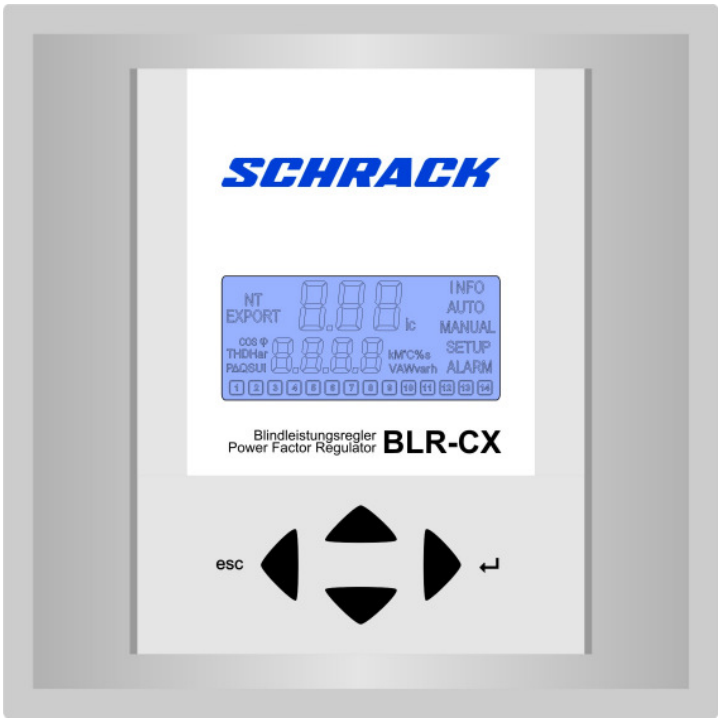
KOMPETENZ VERBINDET. SCHRACK TECHNIK

USER MANUAL



Power Factor Correction Regulator

BLR-CX 6 to 14 steps

Installation:

For installation, all valid standards and safety precautions have to be kept!

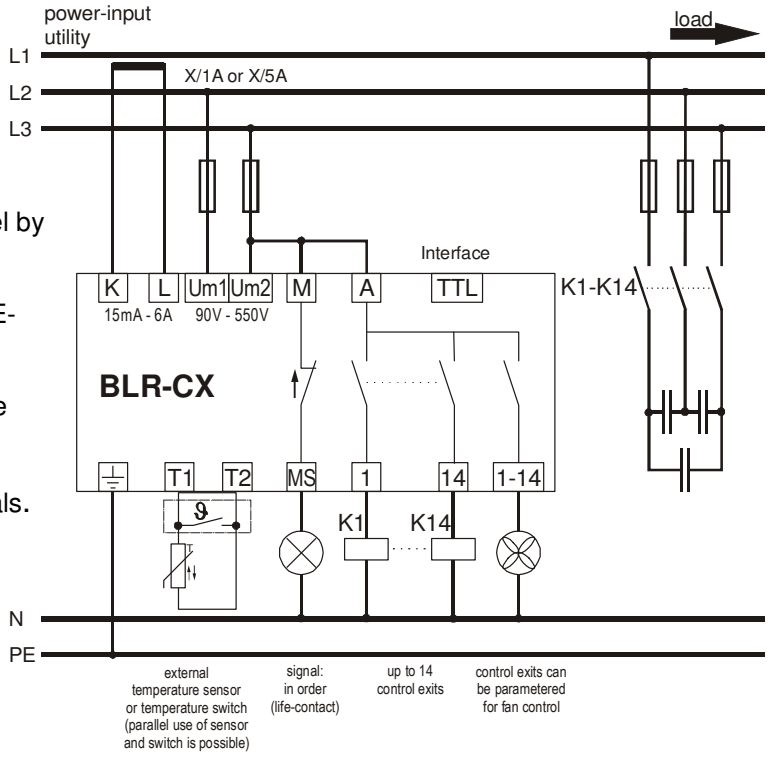
1) Check that the measurement and control voltage, supply frequency and current transformer rating comply with the ratings given on the rear of the relay.

2) Mount the relay in the switch panel by means of two fixing brackets.

3) Connect the protection earth to PE-connection on metal case.

4) Connect up in accordance with the wiring diagram.

5) Remove the link of the CT terminals.



Commissioning:

BLR-CX is preset:
After BLR-CX is powered-on, a countdown of 90 sec is running. After countdown is finished, the discharging time blockade oft he capacitors is active. During these two delays, no control outputs of BLR-CX can be active. The countdown can be interrupted by pushing ◄(esc) button, in this case also the discharging time blockade starts before the regulation starts with the preset parameters.

