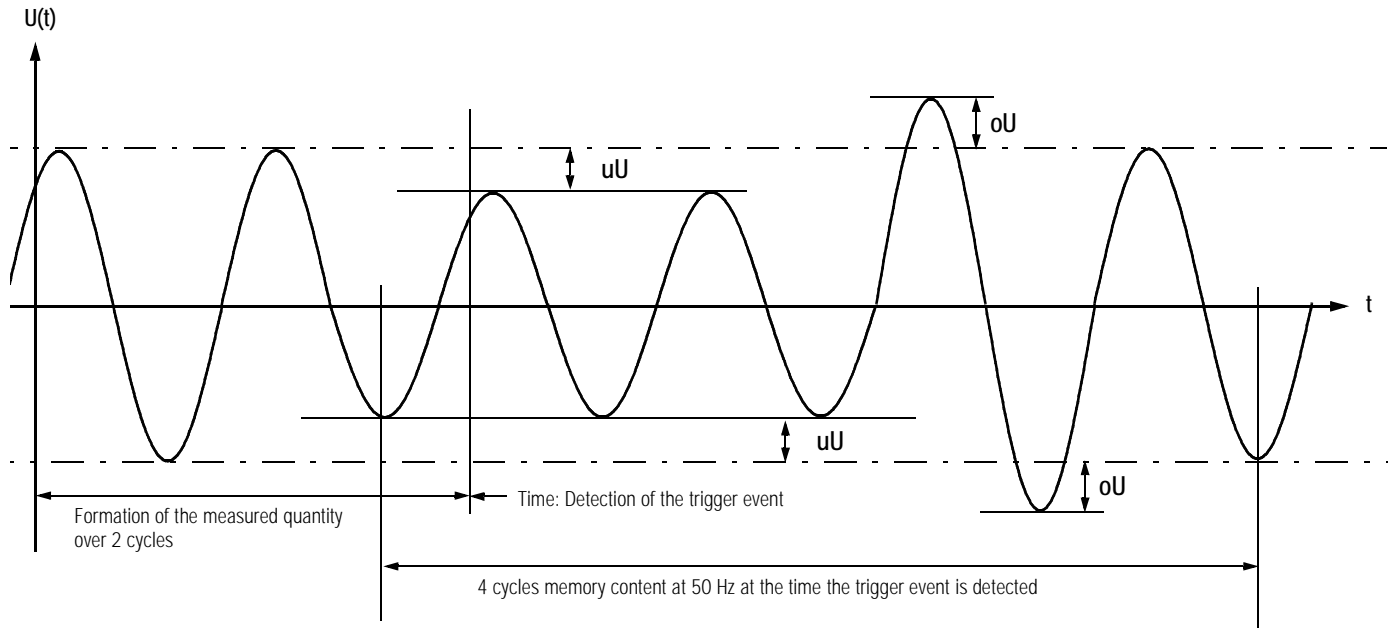
The signal to be analyzed is filtered across a low-pass filter to avoid alias effects. Analog-to-digital conversion is made with a fixed scanning frequency of 50 kHz per phase so that the MAVOWATT 45 can capture phenomena of a duration of 20 μ s and longer.

As measured quantity, the RMS value of current and voltage of each phase is formed over a selectable number of cycles (2, 4, 8 or 16 cycles). The trigger condition is derived from a comparison between the RMS value of the measured quantity and the set limits. If one of the limits exceeds the RMS value, the trigger condition is satisfied. The event is classified, correlated with the corresponding phase and shown on the LC display in the selected type of presentation.

Monitoring, classification and evaluation

As can be seen from the description, the time duration during which the trigger condition is detected is a function of the signal frequency and the selected number of cycles. That is why a comparison between measured value and limit is thus only possible after the RMS value has been formed that is, after at least 2 cycles. Thereafter, the signal change (voltage fluctuation and/or current fluctuation) is classified according to defined characteristics and evaluated according to the selected type of presentation. For a quantitative valuation – that is, the number of violations within the selected sampling interval – the violation is recorded, the memory is again immediately ready for further event detection (real-time evaluation).

The conditions for the graphic presentation of the signal trend are decisively defined by the fixed scanning frequency of 50 kHz and the memory depth of 4 kB. Upon detection of an event, the memory contents are held and shown on the LC display as trace for voltage and current. This presentation is held until the memory contents are overwritten by the next event.



