



**TOUGH  
TRUSTED**

**BELUK**

**SYSTEM COMPONENTS FOR  
POWER FACTOR CORRECTION AND  
POWER QUALITY**



## **BELUK - PURE ENERGY**

BELUK is pioneer and leading manufacturer in the area of power factor control. Since 1956 we develop and produce innovative yet robust products for this technologically complex field. Also in the area of low and medium voltage switchgear our customers benefit from our trend- setting concepts.

On the basis of this extensive know- how we offer not only proven standard components but tailored solutions fitting your specific requirements as well.

Experienced specialists will support you with words and deeds in your planning.

The production organization has been set up following modern and lean principles and methods, and ensures a quick and cost- efficient production.

The quality management system is certified in accordance with DIN ISO 9001 and ensures a constant high level of quality.

We are permanently on the latest technological level due to a sound research and development.

A large number of renowned customers all over the world document our reliability.

Our todays' generation of power factor controllers is the result of decades of continuous technological development.

## **WE CONTROL, WHAT NEEDS TO BE CONTROLLED**

As a start, we produced electromechanical devices. In the seventies electronics became the order of the day, until finally in 1988 the first power factor controllers with microprocessor control were delivered. Since the beginning of the century power analyzers, thyristor switches and capacitor protection relays were added to our portfolio.

Patented Algorithms take care of precise and reliable results and allow for a wide range of standard and customized applications, like i.e. dynamic compensations, compensations for induction furnaces, medium voltage switchgear or wind farms.

BELUK Power factor controllers "separate the chaff from the wheat", that is to say the reactive from active energy, regardless of the number of harmonics disturbing the network.

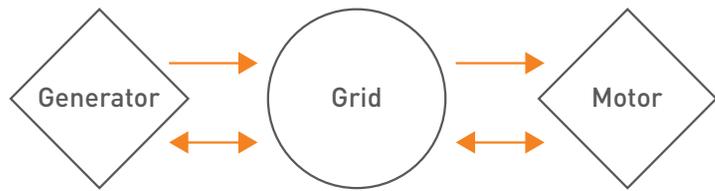
**BELUK**





## ENERGY EFFICIENCY BY POWER FACTOR CONTROL

In mains power supply networks, energy should get from the point of production to the point of consumption. In many cases more energy is transported between the generator (i.e. power plant) and the consumer (i.e. electric motor). This additional energy per time unit, that does not add anything to the active power (usable power) is usually unwanted and is called reactive power.

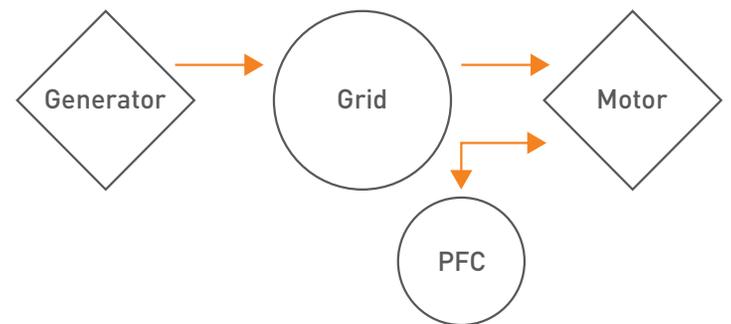
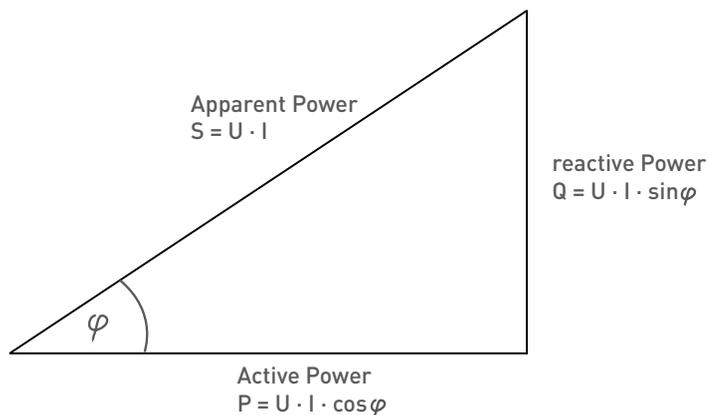


Active power is transformed i.e. into mechanical movement or heat, whereas reactive power is needed for generating i.e. magnetic fields in an electric motor.

Without compensation, reactive power oscillates between generator and motor. Since reactive power has to be generated and transported, the power generators, cables, transformers, etc. have to be sized-up accordingly.

When using a Power Compensation, the reactive power will only oscillate between motor and the compensation. Therefore, no reactive power is drawn from the power generator. As a result, the customer does not have to pay for the reactive power, and the entire network infrastructure as well as the power generator can be designed smaller.

Apparent Power = active power plus reactive power, to be more precise it is the geometrical addition of active and reactive power.

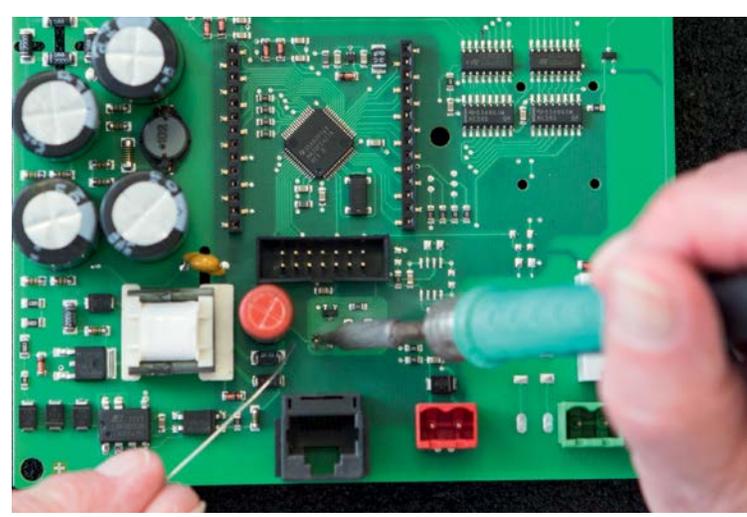




**Rugged – Reliable – Reasonable**  
**Our BELUK BLR CX is performing**  
**tremendously since years.**  
**We are constantly improving it, so it**  
**does not stop becoming even better.**