BLR-CX is not preset:
During the countdown is running, automatic initialisation of BLR-CX can be started by pushing ►(↵) button. After the discharge blocking time (default 75s), the controller is detecting not used switching outputs and lock them out. For the case of an faulty connection of the polarity for voltage and current, the controller detect it and correct it.
After automatic initialisation is finished, BLR-CX starts its control function and is recognizing capacitor size during standard operation. Settings of c/k values and switching program are not necessary. When mains conditions are not suitable for automatic initialization, it will be interrupted. BLR-CX is showing then error code:
"Ai Abrt". If multiple repeat shows no results, then the setting instructions of reference manual should be considered. (not scope of delivery).

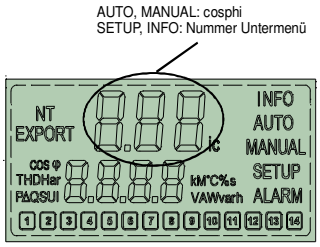
Display "Auto": Message "Auto" shows, that control function is working. When „Auto" is not displayed, then control function is stopped. Reasons for this are: manual operation is active, control function is switched-off, meas. current is less than 15mA, temperature is too high, voltage is out of range or harmonic level of voltage is too high.

Over- and undervoltage monitoring: BLR-CX is equipped with over- and undervoltage monitoring. The allowed range of voltage depends on nominal voltage. When nominal voltage is out of range, message U Alarm is shown. Then the setting of nominal voltage has to be adjusted to local ratings.

Default is ULL 400V

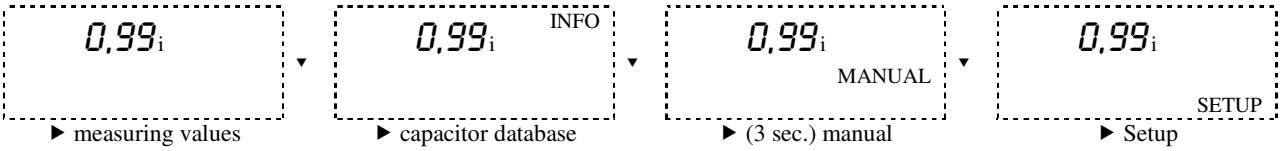
Activation of measuring value display: To enable the display of all possible measurement values the CT ratio has to be set. Otherwise the measurement menu of the BLR-CX only contains values which are only depending to the voltage.

Display and Operation:



INFO:	capacitor database
AUTO:	automatic control is running
MANUAL:	manual mode
SETUP:	setup menu
ALARM:	blinking during alarm
NT:	2. target-pf is activ
EXPORT:	export of active energy
1 – 14:	control outputs

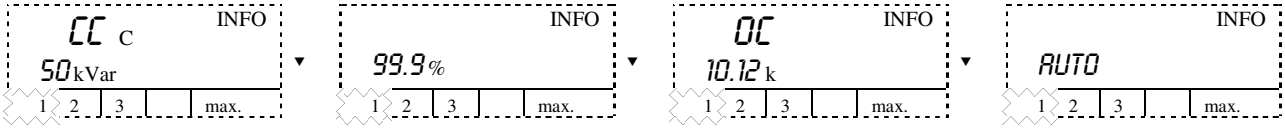
Operation of BLR-CX is done by 4 keys.
In main menu level, you can choose by pushing ▲ or ▼ the main menus. Selection by ►(↵) is opening submenus. By pushing of ◄ (esc) the menu is left to next higher level.



► measuring values | ► capacitor database | ► (3 sec.) manual operating | ► Setup ► (3 sec.) expert

Measuring values (by pushing ▲ and ▼ the measuring values can be selected):
voltage U_{Ph-Ph}, voltage U_{Ph-N}, current **I**, active power **P**, reactive power **Q**, reactive power to reach target **ΔQ**, apparent power **S**, **THD U**, **3.-15. Har**monic of voltage, displacement power factor **cosφ**, power factor **PF** (Λ), average power factor **APF**, frequency **F**, temperature **t**, max. temperature **thi**, operating hours **OPh**

INFO capacitor database: **Attention: The state of the outputs is not shown in this menu!**
By pushing ▲ and ▼ the steps can be chosen. The chosen step is flashing in step indication. By pressing ►(↵) the information for the selected step is shown. Using the up and down buttons can be browsed through the values.



actual power of step | Percentage actual to nominal power | number of operations | steptype

It's possible to have capacitive steps as well as inductive steps. The power is always rated according to selected nominal voltage.
Possible step types: Auto, Fon (Fix on), Foff (Fix off), Defective, AL (Alarm, e.g. for fan control)

MANUAL operation: **Attention: In manual operation, automatic control is not active!**
To avoid that control stops accidentally, this function can only be entered by pushing ►(↵) for 3 sec. to enter this menu.

