Grid analysis tool MC 7000-3

Manual

version 1.0 E

⚠️

CAUTIONS !

1. High voltage !

2. The MC7000-3 must not be operated without protective earth conductor connected!

3. The measuring device is suitable only for usage in low-voltage switchgear systems.
   The maximum permissible input voltages (see technical data) must not be exceeded!

4. The device must only be operated by qualified staff!

CONTENTS

Section 1: GENERAL

The measuring device MC7000-3 has been developed for three-phase measuring, display and storage of electric parameters in low-voltage grids.

The easy to use Windows-based software (included in the delivery) allows a fast and easy evaluation of the measured data. Based on the findings of this evaluation the optimum design for a tailormade PFC solution or the inspection of an existing one is easily performed.
The collected data is available in Excel-format giving the user further processing options.

Additional features:

☑ Equipped with a SD memory card slot for data storage and easy passing on without online connection. A 1GB memory-card is already included in the delivery.
☑ Comfortable programming of recording interval and duration via timers
☑ Display and internal storage of maximum values with time stamp
☑ Display of date and time
☑ Display of harmonics, bar diagram available
☑ Large number of display options e.g. Rotating display and adjustment of font size
☑ Windows-based software allows a fast and easy evaluation of the measured data.
☑ Administration of several projects possible

Graphical display

☑ Several pre-configured graphical display of standard values
☑ Large number of configuration options
☑ Graphical display of selected grid values
☑ Comfortable editing of parameters
☑ Comfortable editing of recording time intervall
☑ Display as line graph or bar diagram
☑ Simultaneous display of several diagrams
☑ Zoom-functions
☑ Copy into clipboard and print function available

Mathematical evaluation of measured values

☑ Comfortable evaluation of measured grid-values
☑ Recommendation of the compensation system output depending on a target cos-phi
☑ Evaluation of measured harmonics
☑ Recommendation of detuning factor for a PFC-system
☑ Display of influence of a selected detuning factor on the harmonics
☑ Several tools for calculation and conversion of important values when designing a PFC-system

Section 2:   IMPORTANT NOTES

The measuring device MC7000-3 has been designed for three-phase measuring, display and storage of electrical measuring values in a low-voltage-grid.

⚠ The device must only be operated by qualified personnel and must only be operated according to the given safety instructions. In addition, the relevant legal and safety regulations for live operation have to be obeyed.

⚠ The measuring device is only designed for the usage in low-voltage switchgear systems. It is not suitable for measuring in medium- and high-voltage grids.

The device must only be operated by qualified staff!

⚠ Before applying the measuring voltage, the device must be grounded via the respective connector (protective earth conductor socket)! An additional PE-socket is available. Measurements with an not grounded device are dangerous and not allowed.
The MC7000-3 must not be operated without protective earth conductor connected!

⚠ When connecting to systems where the zero-potential status is not ensured, the regulations for the prevention of industrial accidents have to be obeyed!
For voltage measuring only measuring lines with an isolation class of minimum CATIII/1000 V have to be used.

The measurement can be used for single and three phase systems with or without neutral conductor. The maximum measuring voltage is 3 x 440 V ~ (L-N) or 3 x 760 V ~ (L-L).
The supply voltage is 110 … 230 V +/- 15 %.
Connection clamps must only be plugged at zero-potential!
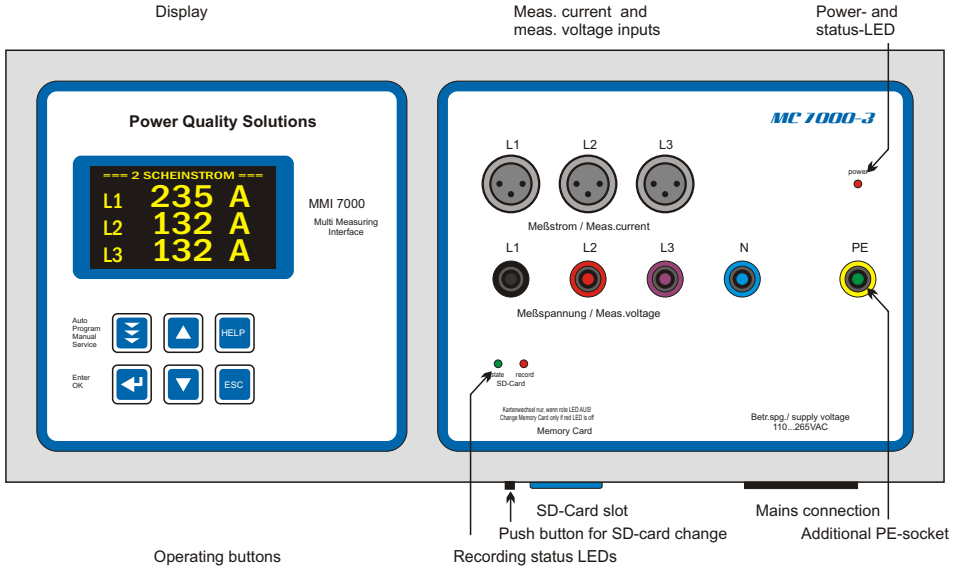
⚠ **Attention!**
Connection to over voltage may result in the destruction of the device!

