

NETWORK ANALYZER

USER MANUAL

The device screenshots in this manual show Turkish text (key “sil” = delete). The device language can be switched to English via Menu > Dil/Language.

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1. Getting Started with UES-EA 03

A. Introduction

Thank you for choosing the UES-EA 03 network analyzer.

UES-EA series energy/network analyzers are designed to measure, monitor and record the parameters required in LV and MV networks and, for models with communication, to transfer data to a computer. The UES-EA 03 Energy Analyzer is the communication-capable model with contacts in this series and is used where an assignable digital output contact and communication are needed.

B. Selection Table

UES-EA-01 is the base model, UES-EA-03 is the model with communication, and UES-EA-04 is the model with data logger. Details are as in the table.

“UES EA” SERIES ANALYZER SELECTION TABLE																
Model	Class	128x64 Graphic LCD	2-63 Harmonics	Phase-to-phase voltage harmonics	Neutral current	5mA min. measuring current	Min, max, demand	VAh energy measurement	Energy display per phase	English / Turkish setting	Password protection	2 Contacts	Voltage, Current and Harmonic Protection	20ms contact response	Modbus RTC	RTC and memory
EA-01	%0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
EA-03	%0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
EA-04	%0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C. Measured Network Parameters

The UES-EA-03 Energy Analyzer is designed to measure all electrical parameters in 3-phase electrical networks. During the design stage, users were taken into account, and attention was paid to an easy-to-use menu and to measurement accuracy.

The parameters measured and displayed by the EA-03 Energy Analyzer are as follows:

no	Parameter	Symbol
1	3 Phase-neutral voltages (max. min. demand)	(U-L1, U-L2, U-L3)
2	3 Phase-phase voltages (max. min. demand)	(U-L12, U-L23, U-L31)
3	3 Phase currents (separately, max. min. demand)	(I-L1, I-L2, I-L3)
4	Neutral current	(I-Mp)
5	Frequency	(Fr)
6	Active powers (3 phases separately, total)	(P-L1, P-L2, P-L3, P)
7	Reactive powers (3 phases separately, total)	(Q-L1, Q-L2, Q-L3, Q)
8	Apparent powers (3 phases separately, total)	(S-L1, S-L2, S-L3, S)
9	Power factor (3 phases separately, total)	(PF-L1, PF-L2, PF-L3, PF)
10	3-phase $\cos\phi$ measurements apart from power factor	($\cos\phi$ -L1, $\cos\phi$ -L2, $\cos\phi$ -L3)
11	Energy ratios	(%E-L1, %E-L1, %E-L3, %E)
12	Instantaneous power ratios (percentage $\tan\phi$)	(%L1, %L1, %L3, %Σ)
13	Phase-neutral voltage harmonics (3 phases, up to 63rd)	(U_THD, U_HAR-02...U_HAR-63)
14	Current harmonics (3 phases, up to 63rd)	(I_THD, I_HAR-02...I_HAR-63)
15	Phase-phase voltage harmonics (3 phases, up to 63rd)	(UUTHD, UUHAR-02...UUHAR-63)
16	Voltage harmonic bars (3 phases, up to 63rd)	
17	Phase-phase voltage bars (3 phases, up to 63rd)	
18	Current harmonic bars (3 phases, up to 63rd)	
19	Total energy counters	(import Wh, export Wh, inductive VARh, capacitive VARh, apparent VAh)
20	Phase energy counters	(E-L1,E-L2,E-L3)

All these parameters are displayed and recorded accurately.

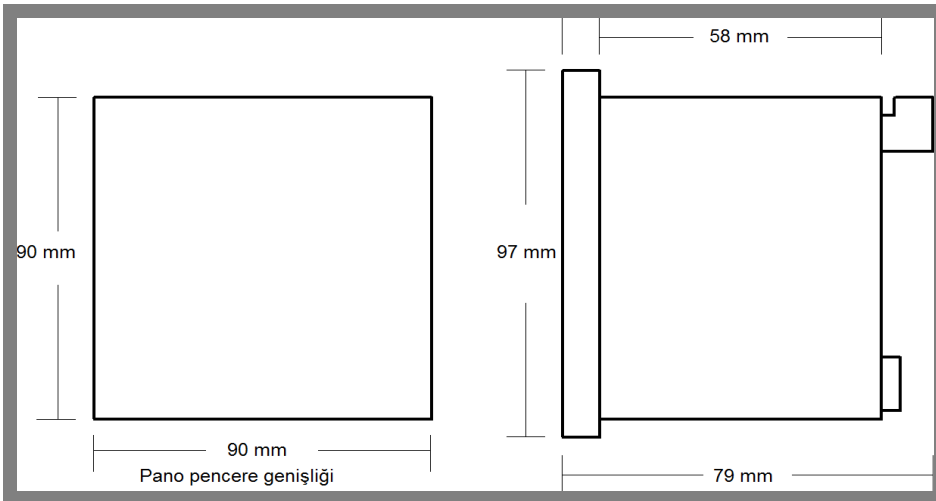
2. UES-EA-03 Features

A. Features

- ✓ General
 - ✓ 128x64 graphic display
 - ✓ Easy-to-use, self-explanatory menu
 - ✓ 50 measurement screens to monitor dozens of parameters
 - ✓ Password protection
 - ✓ English or Turkish language option
 - ✓ Measures all network parameters listed in the parameters table in 3-phase systems.
 - ✓ With its user-friendly menu, it displays them legibly on the graphic screen using only the up and down keys.
 - ✓ Displays direct primary measurements using the current and voltage transformer ratios, and presents the parameters accurately as floating-point values with four digits.
 - ✓ Calculates instantaneous minimum and maximum values and 15-minute demand averages and shows them by pressing the “set” key on the relevant measurement screen.
- ✓ Harmonic Measurement
 - ✓ Measures all odd and even harmonics up to the 63rd harmonic.
 - ✓ Measures total harmonic distortion (THD) more accurately with 63 components.
 - ✓ Measures current, phase-to-neutral voltage and phase-to-phase voltage harmonics separately and displays them as text or as bar graphs.
 - ✓ The sampling rate is 256/20ms (256 per period).
- ✓ Accurate Measurements
 - ✓ All measurements are calculated with 256 samples per period.
 - ✓ True RMS accurate measurements are made.
 - ✓ Accuracy: class 0.2.
 - ✓ Measurement starting from 5mA. Energies at low power levels are also added to the counters; none are skipped.
 - ✓ Neutral current measurement.
 - ✓ Energy measurement in 4 quadrants
 - ✓ 4-quadrant energy measurement for each phase separately as well
 - ✓ Measurement of VAh apparent energy as well
- ✓ Communication
 - ✓ Read and write all network parameters and settings via the RS-485 port using Modbus-RTU.

- ✓ Flexible use with baud, parity and address settings.
- ✓ Remote control of the contact outputs.
- ✓ Contact Outputs and Advanced Alarms
 - ✓ Can respond within a 20 millisecond measurement time
 - ✓ 2 separate contacts
 - ✓ Separate settings for each contact
 - ✓ 2 different parameters can be assigned to each contact
 - ✓ Over or under alarm (or protection) can be assigned for each parameter
 - ✓ Over, under and window-range functions can be assigned to each of 32 network parameters
 - ✓ Hysteresis setting
 - ✓ Ton and Toff settings
 - ✓ Manual control
 - ✓ Remote control from a PC via communication, or over the internet if the network supports it.

B. Device Dimensions



E. Technical Specifications

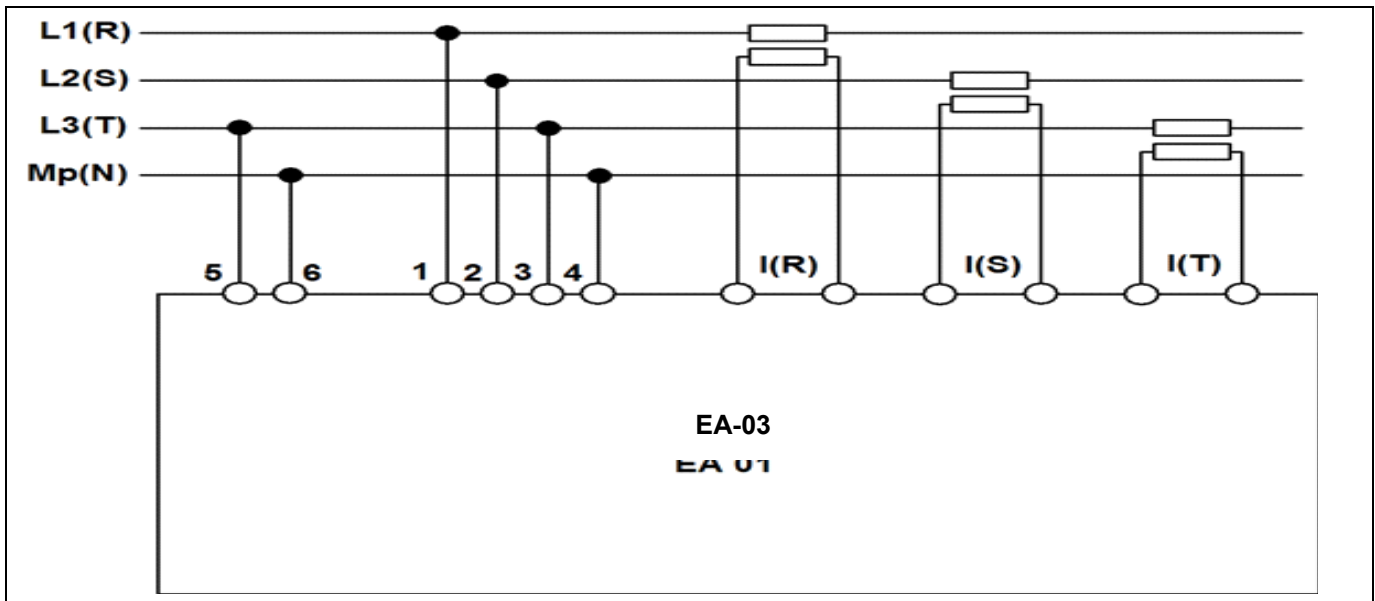
Technical Specifications:	
Auxiliary Supply:	57 VAC, 100 VAC, 220 VAC
Supply circuit power consumption:	<3 VA
Frequency:	50/60 Hz.
Measuring inputs power consumption:	< 0.5VA
L-N in:	0-300 VAC 50/60 Hz.
L-L in:	600 VAC 50/60 Hz.
Measuring range:	1-500 kV (with a suitable voltage transformer)
I in:	0.005-6 A
Measuring inputs power consumption:	<1VA
Measuring range:	5/5-10000/5 A (with a suitable current transformer)
Current-Voltage accuracy:	%0.2
Active-Reactive power accuracy:	%0.5
Connection type:	3P4W
Demand time:	15 min.
Operating temperature:	-5 C 50 C °