After calling manual mode, the regulator freezes the outputs in actual position. By pushing ▲ und ▼ key, the individual steps can be chosen. The state of the outputs is changed by pushing ►(↵) key. The state of the outputs is shown. In manual mode, switching time delay is not working but capacitor discharge lock time is working. When leaving manual mode, BLR-CX continues controlling without switching-off all steps before.

SETUP:
Setup/Expert menu is structured in 6 submenus (100 – 600). Only menu 100 can be reached by calling Setup with short pushing of enter. If enter is pushed for 3 sec, the Expert-menu is started. By pushing ▲ und ▼ the sub-menus or parameters are chosen. By pushing ►(↵) submenus are opened or parameters are switched to edit mode. By pushing ◄ (esc) the next higher level is reached. In edit mode, the cursor is blinking. By pushing ▲ and ▼ the values can be changed, by pushing ◄ and ► the cursor can be moved.
To save the settings, ►(↵) must be pushed, when cursor is on right position.
To refuse the settings, ◄ (esc) can be pushed, when cursor is on left position.

Menu structure:

The table gives an overview about parameters of BLR-CX. Settings in menus 200 to 600 should be done only by using the reference manual.

Menu 100:

Un nominal voltage (is necessary for over- and undervoltage monitoring and is reference for capacitor database)

Ct CT-ratio (when CT-ratio is not set, only values which are only depending on voltage are shown)

Pt VT-ratio

Ai start of automatic initialization (this function is running only, when “Auto” is shown in LCD)

PFC PF-control ON/OFF (all "Auto" steps are off) / HOLD (steps are frozen)

CP1 target-PF 1 After the value for target cos phi is entered, it can be choose between target cos phi inductive (I is flashing – default) or capacitive (c is flashing – exception)

St switching time delay

Out Type of exit: step 1… max. 14

MENU	FUNCTION	DEFAULT
100	**QUICK START SETUP**	
Un	Nominal voltage (phase-phase)	400V
Ct	CT-ratio	1
Pt	VT-ratio	1
Ai	Start automatic initializing	
PFC	Start/Stop/Hold PF-control	On
CP1	Target-PF 1	1,00
St	Switching time delay	10s
OUt	Type of exit: step 1...max. 14	Auto
200	**SETUP MEASURING SYSTEM**	
201	Nominal voltage (phase-phase)	400V
202	CT-ratio	1
203	VT-ratio	1
204	Tolerance nominal voltage	10%
205	Voltage measuring Ph-N	N
206	Phase-offset	0
207	Start automatic initializing	
208	Activate Ai by every start of BLR-CX-V	Y
209	Synchronisation to frequency	Auto
210	Temperature offset	0°C
300	**SETUP CONTROL SYSTEM**	
301	Switching threshold	60%
302	Target-PF 1	1,00
303	Target-PF 2	0,95
304	Target-PF 2 at KW-export	N
305	Switching time delay	10s
306	Switching time delay for fine control	2s
307	Fine control active	N
308	Stop automatic capacitor size detection	N
309	Blocking of defective capacitors	Y
310	Start/Stop/Hold PF-control	On
311	Control algorithm	1
312	Reactive-power offset	0
313	Asymmetrical switching time delay	1
314	Switch-off capacitors in leading condition	N

MENU	FUNCTION	DEFAULT
400	**SETUP CAPACITOR DATABASE**	
401	Discharging time	75s
402	Capacitor size: step 1...max. 14	5var
403	Type of exit: step 1...max. 14	Auto
404	Switching operations: step 1...max. 14	0
500	**SETUP ALARM SYSTEM**	
501	Alarm storage	N
502	THD alarm	N
503	Threshold THD	20%
504	Disconnect capacitors when THD >	N
505	Delay time THD Alarm / Temp. threshold 2	60sec
506	Freeze exits when I = 0	N
507	Service alarm	N
508	Max. operations per step	262k
509	Max. operation hours of BLR-CX-V	65,5k
510	Use temp. sensor as digital input	n
511	digital input active at high signal	n
512	Temperature alarm active	n
513	Temp. threshold level 1 (fan control, type of exit: AL)	30°C
514	Temp. threshold level 2, disconnect capacitors	55°C
515	Control alarm (target cannot be reached)	N
516	Defective steps alarm	N
517	Loss of power alarm	N
600	**RESET**	
601	Reset to default values	
602	Reset capacitor database to default	
603	Reset operation hours	
604	Reset average PF	
605	Reset max. temperature	
606	Reset alarm	
607	1.04	

