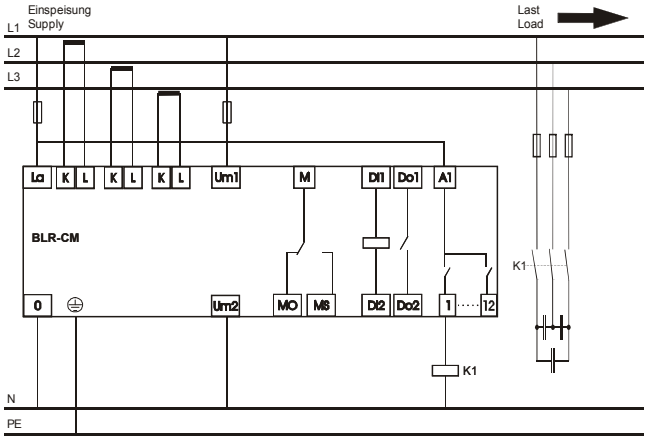
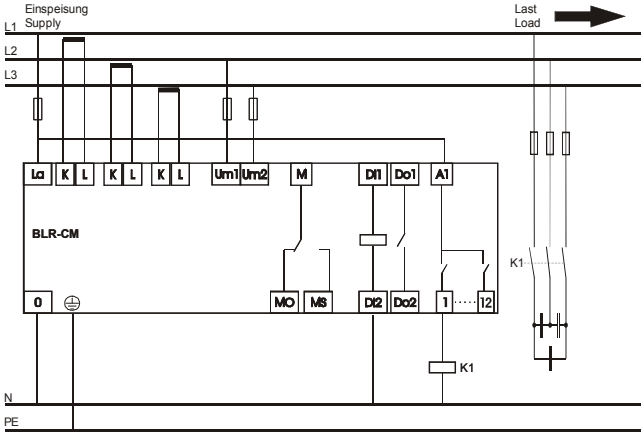
Connection

Only qualified staff is allowed to perform the installation. All legal rules have to be observed and technical standards have to be met. Before connecting the device check that all connecting leads are de-energized and that current transformers are bypassed.



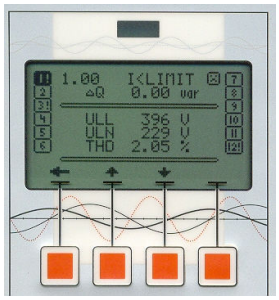


1) Compare auxiliary-, measurement-, control voltage, frequency and the current path of the device (see type label) with the data of the electricity network.
2) Assemble the relay in the switch panel with the 2 mounting clips. If the device is not fitting in the cutout the small plastic bars on the side of the case can be removed with a knife.
3) Connect protective ground to the terminal link of the case.
4) Connect in accordance to the wiring diagram. Pay special attention to the cross section size of the CT connections! An integrated voltage observation with regard to the auxiliary voltage in BLR-CM*3phase* guarantees a safety disconnection of the capacitors in case of undervoltage. It must be ensured, that auxiliary voltage is taken from the identical phase as control voltage for the contactors, to guarantee that all switching elements are safely switched off in case of under voltage.
5) Remove short circuit links of the current transformer before commissioning!

Display

User Interface of BLR-CM*3phase* is a graphical LCD and a membrane keyboard with 4 softkeys.

LCD is split into 4 areas:



Top area:

The two lines of top area are showing information about general status of the relay. The readings of this area are always available, independent from the menu which is used. The readings of top area can be parametered in menu SETUP/DISPLAY.
The “sad face” indicates that there are problems with the level of voltage or current.
The “happy face” indicates that levels of voltage and current are ok.
The “serious face” indicates setting PFC OFF or PFC FREEZE.

Status columns: left and right column are showing the status of the control exits.

1	Step 1, status: off, type: NORMAL
2!	Step 2, status: off, type: NORMAL blocked or FIX OFF
F	Step 3, status: off, type: FAULTY
4	Step 4, status: on, type: NORMAL
5!	Step 5, status: on, type: FIX ON
	Step 6, status: off, type: OFF, not available or PFC OFF

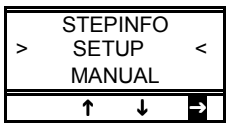
“NORMAL blocked” can be caused by discharging time
“PFC OFF” can be caused by voltage out of tolerance, by relay is off due to setting or due to Alarm system.

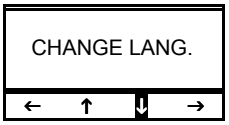
Main area: the three lines of main area are for menu navigation and display of information

Softkey area: the soft key area shows the function of the membrane-keyboard. Depending on the opened menu, the function is different.