3. Connections

A. Commissioning

- ❖ When connecting the voltage inputs, pay attention to the L1(R), L2(S), L3(T) terminals. The phase rotation direction must be observed.
- ❖ The current transformer terminals must be connected to the corresponding phase. A wrong connection causes measurement errors.
- ❖ Pay attention to the polarity terminals (k and l) of the current transformers. A wrong connection causes measurement errors.
- ❖ The current transformer terminals must be tightened especially firmly. A loose contact causes unwanted damage.
- ❖ Connections must not be disconnected while energized.

B. Connection Diagram



C. WARNINGS

WARNINGS !!!

1. The current transformer terminals must never be left open-circuit!
2. Connections must not be disconnected while energized!
3. Always check the connections before energizing the device! If any connection on the terminals has loosened, correct it!
4. Always switch off the power while making corrections!

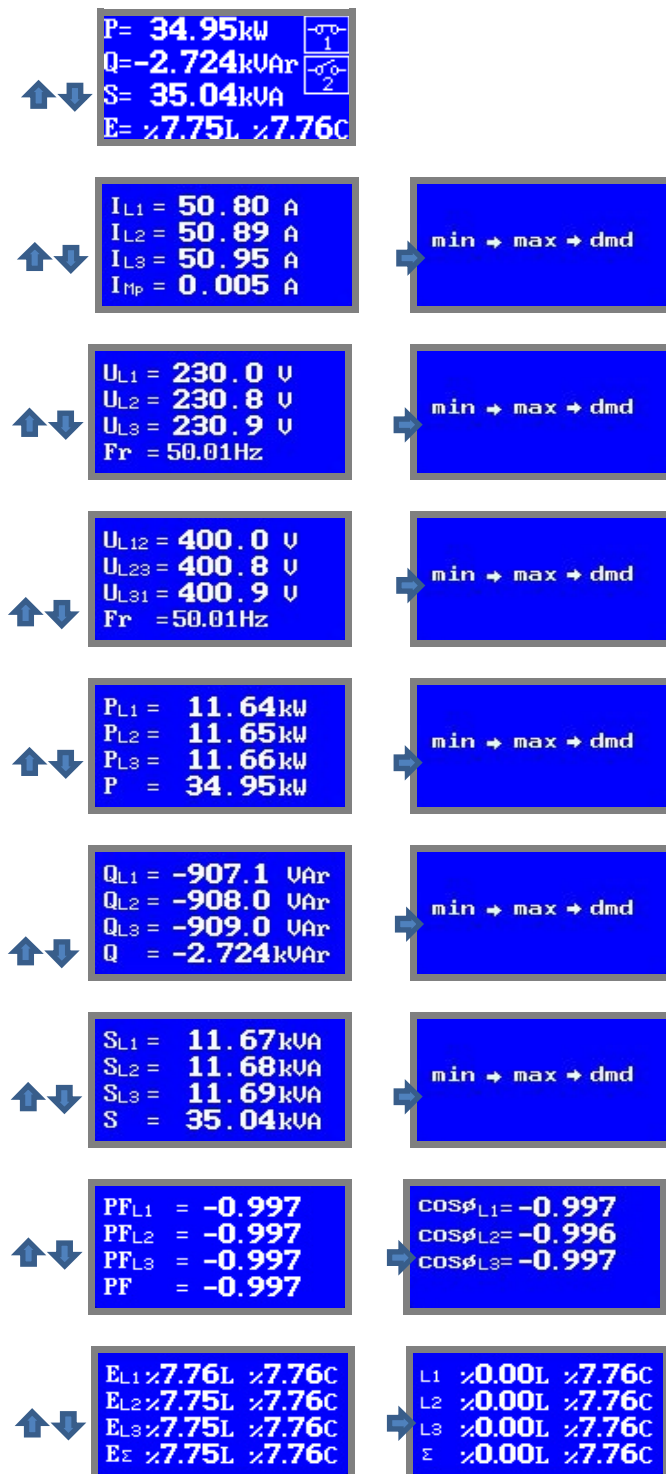
There are no user-serviceable parts inside the device. If you experience a technical problem, please contact us.