There is a choice between different types for the presentation on the LC display. It depends upon the desired evaluation parameters. For the current sampling interval, the **voltage** and/or **current statistics** show the number of limit violations for each phase and separate according to the characteristic of the event. Evaluation is in real time. The **event table** shows time, characteristic of the trigger condition, phase and magnitude of the event the instant it occurs. That is why the event table permits a complete alphanumeric presentation of events. The above mentioned evaluations permit a quantitative valuation of the voltage and/or current fluctuations.

With the **graphic presentation** for current and voltage, the memory contents are held after detection of an event (similar to the function of a transient recorder). The LC display shows that phase in which the event occurred. The characteristic of the trigger condition is displayed on the top line in alphanumeric form. In roll mode, the memory contents (and thus the screen contents) are overwritten when the next event occurs. In single mode, the memory contents are held until the trigger is reset (Treset). It is only then that the next event can be captured and the memory contents overwritten. In this operating mode, it is also possible to display a time portion of the stored signal (zoom function).

With a PC card inserted, it is possible to store the events detected via the trigger criteria during the observation period. For evaluation, first select the desired type of presentation on the LC display. Then start storage via the menu PC-Card. A quantitative evaluation (voltage/current statistics) is made in real time. With event table and graphic recording, the condition for the recording of the next event is automatically restored after the end of a recording (roll mode). The data recorded on the PC card is automatically overwritten.

The printer serves to print the actual LC display (Print Screen). When the printer is switched on, events are printed out in tabular form as they occur. But an event can only be printed out when the previous event is completely printed out. With rapidly occurring events, documentation via the PC card is recommended.



Note

The MAVOWATT 45 has been designed in such a way that essential characteristics of the phenomena, such as described in the relevant literature and in the standards for voltage fluctuations in public electrical supply systems, can be recognized and captured.

3.1 Characteristics and valuation of the trigger conditions

3.1.1 Trigger conditions for voltage fluctuations

The trigger conditions are chosen in such a way that deviations from selected characteristics of the supply voltage, such as described by DIN EN 50 160, can be recognized.

- a) **Line frequency** of the supply voltage:
The measurement is made continuously. The measured and correspondingly valuated line frequency compared with the normal frequency makes a trigger criterion. When the measured frequency exceeds one of the set limits, the trigger condition is satisfied.
- b) **Voltage variations** (slow and fast):
The RMS value of the voltage is continuously measured and compared with the RMS value last determined. When the measured value exceeds the selected deviation band dU , the trigger condition is satisfied. Detection is without distinguishing between slow and fast voltage variations.



Note

To recognize slow voltage fluctuations, the DIN EN 50 160 standard specifies the calculation of a the 10-minute average. This method has been chosen in order to recognize the frequency of voltage fluctuations. This goes for a range which can be annoying to human perception and thus permits an inference from flicker.

- c) **Voltage sags** and short interruptions of the supply voltage:
The RMS value of the voltage is continuously measured and compared with a settable limit. Recognition is without discrimination between voltage sags and short interruptions of the supply voltage. The MAVOWATT 45 allows for the mentioned phenomena to be captured from a duration of 20 μ s.
- d) Temporary line-frequency and transient **overvoltages**:
Their appearance, caused by faults in the utility's supply system or within the customer's (user's) own facilities cannot be foreseen. In general, they last less than 1 s. The trigger condition is derived from a settable limit (RMS value). That is why the MAVOWATT 45 can be used to capture transients lasting longer than 20 recording of the signal shape, being 80 ms, is predetermined by the fixed scanning frequency of 50 kHz and the memory depth of 4 kB.
- e) **Voltage asymmetry**:
The instantaneous values of the three phase voltages are continuously measured and compared with each other. If the difference of a preselected percentage limit is exceeded, the trigger condition is satisfied.
- f) **Waveform** of the supply voltage:
Measurement and evaluation are made with the MAVOWATT 45 and the Z850B option "MAVO-FFT" with the switch set to FFT. For measurements made with the switch set to the PDA position, evaluation regarding the harmonics voltage can be made together with the quantitative evaluations of the power disturbance analysis via a PC software, provided the events are recorded on the PC card.