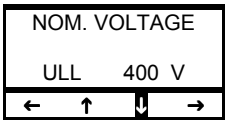
Attention: The present manual is for the first commissioning. For further explanations and more possible settings, please check the reference manual.

For ease of use and adjustment the BLR-CM*3phase* user interface consists of a combination of graphical LCD display and 4 soft-press-keys. The following flow chart shows step by step how to commission the BLR-CM3PHASE. The steps below should be followed by pressing the highlighted soft-press-keys on the BLR-CM*3phase*.



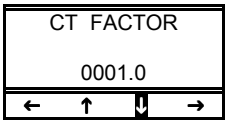


Standard version of BLR-CM*3phase* is supporting English, German and French.



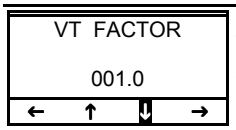
Function of the setting of nominal voltage is to make a definition about the nominal voltage of the system. The threshold levels for under- and overvoltage are based on this as well as the ratings of the capacitor sizes in step database, which are used for control and monitoring. The capacitor sizes, which are stored in step database, are also rated to the nominal voltage.

Independent of connection of the voltage measuring channel, nominal voltage is always the phase-phase voltage!



The CT FACTOR is the ratio of current transformer. (e. g. 1000/5 = ratio 200). At BLR-CM*3phase* the CT-Factor is used for all three current channels.

For current measuring a CT always have to be used!



VT FACTOR is the ratio of the voltage transformer. If the regulator is connected directly to the measurement voltage without VT the value 1 has to be used

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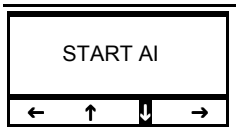


Automatic initialization is switching all exits. During this test it can get information, which exits are working and it can correct the connection of the measuring channels for voltage and current by internal settings.

Automatic initialization can be started only when the “happy face” is shown (voltage and current are ok) and when CONTROL is not set to status OFF or FREEZE manually or by alarm-system. BLR-CM*3phase* needs at least one 3ph. Capacitor-bank for AI! If CONTROL setting is FREEZE done by AI, then a restart is possible.

When AI is running, the status line of BLR-CM3*phase* shows the message: “AI ACTIVE”. The maximum number of switching operations during AI is 10 per exit (normally between 2 and 5). AI is taking care about the setting of discharge time for each exit. If there is a very long discharge time necessary, AI will take a certain time.

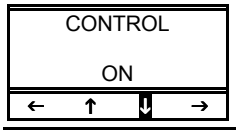
The following messages from AI are possible:

ALARM: AI OK
AI is finished completely. Please check if all used exits are shown with their number in the display and please check if BLR-CM3*phase* is working correctly.

ALARM: CHECK CT’s (CONTROL setting is: FREEZE)
Following reasons are possible:
Rotary field of current measuring is not clockwise or one or two current paths have wrong polarity.

ALARM: STEPS (CONTROL setting is: FREEZE)
Capacitors cannot be detected, because they are not controlled by controller or the rating is smaller as limit.
BLR-CM*3phase*: there is no 3ph. capacitor bank available!

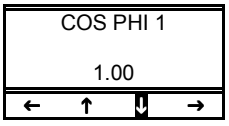
AI ABORTED (CONTROL setting is: FREEZE)
AI couldn’t be finished. The reason could be permanent load variation during AI. Please try it again or do the settings manually.



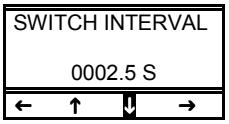
ON: Automatic control is running

FREEZE: Automatic control is stopped; status of exit relays is frozen

OFF: Automatic control is stopped; all exit relays are off



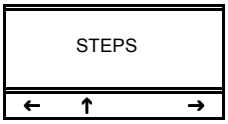
This is the setting for target COS PHI1. It will be valid during normal operation

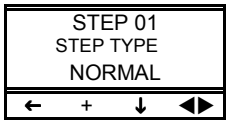


The switch interval is the time delay between switching steps in regulation.

The switch interval has two different functions:

1. Protecting the contactors by reducing the number of switching cycles.
2. Building of the average of the reactive power in the time of the switch interval.





Use + to select the steps and use ◀▶ adjust the step type

To adjust the discharge time push the ↓ button.

STEP TYPE:
Following step types are possible:

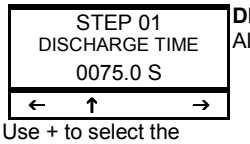
NORMAL = step is used for normal regulation

FIX-OFF = step is permanently switched-off

OFF = step is permanently switched-off an blend out

FIX-ON = step is permanently switched-in
(step will be switched-off in critical situations like over- and under voltage, over temperature or excessive harmonics)

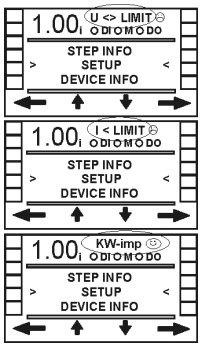
FAULTY = the step is detected as defective and is blocked



Use + to select the steps and use → to enter the input window to adjust the discharge time.