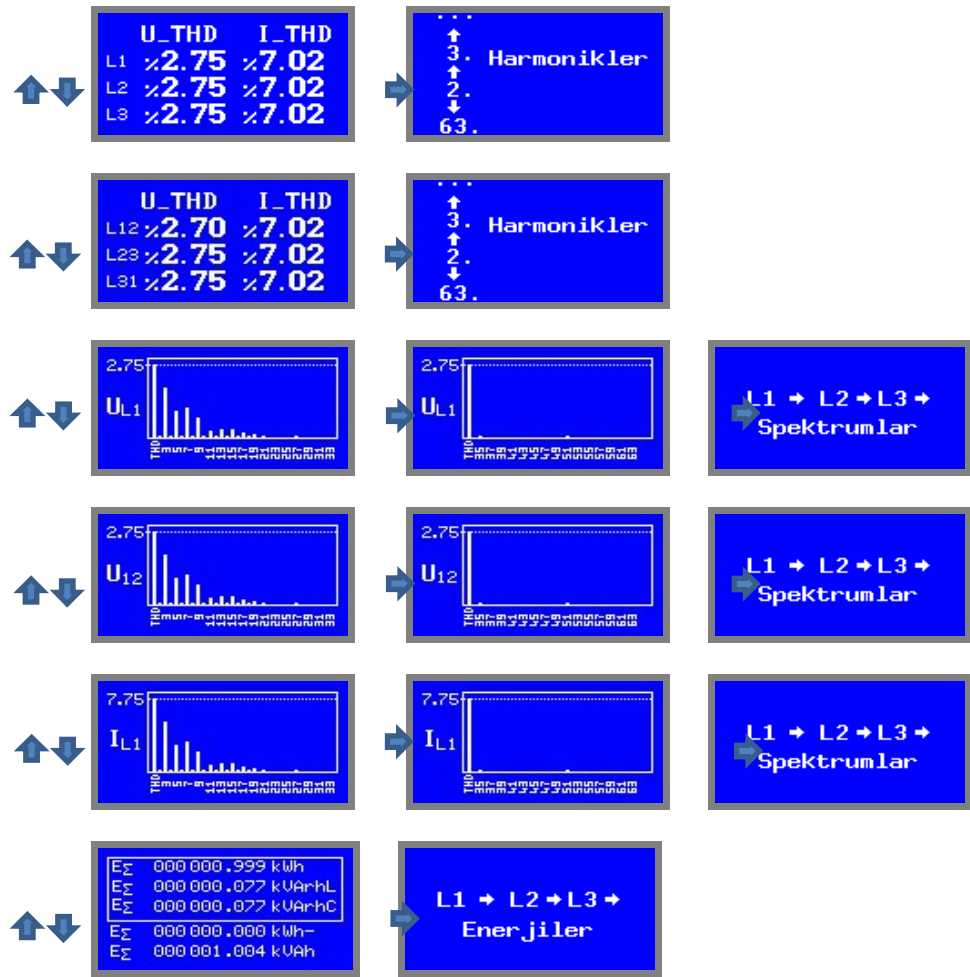
4. Measurement Screens

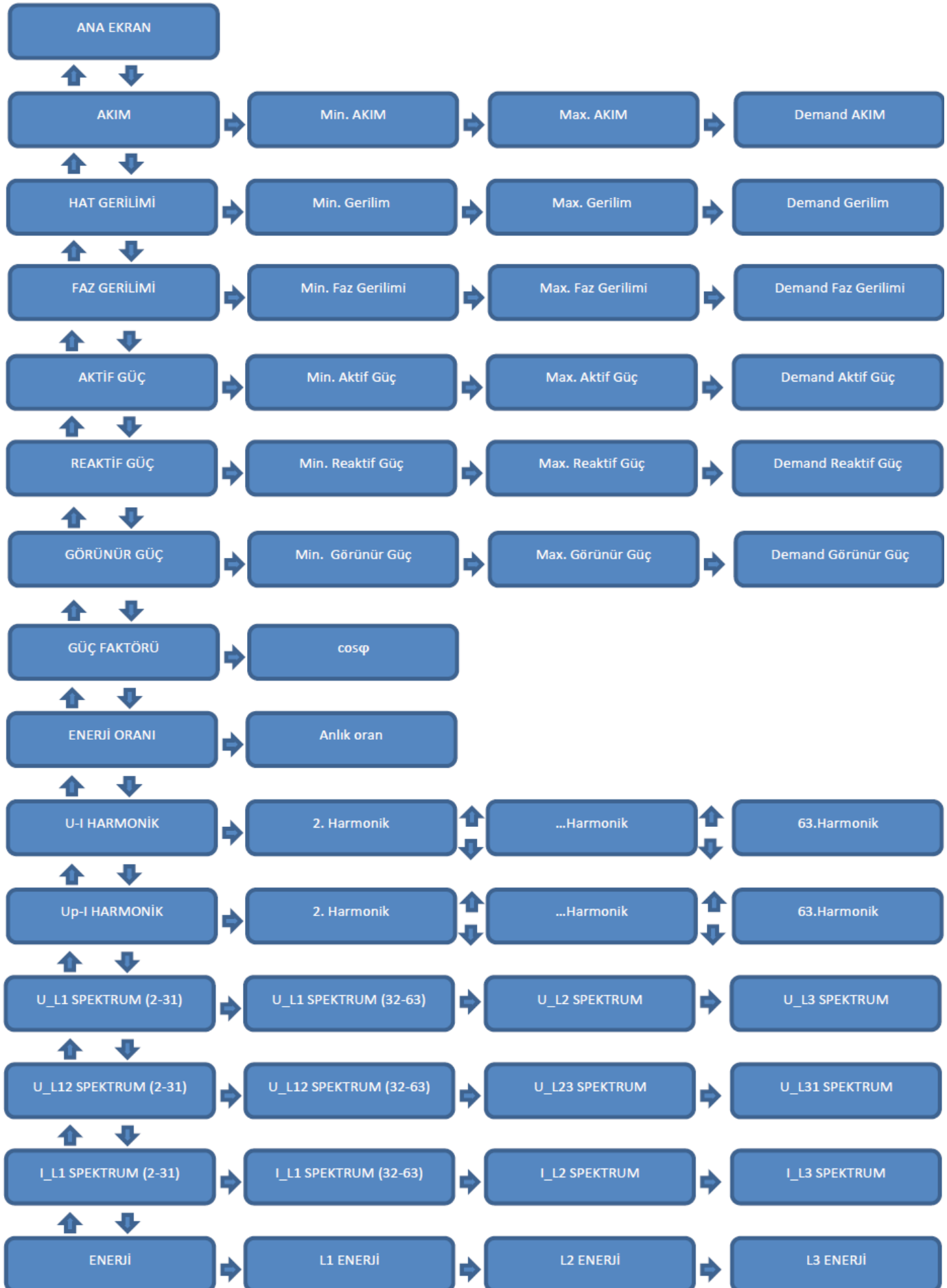
A. Measurement Screens Map

On the UES-EA-03 analyzer, the measured network parameters are shown as below using the “up”, “down” and “set” direction keys. The “set” key brings up the other parameters related to the current screen. Pressing and holding the “set” key enters the menu. The menu is covered separately under another heading. (For the menu see: Section 5)

Measurement Screens:





Measurement Screens Map:

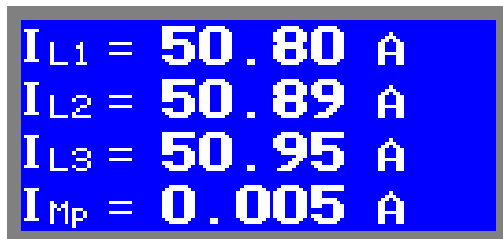
B. Main Screen



The main screen shows the total powers and the total energy ratios. On models with contacts, whether the contacts are open or closed is also shown on the main screen.

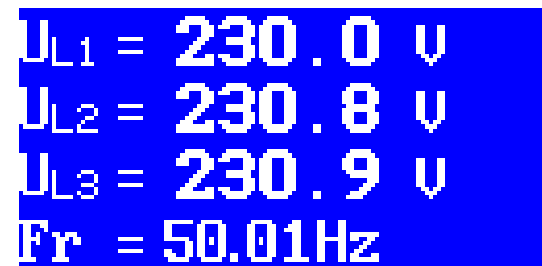
The percentage on the left ending with L shows the ratio of inductive energy to active energy; the ratio ending with C shows the capacitive percentage.

C. Currents



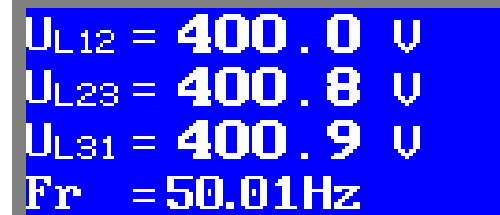
This screen shows the currents per phase and the neutral current. To see the minimum, maximum and demand values of the currents, use the "set" key while on this screen.

D. Phase-to-Neutral Voltages



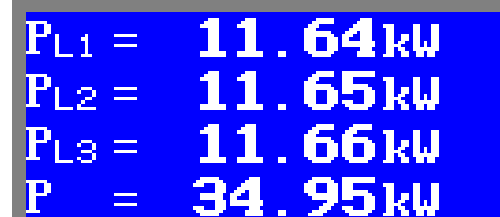
This screen shows the voltages per phase and the frequency. To see the minimum, maximum and demand values of the voltages, use the "set" key while on this screen.

E. Phase-to-Phase Voltages



This screen shows the voltages between phases and the frequency. To see the minimum, maximum and demand values of the phase-to-phase voltages, use the "set" key while on this screen.

F. Active Powers



This screen shows the active powers per phase and the total active power. To see the minimum, maximum and demand values of the active powers, use the "set" key while on this screen.

Active power measurement is directional. In systems that export energy, a (-) sign appears. If the system does not export energy and a (-) active power is displayed, the current transformers of the phases with the minus sign are connected in the wrong direction. This must be corrected.

G. Reactive Powers



This screen shows the reactive powers per phase and the total reactive power. To see the minimum, maximum and demand values of the reactive powers, use the "set" key while on this screen.

H. Apparent Powers

```

SL1 = 11.67kVA
SL2 = 11.68kVA
SL3 = 11.69kVA
S    = 35.04kVA

```

This screen shows the apparent powers per phase and the total apparent power. To see the minimum, maximum and demand values of the apparent powers, use the "set" key while on this screen.

I. Power Factors and $\cos\phi$'s

```

PFL1 = -0.997
PFL2 = -0.997
PFL3 = -0.997
PF    = -0.997

```

```

COS $\phi$ L1 = -0.997
COS $\phi$ L2 = -0.996
COS $\phi$ L3 = -0.997

```

This screen shows the power factors. Switching between the power factor and $\cos\phi$ pages is done with the "set" key.

J. Energy Ratios and Instantaneous Ratios

```

EL1 %7.76L %7.76C
EL2 %7.75L %7.76C
EL3 %7.75L %7.76C
E $\Sigma$  %7.75L %7.76C

```

This screen shows the energy ratios. The inductive and capacitive energy ratios are shown together. You can switch to the instantaneous ratios with the "set" key while on this page.

```

L1 %0.00L %7.76C
L2 %0.00L %7.76C
L3 %0.00L %7.76C
 $\Sigma$  %0.00L %7.76C

```

This screen shows the instantaneous power ratios. The inductive and capacitive power ratios are shown together. The total ratios can be both capacitive and inductive at the same time. This happens when one of the phases is capacitive and another is inductive. In the per-phase ratios, either the inductive or the capacitive ratio is always zero. The compensation status can be checked from these pages.

K. Voltage and Current Harmonics

```

      U_THD   I_THD
L1 %2.75 %7.02
L2 %2.75 %7.02
L3 %2.75 %7.02

```

This page presents the harmonics of the currents and phase-to-neutral voltages for the 3 phases. From this page you can see the THD values, and by entering the details of this page with the "set" key, you can look one by one at the total harmonic distortions and at the 2nd, 3rd, ...63rd harmonics as percentage values. After entering the details with the "set" key, you can browse the harmonics from 2 to 63 with the "up" and "down" keys.

L. Phase-to-Phase Voltage and Current Harmonics

```

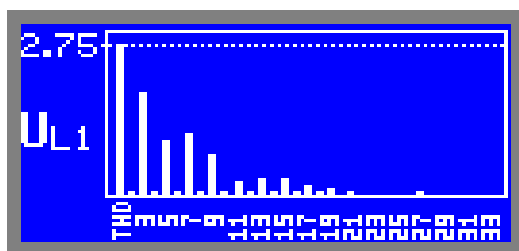
      U_THD   I_THD
L12 %2.70 %7.02
L23 %2.75 %7.02
L31 %2.75 %7.02

```

This page presents the harmonics of the currents and phase-to-phase voltages for the 3 phases. From this page you can see the THD values, and by entering the details of this page with the "set" key, you can look one by one at the total harmonic distortions and at the 2nd, 3rd, ...63rd harmonics as percentage values.

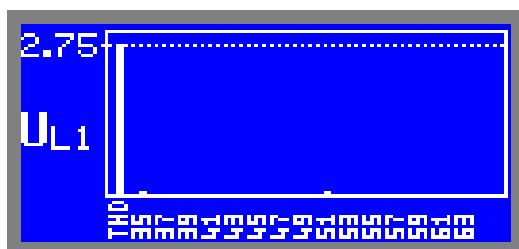
After entering the details with the “set” key, you can browse the harmonics from 2 to 63 with the “up” and “down” keys.

M. Voltage Harmonic Spectrum

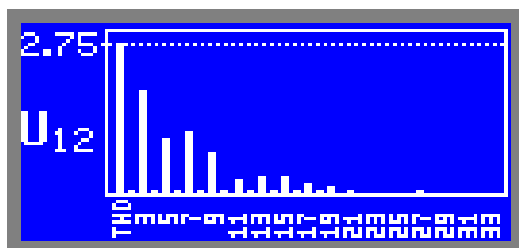


This screen is a page where the 2-33 range and the THD value of a single phase are presented as a spectrum. The THD percentage is written in the upper left corner, and the other harmonics in the spectrum are shown as a bar graph proportional to it.

