

Film Capacitors – Power Factor Correction

Power Factor Controller

Series/Type:	BR7000
Ordering code:	B44066R7xxxE230
Date:	2016-06-01
Version:	4

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General

Characteristics

- Three phase measuring and controlling
- Switching relays customizable for three phase or single phase compensation
- Mixed three and single phase compensation
- Usage as power factor controller and/or as measuring device
- Intelligent control
- Menu driven handling (several plain languages)
- Optimized navigation in the menus by ESCAPE (ESC) button
- HELP-button for interactive help text (related to the particular menu)



Measurement and display

- 3-phase measurement of all relevant grid parameters (voltage, current, reactive power, active power, apparent power, frequency, harmonics up to the 31st order, temperature)
- Display and storage of maximum values, switching operations and operation time
- Display of date, time, operation
- Display of harmonics as THD value or for every harmonic as bar graph
- Oscilloscope mode for graphical display of a complete oscillation incl. harmonics
- Display of measured values freely programmable (display-editor)
- Operation
- Graphic display 128 × 64 dots with max. 8 lines, BR7000-HD with OLED display
- User interface plain language; several languages
- Self explanatory and optimized menu navigation

Modes of operation

- Display and automatic operation (normal control)
- Programming
- Manual operation
- Service operation
- Expert mode
- Osz-mode
- Display Editor
- Interface
- C-TEST

Controlling

- Simple controlling 3-phase (3-phase capacitors), max. 15 switching outputs. For 3-phase-measurement: controlling is done either according to the worst $\cos \varphi$ or average value. For single-phase-measurement: 2 current inputs are additionally available for measured capacitor bank currents
- Single phase controlling: max. 5 switching outputs for each phase (3 · 5 switching outputs); each phase is controlled separately. Single phase capacitors are switched to neutral.
- Mixed controlling: e.g. 3 · 3 single phase capacitors per phase (L-N) for balancing and additional 6 outputs for normal 3-phase-capacitors.
- Separate controlling of single phase capacitors L-L (without neutral)

Error messages

- Over voltage/under voltage/no voltage
- Over current
- Over/under compensated
- Harmonics (THD exceeded)
- Over temperature
- C-defect
- Warning switching operations
- Internal alert message with time stamp
- 1 alarm relay
- 1 relay freely programmable
- 1 relay for fan control

Inputs

- Operating voltage input: 110 ... 440 V AC $\pm 10\%$
- 3 measuring voltage inputs: 30 ... 440 V AC (L-N) / 50...760 V AC (L-L)
- 3 current inputs: X:1A / X:5A
- 1 external input

Outputs

- 3 · 5 relay outputs (contact NO) as switching outputs
- 3 relay outputs (contact NO) for message/alarm/fan
- 2 independent isolated interfaces RS485

Interfaces

- 2 independent, isolated RS485 interfaces; as RJ45 jack

Usage:

- As interface for PC for usage with Windows-Software BR7000-soft
- Firmware update possible
- As system interface for coupling with other controllers or enlargement with system accessories
- As interface for customer specific usage

Specialities

- Time controlled functions possible by internal timer (e.g. time controlled target $\cos \varphi$)
- Internal second parameter set available
- Oscilloscope mode for graphical display of current and voltage – individual phases selectable
- Display of harmonics as bar graph (fourier transformation)

Accessory: BR software for PC

- Connection to RS485-bus
- Administration of several PF-controller possible
- Convenient analysis of recorded values
- Direct connection to USB-port of PC via USB-adapter
- Windows XP upwards



Device settings and visualization

Display and recording of grid parameters

Technical data

Operating voltage	110 ... 440 V AC $\pm 10\%$, 50/60 Hz
Measuring voltage (3-phase)	3 · 30 ... 440 V AC (L-N), 50...760Vac (L-L); 50/60 Hz
Measuring current (3-phase)	3 · X: 5A / X:1A selectable
Power consumption	< 5 W (with 15 relays activated)
Sensibility	50 mA / 10 mA
Switching outputs	
Relay outputs for capacitor branches	15 relays, freely programmable for switching of 1- or 3-phase capacitors
Alarm relay	1
Message relay programmable	1
Relay for panel fan	1
Switching power of relays	250 V AC, 1000 W
Number of active outputs	programmable
Operation and display BR7000 BR7000-HD	illuminated full graphic display 128 × 64 dots OLED character display, yellow
Menu languages	D / E / ES / F / RU / TR
Number of control series	20
Freely editable control series	1 via Editor
Controlling	reach controlling of each phase (L-N) and (L-L)
Modes of operation	1- phase: up to 3 · 5 single phase capacitors 3- phase: up to 15 three-phase capacitors mixed Mode: for balancing and compensation
Control principle	series switching, circular switching, self-optimized intelligent switching mode
	4-quadrant operation
Measuring of current inside the capacitor	possible
target cos φ	0.1 ind ... 0.1 cap adjustable
2nd target cos φ (result driven)	0.1 ind ... 0.1 cap adjustable
Switch on time	selectable from 1 sec to 130 min
Switch off time	selectable from 1 sec to 130 min
Discharge time	selectable from 1 sec to 130 min
Internal clock/several timers	yes
Manual operation	yes
Fixed steps /skip steps	programmable
Zero voltage release	standard

Display/Display functions	
Display of grid parameters As real value/in %/as bar graph	3- phase cos ϕ , V, I, f, Q, P, S, \square Q, THD-V, THD-I
Large display of 3 grid parameters	selection in display editor
Oscilloscope mode	available
Precision	current/voltage: 1% active, reactive, apparent power: 2%
Integrated auxiliary function	context depending, plain text
Storage function	
Storage of maximum values	voltage, current, active, reactive and apparent power, temperature, THD-V, THD-I, voltage
Storage of minimum values	
Storage of switching operations	each output, separately re-settable
Storage of operation time	each capacitor, separately re-settable
Error storage	error register in plain text with time stamp
Error message	red backlight
Temperature monitoring	automatic switching off of steps
Temperature measuring range	–30 ... +100 °C
Interface	2 independent isolated interfaces RS485 (MODBUS RTU, system interface)
Grid measuring-, analysis- and parameterization software	for PC, included in the extend of delivery
External input	230 V AC, isolated
2. Parameter set (target cos ϕ)	via external input or event driven
Casing	panel-mounted instrument DIN 43 700, 144 × 144 × 50 mm
Weight	1 kg
Operating ambient temperature BR7000 BR7000-HD	–20 ... +60 °C –40 ... + 60 °C
Protection class accord. DIN 40 050	front: IP54, rear: IP20
Safety standards	IEC 61010-1: 2011-07
Interference resistance	EN50082-1 :1995
EMV resistance	IEC61000-4-2: 2009-12 IEC61000-4-4: 2013-04
Ordering codes BR7000 BR7000-HD	B44066R7415E230 B44066R7515E230

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Cautions and Warnings

Controller hunting: When putting the capacitor bank into operation, it is required to avoid needless switching cycles (means permanent switching on and off of steps without significant change of consumer load). This so called “controller hunting” would increase the number of switching operations of the connected contactors and capacitors and decrease the expected life cycle (wear out) and, in worst case, capacitor bursting and fire, etc. This can be avoided by a proper programming of the BR7000 with the actual system parameters (current transformer prim. and sec., first kvar step, control series, switching time).

⚠ Please read cautions information about PFC capacitors and cautions as well as installation and maintenance instructions in the actual version of the Product Profile *Power Factor Correction* to ensure optimum performance and prevent products from failing, and in worst case, bursting and fire, etc. The actual Product Profile is available at www.epcos.com/publications.

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Note

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