3.1.2 Summary of the trigger conditions for voltage fluctuations

Characteristic	Marking	Unit	Trigger condition ¹⁾
Magnitude of the supply voltage			
Overvoltage	oU	V	$U_{n,c} > 1,1 \cdot U_{n,c}$
Voltage sag	uU	V	$U_{n,c} < 0,9 \cdot U_{n,c}$
Fast voltage variations	dU	V	$1 \% < dU/U_{ist} < 10 \%$
Waveform	THDU	%	THD < 8 %
Symmetry of the three phase voltages	syU	%	$d(U1, U2, U3) < 3 \%$
Above limit frequency	ofU	Hz	$f \pm 1 \%$
Below limit frequency	ufU	Hz	$f \pm 1 \%$

3.1.3 Trigger conditions for current fluctuations

The measurement of currents occurring when motors are started and/or when electrical facilities are switched on is of special importance. Special attention is directed to current fluctuations of short duration, which show a settling action corresponding to the load variation. Eventual voltage fluctuations in the supply system caused by this are of little importance.

The measurement is made continuously. The magnitude of the measured and correspondingly valued current makes a trigger criterion. When the measured amplitude exceeds the set limit, the trigger criterion is satisfied, and the currents and voltages of all three phases are recorded on the PC card.



Note

Triggering on current fluctuations can be made simultaneously with the recognition of voltage fluctuations.

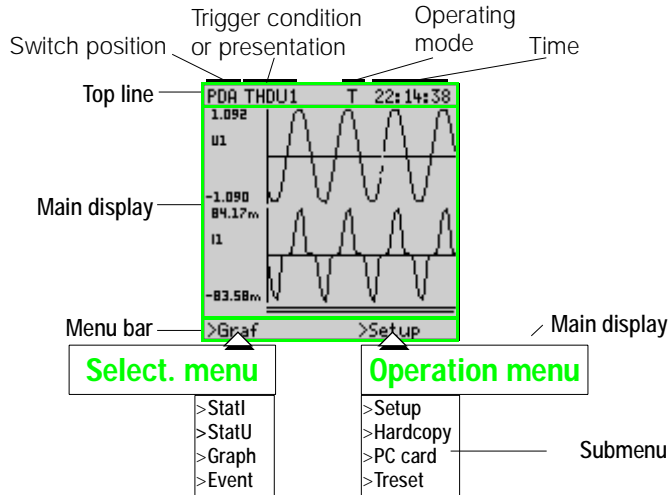
Characteristic	Marking	Unit
Magnitude of the current		
– Overcurrent	ol	A
– Undercurrent	ul	A
– Fast current fluctuations	dl	A
Waveform	THDI	%
Asymmetry of the current	syI	%

The trigger conditions depend upon the application

¹⁾ The given values and designations are taken from the DIN EN 50 160 standard (no responsibility taken)

4 Types of presentation with the switch set to the PDA position

4.1 Presentation of evaluations on the LC display



Event statistics for voltage and current (StatU, StatI)

PDA StatU	S	22:11:29	
	U1	U2	U3
o	0	0	0
u	0	0	0
d	0	0	0
THD	22	0	0
of	0	0	0
uf	0	0	0
>StatU		>Treset	

PDA StatI	S	22:11:50	
	I1	I2	I3
o	0	0	0
u	0	0	0
d	0	0	0
THD	0	0	0
sy	0	0	0
>StatI		>Treset	

The table event statistics lists the number of events per phase and trigger condition for the actual interval. See PC-Card mode for interval setting.

The events are correlated with the phases, classified and entered into the event statistics as counted value. When the interval limit is reached, the counter values are reset. In the new interval, counting starts anew.

The event statistics for all three phases is simultaneously shown on the LC display.

The counted values are recorded in real time.

Table of events (Event)

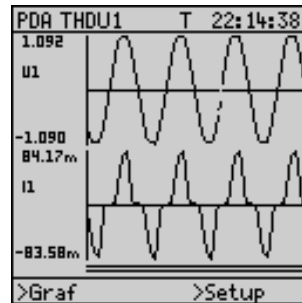
All events are shown in the order they are detected. The event is written out as long as the trigger condition is satisfied. Thus, the duration of an event can be defined. The evaluation time depends upon the number of cycles over which the RMS value is formed and upon the number of events occurring at the same time. With 16 cycles, evaluation is in real time. Together with the event statistics, a quantitative valuation of the voltage and/or current fluctuations is possible.

PDA Event	S	01:08:13
01:08:12	oI3	2,402
01:08:12	oI2	2,388
01:08:12	oI1	2,404
01:08:11	oI3	2,402
01:08:11	oI2	2,388
01:08:11	oI1	2,404
01:08:11	oI3	2,402
01:08:11	oI2	2,388
01:08:11	oI1	2,404
01:08:10	oI3	2,402

>Event >Setup

Wave presentation (Graph)

When an event occurs, the *Graf* display shows the waveform of voltage and current as t-Y diagram. In *roll* mode, the display is held until the next events occur and is then automatically overwritten. In single mode, the next event can be recorded and displayed after the trigger is reset (Treset). In *single* mode, it is also possible to zoom in on a section of the stored signal



The actual trigger condition is displayed at the left of the top line, here: THDU1.

