Film Capacitors – Power Factor Correction

Dynamic and Hybrid Power Factor Controller

Series/Type: BR7000-I-TH, BR7000-I-TH/S485
Ordering code: B44066R7412E230/B44066R7612E230
Date: March 2014
Version: 1

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EPCOS AG is a TDK Group Company.
Characteristics
- 12 transistor and 12 relay outputs
- Direct triggering of up to 32 thyristor switches
  TSM-LC-S at the bus; bi-directional communication;
  design of self-monitoring dynamic systems with
  bus coupling (only version /S485)
- 20 pre-programmed control series
- Control series editor
- Full graphic display 128 x 64 pixel
- Plain language menu
- 4-quadrant-operation
- Display of multiple grid parameters
- Display of harmonics (up to 33rd)
- Display of distortion factor THD-V/THD-I
- Display and control of temperature
- Storage of maximum values
- Storage of switching operations and times (relay outputs)
- Manual and automatic operation
- Zero voltage cut-off
- Various error messages/alarm rely
- Error storage
- Interface RS485 for version -/S485
- Panel mounting 144 x 144 x 55 mm

Inputs
- Operation voltage: 110 … 230 V AC +/- 15%
- Measuring voltage: 30 … 440 V AC (L-N) / 50 … 760 V AC (L-L)
- Current: X:1A / X:5A
- Standard serial interface (e.g. for firmware update)
- Version -/S485: 1 external input

Outputs
- 12 relay outputs
- 12 transistor outputs
- 1 relay output (alarm/fan)
- Version -/S485: 1 message relay (free programmable)
- Version -/S485: interface RS485
Measuring and display of following grid parameters
- Voltage, current, frequency
- Active, reactive and apparent power
- Power factor, missing reactive power
- Harmonics of voltage (up to 33rd/even up to 16th)
- Harmonic of current (up to 33rd/even up to 16th)
- TDH-V, THD-I
- Temperature
- Well-arranged display of power factor and actual status of switching outputs
- Display and storage of maximum values, switching operations and operation time (only static stages)
- Display of harmonics as bar chart

Operation
- Graphic display 164 x 64 dots with 8 lines maximum
- Plain language menu in several languages
- Optimum navigation in the menus via return (ESCAPE) button
- HELP-button for interactive help text

Version with interface (BR7000-1-TH/S485)
- Additional potential free input (programmable) for
  - Switch over 2nd target cos-phi
  - Triggering of a reactive power off-set
- Additional potential free relay output (message relay) for
  - Switching of a fan
  - Display of error- or status messages (programmable)
- Interface RS485 (MODBUS RTU) for
  - Direct triggering of up to 32 addressable thyristor switches TSM-LC-S with bi-directional communication
  - Imbedding of the controller into a network
  - Usage of software BR7000-Soft
  - Output of measured values in ACSII-protocol
- Internal battery-buffered clock for
  - Creation of time stamp of all recorded maximum values
  - Creation of time stamp for all error messages
### Technical data and specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating voltage</strong></td>
<td>110 … 230 V AC +/- 15 %, 50 and 60 Hz</td>
</tr>
<tr>
<td><strong>Measuring voltage</strong></td>
<td>30 … 440 V AC (L-N); 50 … 760 V AC (L-L); 50/60 Hz</td>
</tr>
<tr>
<td><strong>Measuring current</strong></td>
<td>X: 5 A / X: 1 A, selectable</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>&lt; 5 VA</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>50 mA/10 mA</td>
</tr>
</tbody>
</table>

### Switching outputs

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay outputs for capacitor contactors</td>
<td>12</td>
</tr>
<tr>
<td>Transistor outputs for thyristor switches</td>
<td>12</td>
</tr>
<tr>
<td>Alarm relay</td>
<td>1</td>
</tr>
<tr>
<td>Message relay</td>
<td>1 for version -/S485 only</td>
</tr>
<tr>
<td>Switching power of relays</td>
<td>250 V AC, 1000 W</td>
</tr>
<tr>
<td>Switching power of thyristors</td>
<td>24 V DC, 50 mA</td>
</tr>
<tr>
<td>Number of active outputs</td>
<td>Programmable</td>
</tr>
</tbody>
</table>

### Operation and display

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display</strong></td>
<td>Illuminated full graphic display 128 x 64 dots</td>
</tr>
<tr>
<td><strong>Menu languages</strong></td>
<td>CZ/EN/ES/FR/GER/NL/PL/PT/RU/TR</td>
</tr>
<tr>
<td><strong>Freely editable control series</strong></td>
<td>1 via Editor</td>
</tr>
</tbody>
</table>

### Control

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control principle</strong></td>
<td>Sequential switching, circle switching, intelligent switching behavior, 4-quadrant operation</td>
</tr>
<tr>
<td><strong>Operation modes</strong></td>
<td>Dynamic or hybrid PF-controller</td>
</tr>
<tr>
<td><strong>Target cos-φ</strong></td>
<td>0.1 inductive up to 0.1 capacitive adjustable</td>
</tr>
<tr>
<td><strong>Switch on time (dynamic/relay)</strong></td>
<td>20 … 1000 ms / 1 sec … 20 min</td>
</tr>
<tr>
<td><strong>Switch off time</strong></td>
<td>20 … 1000 ms / 1 sec … 20 min</td>
</tr>
<tr>
<td><strong>Discharge time</strong></td>
<td>20 … 1000 ms / 1 sec … 20 min</td>
</tr>
<tr>
<td><strong>Manual operation</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Fixed steps/skip steps</strong></td>
<td>Programmable</td>
</tr>
<tr>
<td><strong>Zero voltage release</strong></td>
<td>Standard</td>
</tr>
</tbody>
</table>

### Display/display functions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display of grid parameters</strong></td>
<td>Cos-φ, V, I, f, W, Q, P, S, ΔQ, THD-V, THD-I</td>
</tr>
<tr>
<td><strong>Display of harmonics</strong></td>
<td>3rd to 33rd harmonics of V and I; even harmonics up to 16th</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Current/voltage: 1%</td>
</tr>
<tr>
<td></td>
<td>Active, apparent and reactive power: 2%</td>
</tr>
<tr>
<td><strong>Integrated help function</strong></td>
<td>Context dependent (German/English)</td>
</tr>
</tbody>
</table>
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-I-TH and BR7000-I-TH/S485 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.

Information given in the PFC-product profile and values given in the data sheet reflect typical specifications. You are kindly requested to approve our product specifications or request our approval for your specification before ordering.

Note

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