



# **Control Software ELMA**

**CONCISE OPERATION MANUAL  
FOR TEST EQUIPMENT OPERATION**

**QUICK GUIDE**

Version 0.9

- 1 – Switch on electronic power source of the equipment ELMA
- 2 – Switch on the control PC
 

NOTE:

a) The program ELMA we recommend to start only after the state, when the power source is switched on and the apparatus Signal Generator displays the voltage and current magnitudes, ready for generation at the power source output.
- 3 – Start the program ELMA
- 4 – Wait till the moment, when the main window of Control Program ELMA is displayed

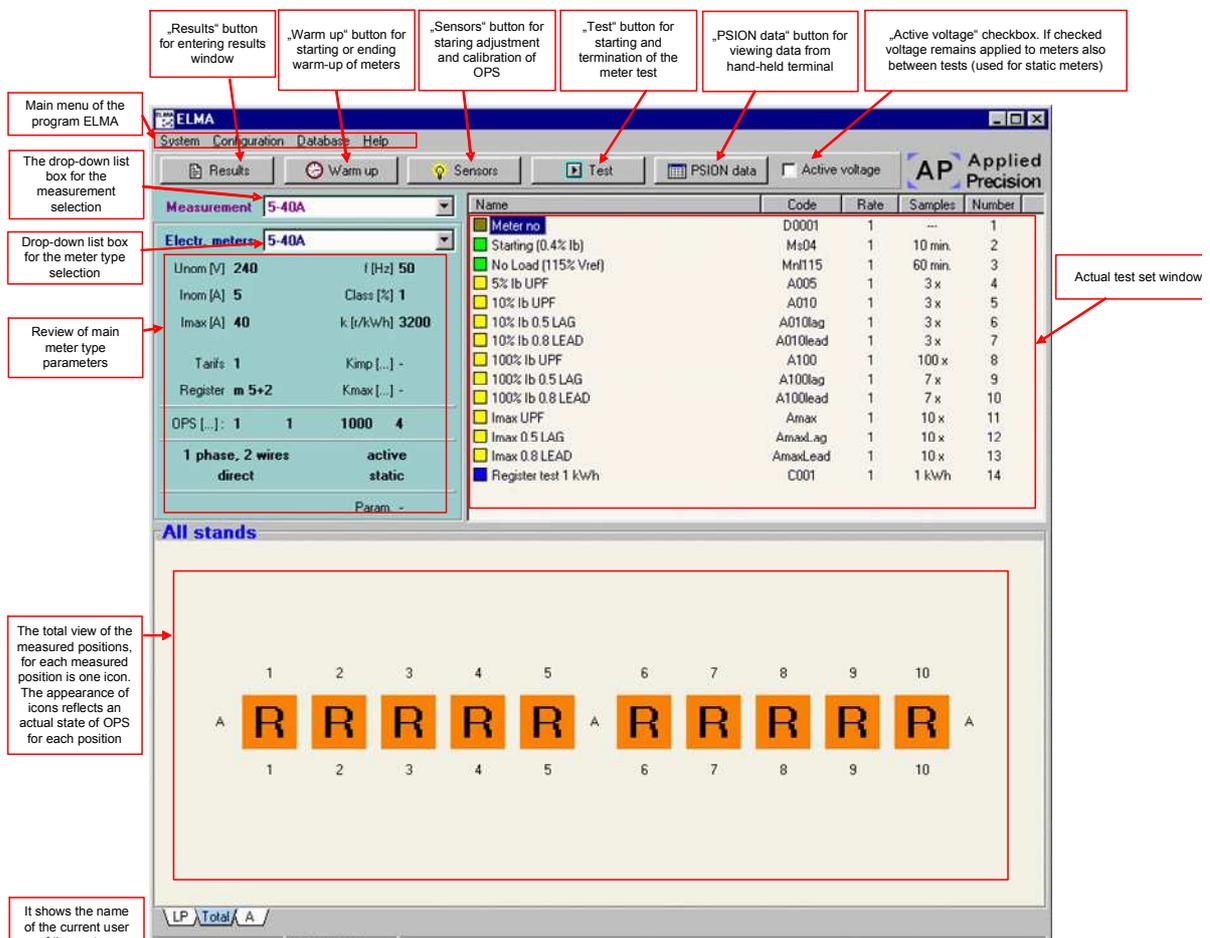


Fig. 1 – Main window of the Control Program ELMA

## 5 – Select the meter type

From the unpacking list “Electricity Meters” select a type of the meter for adjustment or verification. If there is no meter in the list, it is necessary first of all to define it in the database of the meters (more detailed information can be found in the “User’s manual for the program ELMA” in the chapter “Database of the meter types”).

NOTES:	
b)	After selection of the meter type we recommend to check basic parameters of meter as “Ur” – nominal voltage, “I <sub>n</sub> /I <sub>b</sub> ” – nominal/basic current, “I <sub>max</sub> ” – maximal current, displayed under unpacking list with actual values of hanged meters. You will evade a possible damage of meters in a case of mistake when selecting the meter.
c)	The unpacking list “Electricity meters” is not accessible, if in the measurement there are measured results. It means that the meter type change can be performed only when there are not any measured results. Erasing of results may be possible in the window “Results” by the knob “Erase”.

## 6 – Select measurement

From the unpacking list “Measurement” select a required measurement (measurement represents one set of tests, what will be performed during adjustments or verification of the meters. If required measurement does not exist it is necessary to create it (more detailed information you will find in “User instruction manual for the program ELMA” in the chapter “Measurement database”).

NOTE:	
