



Product Catalogue

erfahren, zuverlässig, flexibel

BELUK

experienced, reliable, flexible



Experienced, reliable, flexible.

Beluk is one of the leading manufacturers in the area of power factor control relays. Our experience in this technologically complex field dates back to 1956. And our customers have also profited from our forward-looking concepts in the construction of switchgear for more than 30 years.

On the basis of this extensive know-how, we offer you not only matured standard components, but also problem solutions tailor-made to fit your specific requirements. Experienced specialists support you with word and deed in your planning.

The production organisation has been set up in accordance with DIN EN ISO 9001:2008, thus guaranteeing a uniformly high quality level. In addition, we are always on the latest technological level thanks to well-founded research and development. A large number of renowned customers all over the world documents our reliability.



Controlling everything!

The current generation of BELUK power-factor-control relays is the result of 50 years of technological development. To start with, the production was done in electromechanical versions. In the seventies electronics became the order of the day until 1988, where the first power-factor-control relays with microcontrollers were built. By now you can get the current interfaces for data communications integrated in our devices.

Naturally, we also produce specific power factor control relays for special applications, such as dynamic compensation, compensation of induction furnaces, mediumvoltage switchgear and wind-power stations. BELUK power factor control relays “separate the chaff from the wheat”, that is to say reactive from active energy, regardless of the number of “harmonics” disturbing the system! Thanks to this highly sophisticated measuring technique, our POWER-ANALYZERS are to be found all over the world.

Further devices, such as monitoring relays for voltage, current and capacitors in medium-voltage grids as well as static switch for capacitors supplement our range of products.



Energy Efficiency by Power Factor Correction

BELUK

In times of shortage of resources and climate change, conservation of resources is a fundamental objective, and increasing energy efficiency a core aim of policy.

With the systematic use of power factor correction,

- energy losses in the electrical transmission and distribution networks can be significantly reduced, with a corresponding reduction in the CO₂ emissions involved in generating that lost energy;
- energy transmission and distribution networks can be used more efficiently, for instance for the transmission of regenerative energy;
- the reliability of planning for future energy networks can be increased.

Origin and effects of reactive power

Many electrical devices, e.g. motors, need active power and reactive power. Active power is converted into mechanical power or heat losses, reactive power is needed to maintain the magnetic fields of the devices. This reactive power is transferred periodically in both directions between the generator and the load.



Vector addition of active power P and reactive power Q gives the apparent power S . Power generation utilities and network operators must make this apparent power available and transmit it. This means, that generators, transformers, power lines, switchgear, etc. must be sized for greater power ratings than if load only drew active power. Power supply companies are therefore faced with extra expenditure on equipment and additional power losses. They therefore make additional charges for reactive power if this exceeds a certain threshold. Usually a certain target power factor $\cos \phi$ of between 1.0 and 0.9 (lagging) is specified.

Apparent power
 $S^2 = P^2 + Q^2$

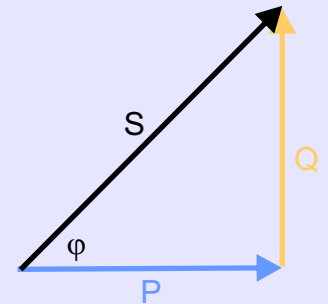
Active power
 $P = S \cdot \cos \phi$

Reactive power
 $Q = S \cdot \sin \phi$

Example: 3-phase motor

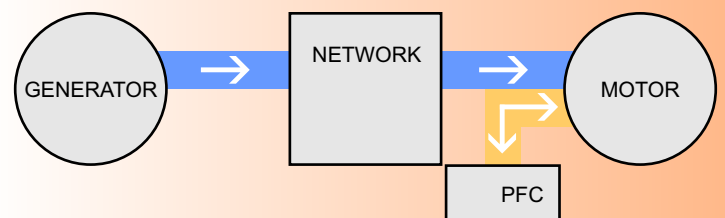
Active power	500kW
Reactive Power:	510kvar (ind)
Resulting apparent power:	714kVA
$\cos \phi$	ind. 0,70