When operating the measuring device not in accordance with above instructions, the device poses a potential danger!

A periodical safety check of the measuring device is recommended.
In case of any indication of mal-function of the device, it must immediately be put out of operation.

Section 3: APPEARANCE AND CONTROL

MC7000-3: Front view

Display

Meas. current and
meas. voltage inputs

Power- and
status-LED

Power Quality Solutions

=== 2 SCHEINSTROM ===

L1 **235 A**
L2 **132 A**
L3 **132 A**

MMI 7000

Multi Measuring
Interface

Auto
Program
Manual
Service

Enter
OK

HELP

ESC

MC 7000-3

L1   L2   L3

power

Meßstrom / Meas.current

L1   L2   L3   N   PE

Meßspannung / Meas.voltage

state   record
SD-Card

Kartenwechsel nur, wenn rote LED AUS!
Change Memory Card only if red LED is off
Memory Card

Betr.spg./ supply voltage
110...265VAC

SD-Card slot
Push button for SD-card change

Recording status LEDs

Mains connection
Additional PE-socket

Operating buttons

RECORD-LED (red)
OFF: no recording
ON (with short interruptions): recording,
writing to card

STATUS LED (green)
Slowly flashing: no card or card error
ON (permanent): ok, ready for recording
Fast flashing: transmission error

Operating mode:
- Automatic
- Program.
- Manual oper.
- Service
- Expert Mode
- Osci - Mode
- Display Editor

Increase
selected
parameter

HELP
opens
help pages

HELP

ESC

ENTER/ OK
Confirmation
storage of
values

Reduce
selected
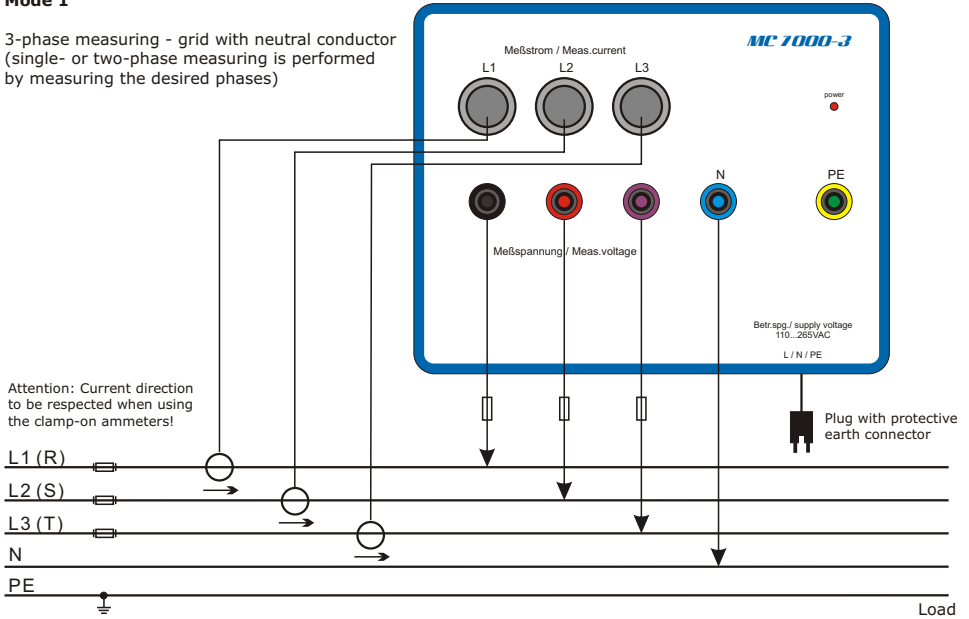parameter

Escape
previous
page/value
in the display

Section 4:   MODES OF CONNECTION

Mode 1

3-phase measuring - grid with neutral conductor
(single- or two-phase measuring is performed
by measuring the desired phases)

Meßstrom / Meas.current
L1   L2   L3

MC 7000-3

power

N   PE

Meßspannung / Meas.voltage

Betr.spg./ supply voltage
110...265VAC

L / N / PE

Attention: Current direction
to be respected when using
the clamp-on ammeters!