d)	The unpacking list “Measurement” is not accessible, if there are in the measurement measured results. It means that change of the meter type is possible to perform only when there are not any measured results. Erasing of results is possible to perform in the window “Results” with the knob “Erase”.

## 7 – Check correct meters connection to the racks/stands

## 8 – Adjust and calibrate OPS-s

Un the program ELMA press the button “Scanners”, what starts a process of setting and starting of optical scanners (OPS).

8.1 After pressing the button “Scanners” the system starts to generate voltages and currents to the meters, to start to register generated power. After display of power the OPSs are switched over to the mode “Bargraph”. In the screen of PC the dialogue window is displayed “Set the scanners of the units OPS !”.

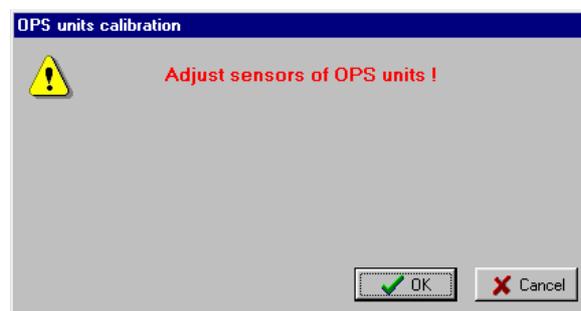


Fig. 2 – Appeal to set the scanners

8.2 The system waits to set the position of optical scanners against the meter disc, eventually against the test output LED. This setting must be performed manually by operators for every measured position. The mode „Bargraph“ is determined for setting the scanner into the position, where it has sufficient sensitivity to correct evaluation of the meter error. The mark is of reflexive type (the electromechanical meter disc). The marc is or reflexive type (electromechanical meter disc) or active (static meter LED). For the reflexive mark (with electromechanical meter) there is set default

mode with activated emitting LED in the scanning head. For scanning of active mark (for all types of electronic meters) there is switched-off LED of the scanning head. There are displayed actual intensity of the scanned signal in a form of a bar scale; if the meter is in operational state (the disc is rotating or test output LED is blinking), then change of a signal intensity scanned away from a mark defines actual sensitivity to the meter mark. Sufficient sensitivity to the meter mark is necessary condition for a right discrimination of the meter mark and corresponding meter error measurement. A mode „Bargraph“ is indicated by the dot in the left inferior part of the display. Displayed bar graph, indication actual scanned signal intensity has a form of bars, moving from the left to the right. The number of bars (can be 0 to 5) indicates scanned actual signal intensity.