The BLR CX Series is a user-friendly “plug’n’play” device, that is designed to start regulating Cos Phi with a minimum of user interaction. Should further settings in the areas of measuring, regulating or alarms become necessary, the BLR CX offers a password protected expert-setup. All adjustments are possible during operation. Malfunctions of the compensation unit will be highlighted in the display and optionally trigger an isolated alarm relay.

A fan can be controlled using one of the output relays. The “Best Fit” Algorithm is patented and has proven its performance over the years. In summary the BLR CX is a high-tech device with an affordable price tag.



- Models:**  
 BLR CXR with 4, 6, 8, 10, 12 and 14 relay outputs  
 BLR CXT with 6 and 12 transistor outputs
- Options:**
- L pluggable temperature sensor
  - MB Modbus RTU RS485
  - V Separate supply voltage (voltage measuring range: 90-690V)



### Automatic Initialization

Advantage: During commissioning the CT ratio and the nominal voltage are the only parameters that need a manual input. The BLR CX takes care of everything else. It also detects which outputs and what type of impedances are connected. A wrong setup is nearly impossible due to automatic phase angle correction. Thus commissioning becomes error- and hassle-free and mistakes during installation are drastically reduced.

### Wide Range Power Supply

Advantage: The device can run on 90 to 550V AC, both 50 and 60 Hz. This covers normal power supplies all over the world. By using a switching power supply, the BLR CX is insensitive to harmonic distortions. This is an advantage when installed in networks with high degree of THD.

### 4 Quadrant Operation

Advantage: Either capacitors or inductors can be connected to this controller. This makes it universally suitable for classic compensations as well as for wind power networks or solar farms.

### Best Fit Algorithm

Advantage: Switching of the stages, which give optimum result in terms of shortest switching time. There is no restriction regarding sequence or size of attached capacitors. The patented "Best Fit" Algorithm will achieve the best results with the least amount of switching. When equal sizes of steps are connected, the controller will distribute the step switching equally. This prolongs the lifetime of the capacitors and protects your investment.

### Automatic Step Size Detection

Advantage: The BLR-CX automatically detects the size of the attached capacitors/ reactors. The values measured are being verified regularly, so that regulation is performed with actual step sizes. Even the ageing of capacitors is detected and optionally an alarm is triggered before the capacitors fail.

### Modbus Retrofit

Advantage: Every BLR CX Power Factor Controller can be retrofit easily with a Modbus Communication Module. This Module can be attached to the back of the regulator, and connected by cable. An expensive exchange of the entire unit is avoided when integrating BLR CX controllers in a Modbus RS485 Network.

#### Technical Data

Measuring- and supply voltage	90 – 550V AC, single phase, 45-65Hz, 5VA, max. fuse 6A VT, ratio from 1.0 -350
Current measurement	15mA – 6A, single phase, burden 20mOhm, CT-ratio from 1-9600
Control exits Relays	14 n/o, with common point, max. fuse 6A, Breaking capacity: 250V AC/ 5A
Static outputs	6 or 12 static outputs , open-collector, breaking capacity: 8 – 48V DC / 100mA
Temperature measurement	Optional by NTC
Fan control	by using one switching exit defined as „Alarm“, devices with transistor outputs use the contacts L / LF for fan control.control.



**High-Tech Power Factor Control aiming at fastest possible hitting of target Cos-Phi, and doing so with least amount of switches.**

High- Tech Power Factor Control with the aim to reach target Cos Phi as fast as possible and with the least switching amount. The various regulating algorithms of the BLR CM (real-time algorithm / mixed algorithm / Best Fit algorithm) are the brain in this powerful PFC. With all the different options and wide range of alarms it is adaptable to all challenging regulating tasks, like i.e. dynamic compensations.

As "Hybrid Version" with 6 relay outputs and 6 transistor outputs, which are controlled by two algorithms working in parallel, static and dynamic changing loads can be controlled simultaneously with optimal results.

The regulating characteristic Q(U), which was especially designed for this controller, makes the BLR CM suitable for controlling and maintaining grid voltage of power generation facilities.



#### **Relay or Transistor outputs**

The BLR CM controller is pre-destined to trigger thyristor switches with either 6 or 12 transistor outputs. Also available: 6 relay plus 6 Transistor outputs (Hybrid Controller). The relay outputs are used for the static loads, the transistor outputs control the dynamic parts of the load.

#### **Automatic Step Recognition**

No matter if reactor or capacitor- the BLR CM recognizes the size automatically. It does not matter which output is connected to a reactor or a capacitor. There are no limitations regarding order or size of the connected impedances.

# BLR-CM

## Optional 3-Phase Measurement

In networks with asymmetric loads (i.e. office buildings), the BLR CM can measure the current of each phase in this variant. In addition, the controller recognizes if a 1- or 3- phase capacitor is being used. In conjunction with the intelligent controller algorithm the result is an optimal compensation of reactive power also in asymmetric networks.

## Graphic LCD Display

The operator can browse the menus and adjust the settings via softkeys (keys with variable functions); the adjustments and measurement values are displayed in a back-lit graphical display in high resolution, using plain text messages. The controller will support English, German and French languages.

