

## Microprocessor controlled power factor control relay

- Start menu for easy commissioning
- Automatic detection and correction of the phase of current and voltage connection
- Fully-automatic c/k-value setting, self-adapting, connection of different capacitor step sizes possible
- Automatic detection and usage of the optimum capacitor step
- Switching programs, best fit, LIFO, combi-filter, progressive
- Capable for 4-quadrant operation
- 1-phase measurement system also suitable for non-sinusoidal currents & voltages
- Connection with pluggable screw terminals
- LCD display with backlight
- Display of harmonics from 3<sup>rd</sup> till the 19<sup>th</sup> order of voltage
- Input for temperature sensor. This input can be used also to switch over to second target cos phi by using a volt-free contact. Fan control possible with designation of any exit relay.
- Input voltage range of 90V to 550V, AC, 45Hz-65Hz
- Current measuring 15mA - 5A, suitable for CT x/1A and x/5A
- Integrated over and under voltage release with auto reset
- Special function to avoid leading Power Factor conditions, suitable for generator APFC
- Displays various power, energy, voltage, current, average PF and missing reactive power readings
- Indication of displacement and true power factor, as well with 3-decimal readings
- Alarm relay (volt-free n/o contact, closed under normal condition)
- TTL-interface on rear
- Instrument casing 144x144mm for cut-out 138 x 138mm, depth 49mm
- Protection class IP20 (casing), IP50 (front)



Description	Type
Power Factor Controller BLR-CX 04 relay outputs	CX 04R
Power Factor Controller BLR-CX 06 relay outputs	CX 06R
Power Factor Controller BLR-CX 08 relay outputs	CX 08R
Power Factor Controller BLR-CX 10 relay outputs	CX 10R
Power Factor Controller BLR-CX 12 relay outputs	CX 12R
Power Factor Controller BLR-CX 14 relay outputs	CX 14R
Power Factor Controller BLR-CX 06 transistor outputs	CX 06T
Power Factor Controller BLR-CX 12 transistor outputs	CX 12T
<b>Options and accessories</b>	
Pluggable temperature sensor	-L
Separate connection of supply voltage	-V
Communication module TTL-RS485/USB (internal)	-MB
Communication module TTL-RS485/USB (separate)	3USB
Software	In process
Data cable TTL/USB	UMS9
Transparent cover with lock IP54	- VT
Wall mounting bracket	3ZWC

## FUNCTION

The intelligent regulation algorithm of BELUK switches the steps optimized and by this it guarantees short compensation times combined with the smallest amount of operations. The operating cycles are shared equally to all steps.

All relevant parameters for the regulation are set ex works in the way that in nearly all cases for BLR-CX no further adjustments are necessary to start the regulation. An optimization of the control mode of the compensation panel to the local conditions is still possible. Parameters can easily be changed, also during operation.

These settings can be done in two separate user menus. The "Start" menu contains only the settings, which can be necessary for commissioning, like nominal voltage, CT and VT ratio and the automatic correction of current and voltage connection.

These settings and further settings of the "Expert" menu are:

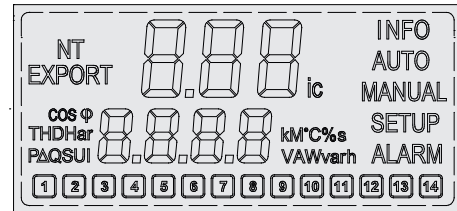
- Measuring:** nominal voltage, CT ratio, VT ratio, tolerance of voltage, connection Ph-Ph/Ph-N, phase-correction, autom. correction of connection, synchronisation, reset operating hours, reset average PF, reset max. temperature
- Regulation:** sensitivity, target-cosphi 1 and 2, switch interval, delay step exchange, step-exchange, autom. capacitor size detection, blocking of defective steps, Regul.progr.: Best-Fit, LIFO, combi, progressive, Offset reactive power, asymmetric switch interval
- Steps:** discharging time, step size in kvar, step type (e.g. fix-steps)
- Alarming:** regulation alarm, defective step alarm, power loss of capacitors, THD U Alarm, over-temperature, limit switching operations, limit operating hours of panel, limit temp1/temp2 I=0 freeze regulation, etc.

For starting regulation, only the correct setting of nominal voltage is necessary. Otherwise the regulation is blocked for protecting the capacitors. If CT ratio is not set, then all the measurement readings which are dependent on this setting are blanked. A wrong connection can be corrected by starting the automatic phase correction. For maintenance work, each individual step can be switched manually.