5 Operation

5.1 General information

Prior to starting a signal analysis exceeding the internal possibilities of the power disturbance analysis, a PC card (option) is required. How to insert the PC card is described in the operating instructions of the mainframe (section 4.7.2).

5.2 Measuring connections



Note

For the presentation of the quantitative analysis values in real time, it is required to connect the voltage paths of all three phases (in parallel) even if a single-phase measurement is made. This ensures that the width of the window of the fundamental frequency corresponds to the phase to be tested.

See the operating instructions of the mainframe, section 5, for the connections.

The trigger conditions apply to all three phases. In the setup of the graphic presentation those phases for which the set trigger conditions are effective are chosen.

5.3 Selecting the presentation

PDA Event		S	01:08:13
01:08:12	oI3	2,402	
01:08:12	oI2	2,388	
01:08:12		2,404	
01:08:12		2,402	
01:08:12		2,388	
01:08:12		2,404	
01:08:11	oI3	2,402	
	I2	2,388	
	I1	2,404	
	I3	2,402	

Select. menu
Present. type

>Statl >Setup
>StatU
>Graph
>Event



Set the *rotary switch* to the PDA position. The LC display shows the event statistics for voltage.



Press the *M* key. The flashing cursor \triangleright moves to the selection menu type of presentation in the menu bar.



Select the desired type of presentation with the *cursor keys*.



Confirm the selection by pressing the *Enter* key. The LC display changes to the new type of presentation.

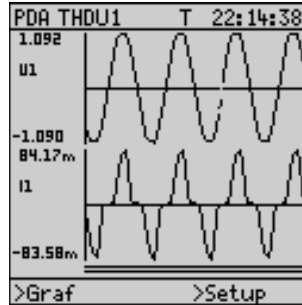
PDA StatU	S	22:11:29			
	U1	U2	U3		
o	0	0	0		
u	0	0	0		
d	0	0	0		
THD	22	0	0		
sy	0	0	0		
of	0	0	0		
uf	0	0	0		
>StatU	>Treset				

5.3.1 Secting roll mode, single mode and zoom function in the graphic presentation

M In *Graf* mode, press the the M key twice. The flashing cursor moves to the menu for mode selection.

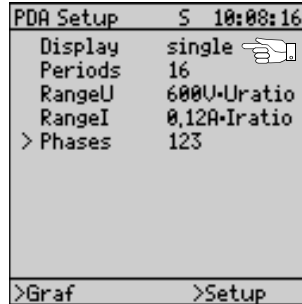
Δ∇ Select *setup* mode, using the cursor keys.

↵ Confirm the *setup* mode by briefly pressing the *Enter* key. The LC display moves to the *setup* presentation.



Δ∇ In the setup menu, select the *display* parameter and the setting *roll* and/or *single*.

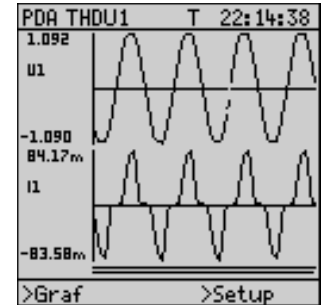
↵ Confirm the *roll* and/or *single* setting by pressing the *Enter* key. Set the other parameters for the graphic presentation in the same way.



Also see section 5.5 Setting measuring parameters and trigger conditions.

M Press the M key. The cursor moves to the left section of the menu bar for setting of the type of presentation.

↵ Confirm the *Graf* presentation by pressing the *Enter* key.



Presentation in roll mode

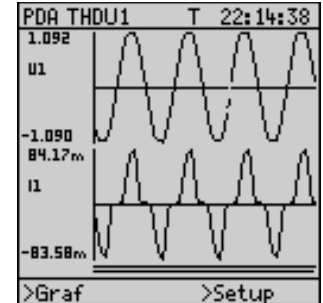
The traces for current and voltage are presented when an event takes place. The presentation is held until a next event occurs and is then automatically overwritten by the new event.

Presentation in single mode, trigger activation

M In the graphic presentation, press the M key twice. The cursor moves to the right section of the menu bar.