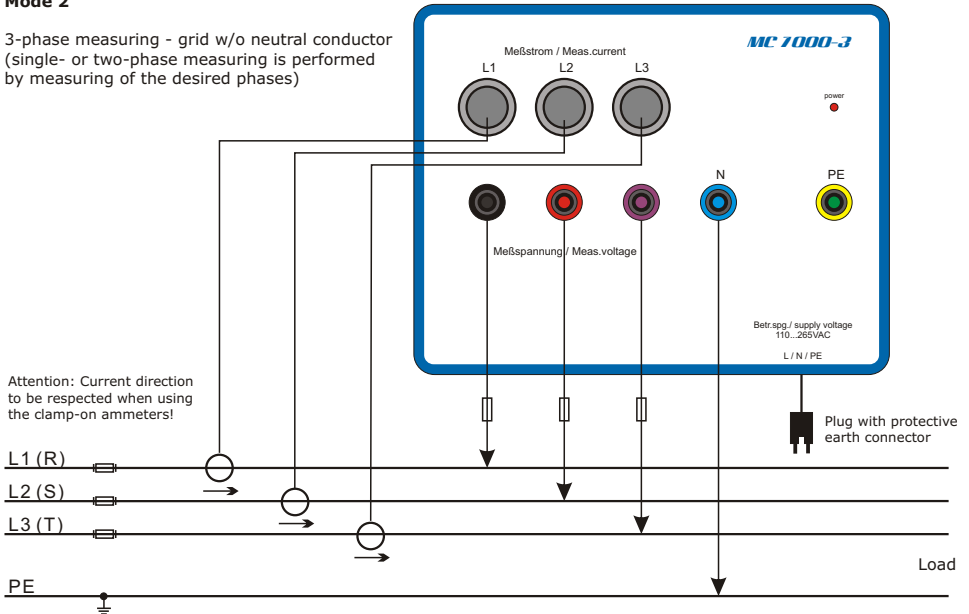Plug with protective
earth connector

L1 (R)
L2 (S)
L3 (T)
N
PE

Load

Mode 2

3-phase measuring - grid w/o neutral conductor
(single- or two-phase measuring is performed
by measuring of the desired phases)

Meßstrom / Meas.current
L1   L2   L3

MC 7000-3

power

N   PE

Meßspannung / Meas.voltage

Betr.spg./ supply voltage
110...265VAC

L / N / PE

Attention: Current direction
to be respected when using
the clamp-on ammeters!

Plug with protective
earth connector

L1 (R)
L2 (S)
L3 (T)

Load

PE

Before applying the measuring voltage, the device must be grounded via the respective connector (protective earth
conductor socket)! An additional PE-socket is available. Measurements with an not grounded device are dangerous and
not allowed.
The MC7000-3 must not be operated without protective earth conductor connected!

Section 5:   MENU / DISPLAY-MODEs

Repeated pressing of the 🔃 button activates the various menus in sequence:
**DisplayMode - ProgramMode - RecordMode - Service - ExpertMode - Osci-Mode - Display-Editor** and back to DisplayMode**.**
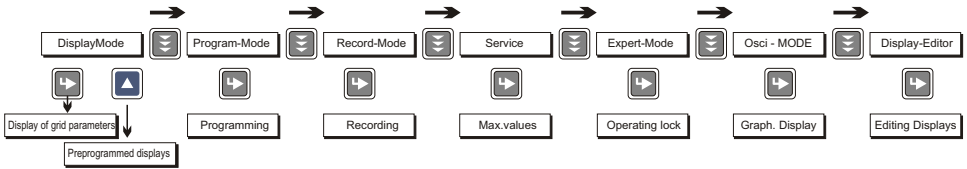
5.1 Display of selected grid parameters - display mode
--> Access from base menu by ↑ / ↓ buttons

In the display-mode, 6 (3 in large letters) freely selectable grid parameters are displayed.
6 different display configurations (stored in the display-editor) can be selected.
Switchover between the different displays is done via buttons ↑ / ↓ .
Selection / programming of display configuration is done in the display editor .

Example Display-Mode

Large display
voltage 3-phase
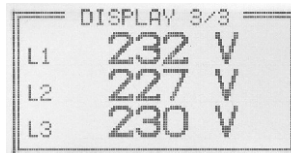
5.2 Display of individual grid values
--> Access from base menu via ENTER-button

By pushing the "ENTER-button" several grid parameters can be selected:

Action	Display	unit	%	Large display possible	Bar-diagramm	3-phase
ENTER	1 LINE VOLTAGE	V		x		x
ENTER	2 APPARENT CURRENT	A	x	x		x
ENTER	3 COS PHI ind/cap			x		x
ENTER	4 REACTIVE POWER	kvar		x		x
ENTER	5 ACTIVE POWER	kW		x		x
ENTER	6 APPARENT POWER	kVA		x		x
ENTER	7 FREQUENCY	Hz		x		x
ENTER	8 3.-51. HARMONICS		x		x	x
ENTER	9 HARMONICS THD-V/I		x		x	x
ENTER	10 ENERGY	kvarh(+),kvarh(-), kWh(+),kWh(-)				x
ENTER	11 TIME / DATE	↑ / ↓ changes date-format				
ENTER	12 Software version					
ENTER	back to: 1					

Buttons ↑ / ↓ change the display format:
The values can be displayed with unit, in % or as large display resp. bar diagram.