While on this page, by pressing the “set” key in sequence you can first view the 32-63 harmonic spectrum of the same phase and then the spectra of phases L2 and L3.

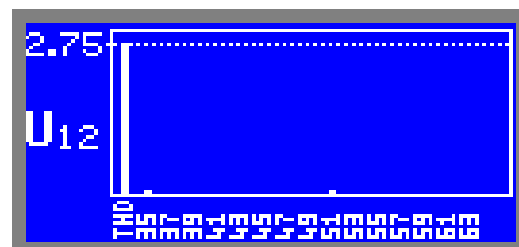


N. Phase-to-Phase Voltage Harmonic Spectrum

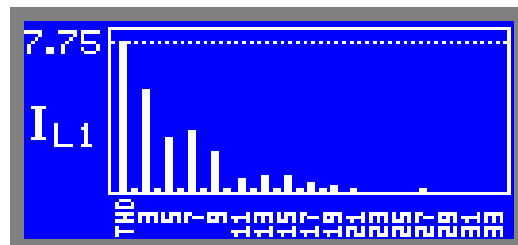


This screen is a page where the 2-33 range and the THD value of a single phase-to-phase voltage are presented as a spectrum. The THD percentage is written in the upper left corner, and the other harmonics in the spectrum are shown as a bar graph proportional to it.

While on this page, by pressing the “set” key in sequence you can first view the 32-63 harmonic spectrum of the same phase and then the spectra of phases L2 and L3.

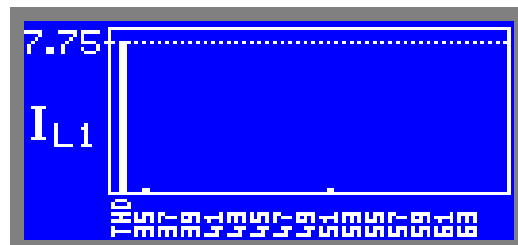


O. Current Harmonic Spectrum

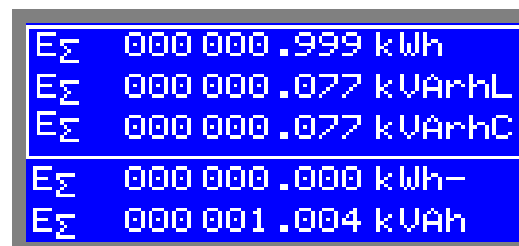


This screen is a page where the 2-33 range and the THD value of the current of a single phase are presented as a spectrum. The THD percentage is written in the upper left corner, and the other harmonics in the spectrum are shown as a bar graph proportional to it.

While on this page, by pressing the “set” key in sequence you can first view the 32-63 harmonic spectrum of the same phase and then the spectra of phases L2 and L3.



P. Energies



On the Energies page, the area inside the box shows the most needed values: import active energy (kWh), inductive reactive energy (kVArhL) and capacitive reactive energy (kVArhC). The other two values are the export active energy and the apparent energy. Resetting the energies is done from the menu.

In addition, to see the other energy counters per phase L1-L2-L3, simply press the “set” key in sequence while on this page.

Energies are displayed multiplied by the current and voltage transformer ratios. The energy counters can roll over up to 12 digits on a kWh basis. After 9 digits the decimal point shifts automatically. Readings can be taken with a resolution of 1Wh.

5. Menu

The settings of the UES-EA-03 analyzer are made through its clear and easy menu. Besides the settings, energy and demand reset operations are also done with the help of the menu. Entry to the menu is password-protected.

To enter the menu, press and hold the “set” key while on any measurement page.

These settings are:

1. Current Transformer Ratio
2. Voltage Transformer Ratio
3. Contact-1
4. Contact-2
5. Contact Test
6. Change Password
7. Delete Energies
8. Delete Demands
9. Language
10. Communication Settings

To return to the upper menu while in any menu, press the “delete” (“sil”) key. To return to the measurement pages and exit the menu completely, press and hold the “delete” key; or exit by pressing the “delete” key repeatedly, two or three times.

A. Entering the Menu

While on any measurement page, it is enough to press and hold the “set” key. The UES-EA-03 will ask for the password:



The first digit of the password is selected with the “up” and “down” keys. After it is selected, the “set” key moves to the next digit. After the four digits are entered, the menu is entered with the “set” key. If the password is entered incorrectly, the menu is not entered; the four-digit password is requested again, starting from the first digit. The digit currently to be entered appears as a selected item, while the other digits are hidden with the “*” character.

When the password is entered correctly, the main menu appears on the screen.

B. Main Menu



In the main menu, the 10 menus of the UES-EA-03 analyzer appear one below the other on two separate pages.

As on first entry in the example picture, the “Current Transformer Ratio” menu is in the selected-item view. The other menus are brought into the selected-item view with the “up” and “down” keys. When the desired menu is selected, the “set” key opens the submenu.



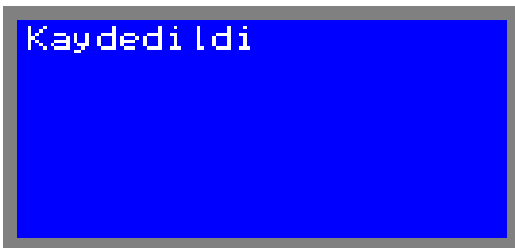
In the example picture, continuing the main menu, the “Delete Energies” item from the items on the other page is selected. The others can be selected with the “up” and “down” keys, or you can go to the first page and select a menu on the first page.

Pressing the “set” key while in the selected-item view opens the selected menu.

C. Current Transformer Ratio



When the menu is selected from the main menu and entered with the “set” key, the current value of the current transformer ratio appears on the screen in the selected-item view, as in the picture. While in this submenu, the current transformer ratio is set with the “up” and “down” keys. Press the “set” key to save the new value. Or press the “delete” key to cancel and return to the main menu. If the “set” key is pressed, a saved message appears on the screen:

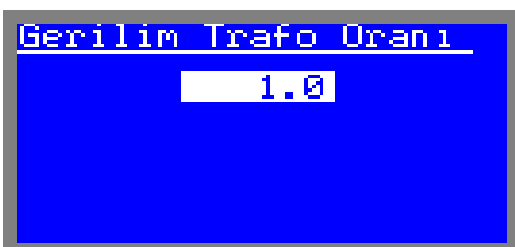


When this message appears, the new value has been saved.

The current transformer ratio is set in steps of “1”. For example, if there is a 1000/5 current transformer, 200 must be entered. For 50/5, 10 must be entered.

The “Saved” message closes automatically after a few seconds and the main menu appears on the screen.

D. Voltage Transformer Ratio



When the menu is selected from the main menu and entered with the “set” key, the current value of the voltage transformer ratio appears on the screen in the selected-item view, as in the picture. While in this submenu, the voltage transformer ratio is set with the “up” and “down” keys. Press the “set” key to save the new value. Or press the “delete” key to cancel and return to the

main menu. If the “set” key is pressed, a “saved” message appears on the screen; when this message appears, the new values have been saved.

The voltage transformer ratio is set in steps of “0.1”.

Voltage Transformer Ratio = primary voltage / secondary voltage

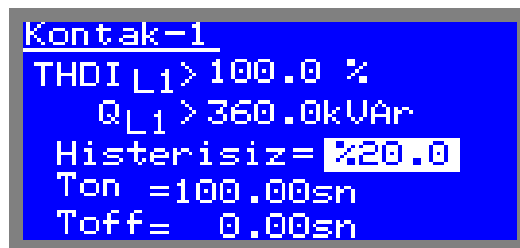
For example, 345 must be entered for 34.5kV transformers.

Voltage transformer ratio = 34.5/0.1

=345

For this example, “345.0” must be entered.

E. Contact-1



Select “Contact-1” from the main menu and enter this menu with the “set” key.

From this menu, the desired alarm can be assigned for Contact-1. The alarms are quite flexible. Two different parameters can be assigned to a contact as over and/or under alarms.

In the example picture, contact-1 output is assigned to give an alarm when the Total Harmonic Distortion of the L1 phase current exceeds 100%. It is also required to give an alarm when the reactive power on phase L1 exceeds 360kVAr. For the contact to return after the alarm limit is exceeded, the parameter that exceeded the limit must fall back by 20%. For example, for a contact that alarms at 100% current harmonics, with a 20% hysteresis it must fall back to 80% for the contact to stop alarming.

The alarms topic is covered in detail in another section. (See: Section-7)

The Contact-1 menu has 9 items. Of these items, only one is in the selected-item view at a time. The “up-down” keys change the value of the selected item. The “set” key moves to the next item. The “delete” key is used to return to the previous item. After the last item, the “Toff” setting, when the “set” key is pressed the “Saved” message appears

on the screen. Thus the contact-1 settings are completed and saved to the settings memory. All 9 items must be assigned in sequence and the "Saved" message must appear.

The "Saved" message disappears automatically after a few seconds and the screen returns to the main menu.

To exit the menus, press the "delete" key. Each press returns to the previous item, and after the first item to the main menu. If the "delete" key is pressed and held, it switches directly to the main measurement screen.

The Contact-1 and Contact-2 menus are very similar. One is only for making the contact-1 settings and the other for the contact-2 settings. Their contents are the same. Different settings can be made for each of the two contacts.

In the Contact-1 menu, the settings are completed by selecting and assigning the 9 items one by one.

These 9 items are:

1. Parameter-1 :

Any one of the 32 different parameters from the parameter table below can be assigned.

2. Over/Under-1:

Selects whether the first parameter will work as over or under.

3. Value-1:

Selects which value of the first parameter is taken as the limit.

4. Parameter-2 :

Any one of the 32 different parameters from the parameter table below can be assigned.

5. Over/Under-2:

Selects whether the second parameter will work as over or under.

6. Value-2:

Selects which value of the second parameter is taken as the limit.