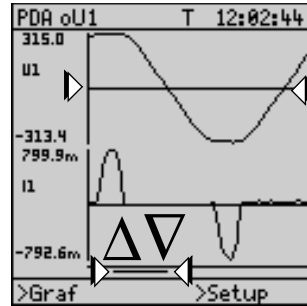
Δ∇ Select *Treset* mode.

↵ Press the *Enter* key. The traces for current and voltage are shown in graphic form when an event occurs. Another event can only be recorded after a trigger reset (Treset).



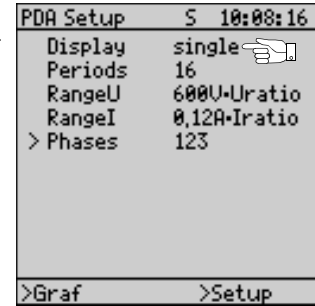
Presentation of a signal section (zoom function) in single mode

- M In single mode, set the flashing cursor to the *Graf* section in the menu bar (left section).
- ↵ The signal section can be zoomed in several stages when pressing the *Enter* key. The position of the display section within the total presentation is localized for the current by the bar below the graphics. The LC display returns to total presentation after the smallest possible display section.
- Δ∇ Select the desired display section with the aid of the cursor keys.
- M To record the next event, set the cursor to *Treset* mode.
- ↵ Pressing of the *Enter* key reactivates the trigger. It is not required to exit the graphic presentation.



Presetting for zoom

- M In *Graf* mode, press the M key twice. The flashing cursor moves to the menu for mode selection.
- Δ∇ Select *setup* mode, using the cursor keys.
- ↵ Confirm *setup* mode by pressing the *Enter* key. The LC display changes to setup of the *general trigger conditions*.



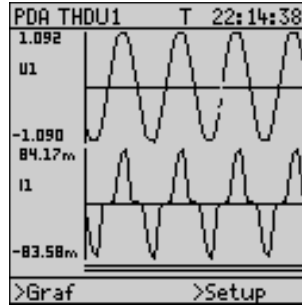
If the setting for display is *roll*, proceed as follows:

- Δ∇ Select the *display* parameter.
- ↵ Confirm the *display* parameter by pressing the *Enter* key. The cursor moves to the entry section.
- Δ∇ Select the setting *single*.
- ↵ Confirm the setting *single*.

Also see section 5.5 Setting measuring parameters and trigger conditions.

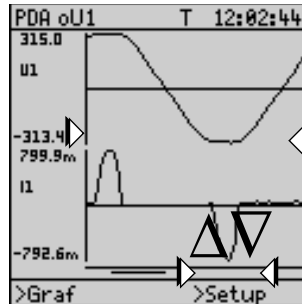
Activating the zoom function

- M Select *Graf* mode in the selection menu. The waveforms of current and voltage are shown in graphical form when an event occurs. Another event can only be recorded after a trigger reset (*Triset*).
- ↵ Press the *Enter* key to activate the zoom function.

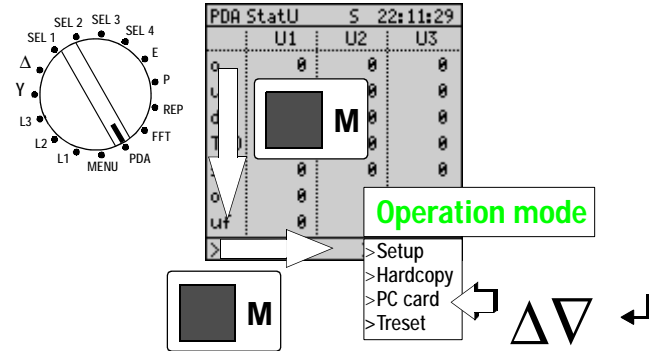


The LC display now shows a display section. The position of the display section within the total presentation (100 %) is localized by the bar below the trace for the current.

- Δ∇ Select the desired display section with the aid of the cursor keys.
- ↵ Each time the *Enter* key is pressed, the presentation of the event is zoomed further that is, a smaller section is zoomed. The LC display returns to total presentation of the event after the smallest possible display section.



5.4 Selecting the operating mode



- ⌚ Set the *rotary switch* to *PDA*. The LC display shows the event statistics for the voltage.
- M Press the *M* key until the *cursor* > flashes in the *operation menu*.
- Δ∇ Select the desired operating mode with the *cursor keys*.
- ↵ Press the *Enter* key. The desired operating mode is confirmed. The display changes to the corresponding menu.