=== DISPLAY-MODE ===

Examples of different displays:
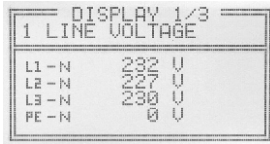
```
=== DISPLAY 1/3 ===
1 LINE VOLTAGE

L1-N     232 V
L2-N     227 V
L3-N     230 V
PE-N       0 V
```
VOLTAGE 3-phas.

```
=== DISPLAY 1/3 ===
2 APPAR.CURRENT

L1    1027 A
L2    1029 A
L3    1026 A
```
CURRENT 3-phas.

```
=== DISPLAY 1/2 ===
4 REACTIVE POWER

L1      64 kvar
L2      64 kvar
L3      56 kvar
Σ      184 kvar
```
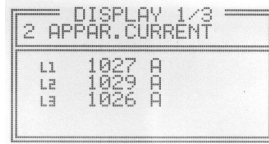REACTIVE PWR 3-phas.

```
=== DISPLAY 7/13 ===
8 HARMONICS  [3.]

L1 V  0.3% I  0.0%
L2 V  0.3% I  0.0%
L3 V  0.3% I  0.1%
```
HARMONICS in %

```
=== DISPLAY 5/8 ===
PF
L1  0.84 IND
PF
L2  1.00
PF
L3  0.95 IND
```
cos-Phi
LARGE LETTERS
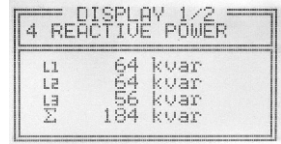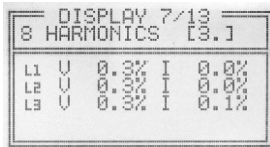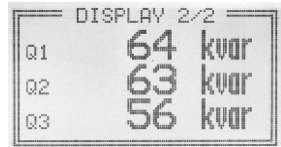
```
=== DISPLAY 2/2 ===
Q1   64 kvar
Q2   63 kvar
Q3   56 kvar
```
REACTIVE PWR
LARGE LETTERS

```
HARMONICS [V-1]
1.0%

0.5%

0%
  3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
```
HARMONICS diagram

```
THD
20%

10%

0%
 THD V 1 2 3   THD I 1 2 3
```
THD V/I as bar diagram
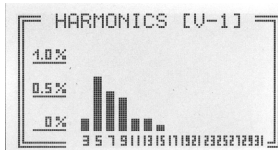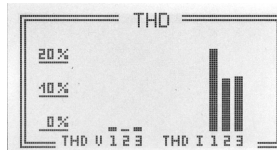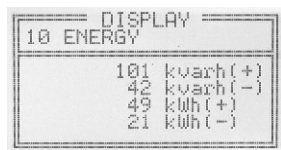
```
=== DISPLAY ===
10 ENERGY

      101 kvarh(+)
       42 kvarh(-)
       49 kWh(+)
       21 kWh(-)
```
ENERGY

Section 6:   HELP-FUNCTION

The MC7000-3 features a context related help function.

For each menu item one or more help pages are available which can be accessed directly by the HELP-button. Scrolling is done with ↑ / ↓ buttons, back/retrace with ESCape.

Section 7: PROGRAM-MODE

Pressing the 🗲 button one time switches from automatic operation to the programming mode.

The upper part of the display always shows the parameter; the adjustable values are shown in the lower part. Editable values are generally given in square brackets. Changes of these values can be done by the buttons ↑ / ↓. By pressing the "ENTER-button" the value is stored. Pressing the "ESC"-button allows to go one step back (without storing).

1 LANGUAGE This selects the language of the operating menu
     [GERMAN, ENGLISH, SPANISH, RUSSIAN, TURKISH]

```
===== PROGRAM-MODE =====
1 LANGUAGE [2]

      [ ENGLISH ]
```

2 CURRENT MEASURING RANGE
     [0…3000 A]   (0…300A / 0…30A / X:5A)
     Selection of optimum sensitivity for the clamp-on ammeters.
     The range X:5A is used for measurement in the secondary
     circle of an existing CT in the system.
     Attention! The minimum current is 1A!
     The measuring uncertainty in this case due to the secondary
     current transformer measurement is approx. 5%!

```
===== PROGRAM-MODE =====
2 CURRENT MEA.RANGE

      [0...3000 A]
```

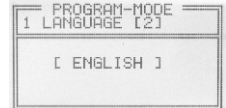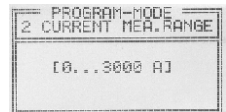**3 I-CONVERTER PRIM** [1000] A / X   (5 … 13000) A
     Selects the primary current of the current converter.
     -> only if X:5A is selected under 2
     Sequential adjustment of L1…L3
     via keys ↑ / ↓. Save and continue with ENTER

4 HARMONICS   3. - [15.]   (possible up to 51st)
     Setting of maximum order of harmonics up to which
     the calculations shall be done.
     Remark: The more calculations are to be performed, the
     slower the indication of harmonics in the display is updated!

```
===== PROGRAM-MODE =====
4 HARMONICS

      3. - [51.]
```
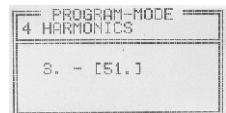
5 - 9 CLOCK [HH:MM], **DATE**   [DD.MM.YY]
     Set system-time and date
     (Due to an internal battery the time will be kept even in
     case of power loss)
     Selection with ↑ / ↓. Save/continue with ENTER

```
===== PROGRAM-MODE =====
5 CLOCK
     [08]: 37
      24 . 03 . 2010
```
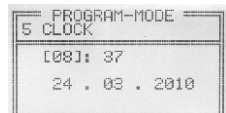
10 CONTRAST   [6]   (0…10)
     Adjustment of display contrast for best readability
     Selection with ↑ / ↓. Save/continue with ENTER
     (Only with LCD-display, not with OLED-display)

```
===== PROGRAM-MODE =====
10 CONTRAST

   ****** [6] ******
```
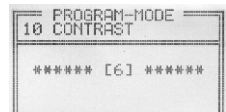
11 Basic settings   [NO]   (YES/NO)
     All parameters are set back to the factory settings.
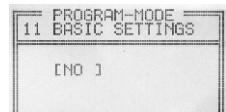
     ATTENTION: All user settings get lost !

```
===== PROGRAM-MODE =====
11 BASIC SETTINGS

      [NO ]
```

Section 8: RECORD-MODE

The RECORD-MODE is the main mode of the device. Here the recording of grid parameters is started or stopped (direct start or via timer) and the status of the recording is indicated in the display.

