



Film capacitor – Power Factor Correction

Power factor controller

Series/Type: B44066R****A***
Ordering code: B44066R5615A415
Date: 2023-12-19
Version: 2

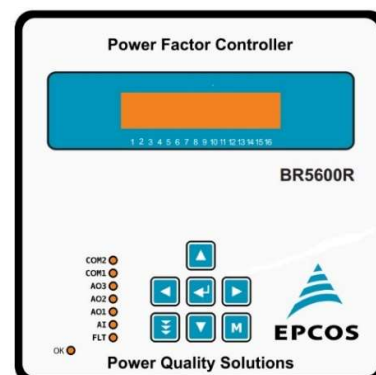
Preliminary data

Applications

- Power factor correction

Features

- Intelligent and high-speed capacitor switching control
- Self-optimizing control capability by ARM micro-processor
- Wide range of auxiliary power supply with AC or DC input
- Large measuring voltage range
- Four-quadrant operation (e.g. stand by generator / solar co- gen)
- High precision of measurement
- Phase sequence of measurement voltage
- Easy edit mode (to program minimum parameters)
- Expert edit mode facility to access special functions
- Minimum current sensing 5mA
- Storage of maximum values, maximum demand, Energy values
- Storage of switching operations and time + Capacitor utilization
- Monitoring of capacitor kVA_r
- One auxiliary input and three auxiliary outputs
- Measurement methods like 3 wattmeter / 2 wattmeter / balanced quadrature / balanced in-phase
- External temperature monitoring facility via PT100 sensor (RTD)
- Capacitor Current monitoring protection for Neutral / Earth current monitoring and harmonics
- Measurement Odd & Even harmonics up to 31st for Supply Voltage (LL, LN), Current, Capacitor current
- IOT enable with GPRS real time data (thro' external modem) / MODBUS connectivity
- Internal Data logging, history of fault detection, load pattern, time storage parameters
- Mono-phase and balanced capacitor through controlling single phase & three phase capacitor duty contactors
- RoHS-compatible
- CE marking



Inputs

- Power Supply Voltage: 90V to 485V L-L / 100V to 550Vdc with OV cutoff. (absolute maximum rating 550V L-L)
- Measurement voltage 50...315V ~(L-N) / 85..... 550V ~(L-L)
- Current X:1A / X:5A (for supply current and capacitor current)
- Standard service interface (for e.g. firmware update)
- Additional external input (110.... 230V)

Preliminary data

Outputs

- 15 switching outputs for capacitor control (extend to 16 switching outputs)
- 3 auxiliary outputs configurable for alarm and control functions

Measuring and display of grid and capacitor parameters

- Voltage, current, frequency
- Active, reactive, apparent and distortion power
- Power factor (PF and DPF), uncompensated reactive power
- Energy import and export (active, reactive, apparent)
- Maximum demand (kVA, kW)
- Harmonics of voltage L-L & L-N (up to 31st linear)
- Harmonics of current (up to 31st linear)
- Harmonics of capacitor current (up to 31st linear)
- THD-V, THD-I, THD-C (in terms of % and values)
- Temperature (internal and external via PT100)
- Display storage of maximum values, switching operations and operating times
- 3 auxiliary outputs configurable for alarm and control functions
- Capacitor kVAr detection of normalized values (removing effect of change in voltage, frequency and harmonics)

Operation

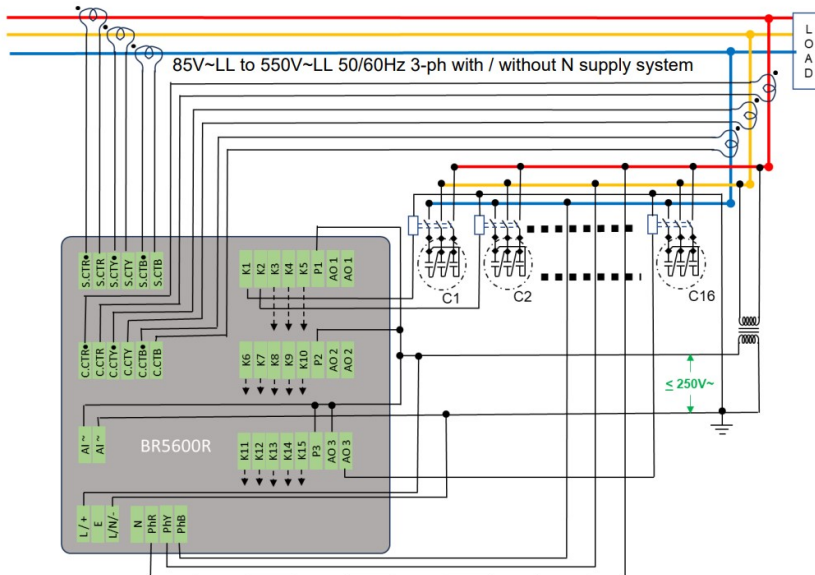
- LCD display 16 characters x 2 lines
- User friendly 7 keys soft-touch keypad
- Simple self-explanatory menu navigation
- Plain language menu in English