Transmission is 714kVA, although only 500kW can be used. Power losses in network are two times of the power losses with $\cos \phi = 1.00$



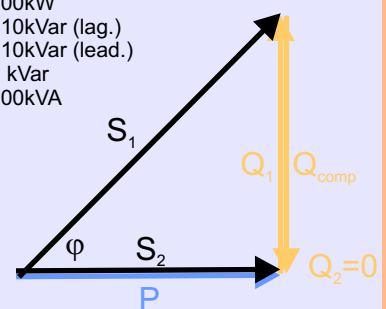
Power factor correction

If the lagging power factor is corrected, for example by installing a capacitor at the load, this totally or partially eliminates the reactive power draw at the power supply company. Power factor correction is at its most effective when it is physically near to the load and uses state-of-the-art technology.



The inductive reactive power Q_1 is compensated for totally or partially by the capacitive reactive power Q_{comp} , the apparent power thus being reduced from S_1 to S_2 .

Active power	500kW
Reactive power	510kVar (lag.)
Power-factor-correction	510kVar (lead.)
Resultant reactive power	0 kVar
giving apparent power	500kVA



The motor draws an active power of 500kW as before, but its reactive power is fully compensated. The supply network needs to transmit an apparent power of 500kVA. Power factor correction reduces the transmission load by 43% of nominal active power. The transmission losses are reduced by factor 2.

In Germany, due to power-factor correction it's possible to save energy losses of around 1 nuclear power plant (compared with no power-factor correction).

Power Factor Control Relay BLR-CX



Description

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 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, temperature offset

Regulation: sensitivity, target-cosphi 1 and 2, switch interval, delay step exchange, stepexchange, autom. capacitorsize detection, blocking of defective steps, Regul.progr.: Best-Fit, LIFO, combi, progressiv, Offset reactive power, asym.-switch interval, avoid leading power factor

Steps: discharging time, step size in kvar, steptype (e.g. Fix-steps), reset step database

Alarming: regulation alarm, defective step alarm, power loss of capacitors, THD U Alarm, overtemperature, limit switching operations, limit OPH of panel, limit temp1/temp2 I=0 alarm (failure in current path), etc.

To start regulation, only the correct setting of nominal voltage is necessary. Differing voltage is blocking control function for protecting the capacitors. If CT ratio is not set, then measurement readings which depend on current are blanked. A wrong connection can be corrected by starting the automatic phase correction. For maintenance work, each individual step can be switched manually.

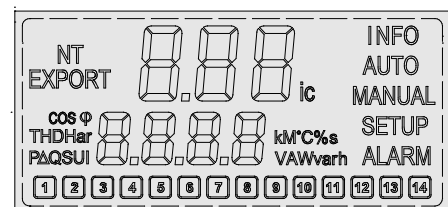
Display of Information

BLR-CX is equipped with LCD with backlit. It shows information 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, displacement power-factor, power-factor, tan phi, 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.

Displacement power-factor and status of the control-outputs are shown permanently.



High-contrast LCD with backlit
and temperature range between -20°C and 70°C.
(Original size)

Measuring

BLR-CX is calculating by the measuring of current and voltage the power conditions in electrical network. Generally, it's not important, in which phase 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.

There is no manual changing of any settings necessary, to use either 5Amp or 1Amp CT.

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 can switch by using one of the control outputs a fan. The switch-off of the capacitor steps due to excess temperature can be triggered by reaching the second excess temperature threshold or can be triggered by N/O contacts of external thermostats, which are connected in parallel to the temperature sensor.