- 8.3 After setting the scanners in all measured positions it is necessary to continue by pressing the button “OK”, what activates calibration of the OPS units. The process of calibration takes 14 seconds and it is indicated by the message “CAL” in the OPS displays.
- 8.4 The calibration ends automatically after 14 seconds and the system is then ready for measurement.
- 8.5 Setting and calibration of the OPS scanners must be performed always, when changing the meters lot or when the supplying power source is switched off and repeatedly switched-on again, always when a measurement is switched on.

## 9 – Start the test

- 9.1 Accentuate the corresponding test in the test window.
- 9.2 Press the button “Test” for switching on the test.

After pressing the button “Test” the system switches on the accentuated test. The switched-on test is indicated by the arrow.

Name	Code	Rate	Samples	Number
Meter no	D0001	1	---	1
Starting (0.4% Ib)	Ms04	1	10 min.	2
No Load (115% Vref)	Mnl115	1	60 min.	3
5% Ib UPF	A005	1	3 x	4
10% Ib UPF	A010	1	3 x	5
10% Ib 0.5 LAG	A010lag	1	3 x	6
10% Ib 0.8 LEAD	A010lead	1	3 x	7
100% Ib UPF	A100	1	20 x	8
100% Ib 0.5 LAG	A100lag	1	20 x	9
100% Ib 0.8 LEAD	A100lead	1	7 x	10
Imax UPF	Amax	1	10 x	11
Imax 0.5 LAG	AmaxLag	1	10 x	12
Imax 0.8 LEAD	AmaxLead	1	10 x	13
Register test 1 kWh	C001	1	1 kWh	14

Fig. 3 – Explanation to the window items of the programming line

- 9.3 The system behaviour during the test depends on a type of the performed test.

### 9.3.1 Automatic test

- The system starts to generate defined burden point.
- It switches the units OPS to the mode “Measurement”, the OPS units will be gradually displaying measured meters measured meter errors.
- The control program ELMA simultaneously displays the errors in all measured positions.

Display in the view “All stands”:

Significance of particular graphical symbols is described in details in the “User operational manual for the program ELMA” in the chapter “All positions”.