7. Hysteresis:

When one of the parameters exceeds the limit value, the "Ton" time runs, and at the end of the time the

contact switches to the "on" state. For it to switch back to the "off" state, it must drop below the limit value by the hysteresis value. This applies to over alarms.

For under alarms, the "Ton" time counts below the limit for the contact to switch to the "on" state, and for the contact that has switched to "on" to return to the "off" state, the value must rise above the limit value by the hysteresis value.

8. Ton:

This item sets the delay that must elapse for the contact to turn "on" when the limit is exceeded or fallen below. It can be set in multiples of 10ms. To get an alarm with no delay in a 20ms measurement, this time must be set to "0.00sn".

9. Toff:

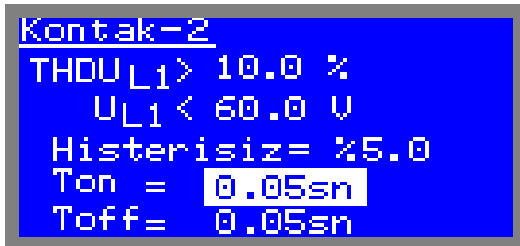
This item sets the delay that must elapse for the contact to turn "off" once the contact has turned "on" and given an alarm. It can be set in multiples of 10ms. To return with no delay in a 20ms measurement, this time must be set to "0.00sn". This item is also called the "Return Time" setting.

Contact Parameter Table:

1	I_L1
2	I_L2
3	I_L3
4	I_Mp
5	U_L1
6	U_L2
7	U_L3
8	U_L12
9	U_L23
10	U_L31
11	Fr
12	P_L1
13	P_L2
14	P_L3
15	P
16	Q_L1
17	Q_L2
18	Q_L3
19	Q
20	S_L1
21	S_L2
22	S_L3
23	S
24	THD_I_L1

25	THD_I_L2
26	THD_I_L3
27	THD_U_L1
28	THD_U_L2
29	THD_U_L3
30	THD_U_L12
31	THD_U_L23
32	THD_U_L31

F. Contact-2



Select "Contact-2" from the main menu and enter this menu with the "set" key.

From this menu, the desired alarm can be assigned for Contact-2. The alarms are quite flexible. Two different parameters can be assigned to a contact as over and/or under alarms.

In the example picture, contact-2 output is assigned to give an alarm when the Total Harmonic Distortion of the L1 phase-to-neutral voltage exceeds 10%. It is also required to give an alarm when the voltage on phase L1 drops below 60V. For the contact to return after the alarm limit is exceeded, the parameter that exceeded the limit must fall back by 5%. For example, for a contact that alarms at 10% voltage harmonics, with a 5% hysteresis it must fall back to 9.5% for the contact to stop alarming.

The alarms topic is covered in detail in another section. (See: Section-7)

The Contact-2 menu has 9 items. Of these items, only one is in the selected-item view at a time. The "up-down" keys change the value of the selected item. The "set" key moves to the next item. The "delete" key is used to return to the previous item. After the last item, the "Toff" setting, when the "set" key is pressed the "Saved" message appears

on the screen. Thus the contact-2 settings are completed and saved to the settings memory. All 9 items must be assigned in sequence and the "Saved" message must appear.

The "Saved" message disappears automatically after a few seconds and the screen returns to the main menu.

To exit the menus, press the "delete" key. Each press returns to the previous item, and after the first item to the main menu. If the "delete" key is pressed and held, it switches directly to the main measurement screen.

The Contact-1 and Contact-2 menus are very similar. One is only for making the contact-1 settings and the other for the contact-2 settings. Their contents are the same. Different settings can be made for each of the two contacts.

In the Contact-2 menu, the settings are completed by selecting and assigning the 9 items one by one.

These 9 items are:

1. Parameter-1 :

Any one of the 32 different parameters from the parameter table below can be assigned.

2. Over/Under-1:

Selects whether the first parameter will work as over or under.

3. Value-1:

Selects which value of the first parameter is taken as the limit.

4. Parameter-2 :

Any one of the 32 different parameters from the parameter table below can be assigned.

5. Over/Under-2:

Selects whether the second parameter will work as over or under.

6. Value-2:

Selects which value of the second parameter is taken as the limit.

7. Hysteresis:

When one of the parameters exceeds the limit value, the "Ton" time runs, and at the end of the time the contact switches to the "on" state. For it to switch back to the "off" state, it must drop below the limit value by the hysteresis value. This applies to over alarms.

For under alarms, the “Ton” time counts below the limit for the contact to switch to the “on” state, and for the contact that has switched to “on” to return to the “off” state, the value must rise above the limit value by the hysteresis value.

8. Ton:

This item sets the delay that must elapse for the contact to turn “on” when the limit is exceeded or fallen below. It can be set in multiples of 10ms. To get an alarm with no delay in a 20ms measurement, this time must be set to “0.00sn”.

9. Toff:

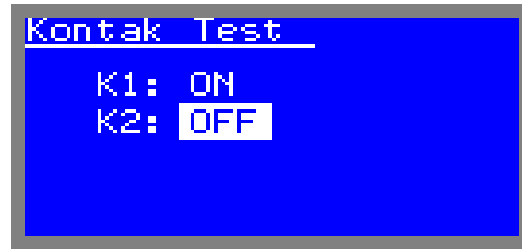
This item sets the delay that must elapse for the contact to turn “off” once the contact has turned “on” and given an alarm. It can be set in multiples of 10ms. To return with no delay in a 20ms measurement, this time must be set to “0.00sn”. This item is also called the “Return Time” setting.

Contact Parameter Table:

1	I_L1
2	I_L2
3	I_L3
4	I_Mp
5	U_L1
6	U_L2
7	U_L3
8	U_L12
9	U_L23
10	U_L31
11	Fr
12	P_L1
13	P_L2
14	P_L3
15	P
16	Q_L1
17	Q_L2
18	Q_L3
19	Q
20	S_L1
21	S_L2
22	S_L3
23	S
24	THD_I_L1
25	THD_I_L2
26	THD_I_L3
27	THD_U_L1
28	THD_U_L2
29	THD_U_L3

30	THD_U_L12
31	THD_U_L23
32	THD_U_L31

G. Contact Test



Enter this menu from the main menu with the “set” key. Press the “delete” key to exit.

Both contacts can be manually switched “ON” or “OFF” with the “up-down” and “set” keys.

While in this menu, the alarms assigned to the contacts are temporarily inactive. Manual control and testing can be done with this menu.

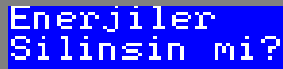
H. Change Password



While in the main menu, select the “Change Password” item and press the “set” key to enter this menu. The 4-digit password is entered by selecting the digits one by one with the “up-down” keys and moving to the next digit with “set”. To prevent mistakes, the new password must be entered a second time. If there is no mismatch, the new password is saved.

I. Delete Energies

When the “Delete Energies” menu is selected from the main menu and the “set” key is pressed, the device asks for confirmation for the reset operation:



If the “set” key is pressed on the confirmation screen, the energies are deleted. To cancel, press the “delete” key. When the “set” key is pressed, the energy counters held by the device are reset and a “deleted” message appears on the screen:



When this “deleted” message appears, the energies have been reset. From then on, the energy records will be the energies measured by the device since the moment of deletion.

The “Deleted” message closes automatically after a few seconds and the main menu appears on the screen.

J. Delete Demands

When the “Delete Demands” menu is selected from the main menu and the “set” key is pressed, the device asks for confirmation for the reset operation:



If the “set” key is pressed on the confirmation screen, the demands are deleted. To cancel, press the “delete” key. When the “set” key is pressed, the minimum, maximum and demand values held by the device are deleted. From that moment on, new ones are calculated and recorded. 15 minutes must pass for new demand values.

K. Language

This is the submenu where the menu language is set. The language can be selected as Turkish or English.



Select “Turkish” or “English” with the “up” and “down” keys and press the “set” key to save the new language of the device.

L. Communication Settings



While in the main menu, select the “Communication Settings” item and press the “set” key to enter this menu.

There are three items in this menu. These three items make it possible to set what the communication port needs. In the example picture, the “Address” item is in the selected-item state. Whichever item is selected, the “up-down” keys increase/decrease or change the value of that item. After making the desired setting, press the “set” key to move to the next item. When all 3 items have been set, pressing the “set” key shows the “Saved” message and the new settings take effect.

6. Default Settings

The default values and setting ranges of the settings are as in the table:

Setting:	Description	Default
Current Transformer Ratio	Between 1 and 2000 In steps of 1	1
Voltage Transformer Ratio	Between 1.0 and 5000.0 In steps of 0.1	1.0
Password	4 digits	“0000”
Language	Turkish or English	Turkish
Contact-1	2 parameters can be assigned as over and under. Hysteresis in steps of 0.1%, on-off times in multiples of 10ms can be set	No parameter assignments.
Contact-2	2 parameters can be assigned as over and under. Hysteresis in steps of 0.1%, on-off times in multiples of 10ms can be set	No parameter assignments.
Baud	4800,9600,19200,38400, 57600,12800	115200
Parity	None, odd, even	none
Address	Between 1-247	1

Users who want to change the password must not forget it, in order to be able to enter the menu again. Those who forget the password must contact the manufacturer.

7. Alarms (Contacts)

With its two contacts, the UES-EA-03 analyzer can be used to give alarms depending on the network parameters it measures.

Analyzers with contacts:

Can be used for advanced alarms,

Can be used as an under/cut-off relay for undervoltage, underfrequency, undercurrent, underpower and the like,

Can be used as an over and protection relay for overcurrent, overvoltage, overpower, overharmonics and the like.

The UES-EA-03 can respond within a 20ms measurement time. Thus, it can also be used as an overvalue protection relay where fast protection is required.