1 INTERVAL   [10s]   (1 / 10 / 60sec./15min.)

Recording interval for recording of grid values to the SD-card. By selecting a smaller interval a more precise evaluation is possible, but the available total recording time is reduced.

```
═══ RECORD-MODE ═══
1 INTERMITTENT [2]

   [10s]
```
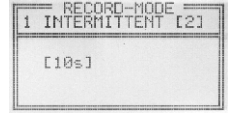
2   RECORDING   (NO / YES / TIMER / SERIES)

YES: Recording starts immediately and will create 1 file. Time of start and stop is indicated in the display (according to the maximum possible recording time).
TIMER: Enables the selection menu for programming of start and stop time of the recording.
SERIES: Recording starts immediately and will create some files up to the full memory capacity.

```
═══ RECORD-MODE ═══
2 RECORDING

   START: [TIMER]
```
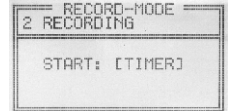
3-12   Programming of start and stop time of a recording

(Only if " TIMER" has been selected under 2 Recording)

3	START HOUR	8	STOP HOUR
4	START MINUTE	9	STOP MINUTE
5	START DAY	10	STOP DAY
6	START MONTH	11	STOP MONTH
7	START YEAR	12	STOP YEAR

```
═══ RECORD-MODE ═══
3 START HOUR

START:    [08]:  39
     24 . 03 . 10
STOP :    22 : 42
     31 . 03 . 10
```
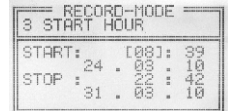
The values in the square brackets are sequentially editable.

After direct start / after programming of the timer the display changes over to the DISPLAY-MODE and indicates the progress / the status of the recording.

```
═══ DISPLAY 0/7 ═══
RECORDING : ON
PROGRESS  : 0%
STATUS    : ▶▶▶
```
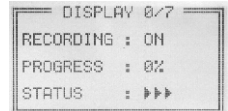
8.1 INTERRUPTION OF RECORDING

The recording can be interrupted or finished at any time under:
RECORD-MODE: 2 RECORDING   STOP:[YES]

```
═══ RECORD-MODE ═══
2 RECORDING

   STOP : [ YES ]
```
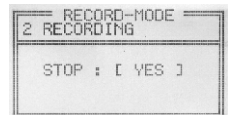
8.2 MEANING OF STATUS LEDs FOR THE SD-CARD SLOT:

RECORD-LED (red)

OFF: no recording
ON: (with short interruptions): recording,
Writing to card

🟢   🔴
state   record
SD-Card

STATUS LED (green)

Slowly flashing: no card plugged or card error
ON (permanent): ok, ready for recording
Fast flashing: transmission error

Section 9:   SERVICE-MENU

This service menu can be reached by the 🔃 button.
The stored maximum values of the grid parameters can be
displayed here.

Action	Display	Unit	3-phase
ENTER ↑/↓	1 min./max. VOLTAGE time stamp	in V	L1 ... L3
ENTER ↑/↓	2 max. CURRENT time stamp	in A	L1 ... L3
ENTER ↑/↓	3 max. REACTIVE POWER time stamp	in kvar	L1 ... L3
ENTER ↑/↓	4 max. ACTIVE POWER time stamp	in kW	L1 ... L3
ENTER ↑/↓	5 max. APPARENT POWER time stamp	in kVA	L1 ... L3
ENTER ↑/↓	6 max. THD - V / THD-I time stamp	in % / bar diagram	L1 ... L3
ENTER	7 MAX. VALUES RESET		
ENTER	8 ENERGY RESET		
ENTER	back to 1		

Section 10:   EXPERT-MODE

The expert mode has an access code:

1 PASSWORD   :   "6343"

2 OPERATING LOCK   [NO]   (NO / YES)

As a protection against unauthorized changes of the system parameters, the device is
equipped with a programming lock. This can be activated in the EXPERT MODE. When the
lock is active, all parameters can be checked but not changed.

Section 11: OSCI-MODE

Access via operation mode button in main menu.
In the osci-mode the actual form of a period of voltage and current is graphically displayed. This allows gathering of information about phase shift and wave form.
Assignment of current / voltage to same phase can be checked here.
Indication consecutively possible for L1…L3 (ENTER-button)
Updating is done via button ↓.
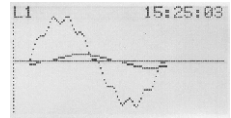
Section 12: DISPLAY-EDITOR

Access via operation mode button in main menu.
In the DISPLAY EDITOR the parameters that shall be permanently displayed in the Display mode can be selected.
6 different display settings with 3 / 6 measuring values can be programmed.