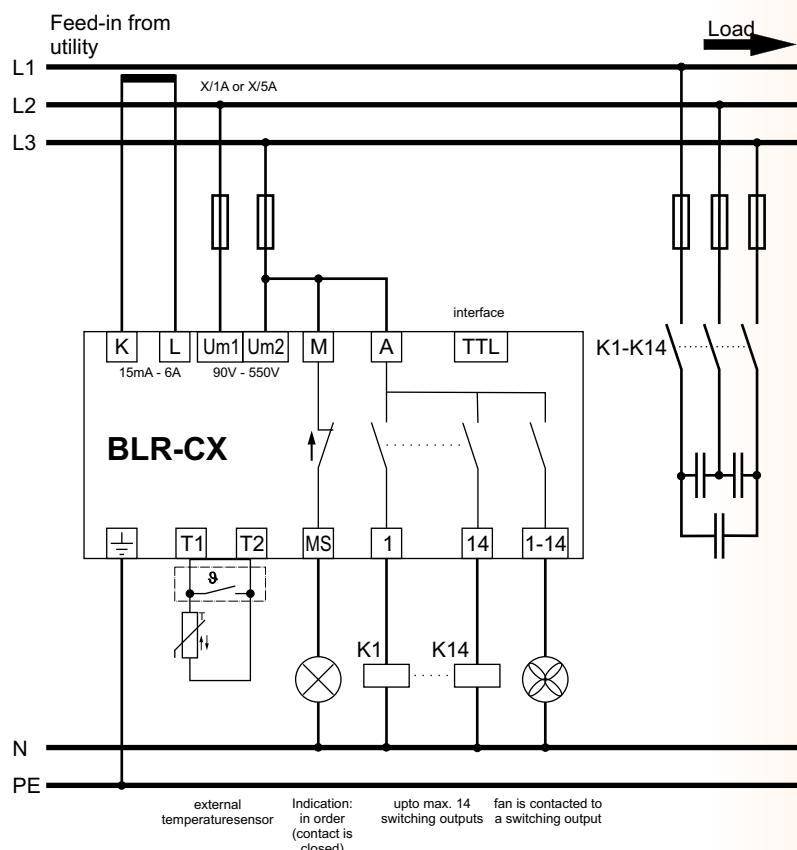
Monitoring

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 and switch-off by exceeding THD U
- Recognition of defective capacitors
- Alarming, when target of regulation cannot be reached
- Signaling of the need for maintenance
- Fan control

Failures and announcements of the panel are shown in LCD. Failures can also be forwarded by the volt free alarm-contact (sign-of-life signal)

For switching the fan, one of the control-outputs has to be used.



Available versions:

BLR-CX04R:	BLR-CX with 4 relay outputs
BLR-CX06R:	BLR-CX with 6 relay outputs
BLR-CX08R:	BLR-CX with 8 relay outputs
BLR-CX10R:	BLR-CX with 10 relay outputs
BLR-CX12R:	BLR-CX with 12 relay outputs
BLR-CX14R:	BLR-CX with 14 relay outputs
BLR-CX06T:	BLR-CX with 6 transistor outputs
BLR-CX12T:	BLR-CX with 12 transistor outputs





Options:

-L:	Pluggable temperature-sensor
-V:	Separate plug for supply voltage Measuring voltage 90-690V
-MB:	RS485 Modbus RTU, USB
-VT	Transparent cover with lock

Accessories:

3USB	Interface kit for retrofitting RS485 Modbus, USB
UMS9	Data cable TTL/USB
3ZWC	Wall mountig bracket