## Suitable for MV and HV Applications

The BLR CM can be ordered with a pre-set reaction time of 8 seconds. This will be enough time for a vacuum contactor to switch. After this switching time the controller will re-measure to register the effective changes in load.

## Real-Time Algorithm

Equipped with a real-time algorithm and transistor outputs, the BLR-CM is ideal for triggering thyristor switches (in dynamic compensations). Deviations are determined immediately (about 1ms) after measurement of one period. Thus, a reaction time of about 20 ms can be achieved.

## Data Memory Optional

Optionally the BLR CM can be equipped with a data memory, which will store all changes of parameters including a time stamp, all alarms with time stamp, as well as measurement values in adjustable intervals and system parameters, like number of switches per step. The data output is via a TTL interface in CSV MS Excel compatible format.

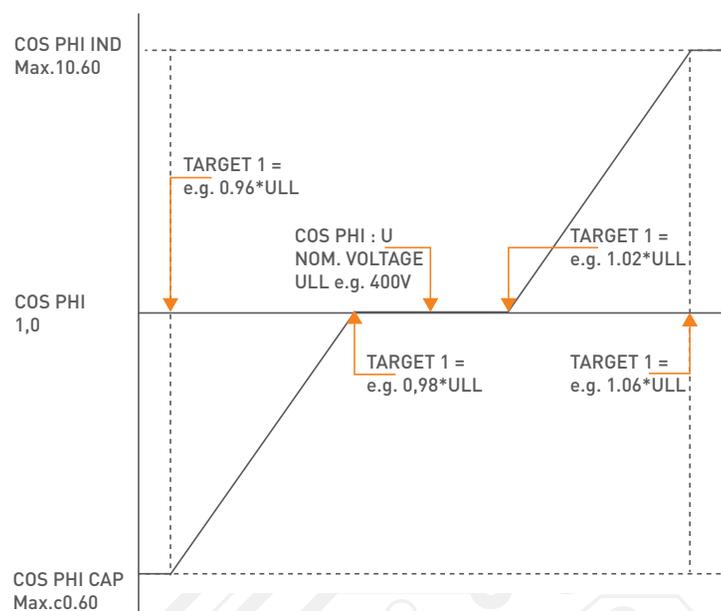
## Best Fit Algorithm

The BLR CM range of controllers have the patented and proven "Best Fit" algorithm. Both capacitive steps and inductive steps can be used simultaneously for PF control. Therefore the BLR CM can react to and control both inductive as well as capacitive loads.

## BLR CM Controller with Q(U) Regulation Characteristics

The target parameter of the BLR Q(U) is the voltage of electric power plants which has to be maintained. In case the measured voltage deviates from the target voltage (undervoltage or overvoltage) the Cos Phi will be adapted dynamically. Then the controller will switch capacitors or chokes accordingly.

The demand for inductive or capacitive reactive power will be calculated by the controller with the help of an adjustable characteristic curve. The advantage of this adjustable curve against a static Cos Phi is, that the regulation target is adjusted dynamically according to the target voltage.



## Technical Data

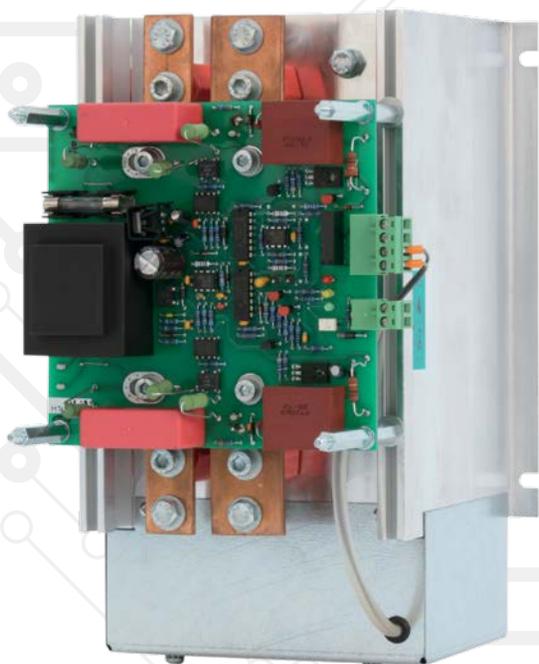
Measuring- and supply voltage	50 – 530V AC, 45-65Hz, PT ratio 1 - 350, 100 - 132V / 207 - 253V, 45-65Hz, max. fuse 6A
Current measuring	0 – 5A, sensitivity 15mA, burden 15mOhm (option -3A: 3x 0 – 5A) overload 20% continuous, CT-ratio 1 - 6500
Control exits	6R, 12R, 6T, 12T, 12RT, relays: N/O, one common point, max. fuse 6A
Breaking capacity	250V AC / 5A, 400V AC / 2A, 110V DC / 0,4A, 30V DC / 5A
Static outputs	open-collector, breaking capacity: 8 – 48V DC / 100mA
	Alarm contact C/O, voltfree, programmable, max. fuse 6A, breaking capacity 250V AC / 5A
Data-logger	optional



**The BELUK BLR TS.**  
**A high-speed power pack with many options.**

Non-mechanic switching: Smooth, fast and always at zero crossing. In contrast to contactors, the switching time of Thyristor switches is always precise to the millisecond.

Transients are minimized this way. Reaction times to the trigger signal are in the milli-second range- this is why thyristor switches are the ideal choice for applications with quickly changing loads (i.e. welding or lifting cranes). On top of this, the BELUK Thyristor switches are known for their robust design and long working life.



# BLR-TS

## Soft Switching at Zero Crossing

The firing electronics of the BELUK TS switch precisely when there is exactly equal voltage at mains and the capacitor. This is fast, and free of transients and therefore gentle and causes very low wear and tear on the capacitors.

