

### Microprocessor controlled power factor control relay with 1-phase measurement system and display of measurement values

- Full-automatic c/k-value setting, self adapting, connection of different capacitor step sizes possible
- Automatic detection and usage of the optimum capacitor step
- Manual mode possible
- Multiple connection types possible through adjustable phase compensation angle
- Capable for 4-quadrant operation
- Individually configurable discharging time allows quicker switching time
- 1-phase measurement system also suitable for non-sinusoidal currents and voltages
- Graphical LCD for display of step status, measurement values and system data
- Measurement display for U, I, P, Q, S, THD U, THD I, ΔQ, F, T
- Harmonics measurement for voltage and current up to the 30<sup>th</sup> order
- Counter for active and reactive work
- Flexible alarm system with up to 15 alarms
- Programmable digital input and digital output
- Programmable alarm relay with volt-free c/o contact
- Step database with storage of origin step size, actual step size and amount of switching cycles for each step
- Real time clock (available in Option –DM)
- Storage of min., max., average value and operating parameters in adjustable time intervals and possibility to synchronize via 2. digital input (24VDC),
- Storage of changing from any system parameter with date and time
- Storage of events, e.g. alarm with date and time
- Download of data via TTL/USB (with optional cable) or partly via Modbus or LCD of the controller (use option –DM)
- Supply voltage 115/230V, 45-65Hz, other voltages on request
- Voltage measuring 50 – 530V, 45 – 65Hz
- Current measuring 15mA – 5A, suitable for CT x/1A and x/5A
- Connection with pluggable screw terminals
- Instrument casing for cutout 144 x 144mm, depth 49mm
- Protection class IP20 (casing), IP50 (front)



Description	Type
Power Factor Controller BLR-CM with 06 relay outputs	CM 06R
Power Factor Controller BLR-CM with 12 relay outputs	CM 12R
Power Factor Controller BLR-CM with 6 relay outputs and 6 transistor outputs	CM 12RT
<b>Options</b>	
Interface RS485 protocol Modbus RTU	- MB
Version for HV and MV Capacitor banks	- HV
Data storage, Real time clock, 2. digital input + Interface RS485 protocol Modbus RTU	-DM
<b>Accessories</b>	
Data cable TTL/USB	UMS9
Transparent cover with lock IP54	- VT
Wall mounting bracket	3ZWC

## REGULATION

The intelligent regulation algorithm of BLR-CM switches the "normal" steps optimized. This guarantees short compensation times combined with smallest amount of operations. The operating cycles are shared equally to all steps.

The fast regulation algorithm is using the fast steps to get best results for real time compensation in one period.

Both modes can work parallel in hybride compensation panels. The normal mode is preparing the working point for real time compensation.

All relevant parameters for the regulation are set ex works in the way that in nearly all cases no further adjustments are necessary to start the regulation.

But this does not mean that the power factor controller cannot be adapted to the compensation system by the means of further adjustments.

An abridgement of the possible settings are:

**Measurement:** CT-ratio, VT-ratio, nominal voltage

CT- and VT- ratio are only necessary to display the correct measurement values. The setting for nominal voltage is needed for over- and undervoltage protection.

**Regulation:** target-cosphi 1, target-cosphi 2, switching time delay  
Switchover from user defined target-cosphi 1 to target-cosphi 2 is done by programmable events. This can either be the digital input or exceeding of threshold levels.

**Settings per step:**  
capacitor size (optional), discharge time, fix-on, fix-off, fast or normal.

The optional data logger is logging changings of settings. This shows if parameters were changed later, to detect unauthorised settings in case of failfunction.

## MEASURING

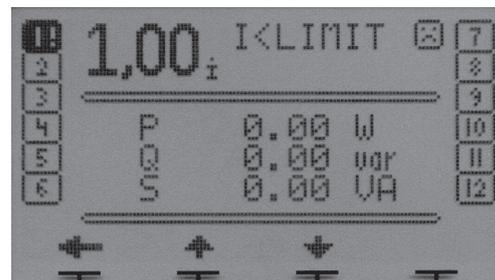
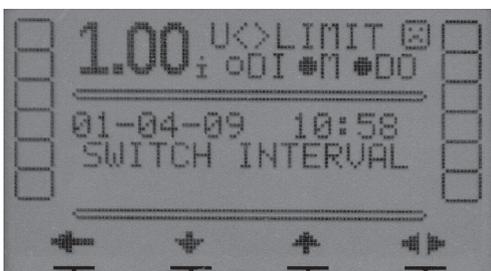
The DSP (digital signal processing) microcontroller of BLR-CM is permanently generating all conditions in the network. As standard, the voltage L1-N and current in L1 are used for this. The separation of auxiliary voltage and voltage measuring allows a voltage measuring range between 50 - 530V. Additionally, there is the possibility to change the phase shift between voltage and current in steps of 15 degrees. The result is the maximum possible flexibility of the relay for applications with voltage measuring phase/neutral, phase/phase and for mixed measuring with different transformer types.