A separate settings group is used for each of the 2 separate contacts for alarms. Different tasks can be assigned to the two contacts. 2 separate parameters can also be assigned to each contact.

Different hysteresis and different Ton and Toff times can be assigned to each contact.

Contact-1 Settings:

Two different parameters or only one parameter can be assigned. The same parameter can be assigned as over and under with separate limits, so that an alarm can be given inside or outside the window range.

Assignment-1:

Protection or alarm is assigned with a parameter, over-under and a limit value.

Example: "Fr>55.00Hz" can be assigned for Over-Frequency protection.

Example: "Fr<45.00Hz" can be assigned for Under-Frequency protection.

Example: "I_L1>500.0A" can be assigned for Overcurrent protection.

Example: "THD_U_L1>%10" can be assigned for Over-Harmonic protection.

Assignment-2:

The second protection or alarm assignment is made with a parameter, over-under and a limit value. If desired, only one assignment can be made.

Example: "U_L3>250.0V" can be assigned for Overvoltage protection.

Example: "U_L12<180.0V" can be assigned for Undervoltage protection.

Example: "I_L2>332.5A" can be assigned for Overcurrent protection.

Example: "THD_I_L2>%52" can be assigned for Over-Harmonic protection.

Hysteresis: The hysteresis setting for Contact-1.

Ton: The time to be counted for the contact to turn “on” when the parameter assigned for Contact-1 goes above or below the assigned limit value.

Toff:

The time that must be counted for Contact-1, once “on”, to return, i.e. turn “off”. For this time to be counted, the exceeded or fallen-below limit must be brought back below or above by the amount of the hysteresis.

Contact-2 Settings:

Two different parameters or only one parameter can be assigned. The same parameter can be assigned as over and under with separate limits, so that an alarm can be given inside or outside the window range.

Assignment-1:

Protection or alarm is assigned with a parameter, over-under and a limit value.

Example: “Fr>55.00Hz” can be assigned for Over-Frequency protection.

Example: “Fr<45.00Hz” can be assigned for Under-Frequency protection.

Example: “I_L1>500.0A” can be assigned for Overcurrent protection.

Example: “THD_U_L1>%10” can be assigned for Over-Harmonic protection.

Assignment-2:

The second protection or alarm assignment is made with a parameter, over-under and a limit value. If desired, only one assignment can be made.

Example: “U_L3>250.0V” can be assigned for Overvoltage protection.

Example: “U_L12<180.0V” can be assigned for Undervoltage protection.

Example: “I_L2>332.5A” can be assigned for Overcurrent protection.

Example: “THD_I_L2>%52” can be assigned for Over-Harmonic protection.

Hysteresis:

The hysteresis setting for Contact-2.

Ton:

The time to be counted for the contact to turn “on” when the parameter assigned for Contact-2 goes above or below the assigned limit value.

Toff:

The time that must be counted for Contact-2, once “on”, to return, i.e. turn “off”. For this time to be counted, the exceeded or fallen-below limit must be brought back below or above by the amount of the hysteresis.

Example settings:

```

Kontak-1
THDIL1>100.0 %
QL1>360.0kVAr
Histerisiz= %20.0
Ton =100.00sn
Toff= 0.00sn

```

```

Kontak-2
THDUL1> 10.0 %
UL1< 60.0 V
Histerisiz= %5.0
Ton = 0.05sn
Toff= 0.05sn

```

As described in the Menu section, when the contact settings are made, 9 items are entered in sequence in total: 3 items for assignment 1, 3 items for assignment 2, and 3 items for the hysteresis, Ton and Toff settings.

Similar settings are made for both contacts, and since the two contacts will work differently, they can be assigned different settings.

In the example screens,

```

Kontak-1
THDIL1>100.0 %
QL1>360.0kVAr
Histerisiz= %20.0
Ton =100.00sn
Toff= 0.00sn

```

First parameter for Contact-1: for over harmonic current, and its limit is 100%. (L1)

Second parameter for Contact-1: for over reactive power, and its limit is 360kVAr. (L1)

Two parameters are assigned for Contact-1 in the example, and contact-1 will turn “on” if only one of the two parameters exceeds its limit. (When the Ton time has elapsed)

Hysteresis for Contact-1: 20% is selected. Thus, 20% below the limit value is the return, i.e. “off”, value. For these settings the return values are 80% total current harmonics and 284kVAr reactive power.

Ton time for Contact-1: set to 100s. If it stays above the limit for 100s after the limit value is exceeded, contact-1 switches to the “on” state and stays that way as long as it does not fall below the return value.

Toff time for Contact-1: set to 0.00s. When contact-1 has switched to the “on” state and falls below the return value, the Toff time is waited and contact-1 switches to the “off” state.

```

Kontak-2
THDUL1> 10.0 %
UL1< 60.0 V
Histerisiz= %5.0
Ton = 0.05sn
Toff= 0.05sn

```

First parameter for Contact-2: for over voltage harmonics, and its limit is 10%. (L1)

Second parameter for Contact-2: for undervoltage, and its limit is 60V. (L1)

Two parameters are assigned for Contact-2 in the example, and contact-2 will turn “on” if only one of the two parameters exceeds its limit or the one assigned as under falls below its limit. (When the Ton time has elapsed)

Hysteresis for Contact-2: 5% is selected. Thus, 5% below and above the limit value is the return, i.e. “off”, value. For these settings the return values are 9.5% voltage harmonics and 63V voltage.

Ton time for Contact-2: set to 0.05s. If it stays above the limit for 50 milliseconds after the limit value is exceeded, contact-2 switches to the “on” state and stays that way as long as it does not fall below the return value. Conversely, when the voltage falls below the 60V limit, contact-2 turns “on” after 50ms.

Toff time for Contact-2: set to 0.05s. When contact-2 has switched to the “on” state and falls below the return value, or vice versa, the Toff time is waited and contact-2 switches to the “off” state.

8. Modbus Register Tables

MODBUS RTU DATA MAP OF MEASUREMENTS (address offset=3000H)						
no	symbol	content	R/W	Integer	range	multiplier
0	xut	Voltage transformer ratio	R	unsigned	0 ... 50000	0.1
1	xct	Current transformer ratio	R	unsigned	0 ... 2000	1
2	I _R	R phase current	R	unsigned	0 ... 60000	0,1 mA
3	I _S	S phase current	R	unsigned	0 ... 60000	0,1 mA
4	I _T	T phase current	R	unsigned	0 ... 60000	0,1 mA
5	I _N	Neutral current	R	unsigned	0 ... 60000	0,1 mA
6	U _R	R phase-to-neutral voltage	R	unsigned	0 ... 6000	0.1 V
7	U _S	S phase-to-neutral voltage	R	unsigned	0 ... 6000	0.1 V
8	U _T	T phase-to-neutral voltage	R	unsigned	0 ... 6000	0.1 V
9	U _{RS}	R-S phase-to-phase voltage	R	unsigned	0 ... 10000	0.1 V
10	U _{ST}	S-T phase-to-phase voltage	R	unsigned	0 ... 10000	0.1 V
11	U _{RT}	R-T phase-to-phase voltage	R	unsigned	0 ... 10000	0.1 V
12	Fr	frequency	R	unsigned	4000 ... 7500	0.01 Hz
13	P _R	R phase active power	R	signed 32	-36000 ... 36000	0.1 W
14						
15	P _S	S phase active power	R	signed 32	-36000 ... 36000	0.1 W
16						
17	P _T	T phase active power	R	signed 32	-36000 ... 36000	0.1 W
18						
19	P _{Import}	Import active power	R	signed 32	-108000 ...	0.1 W
20						
21	P _{Export}	Export active power	R	signed 32	-108000 ...	0.1 W
22						
23	P _Σ	Total active power	R	signed 32	-108000 ...	0.1 W
24						
25	Q _R	R phase reactive power	R	signed 32	-36000 ... 36000	0.1 VAr
26						
27	Q _S	S phase reactive power	R	signed 32	-36000 ... 36000	0.1 VAr
28						
29	Q _T	T phase reactive power	R	signed 32	-36000 ... 36000	0.1 VAr
30						
31	Q _{Import}	Inductive power	R	signed 32	-108000 ...	0.1 VAr
32						
33	Q _{Export}	Capacitive power	R	signed 32	-108000 ...	0.1 VAr
34						

35	Q_{Σ}	Total reactive power	R	signed 32	-108000 ...	0.1 VAr
36						
37	S_R	R phase apparent power	R	signed 32	0 ... 36000	0.1 W
38						
39	S_S	S phase apparent power	R	signed 32	0 ... 36000	0.1 W
40						
41	S_T	T phase apparent power	R	signed 32	0 ... 36000	0.1 W
42						
43	S_{Σ}	Total apparent power	R	signed 32	0 ... 108000	0.1 W
44						
45	PF_R	R phase power factor	R	signed 16	-1000 ... +1000	0.001
46	PF_S	S phase power factor	R	signed 16	-1000 ... +1000	0.001
47	PF_T	T phase power factor	R	signed 16	-1000 ... +1000	0.001
48	PF_{Σ}	Total power factor	R	signed 16	-1000 ... +1000	0.001
49	$\cos\varphi_R$	R phase $\cos\varphi$	R	signed 16	-1000 ... +1000	0.001
50	$\cos\varphi_S$	S phase $\cos\varphi$	R	signed 16	-1000 ... +1000	0.001
51	$\cos\varphi_T$	T phase $\cos\varphi$	R	signed 16	-1000 ... +1000	0.001
52	E_{R_Imp}	R phase import active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
53						
54	E_{R_End}	R phase inductive energy	R	unsigned	0 ... 999 999 999	0.001
55						
56	E_{R_Cap}	R phase capacitive energy	R	unsigned	0 ... 999 999 999	0.001
57						
58	E_{R_Exp}	R phase export active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
59						
60	E_{R_VA}	R phase apparent energy	R	unsigned	0 ... 999 999 999	0.001
61						
62	E_{S_Imp}	S phase import active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
63						
64	E_{S_End}	S phase inductive energy	R	unsigned	0 ... 999 999 999	0.001
65						
66	E_{S_Cap}	S phase capacitive energy	R	unsigned	0 ... 999 999 999	0.001
67						
68	E_{S_Exp}	S phase export active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
69						
70	E_{S_VA}	S phase apparent energy	R	unsigned	0 ... 999 999 999	0.001
71						
72	E_{T_Imp}	T phase import active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
73						
74	E_{T_End}	T phase inductive energy	R	unsigned	0 ... 999 999 999	0.001
75						
76	E_{T_Cap}	T phase capacitive energy	R	unsigned	0 ... 999 999 999	0.001
77						
78	E_{T_Exp}	T phase export active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
79						
80	E_{T_VA}	T phase apparent energy	R	unsigned	0 ... 999 999 999	0.001
81						
82	E_{Σ_Imp}	Total import active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
83						
84	E_{Σ_End}	Total inductive energy	R	unsigned	0 ... 999 999 999	0.001
85						
86	E_{Σ_Cap}	Total capacitive energy	R	unsigned	0 ... 999 999 999	0.001
87						