Preliminary data

PF _{rms} = 0.978 C DPF = 0.995 C	IND. 0.997 ↑ IOK D x X	DPF 0.998 I 0.998 C 1.000 C
Amp-Av= 1.723 KA VoltLL= 433.8 V	Phase Sequence R-Y-B	VLN-RYB 224.5 V 222.8 V 225.2 V
P = 1131.4 KW P1 = 951.99 KW		VLL-RYB 389.7 V 387.2 V 390.0 V
Q = 239.11 KVAR Q1 = 197.84 KVAR		Amp-RYB 1.783KA 1.821KA 1.699KA
S = 1156.8 KVA S1 = 972.33 KVA		AmpC-RYB 635.5 A 638.2 A 629.9 A
D = 443.68 KVA Dx = 626.71 KVA		Amp-N 34.94 A AmpC-EL 0.049 A
VTHD-F = 2.523% ATHD-F = 21.78%		RP = 388.16 KW RP1 = 364.90 KW
AmpC-Av=1.060 KA Freq. = 50.1 Hz		RQ = 91.738 KVAR RQ1= 82.665 KVAR
UQ1= 733.98 KVAR CQ1= 536.14 KVAR		RS = 418.44 KVA RS1 = 404.69 KVA
UnbalanceV: 0.3% A:12.4% C: 2.2%		RDx = 101.25 KVA RD = 78.334 KVA
		RUQ1= 926.41 VAr RCQ1= 369.89KVAR

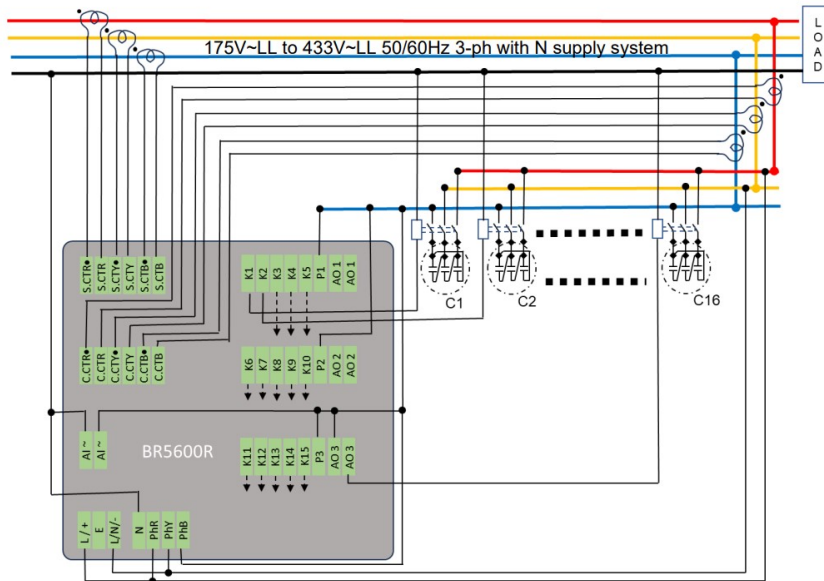
Connection

3-Wire Balanced Load connection to LV Auto-PF system:

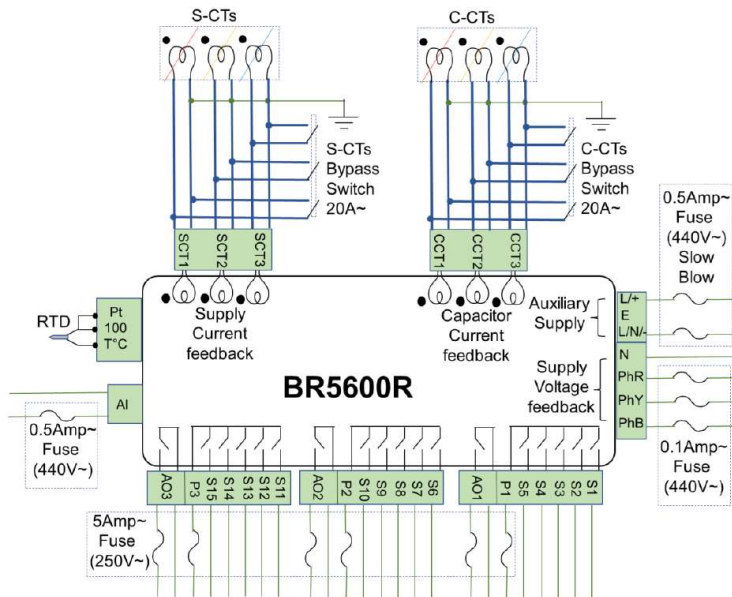


Preliminary data

4-Wire Balanced Load with Neutral connection to LV Auto-PF system:



Protection and mandatory connection requirements



The protection fuses and switches shown in diagram above should be external to BR5600R controller. Users are expected to take care of this requirement for adequate protection to unit and system.

Rupturing Capacity of the fuses should be minimum 20X of its current rating.

CT shorting switches capacity is based upon the measurement saturation current range which is normally between 2.5 to 3.5 times its rated current. Thus, with 5Amp~ range it is

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20Amp~.

CT shorting switches should never be with protection fuses.