## Fast

The BELUK TS switches at the next possible zero crossing after the trigger signal from the controller is present. In a typical case this is 10 ms after the switching signal. This is ideal for fast changing loads like cranes, elevators, welding sets but also for wind farms, oil-rigs, or for the automotive industry.

## Robust

Beluk thyristor switches are well known for their robustness. All thyristor modules used have a minimum blocking voltage of 1800V, and are designed for a long lifetime. A permanent overload of 20% will not damage the devices. Only from 75 kvar capacitor size, a temperature-controlled fan is used for cooling. Below this size, the thermal losses are dispensed passively by a heat sink.

## Protected

All BELUK TS are protected against overheating. Before damage can occur, the thyristor switch will switch itself off to prevent damage. Even a failing cabinet fan or too high temperatures in the cabinet won't be able to damage your investment.

## Low Maintenance

Thyristor switches of the BELUK TS series only need a yearly visual inspection of the heat sink and the cooling fan. No further maintenance is required. The present operating condition is displayed via LEDs.

## Compact

The BELUK TS thyristor switch is very compact in its dimensions (200 x 160 x 215mm no fan, 260 x 160 x 215 with fan). Consequently, there is a higher number of possible arrangements in the cabinet, where the thyristor switches do not interfere with one another thermally.

Nominal Voltage/ Losses	25kvar	50kvar	65kvar	75kvar	100kvar	125kvar	130kvar
400 V	36A/ 68W	72A/ 122W		109A/ 205W	144A/ 250W		
440 V	33A/ 61W	66A/ 111W		99A/ 184W	131A/ 244W		
480 V	30A/ 52W	60A/ 104W		90A/ 172W	120A/ 224W	150A/ 261W	
525 V			72A/ 122W				144A/ 250W
690 V		42A/ 75W			84A/ 145W		

## Technical Data

Recovery time	typically after 1 period
Controlled Phases	2, semi-controlled
Supply Voltage	Direct from the power connection (separate power supply optional available)
Consumption of supply	max. 9 VA
Voltage Trigger- signal	8 - 30 V DC
Consumption Trigger signal	2 mA bei 12 V DC
Auto shut-off temperature	80° Celsius



**KSR1. This is how uncomplicated and reasonable protection for your capacitors looks like**

The KSR1 is a modern single- phase unbalance protection relay. Capacitors in MV or HV compensations use oil as dielectricum, which could catch fire in case of a damage. A permanent supervision of the state of the capacitors is therefore necessary.

The KSR1 offers many ways to protect the capacitors against internal faults, and can warn and switch off if so required (alarm/ trip)



# KSR1

## Wide Range Power Supply

The KSR1 can be connected to any power supply from 40 to 250 VAC as well as 40 to 300V DC. It is therefore capable to work with normal mains connection or with battery power. There is no need to make a selection. By using a switching power supply, the KSR1 is insensitive to harmonic distortions.

## 2 Measuring Inputs

The imbalance can be monitored either by using a separate current or voltage measuring input. Permissible currents range from 15mA to 5A, permissible voltages from 0,1 to 20VAC. A wide range of typical monitoring scenarios is covered with the KSR1.

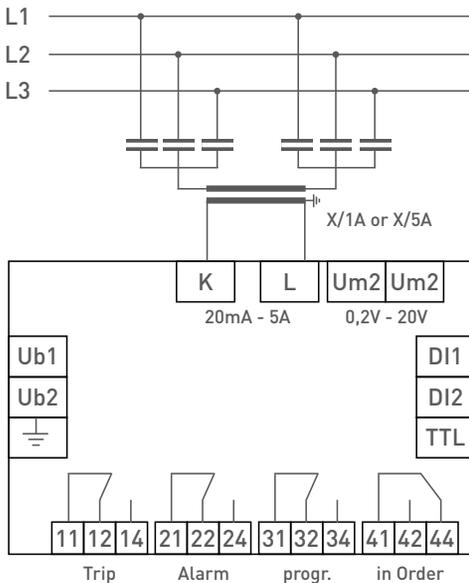
## Programmable Outputs

Each of the 3 output relays has its own parameters. After elapsing of the programmed delay time, the corresponding relay will be triggered. After the alarm causing situation is over, the respective relay will be reset automatically or must be reset manually.

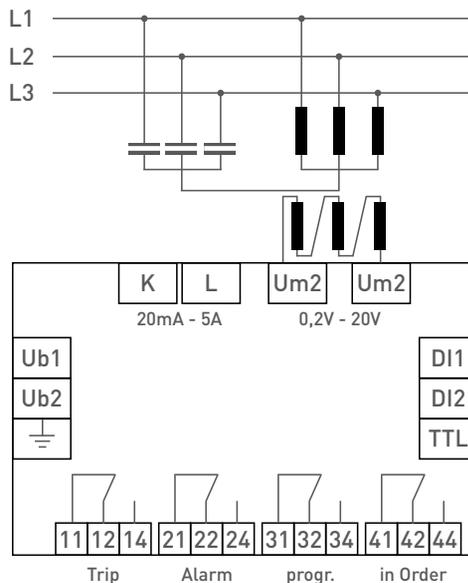
## Option Modbus

Retrofitting the KSR1 with Modbus communication is very simple. A Modbus module has to be attached to the back of the relay casing and connected by cable. There is no need to exchange the entire relay if there is a requirement to integrate the KSR1 to a Modbus communication.