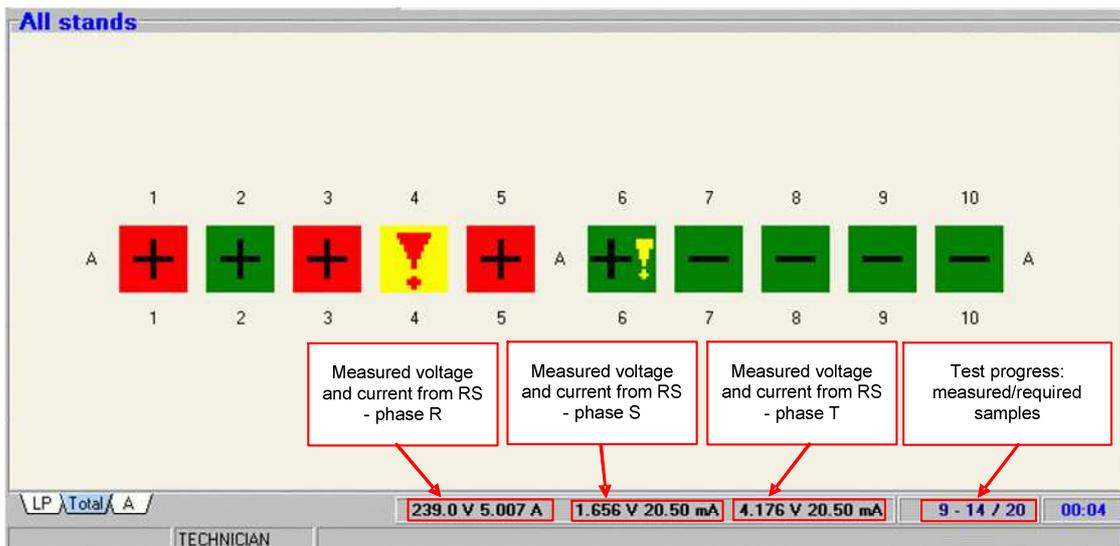


Fig. 4 – Explanation to the window items for test results – all racks/stands

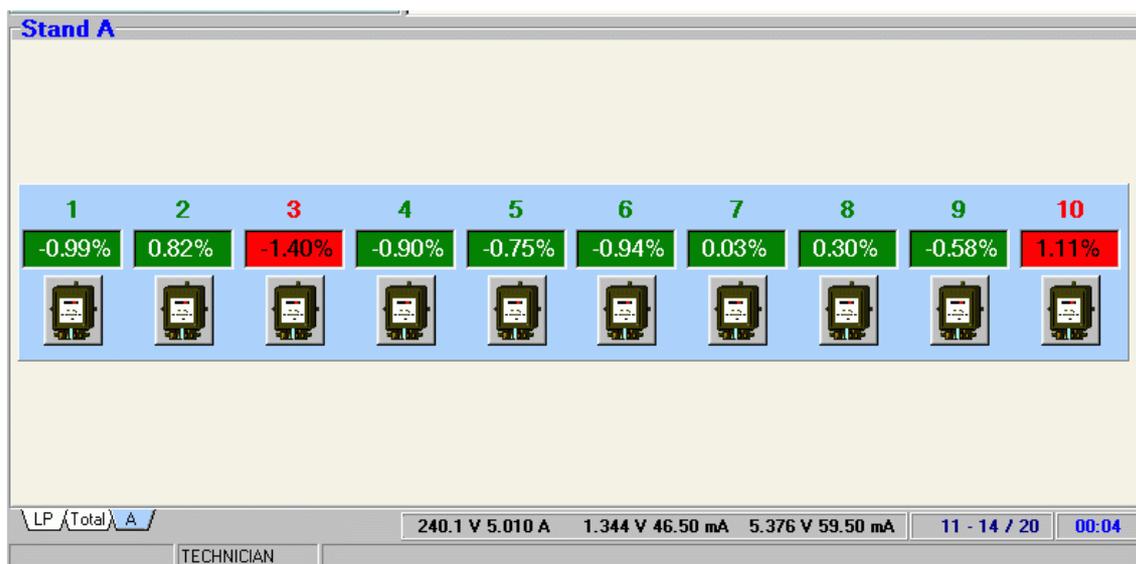


Fig. 5 – Explanation in item “Stand A”

Automatic test ends after measurement of determined number of values in each measuring position. In the sample in the picture there is defined number of 20 values in each position. After measuring 20 values, the system automatically ends generation of the power and evaluates the test, including calculation of measurement uncertainties.

NOTE:	
e)	Modern simple or multi-function and multi-energy static electricity meters are equipped with electronic tariff devices with many registers in the memory (from several to several hundreds) in what there are stored measured and calculated results of measurements. For such smart meters, if verification of the meter will include also register contents reading, the equipment ELMA must be equipped with the units OPS 300 and with corresponding software. This is valid also for programming of the meters on test equipment ELMA.

### 9.3.2 Manual test

The term manual tests comprise starting current test, creepage and meter constant verification, what evaluation requires active collaboration of operators. The test of the maximum demand verification can be either manual for older types of electricity meters.

- The system starts generation of defined burden point;
- The test course depends on the type of the meter construction:

#### 9.3.2.1 Electromechanical electricity meters

The OPS units will be switched over to the mode “Manual”. In the OPS units displays there is shown the text “YES”, what indicates, that the meter has complied with the test conditions.