DISCHARGE TIME:
Allows to set the discharge time for each step individually.

After completing the steps above, the controller will check the measured voltage and current. If all measured values are within the prescribed tolerances, the controller start will start normal operation.

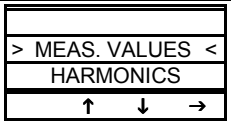


If the controller remains in this setup status for more than 5 sec use the flowchart above to check the VT ratio the nominal voltage and the connection of the voltage measurement.

If the controller remains in this setup status, check the connection of the current transformer. e.g. has the short link been removed and is the respective CT ratio correctly set?

As soon the controller has acquired the measurement voltage and the measurement current it shows the current cos phi and starts with normal operation.

Menü BLR-CM*3phase*



ULL (voltage phase – phase)
ULN (voltage phase – neutral)
THD U (THD voltage)
I1 /I2 / **I3** (current for each phase)
THD I 1 / THD I 2 / THD I 3 (THD current in %)
P1 / **P1** / **P1** (active power for each phase)
Q1 / **Q2** /**Q3** (reactive power for each phase)
S1 / **S2** / **S3** (apparent power for each phase)
P (total active power)
Q (total reactive power)
S (total apparent power)
ΔQ1 / ΔQ2 / ΔQ3 (control deviation for each phase in kvar)
ΔQ (total control deviation in kvar)
CP1 / CP2 / **CP3** (cosφ for each phase)

PF 1 (power factor Λ1 = P1/S1, kW/kVA)
PF 2 (power factor Λ2 = P2/S2, kW/kVA)
PF 3 (power factor Λ3 = P3/S3, kW/kVA)
F (frequency)
T (temperature at rear side of the device)
T-MAX (max. temperature)
OPH (operation hours of pfc-relay)
APF (average power factor)
PF (power factor Λ = P/S, kW/kVA)
WPI / WPE (counter active work import / export)
WQI / WQC (counter reactive work inductive / capacitive)
Rotary Field of current path

MEAS: VALUES > HARMONICS < STEPINFO ↑ ↓ →

Harmonics for current and voltage up to 31st order

HARMONICS > STEPINFO < SETUP ↑ ↓ →

Display Step type, switching operations, Step size.

STEPINFO > SETUP < MANUAL ↑ ↓ →

			Factory setting	Adjustable range
CHANGE LANG.	→		ENGLISCH	English, German and French.
↓				
NOM. VOLTAGE	→		ULL 400 V	100 – 220kV
↓				
CT FACTOR	→		1	1-6500
↓				
VT FACTOR	→		1	1-350
↓				
START AI	→		NO	YES / NO
↓				
CONTROL	→		ON	ON / OFF / FREEZE
↓				
COS PHI 1	→		1.00	i 0.60 – c 0,70
↓				
SWITCH INTERVAL	→		10.0 S	0.5 S – 1200.0
↓				
STEPS	→	**STEP TYPE**	STEPS 1-12 STEP TYPE NORMAL	NORMAL / FIX-OFF / OFF / FIX-ON
		↓		
		DISCHARGE TIME	STEPS 1-12 DISCHARGE TIME 75 S	0.5 – 1200 S

SETUP > MANUAL < DATALOGGER ↑ ↓ →

To enter in manual mode, please select “MANUAL” and push ► for 3 seconds. The automatic control is frozen and the exits can be switched manually. By the means of the **+** -key the referring step can be selected. Changing the switching state is possible by pushing the ◄►-key.

Manual switching is only possible when measurement voltage is in allowed range. Otherwise over- and undervoltage protection will block this function. After switching off an active step the discharging time is active. Only after this time is over the step can be switched on manually again.

The menu item “DATALOGGER” is only visible when the device is equipped with option –DM.

MANUAL > DATALOGGER < DEVICE INFO ↑ ↓ →

SETUP HISTORY	→	In item “SETUP HISTORY” are all changes in the setup of the device stored. For each changed value are the following information’s with time stamp stored: Name of the setting, e.g. CT FACTOR and initial value and new adjusted value. For more detailed information’s, please check the reference book.
ALARM HISTORY	→	In item “ALARM HISTORY” are all alarm events stored. For each alarm event are the following information’s with time stamp stored: Name of alarm e.g. Temp 1, adjusted threshold and max. value and voltage and current.

DATALOGGER > DEVICE INFO < ↑ →

device type e.g. BLR-CM
software: z.B. V 02.07.02
flag: z.B. 3I = 3phase measurement