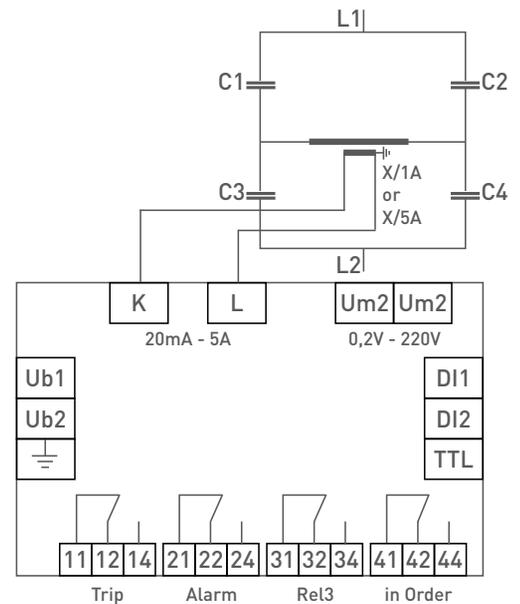
## Double-Star Connection



## Voltage Monitoring



## H-Bridge Connection



## Technical Data

Supply Voltage	40 – 250V AC, 45-65HZ / 40 – 300VDC, 5VA; max. fuse 6A
Measuring Voltage	0,1 – 20V; burden 240kOhm, with low-pass filter, Vt- ratio adjustable 1-350, Short term overload: 500 V for 10 seconds
Accuracy	0.5% vom upper range value.
Current measurement	15mA – 5A; burden 20mOhm; Ct ratio adjustable 1-4000, Continuous overload: 25A; short term: 100A / 1sec
Relay outputs	4 relays, c/o, voltfree, max. fuse 6A
Functions	Relay 1: Trip, Relay 2: Alarm, Relay 3: programmable (Alarm / Trip / both) Relay 4: Device working OK
Max. output rating AC	1250VA, max. switching voltage: 440VAC
max. output rating DC (ohmic)	30V / 5A; 60V / 1A; 110V / 0,5A; 220V / 0,3A



**The protection relays KSR protect your Expensive assets reliably, and this at a very competitive price.**

**This relay measures, warns, and switches capacitor banks off before huge damage can happen. The 7 measuring channels and the wide range of product versions make it suitable for various applications.**

### 7 Measurement Channels

There are 3 voltage and 4 current measuring channels in the KSR, so the range of possible connections for monitoring capacitors is very versatile. This way 4 capacitor pairs (3-phase) can be monitored simultaneously using their star point, or one capacitor pair (3-phase) can be monitored using all 3 phases of current and voltage (see example application drawings).

### Sophisticated Measuring and Monitoring System

The measurement system of the KSR offers a total of 7 input channels (3 for voltage, 4 for currents). The CT ratio is programmable in a range of 1 – 10000. Current input 1 to 3 share the same CT ratio, whereas channel 4 can be programmed with a different CT ratio.

In total there are 32 protection settings available.

A total of 6 relays are available for alarm signals, among them 2 c/o and 4 n/o relays. These relays can be "or" linked so that they are dependent on several alarm conditions. In addition to the alarm relays, also alarm messages can be displayed on the LCD display.

### Galvanically Isolated Current Inputs

The current input of the KSR is galvanically isolated- this protects the device against damage through accidental overcurrent. An input current of 200A for 1 second will not harm the KSR. In case of an overcurrent at the current input, the device stays intact and your investment is protected.

### Data Memory and Modbus RS485 Communication (Optional)

The KSR can be equipped with a fault recorder. Every fault or alarm is recorded with its source, date/ time, limit and max value. The option "-DM" also comes with Modbus communication interface, and a digital input for blocking alarms.

The capacitor protection relays BELUK KSR monitor and protect you valuable facility at a very competitive price. The KSR will measure, warn and if needed switch off capacitors before major damage will occur. With 7 measuring channels and the product variations, the KSR is fit for almost any application.

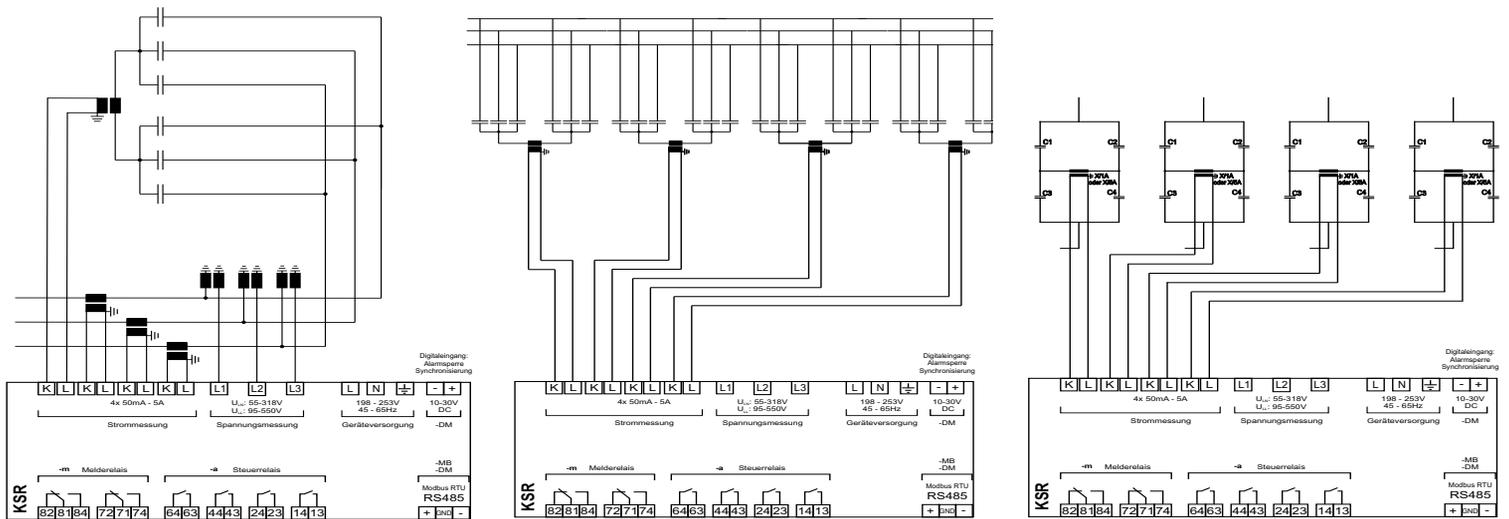
### Product- Variation „Z“

The KSR-Z offers factory pre-programmed protection settings, which are based on tripping curves following ANSI (American National Standards Institute) standards. An alarm will be dependent on the violation of a trigger value and the time of the violation according to the tripping curve. Nothing has to be adjusted by the operator, since everything is pre-programmed. This makes commissioning work easy and fast; no additional software is needed. Following parameters can be adjusted, each with a trip and an alarm value:

OL (Overload), Olth (Overload thermal), Olf (Overload fundamental), UL (Underload), OV (Overvoltage), UV (Undervoltage), UB (Unbalance), EF (Earth Fault), VA (Voltage Assymmetric)

By default the KSR-Z comes with a fault recorder, Modbus interface and a digital input. Same as the standard KSR, 3 voltage measurement channels and 4 current measurement channels are available.

# KSR



## Product-Variation „V“

The KSR-V has a total of seven Voltage measuring Channels. 3 of those are used to measure the mains voltage, and 4 channels measure imbalances. Again, the proven monitoring system of the classical KSR is used here:

32 possible protection settings can be programmed, and again written alarm messages in the display of the unit are available next to 2 c/o plus 4 n/o contacts as output relays.

### Technical Data KSR

Supply Voltage	207 – 253V, 45 – 65Hz, max. fuse 6A (AC type), 80 – 132V (DC- type). Other voltages upon request.
Voltage Measurement	L-N 55V .. 318V, L-L 95V .. 550V, 45 – 65Hz, Vt ratio 1 – 4000
Current Measurement	50mA – 5A (Type 55) oder 20mA – 1A (Type 11), CT required CT ratio 1 – 10000, Current Overload: 20% continuous, 200A for 1 sec. (Option -E)
Power Consumption	<1VA
Switching outputs	2 c/o contacts, voltfree, Switching power: 250V AC / 5A, 30V DC / 5A (ohmic) 4 n/o contacts, voltfree, Switching Power: 250V AC / 5A, 30V DC / 5A (ohmic) alternatively: 4 Opto-couplers, voltfree, Open-collector, Switching Power: 250V DC / 0,1A
Digital Input	10-30 VDC
Fan Control	temperature sensor on the back of the device. Programming of outputs for fan control possible

### Technical Data KSR-Z

Voltage Measurement	55/95V – 318/550V, 45-65 Hz, Vt- ratio 1 – 4000
Current Measurement	50 mA – 5 A (Type 55) or 20 mA – 1A (Type 11), burden 15mOhm, CT required, CT ratio 1 – 10000
Current overload	20% continuous, 200A for 1 Second

### Technical Data KSR-V

Voltage Measurement	55/95V – 318/550V, 45-65 Hz, Vt- ratio 1 – 4000
Voltage measurement for imbalance monitoring	0 – 20V min sensitivity 0,5V, max. 120V continuous.
Switching outputs	2 c/o contacts, voltfree, max. fuse 6A, 4 n/o contacts, voltfree, max. fuse 6A



**The BELUK EMM-5. It does not miss the slightest deviation. Precise and reliable.**

The EMM-5 is a power analyzer, monitoring various trigger values in a network and counting active and reactive power per phase. The operator can choose an exceeding

or shortfall of 52 different measuring values. This can be used to program a total of 32 protection settings.



**Models:**

MB RS485 Modbus RTU  
DM RS485 Modbus RTU, data recorder, event recorder, real time clock, digital input

**Options:**

m 2 c/o contacts  
am 2 c/o contacts  
4 c/o contacts  
Im 2 c/o contacts  
4 impulse outputs

# EMM-5

## Complex Measurement – Easy Operation

The EMM-5 power analyzer has been designed to provide a great variety of information from the power distribution system it supervises. It contains a powerful measurement system, that is able to provide high precision values from 3-phase systems.

A large liquid crystal display with backlight provides a good visibility even in poor light conditions.

Four adaptive soft-keys provide easy and intuitive usage also in complex situations.

All measurement values of the EMM-5 are arranged on several pages of the display. Using the "auto roll" function, the power analyzer will scroll through all pages in 10 second intervals.

This way the information is presented in a very clear and orderly way, without any action from the operator.

## Variable Output System

Next to Alarm messages on the display of the device, alarms can also be used for an external alarm using the relay outputs on the EMM-5. External counters for both active and reactive power can be addressed using the 4 output relays. Of course a Modbus Interface is available, same as a Data Memory.

## Counter System with 32 Counters

The EMM-5 can handle two tariffs optionally. Either each day at the same time tariffs will be switched or by means of an external signal which is connected to the digital input. Per tariff following counters are available:

Active Ppower Import (L1, L2, L3, total)

Active Power Export (L1, L2, L3, total)

Reactive Power Inductive (L1, L2, L3, total)

Reactive Power Capacitive (L1, L2, L3, total)

All phases are displayed separately, therefore the EMM-5 has 32 counters available.

## Multi Source and Multi Target Alarms

A single relay can be actuated by one, but also from more alarm situations (multi source). In the later case, the conditions are linked by "or" disjunction: Only one signal is enough to trigger the alarm.

Same way one alarm condition can also have more than one relay as target (multi target). If the alarm condition is reached, all relays assigned are operated.