The BLR-CM is measuring the temperature in the panel by using the integrated temperature sensor. This measurement value can be handled flexible, e.g. it can be used for an alarm message, switching-off the steps or activating a fan by using the digital output.

At BLR-CM the following measurement values can be displayed:

- voltage (phase/phase and phase/neutral)
- current
- active power
- reactive power
- apparent power
- THD voltage
- THD current
- harmonics for voltage (order 2 - 30)
- harmonics for current (order 2 - 30)
- counter active work import / export
- counter reactive work inductive / capacitive
- missing reactive power for target-cosphi
- frequency
- temperature

The optional data logger logs measuring values in intervals with minimum, maximum, average and time.



## FEATURES

**All relays are fitted with these features as standard:**

- Auxiliary voltage separate from voltage measuring
- Auxiliary voltage: 115/230V, 45-65Hz
- Voltage measuring: 1 x 50 - 530V
- Current measuring: 1 x 15mA - 5A
- Relay output alarm: 1 x C/O contact
- Digital input: 1 x 50 - 250V AC
- Digital output: 1 x N/O contact
- Sensor for temperature measuring

**Types of different switching outputs:**

- BLR-CM 06R: 6 relays (one common point)
- BLR-CM 12R: 12 relays (one common point)
- BLR-CM 06T: 6 static outputs (one common point)
- BLR-CM 12T: 12 static outputs (one common point)
- BLR-CM 12RT: 6 static outputs, 6 relays (two separate common points)

**Optional features:**

- MB: RS485 with Modbus RTU protocol
- DM: Data logger + RS485 with Modbus RTU protocol

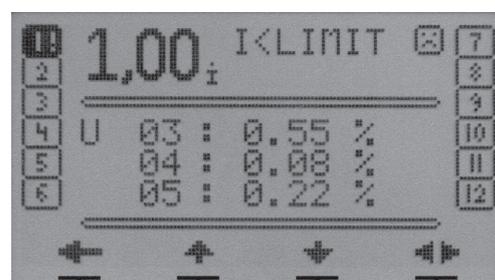
Different auxiliary voltage on request

## PROTECTION AND ALARMS

The BLR-CM includes a lot of different supervision functions to guarantee a durable safe operation of the compensation system and to ensure a long life cycle of the used components. Some of these supervising functions are:

- under- and overvoltage
- harmonics
- defective steps
- maintenance (loss of power and amount of operations)
- alarm by not reaching the target cosphi
- temperature measuring with fan control and switching off steps
- digital input