88	E _{Σ_Exp}	Total export active energy	R	unsigned	0 ... 999 999 999	0.001 kWh
89						
90	E _{Σ_VA}	Total apparent energy	R	unsigned	0 ... 999 999 999	0.001
91						
92	THD_U _R	R phase voltage THD	R	unsigned	0-49999	%0.01
93	THD_U _S	S phase voltage THD	R	unsigned	0-49999	%0.01
94	THD_U _T	T phase voltage THD	R	unsigned	0-49999	%0.01
95	THD_U _{RS}	R phase voltage THD	R	unsigned	0-49999	%0.01
96	THD_U _{ST}	S phase voltage THD	R	unsigned	0-49999	%0.01
97	THD_U _{RT}	T phase voltage THD	R	unsigned	0-49999	%0.01
98	THD_I _R	R phase current THD	R	unsigned	0-49999	%0.01
99	THD_I _S	S phase current THD	R	unsigned	0-49999	%0.01
100	THD_I _T	T phase current THD	R	unsigned	0-49999	%0.01
101	K _{state}	Contact states	R	unsigned	0,1,2,3	1

MIN MAX DEMAND MODBUS RTU DATA MAP (address offset=3200H)

no	symbol	content	R / W	type	range	multiplier
0	xut	Voltage transformer ratio	R	unsigned 16	0 ... 50000	0.1
1	xct	Current transformer ratio	R	unsigned 16	0 ... 2000	1
2	I _{Rmin}	Min R phase current	R	unsigned 16	0 ... 60000	0,1 mA
3	I _{Rmax}	Max R phase current	R	unsigned 16	0 ... 60000	0,1 mA
4	I _{Rdmd}	Demand R phase current	R	unsigned 16	0 ... 60000	0,1 mA
5	I _{Smin}	Min R phase current	R	unsigned 16	0 ... 60000	0,1 mA
6	I _{Smax}	Max R phase current	R	unsigned 16	0 ... 60000	0,1 mA
7	I _{Sdmd}	Demand R phase current	R	unsigned 16	0 ... 60000	0,1 mA
8	I _{Tmin}	Min R phase current	R	unsigned 16	0 ... 60000	0,1 mA
9	I _{Tmax}	Max R phase current	R	unsigned 16	0 ... 60000	0,1 mA
10	I _{Tdmd}	Demand R phase current	R	unsigned 16	0 ... 60000	0,1 mA
11	I _{Nmin}	Min R phase current	R	unsigned 16	0 ... 60000	0,1 mA
12	I _{Nmax}	Max R phase current	R	unsigned 16	0 ... 60000	0,1 mA
13	I _{Ndmd}	Demand R phase current	R	unsigned 16	0 ... 60000	0,1 mA
14	U _{Rmin}	Min R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
15	U _{Rmax}	Max R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
16	U _{Rdmd}	Demand R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
17	U _{Smin}	Min R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
18	U _{Smax}	Max R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
19	U _{Sdmd}	Demand R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
20	U _{Tmin}	Min R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
21	U _{Tmax}	Max R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
22	U _{Tdmd}	Demand R phase-to-neutral voltage	R	unsigned 16	0 ... 60000	0,1 V
23	U _{RSmin}	Min R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
24	U _{RSmax}	Max R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
25	U _{RSdmd}	Demand R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
26	U _{STmin}	Min R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
27	U _{STmax}	Max R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
28	U _{STdmd}	Demand R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
29	U _{RTmin}	Min R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
30	U _{RTmax}	Max R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
31	U _{RTdmd}	Demand R-S phase-to-phase voltage	R	unsigned 16	0 ... 60000	0,1 V
32	P _{Rmin}	Min R phase active power	R	signed 32	0 ... 36000	0.1 W
34	P _{Rmax}	Max R phase active power	R	signed 32	0 ... 36000	0.1 W

36	P _{Rdmd}	Demand R phase active power	R	signed 32	0 ... 36000	0.1 W
38	P _{Smin}	Min S phase active power	R	signed 32	0 ... 36000	0.1 W
40	P _{Smax}	Max S phase active power	R	signed 32	0 ... 36000	0.1 W
42	P _{Sdmd}	Demand S phase active power	R	signed 32	0 ... 36000	0.1 W
44	P _{Tmin}	Min T phase active power	R	signed 32	0 ... 36000	0.1 W
46	P _{Tmax}	Max T phase active power	R	signed 32	0 ... 36000	0.1 W
48	P _{Tdmd}	Demand T phase active power	R	signed 32	0 ... 36000	0.1 W
50	P _{IMPmin}	Min import active power	R	signed 32	0 ... 108000	0.1 W
52	P _{IMPmax}	Max import active power	R	signed 32	0 ... 108000	0.1 W
54	P _{IMPdmd}	Demand import active power	R	signed 32	0 ... 108000	0.1 W
56	P _{EXPmin}	Min export active power	R	signed 32	0 ... 108000	0.1 W
58	P _{EXPmax}	Max export active power	R	signed 32	0 ... 108000	0.1 W
60	P _{EXPdmd}	Demand export active power	R	signed 32	0 ... 108000	0.1 W
62	P _{Σmin}	Min total active power	R	signed 32	0 ... 108000	0.1 W
64	P _{Σmax}	Max total active power	R	signed 32	0 ... 108000	0.1 W
66	P _{Σdmd}	Demand total active power	R	signed 32	0 ... 108000	0.1 W
68	Q _{Rmin}	Min R phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
70	Q _{Rmax}	Max R phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
72	Q _{Rdmd}	Demand R phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
74	Q _{Smin}	Min S phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
76	Q _{Smax}	Max S phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
78	Q _{Sdmd}	Demand S phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
80	Q _{Tmin}	Min T phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
82	Q _{Tmax}	Max T phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
84	Q _{Tdmd}	Demand T phase reactive power	R	signed 32	0 ... 36000	0.1 VAR
86	Q _{INDmin}	Min inductive power	R	signed 32	0 ... 108000	0.1 VAR
88	Q _{INDmax}	Max inductive power	R	signed 32	0 ... 108000	0.1 VAR
90	Q _{INDdmd}	Demand inductive power	R	signed 32	0 ... 108000	0.1 VAR
92	Q _{CAPmin}	Min capacitive power	R	signed 32	0 ... 108000	0.1 VAR
94	Q _{CAPmax}	Max capacitive power	R	signed 32	0 ... 108000	0.1 VAR
96	Q _{CAPdmd}	Demand capacitive power	R	signed 32	0 ... 108000	0.1 VAR
98	Q _{Σmin}	Min total reactive power	R	signed 32	0 ... 108000	0.1 VAR
100	Q _{Σmax}	Max total reactive power	R	signed 32	0 ... 108000	0.1 VAR
102	Q _{Σdmd}	Demand total reactive power	R	signed 32	0 ... 108000	0.1 VAR
104	S _{Rmin}	Min R phase apparent power	R	signed 32	0 ... 36000	0.1 VA
106	S _{Rmax}	Max R phase apparent power	R	signed 32	0 ... 36000	0.1 VA
108	S _{Rdmd}	Demand R phase apparent power	R	signed 32	0 ... 36000	0.1 VA
110	S _{Smin}	Min S phase apparent power	R	signed 32	0 ... 36000	0.1 VA
112	S _{Smax}	Max S phase apparent power	R	signed 32	0 ... 36000	0.1 VA
114	S _{Sdmd}	Demand S phase apparent power	R	signed 32	0 ... 36000	0.1 VA
116	S _{Tmin}	Min T phase apparent power	R	signed 32	0 ... 36000	0.1 VA
118	S _{Tmax}	Max T phase apparent power	R	signed 32	0 ... 36000	0.1 VA
120	S _{Tdmd}	Demand T phase apparent power	R	signed 32	0 ... 36000	0.1 VA

MIN MAX DEMAND MODBUS RTU DATA MAP-2 (address=3300H)						
no	symbol	content	R/ W	Integer	range	multiplier
0	xut	Voltage transformer ratio	R	unsigned	0 ... 50000	0.1
1	xct	Current transformer ratio	R	unsigned	0 ... 2000	1
3	S _{Σmin}	Min total apparent power	R	signed 32	0 ... 108000	0.1 VA
5	S _{Σmax}	Max total apparent power	R	signed 32	0 ... 108000	0.1 VA
7	S _{Σdmd}	Demand total apparent power	R	signed 32	0 ... 108000	0.1 VA