Technical Data

Measuring- and supply voltage:	90 – 550V AC, single phase, 45-65HZ, 5VA, max. fuse 6A VT-ratio from 1,0 – 350,0
Current measuring:	15mA – 6A, single phase, burden 20mOhm, ct-ratio from 1-9600
Control Outputs:	Up to 14 relays, n/o, with common point, max. fuse 6A breaking capacity: 250V AC / 5A
Temperature measuring:	By NTC
Alarm contact:	Relay, volt free, life contact, max. fuse 6A, breaking capacity: 250V AC / 5A
Fan control:	By using one switching exit defined as "Alarm"
Interface:	TTL, rear
Ambient temperature:	Operation: -20°C – 70°C, storage: -40°C – 85°C
Humidity:	0% - 95%, without moisture condensation
Voltage class:	II, dirt class 3 (DIN VDE 0110, part 1 / IEC60664-1)
Standards:	DIN VDE 0110 part 1 (IEC 60664-1:1992) VDE 0411 part 1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 part 20 (DIN EN 61326 / IEC 61326: 1997 + A1:1998 +A2: 2000)
Conformity and listing:	CE, cULus, EAC
Connection	Pluggable terminal block, screw type max. 4qmm
Case:	Front: instrument case PC/ABS (UL94-VO), Rear: metal
Protection class:	Front: IP50, (IP54 by using a gasket), Rear: IP20
Weight:	ca. 0,6kg
Dimension:	144x144x58mm h x w x d, cut out 138 (+0,5) x 138 (+0,5)mm

Alarms:

BLR-CX has an extended alarm system. All possible settings are shown in menu structure. When an alarm is active, the sign ALARM in the display is blinking. An error code is shown in LCD. Possible error codes are:

U ALARM	Measuring voltage is out of tolerance
I Lo ALARM	Measuring current is less 15mA (please check current path)
I Hi ALARM	Measuring current is too high.
PFC ALARM	Target cannot be reached
HAr ALARM	THD U alarm (harmonic alarm)
StEP ALARM / FLty ALARM	One or more steps are defective. The defective steps are blinking together with the ALARM sign.
SPL ALARM / I I ALARM	One or more steps have less than 50% of original size. Number of step and alarm text are blinking alternately.
tHi ALARM	Over temperature alarm. The steps will be switched-off step by step.
OPH ALARM	Max. allowed operating hours are reached.
OPC ALARM / I I ALARM	Max. allowed number of switch cycles of one or more steps is reached.
Ai / Abrt	Abort of automatic initialization due to not suitable load conditions

Customer settings

Menu	Factory setting	Customer setting	Menu	Factory setting	Customer setting
100			**400**		
Un	400 V		401	75 s	
Ct	1		402	5 var (1-max.)	
Pt	1		403	AUTO (1-max.)	
Ai	NO		404	0 (1-max.)	
PFC	ON		**500**		
CP1	1		501	NO	
St	10 s		502	NO	
200			503	20 %	
201	400 V		504	NO	
202	1		505	60 s	
203	1		506	NO	
204	10%		507	NO	
205	NO		508	262.1 k	
206	0		509	65.5 k h	
207	NO		510	NO	
208	YES		511	NO	
209	AUTO		512	NO	
210	0℃		513	30 ℃	
300			514	55 ℃	
301	60%		515	NO	
302	1		516	NO	
303	0,95 i		517	NO	
304	NO		**600**		
305	10 s		601	NO	
306	2 s		602	NO	
307	NO		603	NO	
308	NO		604	NO	
309	YES		605	NO	
310	ON		606	NO	
311	1		607	1.xx	
312	0				
313	1				
314	NO				

CONNECTING COMPETENCE.

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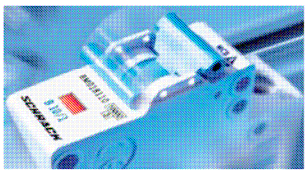

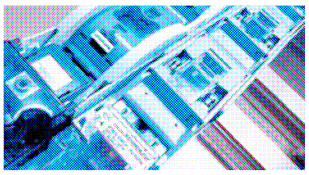

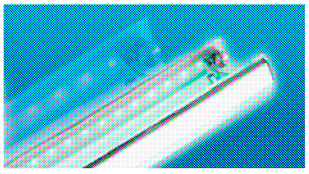

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