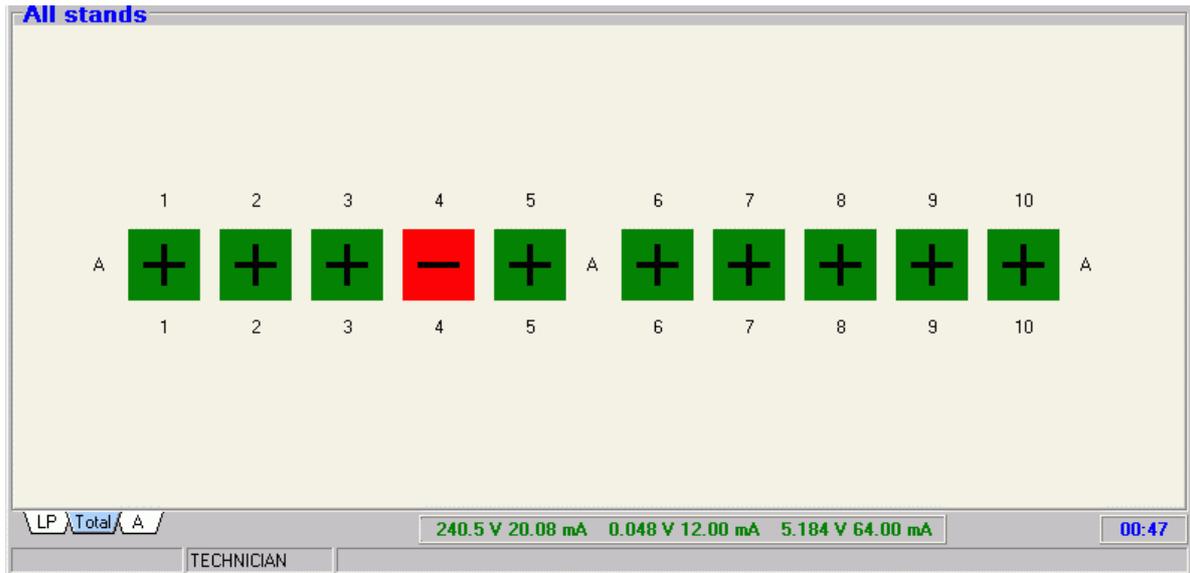


Fig. 6 – Display in the item “All stans”

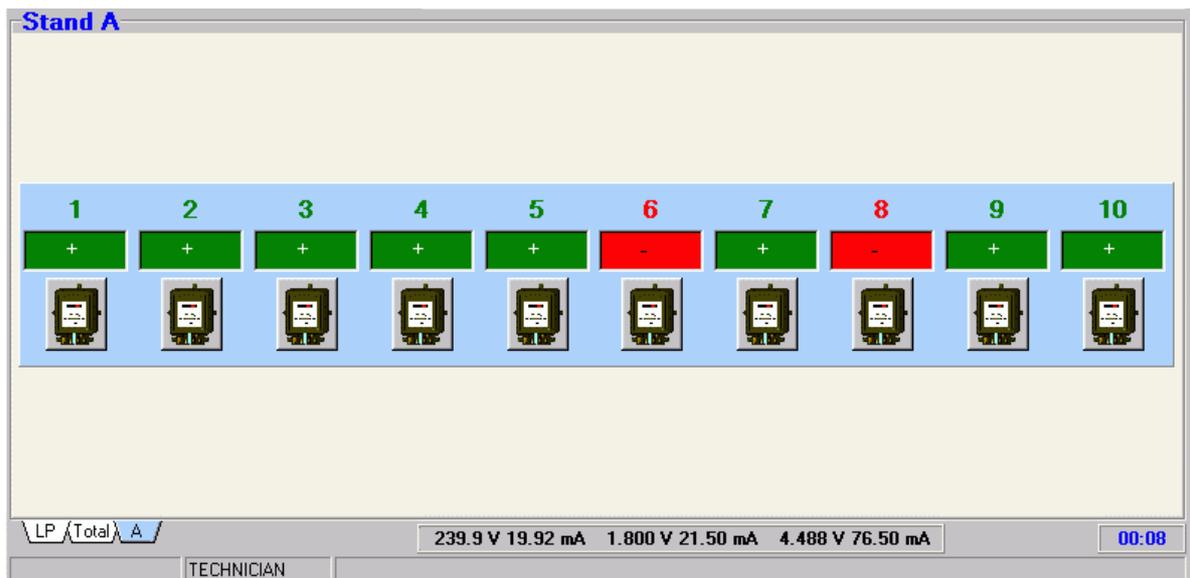


Fig. 7 – Display in the item “Stand A”

The manual test ends after elapsing defined time. The operators are asked to evaluate the test in a manual way.