## MEASURING

BLR-CX is calculating by the measurements of current and voltage the power conditions in electrical network. Generally, it's not important, in which phases voltage and current are connected, because the connection is corrected by BLR-CX after starting the automatic phase correction. The min. sensing current is 15mAmp, which ensures a reliable and exact regulation. For the current measuring 1Amp CTs can be used as well as 5Amp CTs. For this, there is no manual changing of any settings necessary. The wide range SMPS allows to realize voltage measuring in a range between 90V and 550V.

By using the temperature sensor, BLR-CX can measure the internal temperature of the compensation panel and switch by using one of the exit relays, a fan. The switch-off of the capacitor steps due to overtemperature can be triggered by reaching the second overtemperature level or can be triggered by N/O contacts of external thermostates, which are connected in parallel to the temperature sensor.



High-contrast LCD with backlight  
and temperature range from -20°C to +70°C.  
(Original size)

## DISPLAY

BLR-CX is equipped with LCD with back-lighting. It shows informations about the panel and about the mains parameters. It's also necessary for setting the parameters of BLR-CX:

Mains parameters: voltage, current, kW, kvar, kVA, kvar to target, THD U, 3rd to 19th harmonic of voltage, cos phi, powerfactor, frequency, temperature

Panel informations: power-on hours of panel, operating cycles per step, max. temperature of panel, average power factor, rating per step in kvar, percentage of the rating per step compared with the nominal rating.

Cos phi and status of the exits are shown permanently.

## MONITORING

The monitoring features of BLR-CX guarantee a reliable operation and a long life of the compensation panel:

- Low voltage switch-off against chattering of contactors
- Over voltage switch-off for protecting the capacitors
- Overtemperature switch-off
- Monitoring of THD U
- Recognition of defective capacitors
- Alarming, when target of regulation cannot be reached
- Signalling of the need for maintenance
- Fan control

Failures and announcements of the panel are shown in LCD. Failures can also be forwarded by the voltfree alarm-contact (sign-of-life signal) For switching the fan, one of the step-exits has to be used.

## FEATURES

### Standard features:

**Auxiliary voltage is taken from voltage measuring path**

**Measuring-auxiliary voltage:** 90-550V, 45-65Hz

**Current path:** 1 x 15mAmp - 6Amp

**Alarm relay:** 1 x n/o contact (sign-of-life)

**Number of control exits:** 4, 6, 8, 10, 12, 14

**Terminal for connecting a temperature-sensor**

**TTL-interface**

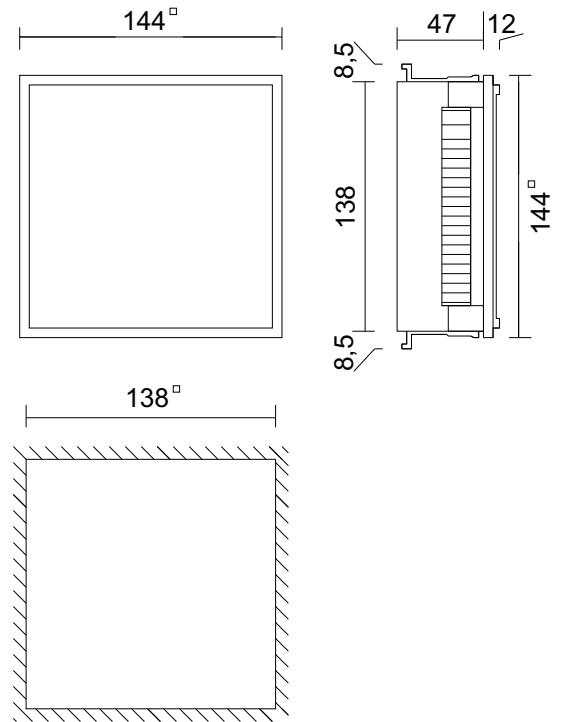
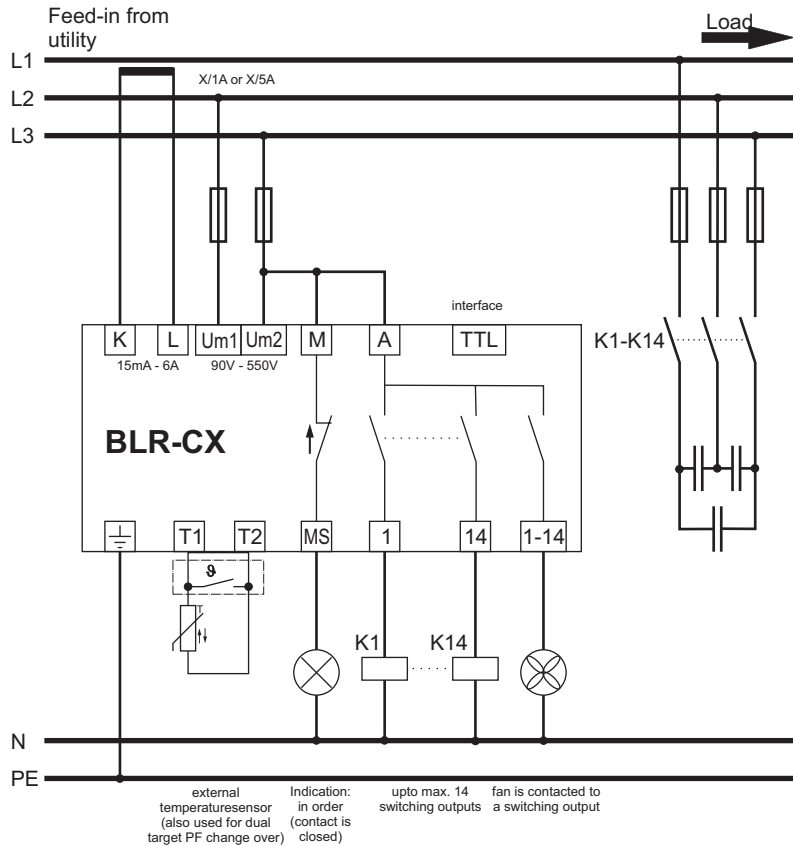
**Accessories:**