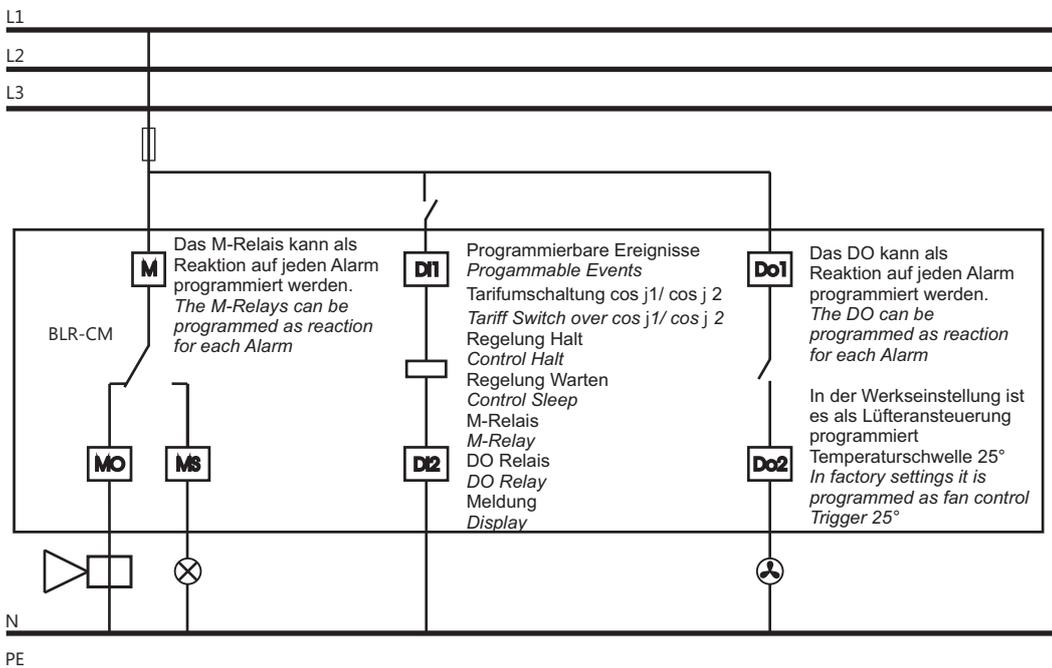
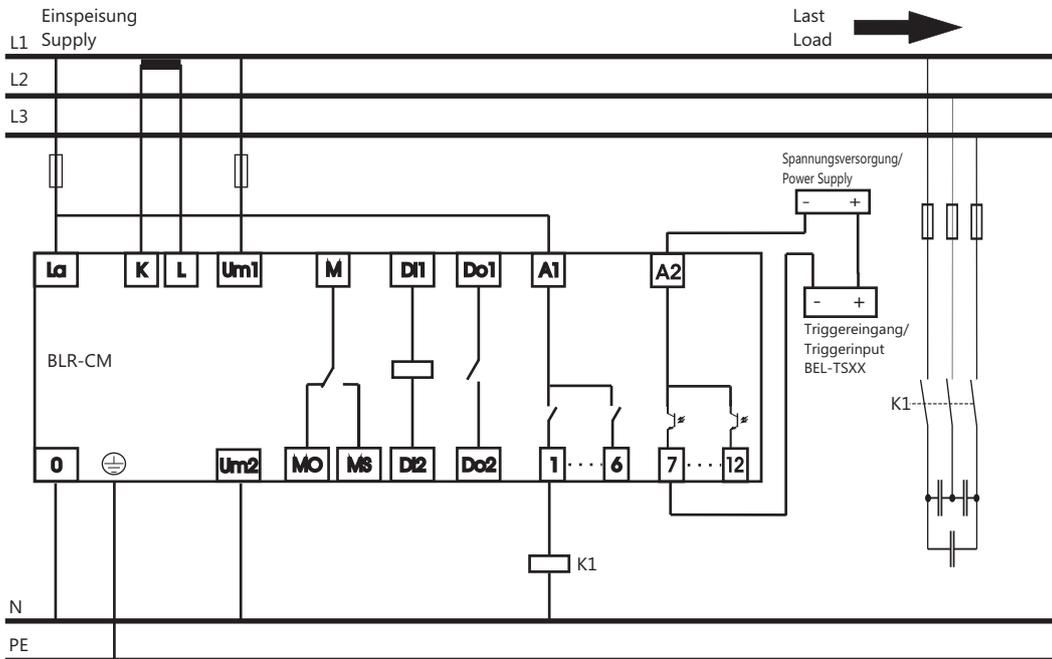
The optional data logger logs all events with time and date.



# TECHNICAL DATA

Auxiliary voltage:	100-132V / 207-253V, 45-65Hz, max. fuse 6A	Ambient temperature:	operation: 0°C ... +70°C, storage: -20°C ... +85°C
Voltage measuring:	50 - 530V, 45-65Hz, PT-ratio 1 - 350	Humidity:	0% - 95%, without moisture condensation
Current measuring:	0-5A, sensitivity 15mA, burden 15mOhm, overload 20% continuous, CT-ratio 1-4000	Overvoltage class:	II, pollution degree 3(DIN VDE 0110, Teil 1 / IEC 60664-1)
Regulation outputs:	6R, 12R, 6T, 12T, 12RT relays: N/O, one common point, max. fuse 6A breaking capacity: 250V AC / 5A static outputs: open-collector, breaking capacity: 8-48V DC / 100mA	Standards:	DIN VDE 0110 Teil1(IEC 60664-1:1992) VDE 0411 Teil1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Teil 20 (DIN EN 61326 / IEC 61326: 1997 + A1: 1998 +A2:2000)
Alarm contact:	C/O, voltfree, programmable max. fuse 6A, breaking capacity 250V AC / 3A	Conformity and listing:	CE, UL, cUL
Digital input:	50 - 250V AC, programmable	Terminals:	screw-type, plugable, max. 2,5qmm
Digital output:	N/O, voltfree, programmable max. fuse 6A, breaking capacity 250V AC / 5A	Casing:	front: instrument casing plastic (UL94-VO), rear: metal
Interface:	RS485 (optional) Modbus RTU protocol (Slave)	Protection class:	front: IP54, rear: IP20
		Weight:	ca. 0,8 kg
		Dimensions:	144 x 144 x 58mm h x w x d, cutout 138 <sup>+0,5</sup> x 138 <sup>+0,5</sup> mm

# CONNECTION DIAGRAM



# DIMENSIONS