CT wire should be braided copper with c/s area as $\geq 2.5 \text{ mm}^2$.

Voltage current wires should be with $\geq 1\text{kV}$ ~ insulation wire with c/s area as $\geq 1\text{mm}^2$.

Voltage section fuses can be replaced by equivalent rating MCB (Miniature Circuit Breakers).

Current section cannot use MCBs.

Communication

■ Interface RS232 communication –

COM1 (RS232) serial communication port used for PC-app (PF_DataView)

AT+ command (3GPP) communication with GPRS modem (supporting https:// protocol)

■ Interface RS485 (MODBUS RTU)

COM2 (RS485) serial MODBUS communication port

RM1 (remote command receiver) through MODBUS communication from remote measurement meter.

■ Data logging

Various types of data stored in BR5600R non-volatile memory (E²PROM)

Three types of data storage

Faults/events log

Daily log (every 24hrs at day change)

Interval log (User set time slot) – 5/10/15/30/60/120 minutes and user set data size

options as 64/128/256/512 bytes per saved record

User settings data storage (available to user through communication channels)

■ Internal clock (with super capacitor backup)

Power down back-up time for clock is >30 days (10°to 40°C ambient)

Creation time / date stamps for events, interval and daily logs

Time /date stamp update from GPRS network connection

Time based reset for maximum values, maximum demand, energy counters

■ Programmable auxiliary input

Monitor the control ac supply healthiness. This is given to auxiliary control functions

Enable /disable PF correction action

Switch over 2nd target cos-phi (Generator)

HOLD – the correction time is extended infinitely till the digit1is observed in this port

(0V to 10V – No action; 68V to 290 – capacitor on hold)

Master – master holds position command received from other unit in follower operation

Follower - follower receives command for enabling the normal capacitor control operation

Preliminary data
■ Three programmable auxiliary output

- Fan ON/OFF for temperature control
- ALARM annunciation indicative faults
- ALARM capacitor trip annunciation, faults that trips all capacitors
- ALARM for auto synchronous failure
- Capacitor unbalance current (neutral/earth current in case of 3CT capacitor connection only)
- Internal temperature exceeding alarm
- Clock time failure
- GPRS communication data pending
- GPRS communication error
- Unit healthy function indicator
- Additional cap bank (only applicable for 3rd auxiliary output)

Technical data and specification

Operating voltage	90V to 485Vac L-L / 100V to 550Vdc
Measuring voltage	50....315Vac ~(L-N) / 85..... 550Vac ~(L-L)
Measuring current	X : 1A / X : 5A (for supply current and capacitor current)
Power consumption	< 5VA
Sensitivity	5mA

Switching output

Relay output for capacitor branches	15 can be extended to 16 (through auxiliary output 3)
Auxiliary outputs	3 (programmable)
Switching power	250VAC, 0.5A Inductive and 1000W resistive load
Number of active output	Programmable

Operation and display

Display	LCD display 16 characters x 2 lines
Menu language	English
Freely editable control series	User programable

Control

Control principle	Intelligent switching behavior, 4 quadrant operation
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Automatic initialization /test run	Possible
Target PF	0.1 Inductive up to 0.1 capacitive
Correction time	Selectable from 1 sec to 3600 sec
Discharge time	Selectable from 1 sec to 7200 sec
Interleaving time delay	Selectable from 0.5 sec to 60 sec
Manual Operation	Yes
Fixed steps /skip steps	Programmable
Zero voltage release	Standard

Display/display function

Display of grid parameters	PF, V, I, F, active, reactive, apparent power, THD-V, THD-I
PF display	Up to 3 rd decimal point
Display of harmonics	Up to 31 st harmonics (odd and even)
Accuracy	Current / voltage :1%, active, apparent and reactive power: 2%

Storage function

Storage of maximum values	Voltage, current, active, reactive, apparent power, temperature, THD-V, THD-I
Storage of switching operations	Available (each output can be reset separately)
Storage of operation time	Available (each capacitor can be reset separately)
Events storage	latest 512 events/ faults for TCP-V01 protocol and 256 for https:// protocol are available in memory. User can be download and view through data downloading software

Temperature monitoring

Monitoring	Automatic steps switch off
Temperature measuring range(internal)	0.....+65 °C
Temperature measuring range(external – via PT100)	0.....+100 °C

Casing

Panel mounted instruments	146x146x75 mm, panel cut out dimension 139x139mm
Weight	1.25kg
Ambient operating temperature	0.....+60 °C

Preliminary data

Protection class according to IEC 62059	Front : IP54, rear : IP20
Safety regulations	IEC 61010-1
Interference resistance	IEC 61326-1
EMC-interference	IEC 61326-1
Over voltage category	III
Pollution degree	2
Ordering code	B44066R5615A415

Cautions and warnings

Controller hunting : When putting the capacitor bank in operation, it is required to avoid needless switching cycles (permanent switching on and off of steps without significant change of consumer load). This is 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 busting and fire etc. This can be avoided by a proper programming of BR5600R with the actual system parameters (current transformer primary and secondary, first step kvar, 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.tdk-electronics.tdk.com. 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.

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