5.5 Setting the measuring parameters and trigger conditions

Several display pages are required for the abundant setting of the individual trigger conditions. In order to ensure a simple correlation, the trigger conditions are correlated with the corresponding types of presentation. The trigger conditions for the voltage can be called up from the *SatU* presentation type that for the current from the *StatI* presentation type. General trigger conditions are set in the presentation type *Graf/Setup* or *Event/Setup*.



Note

For the voltage and current ratios (Uratio and/or Iratio) the settings of the switch positions L1 to L3 are made in the selection menu setup. Should the settings have to be changed, set the function switch to the position L1, L2 and/or L3. Now, perform the settings as described in section 4.8.3 of the operating instructions for the mainframe. Then, reset the switch to the PDA position.

5.5.1 Setting the trigger conditions for voltage and current

M In the presentation type *StatU* and/or *StatI*, press the *M* key twice. The flashing cursor moves to the mode menu.

Δ∇ Select *setup* mode with the cursor keys.

↵ Confirm *setup* mode by pressing the *Enter* key. The LC display changes to *setup* of *trigger conditions*.

PDA StatU	S	22:11:29	
	U1	U2	U3
o	0	0	0
u	0	0	0
d	0	0	0
THD	22	0	0
sy	0	0	0
of	0	0	0
uf	0	0	0
>StatU	>Treset		

Δ∇ Select the desired parameter with the cursor keys.

↵ Confirm the parameter by pressing the *Enter* key. The first setting position flashes.

Δ∇ Perform the setting with the cursor keys.

↵ Confirm the setting by pressing the *Enter* key.

PDA Setup	H
> oU / U	,0000
uU / U	,0000
dU / U	,0000
THDU / %	,000
syU / %	,000
ofU / Hz	,000
ufU / Hz	,000
Printer	off
Interval	0030
>StatU	>Setup

If several positions are available for setting, the cursor flashes at the next position at a time after confirmation with *Enter*. Perform all settings as described above.

After setting of the last place, the cursor is displayed at the actual position of the decimal point for a default setting of the decimal place. Make a new setting with the $\Delta\nabla$ keys and confirm with *Enter*.

5.5.2 Setting the general trigger conditions

M In the presentation type *Event* and/or *Graf*, press the *M* key twice. The flashing cursor moves to the *operation menu*.

$\Delta\nabla$ Select *setup* mode with the cursor keys.

↵ Confirm *setup* mode by pressing the *Enter* key. The LC display changes to the presentation of *setup*. See the next page for the meaning of the individual parameters. Set the individual parameters as described in the above section.

PDA Setup	S 10:08:16
Display	single
Periods	16
RangeU	600U-Uratio
RangeI	0,12A-Iratio
> Phases	123
>Graf	>Setup

How to exit the setup menu

Press the *M* key. The flashing *cursor* moves to the menu *type of presentation*. Now, the type of presentation can again be selected with the $\Delta\nabla$ *cursor* keys.

Meaning of the general trigger conditions



Note

The trigger criterion – reference quantity for the trigger conditions – is the RMS value of the waveform. The RMS value is determined over a defined number of cycles.

General PDA setup

Display: The trigger types *roll* and *single* are exclusively referred to the graphic presentation. In *roll* mode, the constantly detected events are shown on the LC display. In *single* mode, the actual presentation is only overwritten when the trigger is reset manually.

Cycles: Number of cycles used for the determination of the RMS value.

Range U (range I):

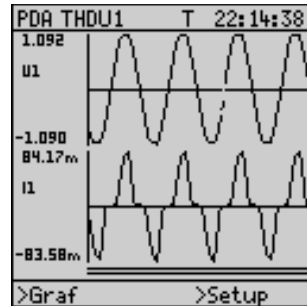
Range selection (600/100/12 V for voltage and/or 1/0,12 A for current). Autoranging is switched off with the switch set to PDA.

Phases: Selecting the phases to which the trigger conditions apply.

5.6 Resetting the trigger

If you selected the trigger condition *single*, the trigger must manually be activated for the capture of another event. This, however, goes for the graphic presentation only.

To reset the trigger, first select the graphic presentation *trigger*, then the *Reset* mode. When pressing the Enter key, it is possible to record another event.



5.7 Printing via the PSI module

Printing the actual display

When pressing the PRINT key on the integrated printer module SECUTEST PSI, the actual display is printed out on roll paper. The display is stored to an own screen memory. The unit continues to be available for data acquisition (*sample mode*) while printing takes place.