Technical Data

Type of Device:	Reactive power regulator
Control Variable:	Electrical displacement reactive power
Priciple of Regulation:	Gradational regulation with the following modes: <ul style="list-style-type: none"> - Best-Fit: starting with the biggest suitable capacitor - LIFO: last in-first out - Combifilter: Best-Fit, with more connected reactive power of odd outputs - Progressive: all required outputs are switched in short intervals
Special Features:	<ul style="list-style-type: none"> - Automatic detection and correction of the phase of current and voltage connection - Automatic detection of the engaged outputs - 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 9600
Control Outputs:	Up to 14 relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Temperature measuring:	By NTC
Sign-Of-Life contact:	Relay, voltfree, N/O, max. fuse 4A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Fan Control:	By using a control output
Interface:	TTL, rear
Ambient Temperature:	Operation: -20°C-70°C, storage: -20°C-85°C
Humidity:	0% - 98%, without moisture condensation
Overvoltage class:	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)
Standards:	DIN VDE 0110-1 (IEC 60664-1:1992 +A1:2000 +A2:2002) VDE 0411-1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843-20-1:2006 (DIN EN 61326-1:2006 / IEC 61326-1: 2005) VDE 0843-20-2-2:2006 (DIN EN 61326-2-2:2006 / IEC 61326-2-2: 2005)
Conformity and Listing:	   
Terminals:	Pluggable terminal blocks, screw type, max. 4qmm
Casing:	Front: instrument casing plastic (UL94-VO), Rear: metal
Protection Class:	Front: IP50, (IP54 by using a gasket between relay and panel) Rear: Ip20
Weight:	approx. 0,6kg
Dimensions:	144x144x58mm hxwxh, cutout 138 (+0,5) x 138 (+0,5)mm

BELUK

Power Factor Control Relay BLR-CM-R



Description

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-CM 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 language, nominal voltage, CT and VT ratio and the automatic correction of current and voltage connection, control on/off, target-cosphi1, switch interval, discharge lock time and step types.

These 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 OPH, reset average PF, reset max. Temperature, temperature offset

Regulation: sensitivity, target-cosphi 1 and 2, switch interval, delay step exchange, stepexchange, autom. capacitor size detection, blocking of defective steps, Control modes: Best-Fit, LIFO, combi, progressive, Offset reactive power, asym.-switch interval, avoid leading power factor

Steps: discharging time, step size in kvar, steptype (e.g. Fix-steps), reset step database

Alarming: control alarm, defective step alarm, power loss of capacitors, THD U Alarm, THD I Alarm, overtemperature, cosphi alarm, kW overload, kvar overload, kW Export, external alarm, limit switching operations, limit temp1/temp2 I=0 alarm (failure in current path), etc.

To start regulation, only the correct setting of nominal voltage is necessary. Differing voltage is blocking control function for protecting the capacitors. A wrong connection can be corrected by starting the automatic phase correction. For maintenance work, each individual step can be switched manually.

Display of Information

BLR-CM is equipped with graphical LCD with backlit. It shows information about the panel and about the mains parameters. It's also necessary for setting the parameters of BLR-CM:

Mains parameters: voltage, current, kW, kvar, kVA, kvar to target, THD U, THD I, 2nd to 30th harmonic of voltage and current, displacement power-factor, power-factor, frequency, temperature

Panel informations: OPH 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.

Displacement power-factor and status of the control-outputs are shown permanently.

Measuring

BLR-CM is calculating by the measuring of current and voltage the power conditions in electrical network. Generally, it's not important, in which phase voltage and current are connected, because the connection is corrected by BLR-CM after starting the automatic phase correction. The min. sensing current is 15mA, which ensures a reliable and exact regulation.

There is no manual changing of any settings necessary, to use either 5Amp or 1Amp CT.

Voltage measuring is possible in a range between 50V and 530V.

By using the integrated temperature sensor, BLR-CM can measure the internal temperature of the compensation panel and can switch by using digital output a fan. Switching-off capacitor steps due to excess temperature can be triggered by reaching the second excess temperature threshold.

Monitoring

The monitoring features of BLR-CM 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 and switch-off by exceeding THD U or THD I
- Recognition of defective capacitors
- Alarming, when target of regulation cannot be reached
- Signaling of the need for maintenance
- Fan control
- external alarm by digital input

Failures and announcements of the panel are shown in LCD. Failures can also be forwarded by the volt free alarm-contact (sign-of-life signal)

For switching the fan, digital output can be used.