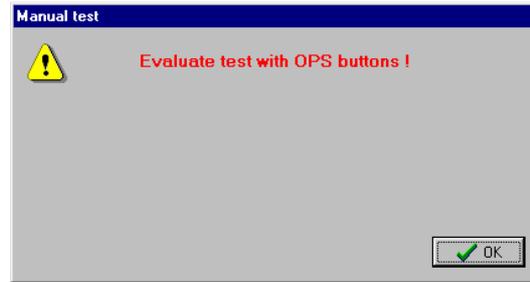


Fig. 8 – Appeal to record values in the scanners

For evaluation it is necessary to use the button of OPS unit. The button permits to switch over the statuses “complies/ not complies” (“YES/NO”).

### 9.3.2.2 Static electricity meters

The OPS units are set to the mode “Counter”, where the OPS units have displayed the text “Cnt”. In this mode the OPS unit counts the impulses from the meter test LED.

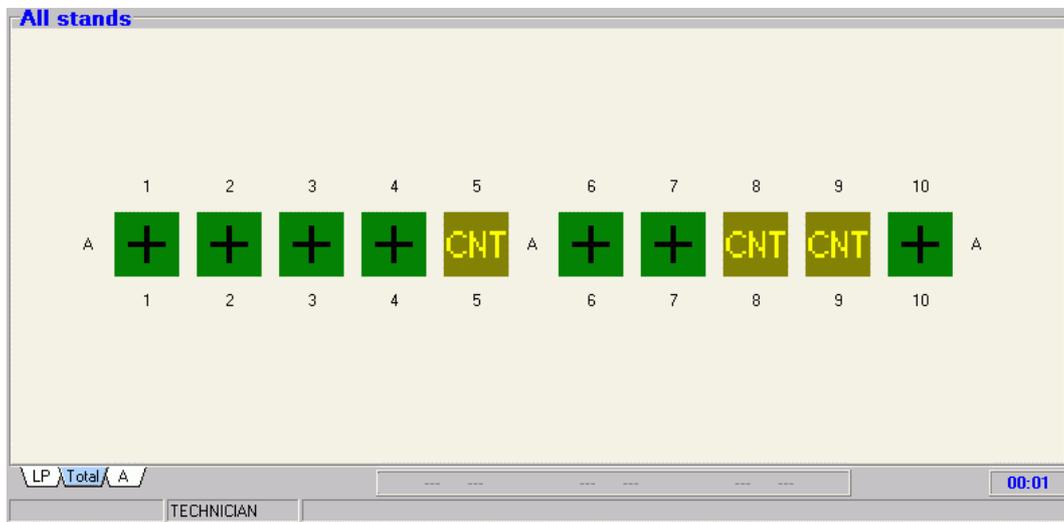


Fig. 9 – Display in the view “All stands”