Section 13: MAINTENANCE AND WARRANTY

No maintenance of the MC7000-3 is required when operation conditions are obeyed. Nevertheless a rotating functional check of the device is recommended.

The measuring accuracy indicated is only guaranteed in case the device is tested / calibrated once a year by the supplier.

The accessories (connection and measuring lines, clamp-on ammeters) have to be checked for mechanical damages regularly. Damaged parts must no longer be used and have to be replaced by new ones!

The typical life expectancy of the internal Li-battery is 8…10 years. It is firmly connected to the circuit board and should only be exchanged by the manufacturer.
In the event of any interventions in the controller during the warranty period, all warranty claims lapse.

Section 14   Software for evaluation of grid parameters for the WINDOWS operating system

Software for evaluation of grid parameters for the WINDOWS operating system.
PC-software for evaluation of grid parameters recorded on the CD-card. The software is included in the delivery and allows the administration of any number of projects. The following program options are available with the software:

Graphical display and evaluation of recorded grid parameters:
- ☑ Several pre-configured graphical displays of standard parameters
- ☑ Graphical display of selected grid parameters, large number of configuration options
- ☑ Comfortable editing of parameters and time interval
- ☑ Simultaneous display of several diagrams with the same time reference
- ☑ Display of harmonic spectrum
- ☑ Display as line graph or bar diagram, zoom-functions included
- ☑ Copy into clipboard and print functions available

Mathematical evaluation of measured values:
- ☑ Automatic calculation of required kvar (target cos-Phi to be set by user)
- ☑ Recommendation of kvar steps for a PFC-system
- ☑ Evaluation of measured harmonics and recommendation of detuning factor of a PFC system of calculated size
- ☑ Evaluation of kvar requirement vs. time and the optimum switching time resulting from it. Recommendation of dynamic compensation if required.

Various useful tools for practicing PFC:
- ☑ Calculation of required compensation output for an inductive load at given inductivity and power factor
- ☑ Conversion of capacitor output for different voltages
- ☑ Adjustment of three phase / single phase capacitors
- ☑ Selection of required cable cross sections and fuses for power capacitors and / or compensation systems.

A detailed description of all software functions is available by the online help and also in the program description on the enclosed CD.
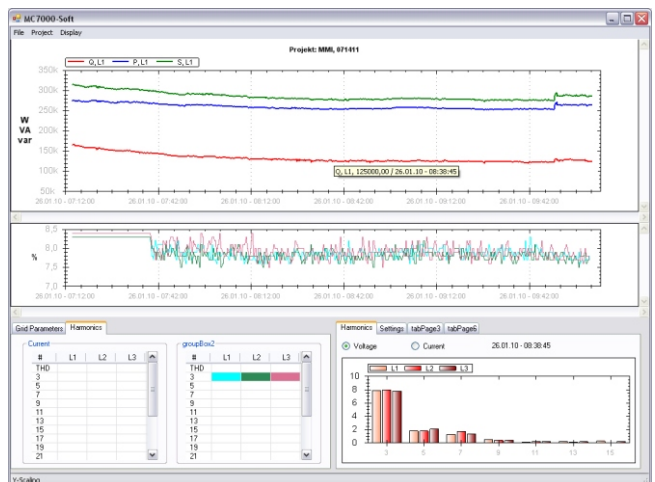
Annex 1:   Toubleshooting

Error display	Root cause / remedy
Indication of negative power in the display	- Check direction of clamp-on ammeters! - Check energy direction in the system (supply to the grid ?)
Incorrect grid cos-phi is indicated	- See above - Check phase position - Check phase adjustment (voltage / current at same phase) - See osci-mode
Measuring current display: " > " (overcurrent)	- Measuring current range exceeded, "POWER"-LED is flashing red at the same time - Switch-over current range!
Measuring voltage display: ">" (overvoltage)	- Measuring voltage range exceeded, "POWER"-LED is flashing red at thesame time
After switching on the template "SYSTEM-TEST" appears in the display	The system test serves to check the device after putting into operation. If this page shows up, at least one internal test is not ok. The error can be read but not removed here. In such a case please contact your local EPCOS partner.
"POWER" LED flashing red	- Over current or over voltage - Compare with display
Status LED (green) flashing slow Status LED (green) flashing fast	- No SD-card plugged or card error - Transmission error during recording
No indication of voltage	Check high power fuses in the safety measuring lines L1-L3. **Attention! Separate measuring lines from the grid before at both sides!** **Only identical fuses must be used for exchange.**