**Temperature-sensorInterface converter TTL-USB**

**Software WinBSTO2**

# CONNECTION DIAGRAM

# DIMENSIONS



# TECHNICAL DATA

Type of Device:	Power Factor Control Relay ( automatic reactive power management )
Control Variable:	Electrical displacement reactive power
Principle of Regulation:	Stepped regulation with the following modes:: - Best-Fit: starting with the biggest exits - LIFO: last in-first out - Combifilter: Best-Fit, with more connected power of odd exits - Progressive: all required exits are switched in quasi one operation
Special Features:	- Automatic detection and correction of the phase of current and voltage connection - Automatic detection of the used exits - Automatic detection and adaption of the capacitor ratings - Over- and undervoltage monitoring - Monitoring of THD U - Overtemperature switch-off
Measuring Display:	V, A, kVA, kW, kvar, cosphi, PF, Δkvar, THD U, 3rd to 19th harmonic of voltage
Information Display:	Switch cycles per step, capacitor rating, status of the exits, operating hours of the panel, max.temperature, average PF
Measuring- and Auxiliary Voltage:	90- 550V AC, single phase, 45-65HZ, 5VA, max. fuse 6A, VT ratio from 1.0 to 350.0
Current Measuring:	15mA -6A, single phase, burden 20mOhm, CT ratio from 1 to 4000
Control Exits:	Upto 14 relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A (or) 400V AC / 2A
Temperature measuring:	By NTC
Sign-Of-Life contact:	Relay, voltfree, N/O, max. fuse 4A, breaking capacity: 250V AC / 5A
Fan Control:	By using a control exit
Interface:	Serial interface, TTL located on rearside
Ambient Temperature:	Operation: -20°C...+70°C, storage: -20°C...+80°C
Humidity:	0% - 95%, without moisture condensation
Overvoltage class:	II, pollution degree 3 (DIN VDE 0110, Teil 1 / IEC60664-1)
Standards:	DIN VDE 0110 Teil 1 (IEC 60664-1:1992) VDE 0411 Teil 1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Teil 20 (DIN EN 61326 / IEC 61326: 1997 + A1:1998 +A2: 2000)
Conformity and Listing:	CE, UL, cUL
Terminals:	Plugable terminal blocks, screw type, max. 4qmm
Casing:	Front: instrument casing plastic (UL94-VO), Rear: metal
Protection Class:	Front: IP50, (IP54 by using a gasket), Rear: IP20
Weight:	approx. 0.6kg
Dimensions:	144x144x58mm hwxwd, cutout 138 (+0.5) x 138 (+0.5)mm