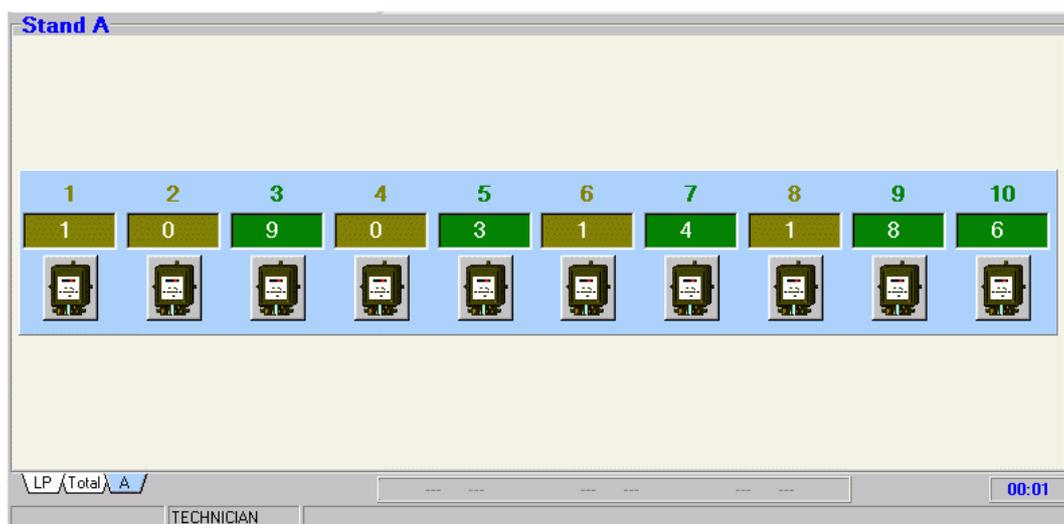


Fig. 10 – Display in the view “Stand A”

For the test of creepage there is maximal permitted number of impulses equal to 1, otherwise the meter is evaluated as not complying.

For the test of starting current there is a minimal complying number of impulses equal to 2 during defined time. After reaching two impulses the meter complies with condition of test. After elapsing of defined time the test is automatically ended.

### 9.3.3 Electricity Meter Constant Verification

During this test there is supplied energy to the meters, what is determined. Evaluation of the test is based on comparison of register readings before and after applying of energy lot.

More information on the test of constant verification are described in the clause "Test of constant verification" in the user manual "Control System ELMA".

### 9.3.4 Maximum test

During this test there is supplied energy with constant power during integration time. Evaluation tests are based on comparison of maximal power measured by a reference standard of the system ELMA with the medium power measured by the meter.

More information on the test of medium power (and on maximum demand) is described in the chapter "Maximum demand test" in the user manual "Control System ELMA".

### 9.3.5 Tests: Serial Number, Meter Type, User Text, Final Registers Reading

These acts are defined as tests and they are determined for identification meter data entry.

More information on these tests are described in the chapter "Input of data from hand-held terminal" v of the user manual "Control system ELMA".

## 10 – View of results

Measured results are accessible in the window "Results", what is possible to be activated by pressing program.

	A1#	A2#	A3#	A4	A5#	A6#	A7#	A8#	A9#	A10#
D0001 - Meter no	111111	111112	111113	111114	111115	111116	111117	111118	111119	111120
Ms04 - Starting [0.4% Ib]	+ (9)	+ (6)	+ (6)	+ (4)	+ (7)	+ (8)	+ (9)	+ (9)	+ (5)	+ (7)
Mnl115 - No Load [115% Vref]	+ (1)	+ (1)	+ (1)	+ (0)	+ (0)	+ (0)	+ (0)	+ (0)	+ (1)	+ (0)
A005 - 5% Ib UPF	0.08	-1.03	1.49	-1.75	-0.42	<b>2.10</b>	0.03	-0.39	-0.73	1.65
A010 - 10% Ib UPF	<b>-2.33</b>	1.34	0.26	1.78	0.17	<b>-1.95</b>	1.49	-1.50	-0.79	-1.61
A010lag - 10% Ib 0.5 LAG	-0.74	<b>-2.33</b>	0.21	0.46	-0.03	<b>2.19</b>	-1.64	1.15	-0.82	0.41
A010lead - 10% Ib 0.8 LEAD	1.05	0.04	-1.00	-0.97	1.29	<b>-1.78</b>	0.62	0.74	-0.85	<b>2.16</b>
A100 - 100% Ib UPF	-1.82	<b>-2.13</b>	0.23	-0.11	<b>-2.25</b>	-1.08	1.67	<b>-1.97</b>	-0.76	-0.93
A100lag - 100% Ib 0.5 LAG	1.38	-0.50	<b>-2.09</b>	1.74	<b>2.07</b>	0.87	-1.23	<b>2.25</b>	-0.04	1.04
A100lead - 100% Ib 0.8 LEAD	0.55	<b>2.44</b>	1.64	-1.03	-1.81	-0.46	<b>-2.11</b>	-0.48	-0.12	-0.20
Amax - Imax UPF	-1.15	-0.84	-1.87	1.66	-1.54	0.34	0.92	<b>2.28</b>	-1.68	-1.51
AmaxLag - Imax 0.5 LAG	1.63	<b>-2.48</b>	1.52	0.06	0.63	-1.24	<b>1.99</b>	<b>-1.98</b>	-1.73	-0.92
AmaxLead - Imax 0.8 LEAD	-1.00	1.00	-0.35	-0.40	<b>-2.05</b>	1.52	0.12	-1.82	<b>-2.20</b>	<b>1.94</b>
C001 - Register test 1 kWh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Fig. 11 – Window "Results"