### Technical Data

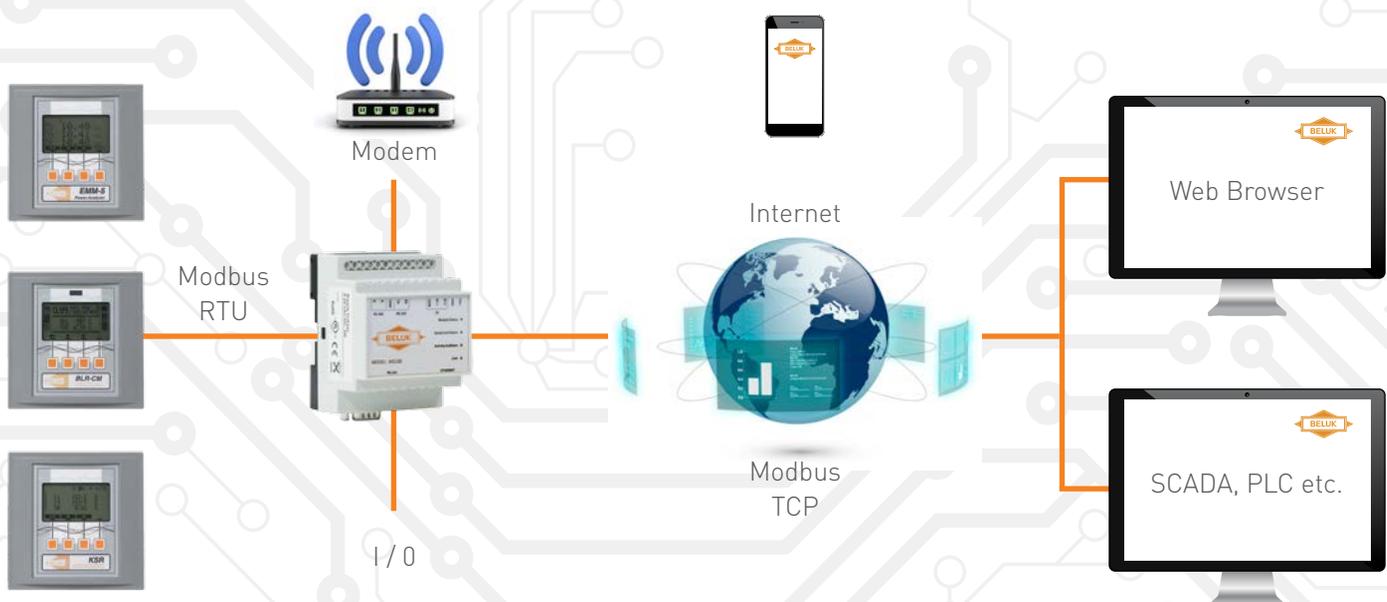
Supply Voltage	207 - 253V, 45 - 65Hz, max. fuse 6A, Voltage measurement L-N 55V .. 318V, L-L 95V .. 550V, 45 - 65Hz, Vt factor: 1 - 4000
Current measurement	0 - 5A, minimum 50mA, Power consumption < 1VA CT required, Ct ratio: 1 - 10000, Current overload 20% continuous, 50A for 1 sec.
Current measurement	Option -E: 200A for 1 sec
Relay outputs	4 n/o, voltfree, max. fuse 6A, 2 c/o, voltfree, max. fuse 6A
Breaking capacity	250V AC / 5A, 30V DC / 5A (ohmic), 110V DC / 0,4A (ohmic), 110V DC / 0,3A (inductive)
Impulse outputs (optional)	Transistor outputs, galvanic isolation by opto-coupler, Switching voltage: max. 250V DC, switching current max. 100mA, Switching frequency: max. 4Hz, tON ≥ 50ms / tOFF ≥ 50ms
Digital Input	on request
Fan control	temperature measurement on rear of device programming of relay outputs for fan control possible

**Small but communicative: Our MiniSCADA. It connects what needs to be connected.**



The BELUK MiniSCADA is an easy-to-use web based SCA-DA system. Both local and remote control is supported over Ethernet, Internet, LANs, phone modems and GSM/ GPRS (external modem required). The Beluk MiniSCADA hardware has a built-in web-server that operates when customizing the graphical user web interface. Everything is done by clicking

your way through the onboard web pages using a standard web browser at any computer. Therefore no Windows tools or HTML editors are needed. No licenses or royalties. Connect the Modbus devices and select the desired data. Data which has been configured is shown automatically on the integrated webpage. There is no need for HTML programming.



# MINI SCADA

## Web-Server

The gateway acts as a web interface to one or more Modbus RTU devices (slaves). The gateway holds an embedded web server with corresponding web pages integrated. The operator can configure what data (up to 400 modbus registers) to be monitored and controlled through the onboard web pages. When the configuration is saved, the Modbus data will start updating immediately on the web pages.

## Alarms by E-Mail and SMS

The user can configure up to 64 alarms and the conditions needed to trigger an alarm. The alarm can be sent by E-mail or SMS (external GSM modem required) where the user can decide whom to receive the alarms. Of course the user can configure the text in the email or the SMS. All alarms are additionally stored in an alarm history.

## Data Logging with Historical Trend Graphs

The device can log up to 64 parameters with selectable sample rate (10 sec to 60 min). The parameters are stored into the built-in memory and they are also displayed with trend graphs. Collected data can be downloaded to the PC as CSV file.

## Modbus TCP

The gateway acts as pure transparent connection between serial Modbus RTU devices to the standard Ethernet protocol Modbus TCP, used in all major SCADA systems or PLC's.

## Security

To ensure safe communication the product supports different levels of security. For example, an authorized user can only log on with the correct user name and a password, assigned by the administrator.

The product also holds several functions to keep the database consistent in case of power loss etc.