Version 1.0 E , May 2010

Annex 2:   Technical Data

Type series	MC 7000-3
Operating voltage	110…230 V~, +/-15%, 50 / 60Hz
Measuring voltage (3-phase)	3x 30…440 V~ (L-N); 50 / 60Hz
	3x 50…760 V~ (L-L); 50 / 60Hz
Measuring current (3-phase)	30 / 300 / 3000A; 50 / 60Hz
	with "MiniFlex" flexible current clamps
Power consumption	< 5 VA
Operation and display	
Menu languages	D / E / ES / RU / TR
Display	Illuminated full graphic display 128x64 dot
Display functions	
Display of grid parameters	3-phase
as real value / % / bar chart	cos-Phi, V, I, f, Q, P, S, THD-V, THD-I
Large display of 3 grid parameters	Selection via display-editor
Display of harmonics	3. - 51.harmonics of V and I
	Display also as bar graph
Osci-Mode	Possible
Precision	Current / voltage: 1%
	Active, reactive, apparent power: 2%
Integrated help function	Context depending, plain text
Recording / Memory functions	
Storing of all grid parameters on SD-Card according to the adjusted measuring interval	3-phase cos-Phi, V, I, f, Q, P, S, THD-V, THD-I single harmonics of V and I, energy
Storage media	SD-Memory card (in delivery)
Measuring interval	1 / 10 / 60 sec./ 15 min.
Total recording time per file per measuring interval 1 / 10 / 60 sec.	18 hrs. / 7 days / 48 days / 720 days
Additional storage of maximum values in the internal memory of a device	Voltage, current, active-,reactive-, apparent power, THD-V, THD-I
Error storage	Error register with time stamp
Others	
Casing	Dimension
	390 x 310 x 147mm (outside)
Weight	appr. 4 kg
Operating ambient temperature	-10 … +50°C
Storage temperature	-20 … +60°C
Degree of pollution	2
Over voltage category	CAT III
Protection class according to IEC60529	IP 40
Protection class	I
Safety standards	IEC 61010-1:2001; EN 61010-1:2001
EMV-resistance	IEC 61000-4-2:8kV; IEC 61000-4-4:4kV

Annex 2:   Technical data (Accessories)

Qty.	Description:	Remarks
1 pc.	Measuring device MC7000-3	
1 pc.	Low power device connection	
3 pcs.	Safety measuring cable 2m 1000V, CAT IV, incl. internal high power fuse	black red violet
1 pc.	Safety measuring cable 2m 1000V, CAT III	blue
4 pcs.	Safety dolphin clips 1000V, CAT III	black, red violet, blue
1 pc.	Manual	
1 pc.	Windows-based software-CD	
1 pc.	SD-memory card	
3 pcs.	MiniFlex flexible current clamps Cable length 2.8m max. 3000A, sensor L=400mm 600Vrms (CAT IV), 1000Vrms (CAT III)	Accessory mandatory, but not included. To be ordered separately

PROGRAM-MODE

RECORD-MODE

Column 1

DISPLAY 1/7
L1 230 V
L2 230 V
L3 230 V

DISPLAY 2/7
L1 123 A
L2 239 A
L3 167 A

DISPLAY 3/7
PF L1 1.00
PF L2 0.98 IND
PF L3 0.97 IND

DISPLAY 4/7
Q1 88.23 kvar
Q2 89.50 kvar
Q3 90.20 kvar
cos φ L1 1.00
cos φ L2 0.98 IND
cos φ L3 0.97 IND

DISPLAY 5/7
QΣ 88.23 kvar
PΣ 89.50 kW
SΣ 90.20 kVA
cos φ Σ 0.98 IND

DISPLAY 6/7
f1 50 Hz
f2 50 Hz
f3 50 Hz
QΣ 88.23 kvar
PΣ 89.50 kW
SΣ 90.20 kVA

DISPLAY 7/7
1.0%
0.5%
0%
THD V 1 2 3   THD I 1 2 3

Column 2

1   LINE VOLTAGE
L1-N 230 V
L2-N 230 V
L3-N 230 V
PE-N 0 V

2   APPAR. CURRENT
L1 123 A
L2 239 A
L3 167 A

3   COS φ
cos φ L1 1.00
cos φ L2 0.98 IND
cos φ L3 0.97 IND
cos φ Σ 0.99 IND

4   REACTIVE POWER
L1 88 kvar
L2 88 kvar
L3 88 kvar
Σ 264 kvar

5   ACTIVE POWER
L1 88 kW
L2 88 kW
L3 88 kW
Σ 264 kW

6   APPARENT POWER
L1 88 kVA
L2 88 kVA
L3 88 kVA
Σ 264 kVA

7   FREQUENCY
L1 50 Hz
L2 50 Hz
L3 50 Hz

8   HARMONICS [3.]
L1 V 0.5% I 1.0%
L2 V 0.8% I 1.0%
L3 V 0.5% I 1.0%

9   HARMONICS THD
L1 V 0.3% I 0.2%
L2 V 0.3% I 0.2%
L3 V 0.3% I 0.2%

10   ENERGY
xxx kvarh (+)
xxx kvarh (-)
xxx kWh (+)
xxx kWh

11   TIME / DATE
12:56:07
25.02.2009
(FORMAT-CHANGE)

12   SOFTWAREVERSION
MC 7000
VERSION V1.0

BACK TO 1

Column 3 (PROGRAM-MODE)

1   LANGUAGE [2]
[ENGLISH]

2   CURRENT MEA.RANGE
[0 ... 3000 A]

3   I-CONVERTER PRIM
[1000] A / 5 A

4   HARMONICS
3. - [15.]

5   CLOCK
[10] : 40
12 . 02 . 2010

6   CLOCK
10 : [40]
12 . 02 . 2010

7   DATE
10 : 40
[12] . 02 . 2010

8   DATE
10 : 40
12 . [02] . 2010

9   DATE
10 : 40
12 . 02 . [2010]

10   CONTRAST
****** [6] ******

11   BASIC SETTINGS
[NO]

BACK TO 1

Settings shown with grey background
colour are active only in case
of certain other settings.
If not needed they are not displayed.