The results are displayed in the form of table where one line represents one measured position. The colour of head of the column determines, whether the meter in the given position has complied (green colour) or has not complied (red colour).

More detailed information on any result can be obtained in the window, what displays after keeping the cursor of the mouse over the given field of the table.

-0.11	-2.25
1.74	avg -0.109 %
	stDev +0.017
-1.03	1. -0.12 %
1.66	2. -0.12 %
	3. -0.11 %
0.06	4. -0.10 %
	5. -0.13 %
-0.40	6. -0.13 %
	7. -0.12 %
0.00	8. -0.08 %
	9. -0.12 %
	10. -0.09 %
	11. -0.11 %
	12. -0.12 %
	13. -0.11 %
	14. -0.13 %
	15. -0.09 %
	16. -0.09 %
	17. -0.10 %
	18. -0.08 %
	19. -0.12 %

Fig. 12 – Details of Automatic Test results

0.00	0.00
1.	1004.000
2.	1005.000
3.	1 kWh

Fig. 13 – Details of the Meter Constant Verification result

## 11 – To print protocols

Impression of protocols requires to have MS Word installed.

Impression of protocols can be performed by pressing the button “Protocol” in the window “Results”.

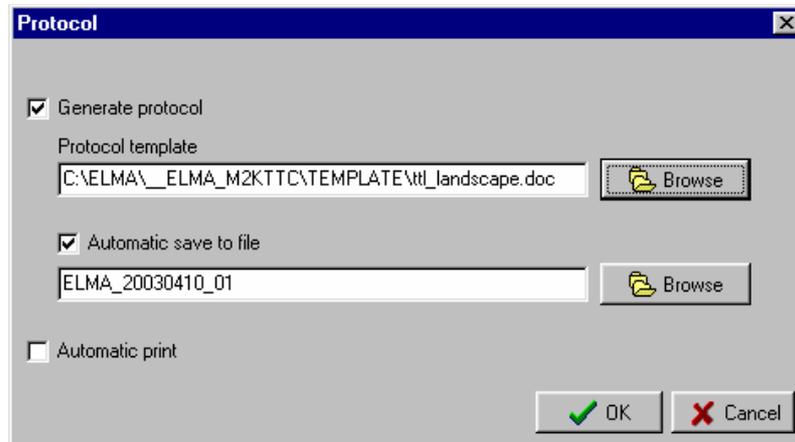
The window “head of protocol” then is shown, where all information can be checked from the head of created protocol.

Protocol header		Measured electricity meters	
Protocol number	ELMA_20030410_01	Manufacturer	AP
Date 1	10.04.2003	Type	ET 2310
Date 2	10.04.2003	Model	
Temperature	23.5C	Precision class	2 %
Relative humidity		U	240 V
Pressure		I	5-40 A
Name1	NAME1	k	3200 imp/kWh
Name2	NAME2	Frequency	50 Hz
Remark		Imp. output const.	250 imp/kWh
Label_UserText1		Comment	
Label_UserText2		Calibration valid until	2008
Label_UserText3			

OK

Fig. 14 – Display in the view “Protocol headline”

After pressing the button “OK” the window “Protocol” is displayed, where a way of protocol generation has to be set.



**Fig. 15 – Setting of the mode of protocol generation**

After generation of protocol it is necessary to choose the protocol pattern, to select automatic storing to the file and eventually automatic printing to the printer.

After pressing the button “OK” the protocol is generated and eventually stored into the file and printed.

More detailed information on the protocols creation is described in the chapter “Creation and printing of protocols” in the user manual “Control system ELMA”.