## Technical Data

Ethernet Protocols	Modbus TCP, http, SMTP, FTP, SNMP
Ethernet Baudrate	10/ 100 Mbit/s
Serial Interface 1	RS232/ RS485 for Modbus RTU/ ASCII
Serial Interface 2	RS232 (full modem support)
Network Baudrate	Configurable up to 57,6 kbit/s
Power supply	9-32V AC/DC
Power consumption	50mA/ 24V
Operation Temperature	0...+60°C
Konformität	EN 50081-2:1993 and EN 61000-6-2:1999
Humidity Range	5 - 93% RH, non-cendensing
Housing	Grey Plastic, Lexan 940, self-extinguishing acc. to UL94-V0
DIN Rail mounting	4 modules, IP20
Dimensions	90mm x 70mm x 58mm

# BELUK SWITCHGEAR DESIGN



## Switchgear Division

A wide range of notable customers trusts our quality and reliability as supplier of switchgear products for more than four decades. This is based on a wide spectrum of technologically well- designed switchgear.

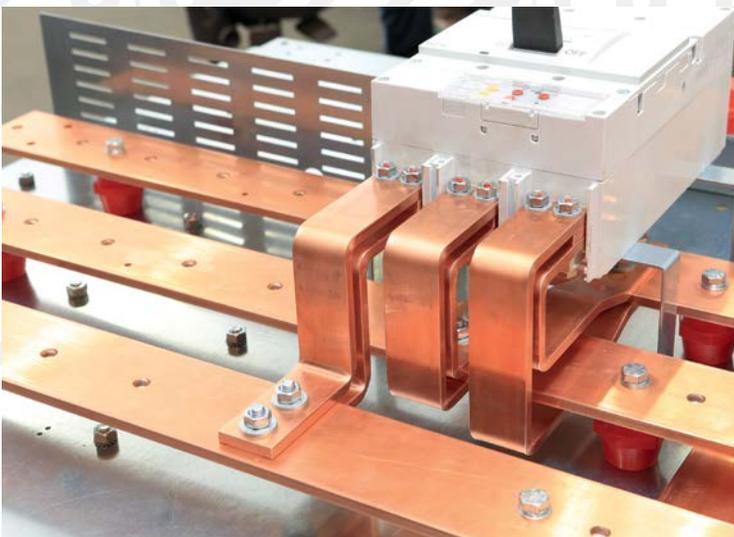


## Medium-Voltage Switchgear

We offer air-insulated medium-voltage control panels, for circuit-breaker switchgear in various sizes and execution variations.

## Low-Voltage Switchgear

Our low-voltage switchgear is supplied either as free- standing distribution in open and closed versions, or as wall-mounted distribution in modular framework structure and are being used for both standardized applications as well as specialized solution.



## Turnkey Transformer Substations / Installation Works

We engineer and deliver turnkey transformer substations to you, equipped with products of our own or other brand names. Our highly trained installation staff executes modifications, retrofit and extensions of existing switchgear quickly and dependably

# TECHNICAL DATA

Technical Data	BLR CX	BLR CM	KSR1
Ambient Temperature Operation	-20°C – 70°C	-20°C – 70°C	-20°C – 70°C
Ambient Temperature Storage	-40°C – 85°C	-30°C – 85°C	-40°C – 85°C
Humidity	0% - 95%, no condensation allowed	0% - 95%, no condensation allowed	0% - 95%, no condensation allowed
Overvoltage Class	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)
Protection Class front	IP 50	IP 54	IP 50
Protection Class rear	IP 20	IP 20	IP 20
Conformity and Listing	CE, UL, cUL, GOST-R	CE, UL, cUL, GOST-R	CE, GOST-R
Standards			IEC 60255-1 Oscillatory Waves IEC 60255-2 Oelectrostatic Discharge IEC 60255-3 RF Electromagnetic Fields IEC 60255-4 Electrical fast transients IEC 60255-5 Impulse Test (Surge)
Terminals	Pluggable Terminal blocks, screw type, max. 2,5 qmm	Pluggable Terminal blocks, screw type, max. 2,5 qmm	Pluggable Terminal blocks, screw type, max. 2,5 qmm
Casing front	Plastic, self extinguishing (UL94-V0)	Plastic, self extinguishing (UL94-V0)	Plastic, self extinguishing (UL94-V0)
Casing rear	Metal	Metal	Metal
Weight	approx. 0,6kg	approx. 0,8kg	approx. 0,6kg
Dimensions	144 x 144 x 58mm h x w x d	144 x 144 x 58mm h x w x d	144 x 144 x 58mm h x w x d
Technical Data	Model Range KSR	EMM 5	
Ambient Temperature Operation	-20°C – 70°C	-20°C – 70°C	
Ambient Temperature Storage	-30°C – 85°C	-30°C – 85°C	
Humidity	0% - 95%, no condensation allowed	0% - 95%, no condensation allowed	
Overvoltage Class	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)	
Protection Class front	IP 54	IP 54	
Protection Class rear	IP 20	IP 20	
Conformity and Listing	CE, UL, cUL, GOST-R	CE, UL, cUL, GOST-R	
Standards	IEC 60255-1 Oscillatory Waves IEC 60255-2 Oelectrostatic Discharge IEC 60255-3 RF Electromagnetic Fields IEC 60255-4 Electrical fast transients IEC 60255-5 Impulse Test (Surge)		
Anschluss	Pluggable Terminal blocks, screw type, max. 2,5 qmm	Pluggable Terminal blocks, screw type, max. 2,5 qmm	
Gehäusefront	Plastic, self extinguishing (UL94-V0)	Plastic, self extinguishing (UL94-V0)	
Gehäuserückseite	Metal	Metal	
Gewicht	approx. 0,65kg	approx. 0,65kg	
Abmessungen	144 x 144 x 58mm h x w x d	144 x 144 x 58mm h x w x d	