Printing in the selected time interval

With the printer switched on (parameter **printer on** in the PDA setup of StatU and/or StatI), the detected events which satisfy the trigger condition are printed out in the preselected interval the instant they occur. The trigger condition and the phase in which the event occurred are simultaneously printed out.

At the same time, the actual values can be stored to the PC card within the set time interval. The unit continues to be available for the acquisition of event data (sample mode).



Note

The printer requires about 20 sec to print out the actual LC display. If the selected interval is shorter than the time needed for the printout, the next printout is started immediately after the end of the printout.

- M In the StatU and/or StatI type of presentation, press the *M* key twice. The flashing cursor moves to the menu for mode selection.
- Δ∇ Select *setup* mode with the cursor keys.
- ↵ Confirm *setup* mode by pressing the *Enter* key. The LC display changes to the presentation of *setup*.

PDA StatU		S 22:11:29		
	U1	U2	U3	
o	0	0	0	
u	0	0	0	
d	0	0	0	
THD	22	0	0	
sy	0	0	0	
of	0	0	0	
uf	0	0	0	
>StatU		>Treset		

- Δ∇ Select the parameter **printer** with the *cursor keys*.
- ↵ Confirm the parameter by pressing the *Enter* key. The cursor moves to the setting section.
- Δ∇ Set the parameter to **on**, using the cursor keys.
- ↵ Confirm the setting by pressing the *Enter* key.

PDA Setup		H
>oU / U		.00000
uU / U		.00000
dU / U		.00000
THDU / %		.000
syU / %		.000
ofU / Hz		.000
ufU / Hz		.000
Printer	off	
Interval	0030	
>StatU		>Setup

Protocol printout

The printout corresponds to the LC display.

5.8 Recording a PDA measuring sequence on the PC card

Selecting the recording parameters

- M With the switch set to the *PDA position*, press the *M key* once. The flashing cursor moves to the selection menu *type of presentation*.
- Δ▽ With the *cursor keys*, select the type of presentation containing the desired recording parameters.
- ↵ Confirm the type of presentation by pressing the *Enter key*.

PDA StatU		S	22:11:29		
	U1	U2	U3		
o	0	0	0		
u	0	0	0		
d	0	0	0		
THD	22	0	0		
sy	0	0	0		
of	0	0	0		
uf	0	0	0		
>StatU		>Treset			

- M Press the *M key* twice. The flashing cursor moves to the operation menu.
- Δ▽ Select **PC card** mode with the *cursor keys*.
- ↵ Confirm **PC card** mode by pressing the *Enter key*. The LC display changes to the menu for setting of the recording parameters.

PDA Event		S	01:00:13	
01:00:12	oI3	2,402		
01:00:12	oI2	2,388		
01:00:12	oI1	2,404		
01:00:11	oI3	2,402		
01:00:11	oI2	2,388		
01:00:11	oI1	2,404		
01:00:11	oI3	2,402		
01:00:11	oI2	2,388		
01:00:11	oI1	2,404		
01:00:10	oI3	2,402		
>Event		>Setup		

Setting the sample time

- Δ▽ With the cursor keys, set the flashing *cursor* > to the parameter *Beg. ... and/or Ende ... (Start ... and/or End ...)*.
- ↵ Confirm the parameter *Beg. ... and/or Ende ... (Start... and/or End ...)* by pressing the *Enter key*. The first entry position starts to flash.
- Δ▽ Perform the setting at the first entry position with the cursor keys.
- ↵ Confirm the setting at a time by pressing the *Enter key*. The next entry position starts to flash. Perform the setting for all positions in the same way. After the last entry, the cursor either flashes in front of the actual parameter or in front of the parameter *store*.

PDA StatU		E	10:00:33	
> Store	no			
Read	00			
Interval	0030			
Start time	10:09:03			
Start date	23,07,1992			
End time	04:16:33			
End date	15,08,1992			
Delete	no			
Run	0			
>StatU		>PC-Card		

Starting the PDA measuring sequence

- Δ∇ In the PC card selection menu, move the flashing cursor ➤ to the submenu *store*.
- ↵ Confirm the submenu *store* by pressing the *Enter* key. The flashing cursor moves to the **no/yes** entry field.
- Δ∇ Select store **yes** with the cursor keys.
- ↵ Confirm the selection by pressing the *Enter* key.

PDA StatU	E 10:08:33
> Store	no
Read	00
Interval	0030
Start time	10:09:03
Start date	23,07,1992
End time	04:16:33
End date	15,08,1992
Delete	no
Run	0
>StatU	>PC-Card

The activated recording is shown at the right of the top line.