R phase-to-neutral Voltage Harmonics (address=3600h)					
no	content	R/W	Type	range	multiplier
0	THD UR	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic UR	R	unsigned 16	0-49999	%0.01
3	3. Harmonic UR	R	unsigned 16	0-49999	%0.01
4	4. Harmonic UR	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic UR	R	unsigned 16	0-49999	%0.01
61	61. Harmonic UR	R	unsigned 16	0-49999	%0.01
62	62. Harmonic UR	R	unsigned 16	0-49999	%0.01
63	63. Harmonic UR	R	unsigned 16	0-49999	%0.01

S phase-to-neutral Voltage Harmonics (address=3700h)					
no	content	R/W	Type	range	multiplier
0	THD US	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic US	R	unsigned 16	0-49999	%0.01
3	3. Harmonic US	R	unsigned 16	0-49999	%0.01
4	4. Harmonic US	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic US	R	unsigned 16	0-49999	%0.01
61	61. Harmonic US	R	unsigned 16	0-49999	%0.01
62	62. Harmonic US	R	unsigned 16	0-49999	%0.01
63	63. Harmonic US	R	unsigned 16	0-49999	%0.01

T phase-to-neutral Voltage Harmonics (address=3800h)					
no	content	R/W	Type	range	multiplier
0	THD UT	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic UT	R	unsigned 16	0-49999	%0.01
3	3. Harmonic UT	R	unsigned 16	0-49999	%0.01
4	4. Harmonic UT	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic UT	R	unsigned 16	0-49999	%0.01
61	61. Harmonic UT	R	unsigned 16	0-49999	%0.01
62	62. Harmonic UT	R	unsigned 16	0-49999	%0.01
63	63. Harmonic UT	R	unsigned 16	0-49999	%0.01

R phase Current Harmonics (address=3900h)					
no	content	R/W	Type	range	multiplier
0	THD IR	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic IR	R	unsigned 16	0-49999	%0.01
3	3. Harmonic IR	R	unsigned 16	0-49999	%0.01
4	4. Harmonic IR	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic IR	R	unsigned 16	0-49999	%0.01
61	61. Harmonic IR	R	unsigned 16	0-49999	%0.01
62	62. Harmonic IR	R	unsigned 16	0-49999	%0.01
63	63. Harmonic IR	R	unsigned 16	0-49999	%0.01

S phase Current Harmonics (address=3A00h)					
no	content	R/W	Type	range	multiplier
0	THD IS	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic IS	R	unsigned 16	0-49999	%0.01
3	3. Harmonic IS	R	unsigned 16	0-49999	%0.01
4	4. Harmonic IS	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic IS	R	unsigned 16	0-49999	%0.01
61	61. Harmonic IS	R	unsigned 16	0-49999	%0.01
62	62. Harmonic IS	R	unsigned 16	0-49999	%0.01
63	63. Harmonic IS	R	unsigned 16	0-49999	%0.01

T phase Current Harmonics (address=3B00h)					
no	content	R/W	Type	range	multiplier
0	THD IT	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic IT	R	unsigned 16	0-49999	%0.01
3	3. Harmonic IT	R	unsigned 16	0-49999	%0.01
4	4. Harmonic IT	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic IT	R	unsigned 16	0-49999	%0.01
61	61. Harmonic IT	R	unsigned 16	0-49999	%0.01
62	62. Harmonic IT	R	unsigned 16	0-49999	%0.01
63	63. Harmonic IT	R	unsigned 16	0-49999	%0.01

R-S phase-to-phase Voltage Harmonics (address=3C00h)					
no	content	R/W	Type	range	multiplier
0	THD URS	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic URS	R	unsigned 16	0-49999	%0.01
3	3. Harmonic URS	R	unsigned 16	0-49999	%0.01
4	4. Harmonic URS	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic URS	R	unsigned 16	0-49999	%0.01
61	61. Harmonic URS	R	unsigned 16	0-49999	%0.01
62	62. Harmonic URS	R	unsigned 16	0-49999	%0.01
63	63. Harmonic URS	R	unsigned 16	0-49999	%0.01

S-T phase-to-phase Voltage Harmonics (address=3D00h)					
no	content	R/W	Type	range	multiplier
0	THD UST	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic UST	R	unsigned 16	0-49999	%0.01
3	3. Harmonic UST	R	unsigned 16	0-49999	%0.01
4	4. Harmonic UST	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic UST	R	unsigned 16	0-49999	%0.01
61	61. Harmonic UST	R	unsigned 16	0-49999	%0.01
62	62. Harmonic UST	R	unsigned 16	0-49999	%0.01
63	63. Harmonic UST	R	unsigned 16	0-49999	%0.01

R-T phase-to-phase Voltage Harmonics (address=3E00h)					
no	content	R/W	Type	range	multiplier
0	THD URT	R	unsigned 16	0-49999	%0.01
1	reserved	R	unsigned 16	0-49999	%0.01
2	2. Harmonic URT	R	unsigned 16	0-49999	%0.01
3	3. Harmonic URT	R	unsigned 16	0-49999	%0.01
4	4. Harmonic URT	R	unsigned 16	0-49999	%0.01
5-60	i. Harmonic URT	R	unsigned 16	0-49999	%0.01
61	61. Harmonic URT	R	unsigned 16	0-49999	%0.01
62	62. Harmonic URT	R	unsigned 16	0-49999	%0.01
63	63. Harmonic URT	R	unsigned 16	0-49999	%0.01

MODBUS RTU DATA MAP OF SPECIAL COMMANDS (address=4200h)					
no	address	description	R/W	type	range
0	4200h	Return to Factory Settings	W (06h)	unsigned 16	only 55AAH
1	4201h	Delete energies	W (06h)	unsigned 16	only 55AAH
2	4202h	Delete demands	W (06h)	unsigned 16	only 55AAH
3	4203h	Contact-1 pull in	W (06h)	unsigned 16	only 55AAH
4	4204h	Contact-1 release	W (06h)	unsigned 16	only 55AAH
5	4205h	Contact-2 pull in	W (06h)	unsigned 16	only 55AAH
6	4206h	Contact-2 release	W (06h)	unsigned 16	only 55AAH

Modbus-RTU data map of the settings (address=4000h)					
no	content	R/W	type	range	multiplier
0	Current transformer ratio	R/W	unsigned 16	0 ... 2000	1
1	Voltage transformer ratio	R/W	unsigned 16	0 ... 50000	0.1
2	Demand time	R/W	unsigned 16	1 ... 60	
3	Language	R/W	unsigned 16	0:Turkish 1:English	1
4	Contact-1 parameter A	R/W	unsigned 16	0 ... 32	1
5	Contact-1 parameter B	R/W	unsigned 16	0 ... 32	1
6	Contact-1 operator A	R/W	unsigned 16	0: greater than 1: less than	1
7	Contact-1 operator B	R/W	unsigned 16	0: greater than 1: less than	1
8	Contact-1 Ton	R/W	unsigned 16	0 ... 50000	10ms (0.01s)
9	Contact-1 Toff	R/W	unsigned 16	0 ... 50000	10ms (0.01s)
10	Contact-1 Hysteresis	R/W	unsigned 16	10 .. 500	%0.1
11	Contact-2 parameter A	R/W	unsigned 16	0 ... 32	1
12	Contact-2 parameter B	R/W	unsigned 16	0 ... 32	1
13	Contact-2 operator A	R/W	unsigned 16	0: greater than 1: less than	1
14	Contact-2 operator B	R/W	unsigned 16	0: greater than 1: less than	1
15	Contact-2 Ton	R/W	unsigned 16	0 ... 50000	10ms (0.01s)
16	Contact-2 Toff	R/W	unsigned 16	0 ... 50000	10ms (0.01s)
17	Contact-2 Hysteresis	R/W	unsigned 16	10 .. 500	%0.1
18	Password	R/W	unsigned 16	0 ... 9999	1

19	Contact-1 Value A	R/W	unsigned 32	0 ...60000(I,U) 25000 ...75000(Fr) 0 ...108000(P,Q,S) 0 ...50000(THD)	For I: 0.0001 For U: 0.01 For P,Q,S: 0.1 For Fr: 0.001 For THD: 0.01
21	Contact-1 Value B	R/W	unsigned 32	0 ...60000(I,U) 25000 ...75000(Fr) 0 ...108000(P,Q,S) 0 ...50000(THD)	For I: 0.0001 For U: 0.01 For P,Q,S: 0.1 For Fr: 0.001 For THD: 0.01
23	Contact-2 Value A	R/W	unsigned 32	0 ...60000(I,U) 25000 ...75000(Fr) 0 ...108000(P,Q,S) 0 ...50000(THD)	For I: 0.0001 For U: 0.01 For P,Q,S: 0.1 For Fr: 0.001 For THD: 0.01
25	Contact-2 Value B	R/W	unsigned 32	0 ...60000(I,U) 25000 ...75000(Fr) 0 ...108000(P,Q,S) 0 ...50000(THD)	For I: 0.0001 For U: 0.01 For P,Q,S: 0.1 For Fr: 0.001 For THD: 0.01

integer:	Equivalent
0	None
1	I_L1
2	I_L2
3	I_L3
4	I_Mp
5	U_L1
6	U_L2
7	U_L3
8	U_L12
9	U_L23
10	U_L31
11	Fr
12	P_L1
13	P_L2
14	P_L3
15	P
16	Q_L1
17	Q_L2
18	Q_L3
19	Q
20	S_L1
21	S_L2
22	S_L3
23	S
24	THD_I_L1
25	THD_I_L2
26	THD_I_L3
27	THD_U_L1
28	THD_U_L2
29	THD_U_L3
30	THD_U_L12
31	THD_U_L23
32	THD_U_L31