Column 4 (RECORD-MODE)

1   INTERMITTENT [2]
[10s]

2   RECORDING
START: [NO]

3   START HOUR
START: [15] : 05
            12 . 02 . 10
STOP :   05 : 17
            20 . 02 . 10

4   START MINUTE
START: 15 : [05]
            12 . 02 . 10
STOP :   05 : 17
            20 . 02 . 10

5   START DAY
START: 15 : 05
            [12] . 02 . 10
STOP :   05 : 17
            20 . 02 . 10

6   START MONTH
START: 15 : 05
            12 . [02] . 10
STOP :   05 : 17
            20 . 02 . 10

7   START YEAR
START: 15 : 05
            12 . 02 . [10]
STOP :   05 : 17
            20 . 02 . 10

8   STOP HOUR
START: 15 : 05
            12 . 02 . 10
STOP :   [05] : 17
            20 . 02 . 10

9   STOP MINUTE
START: 15 : 05
            12 . 02 . 10
STOP :   05 : [17]
            20 . 02 . 10

10   STOP DAY
START: 15 : 05
            12 . 02 . 10
STOP :   05 : 17
            [20]. 02 . 10

11   STOP MONTH
START: 15 : 05
            12 . 02 . 10
STOP :   05 : 17
            20 . [02] . 10

12   STOP YEAR
START: 15 : 05
            12 . 02 . 10
STOP :   05 : 17
            20 . 02 . [10]

Back to main-menu

= DISPLAY 0/7 =
RECORDING : ON
PROGRESS : 5%
STATUS: >>>

Operating diagram (fast programming)
MC 7000-3

= SERVICE =	= EXPERT-MODE =	= OSCI-MODE =	=DISPLAY EDITOR=

= SERVICE =

1 min/max VOLTAGE
L1   230 / 235 V
L1   230 / 235 V
L1   230 / 235 V

2   max CURRENT
L1   123 A
L2   239 A
L3   167 A

3   max REACTIVE PWR
L1   88 kvar
L2   88 kvar
L3   88 kvar
Σ   88 kvar

4   max ACTIVE PWR
L1   88 kW
L2   88 kW
L3   88 kW
Σ   88 kW

5   max APPARENT PWR
L1   88 kVA
L2   88 kVA
L3   88 kVA
Σ   88 kVA

6   max THD-V   THD-I
L1   V 1.0%   I 2.0%
L2   V 1.0%   I 2.0%
L3   V 1.0%   I 2.0%

7   max VALUES
RESET [NO]

9   ENERGY
RESET [NO]

BACK TO 1

Use buttons for
display time-stamps!

= EXPERT-MODE =

1 PASSWORD   ????
0 * * *   (6343)

2   OPERATING LOCK
[NO]

3   PROTOCOL COM 1
[------]

BACK

= OSCI-MODE =

L1   13:41:06

L2   13:41:06

L3   13:41:06

BACK TO L1

=DISPLAY EDITOR=

= DISPLAY EDITOR =
1   DISPLAY 1 LINE 1
1 [LINE VOLTAGE L1]
2   LINE VOLTAGE L2
3   LINE VOLTAGE L3

= DISPLAY EDITOR =
2   DISPLAY 1 LINE 2
1   LINE VOLTAGE L1
2 [LINE VOLTAGE L2]
3   LINE VOLTAGE L3

= DISPLAY EDITOR =
3   DISPLAY 1 LINE 3
1   LINE VOLTAGE L1
2   LINE VOLTAGE L2
3 [LINE VOLTAGE L3]

4 DISPLAY 2 LINE 1
5 DISPLAY 2 LINE 2
6 DISPLAY 2 LINE 3
7 DISPLAY 3 LINE 1
8 DISPLAY 3 LINE 2
9 DISPLAY 3 LINE 3
10 DISPLAY 4 LINE 1
11 DISPLAY 4 LINE 2
12 DISPLAY 4 LINE 3
13 DISPLAY 4 LINE 4
14 DISPLAY 4 LINE 5
15 DISPLAY 4 LINE 6
16 DISPLAY 5 LINE 1
17 DISPLAY 5 LINE 2
18 DISPLAY 5 LINE 3
19 DISPLAY 5 LINE 4
20 DISPLAY 5 LINE 5
21 DISPLAY 5 LINE 6
22 DISPLAY 6 LINE 1
23 DISPLAY 6 LINE 2
24 DISPLAY 6 LINE 3
25 DISPLAY 6 LINE 4
26 DISPLAY 6 LINE 5
27 DISPLAY 6 LINE 6

= DISPLAY EDITOR =
BASIC SETTINGS
[NO]

BACK TO 1