E: The measurement is activated at the selected time (Enable)

M: Recording takes place (Memory)

T: Trigger condition active (Trigger)

5.9 Stopping a recording



Note

When leaving the PDA switch position, the other functions of the unit can only be addressed with the recording stopped. This is of importance because an active recording which is to be complete (that is, real-time recording) must not be stopped accidentally (e.g. by incorrect operation).

Therefore, it is not useful to switch from the PDA switch position to another one during the recording. To stop the recording, the switch must be set to the PDA position. Call up PC-Card mode menu and stop the recording.

- M With the switch set to the PDA position, press the *M* key twice. The flashing cursor moves to the mode selection menu.
- Δ∇ Select *PC card* mode with the cursor keys.
- ↵ Confirm *PC card* mode by pressing the *Enter* key. The LC isplay changes to the menu for setting of the recording parameters.

PDA StatU	E	10:08:33
> Store	no	
Read	00	
Interval	0030	
Start time	10:09:03	
Start date	23,07,1992	
End time	04:16:33	
End date	15,08,1992	
Delete	no	
Run	0	
>StatU	>PC-Card	

5.9.1 Stopping a recording automatically

Lapse of time

The recording is automatically stopped when the set time has elapsed.

The marking **M** on the top line disappears.

PDA StatU	E	10:08:33
> Store	no	
Read	00	
Interval	0030	
Start time	10:09:03	
Start date	23,07,1992	
End time	04:16:33	
End date	15,08,1992	
Delete	no	
Run	0	
>StatU	>PC-Card	

5.9.2 Stopping a recording manually

- Δ∇ In the setting menu PC card, move the flashing cursor > to the field *store* using the cursor keys.
- ↵ Confirm the menu by pressing the *Enter* key. The cursor > moves to the *yes/no* selection field.
- Δ∇ Select **no** with the cursor keys (stop storing).
- ↵ Confirm stop storing by pressing the *Enter* key.

5.10 Replaying a PDA recording on the LC display

M With the switch set to the *PDA* position, press the *M* key *twice*. The flashing cursor moves to the operation menu.

Δ▽ Select **PC card** mode with the *cursor keys*.

↵ Confirm **PC card** mode by pressing the *Enter* key. The LC display changes to the menu for parameter setting for recording and replay.

PDA Event	S	01:08:13
01:08:12	oI3	2,402
01:08:12	oI2	2,388
01:08:12	oI1	2,404
01:08:11	oI3	2,402
01:08:11	oI2	2,388
01:08:11	oI1	2,404
01:08:11	oI3	2,402
01:08:11	oI2	2,388
01:08:11	oI1	2,404
01:08:10	oI3	2,402
>Event		>Setup

Δ▽ Set the flashing *cursor* to the **read** parameter.

↵ Confirm the **read** parameter by pressing the *Enter* key. The flashing cursor moves to the setting field.

Δ▽ With the *cursor keys*, select the desired *measuring sequence** (*Run No.*).

↵ Confirm the selection by pressing the *Enter* key.

PDA StatU	E	10:08:33
> Store	no	
Read	00	
Interval	0030	
Start time	10:09:03	
Start date	23,07,1992	
End time	04:16:33	
End date	15,08,1992	
Delete	no	
Run	0	
>StatU		>PC-Card

The measured values are stored together with the mask information so that a replay is made on the LC display which is equivalent to the hardcopy.

* The **Run** parameter shows the number of actually stored measuring sequences.

5.10.1 Exiting the menu replay of a PDA recording

M With the switch set to the *PDA* position, press the *M* key 3 times. The flashing cursor moves to the menu for selection of the type of presentation.

Δ▽ Select the desired type of presentation with the *cursor keys*.

↵ Confirm the type of presentation by pressing the *Enter* key.

PDA Event	S	01:08:13
01:08:12	oI3	2,402
01:08:12	oI2	2,388
01:08:12	oI1	2,404
01:08:11	oI3	2,402
01:08:11	oI2	2,388
01:08:11	oI1	2,404
01:08:11	oI3	2,402
01:08:11	oI2	2,388
01:08:11	oI1	2,404
01:08:10	oI3	2,402
>Event		>Setup

Print, store and replay LC displays


Corresponding to the functions of the mainframe, it is also possible to store hardcopies and make printouts of the actual LC display. The operating steps for these functions are already described in section 4.6 of the operating instructions of the mainframe.

It is possible to call up help texts for many settings and show them on the display.

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