Data logger

Datalogger (option -DM) is split into 4 parts:

SETUP HISTORY: modification of parameter is logged with date and time. The logged information can be seen in LCD.

ALARM HISTORY: Beginning and End of alarms are logged with date and time. The logged information can be seen in LCD.

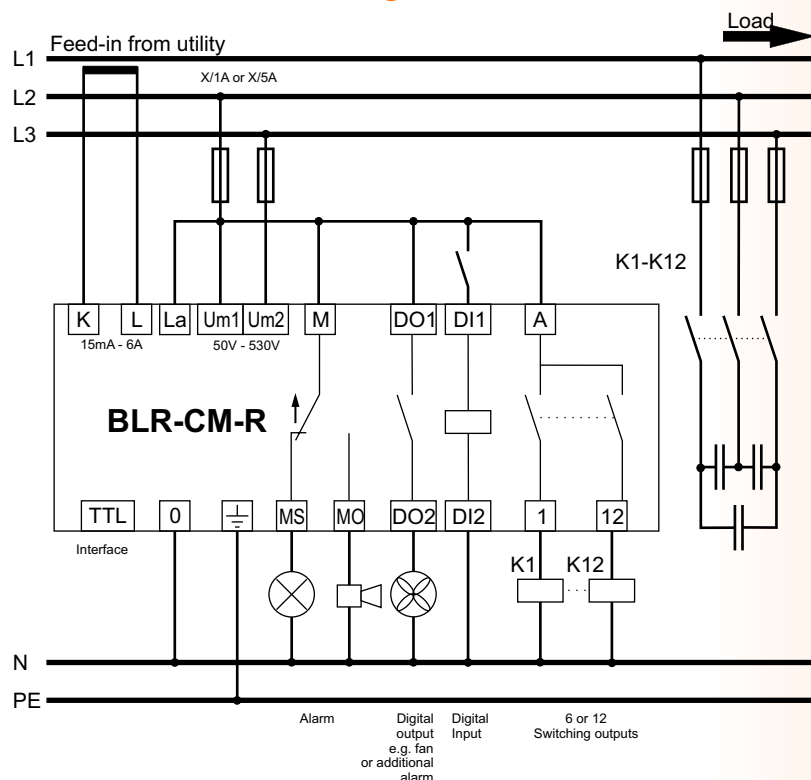
LOGGER OF MEASURING VALUES: logging of measuring values in adjustable intervals from 1 to 720 minutes. The measuring values are recorded with minimum, maximum and mean value per interval.

LOGGER of SYSTEM INFORMATION: daily logging of kWh, kvarh, number of switching operations and step size per step, average power-factor and average power-factor of the last 24h.

Measuring values and system information can be downloaded by TTL-interface with TTL-USB converter cable and saved to CSV-file on pc. Analysis of the data can be done by spreadsheet program.

Connection Diagram

Order Codes



Available Versions:

BLR-CM06R:	BLR-CM with 6 relay outputs
BLR-CM12R:	BLR-CM with 12 relay outputs

Options:

-HV:	Version for MV and HV application
-MB:	RS485 Modbus RTU
-DM:	RS485 Modbus RTU, data logger RTC, digital input 24VDC
-VT	Transparent cover with lock

Accessories:

UMS9	Data cable TTL/USB
3ZWC	Wall mounting bracket

Technical Data

Type of Device:	Reactive power regulator
Control Variable:	Electrical displacement reactive power
Principle of Regulation:	Gradational regulation with the following modes: - Best-Fit: starting with the biggest suitable capacitor - LIFO: last in-first out - Combifilter: Best-Fit, with more connected reactive power of odd outputs
Special Features:	- graphical LCD with backlit - Automatic detection and correction of the phase of current and voltage connection - Automatic detection of the engaged outputs - Automatic detection and adaption of the capacitor ratings - Over- and undervoltage monitoring - Monitoring of THD U and THD I - Overtemperature switch-off
Measuring Display:	V, A, kVA, kW, kvar, cosphi, PF, Δkvar, Hz, °C, kWh imp, kWh exp, kvarh ind, kvarh cap, THD U, THD I, 2nd to 30th and 3rd to 29th harmonic of voltage and current.
Information Display:	Switch cycles per step, capacitor rating, status of the exits, operating hours of the panel, max.temperature, average PF
Auxiliary Voltage:	230V AC with tapping point 115V AC, +/- 10%, 45-65HZ, 10VA, max. fuse 6A
Measuring- Voltage:	50- 530V AC, single phase, 45-65HZ, <1VA, max. fuse 6A, VT ratio from 1,0 to 350,0
Current Measuring:	15mA -6A, single phase, burden 20mOhm, CT ratio from 1 to 9600
Control Outputs:	Up to 12 relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Temperature measuring:	By integrated NTC
Alarm contact:	Relay, voltfree, C/O, max. fuse 4A, breaking capacity: 250V AC / 5A
Digital output:	relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Fan Control:	By using a digital output
Digital input 1:	50 - 250V AC, programmable
Digital input 2:	10 - 30V DC, for synchronizing of data-logger (only available in option -DM)
Interface1:	TTL, rear
Interface 2:	RS485 Modbus RTU Slave (only available in options -MB and -DM)
Ambient Temperature:	Operation: -20°C-70°C, storage: -20°C-85°C
Humidity:	0% - 98%, without moisture condensation
Overvoltage class:	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)
Standards:	DIN VDE 0110-1 (IEC 60664-1:1992 +A1:2000 +A2:2002) VDE 0411-1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843-20-1:2006 (DIN EN 61326-1:2006 / IEC 61326-1: 2005) VDE 0843-20-2-2:2006 (DIN EN 61326-2-2:2006 / IEC 61326-2-2: 2005)
Conformity and Listing:	
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 between relay and panel) Rear: IP20
Weight:	approx. 1,0kg
Dimensions:	144x144x58mm hwxwd, cutout 138 (+0,5) x 138 (+0,5)mm

BELUK



Description

The real time regulation algorithm of Beluk is calculating the control deviation directly after measuring one mains periode and switches dependent on the settings all necessary capacitors in one operation. The hybrid version is working with two separate algorithm. The standard algorithm for contactor controlled capacitors is building an optimized working point for the real time algorithm. To get an optimization of the control mode of the compensation panel to the local conditions different parameters can be changed. These settings can be done in two separate user menus. The "Start" menu contains only the settings, which can be necessary for commissioning, like language, nominal voltage, CT and VT ratio and the automatic correction of current and voltage connection, control on/off, target-cosphi1, switch interval, discharge lock time and step types.

These and furthers 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 OPH, reset average PF, reset max. Temperature, temperature offset
- Regulation:** sensitivity, target-cosphi 1 and 2, switch interval, delay step exchange, stepexchange, autom. capacitorsize detection, blocking of defective steps, Control modes: Best-Fit, LIFO, combi, progressive, Offset reactive power, asym.-switch interval, avoid leading power factor
- Real time:** measuring break, building average of control deviation, limit kvar which can be switched in one operation, blocking switching operations at exceeding THD U
- Steps:** discharging time, step size in kvar, steptype (e.g. Fix-steps), reset step database
- Alarming:** control alarm, defective step alarm, power loss of capacitors, THD U Alarm, THD I Alarm, overtemperature, cosphi alarm, kW overload, kvar overload, kW Export, external alarm, limit switching operations, limit temp1/temp2 I=0 alarm (failure in current path), etc.

To start regulation, only the correct setting of nominal voltage is necessary. Differing voltage is blocking control function for protecting the capacitors. Dynamic mode has no recognition of capacitor sizes. Capacitor sizes can be detected by using normal mode at the beginning. A wrong connection can be corrected by starting the automatic phase correction. For maintenance work, each individual step can be switched manually.

Display of Information

BLR-CM is equipped with graphical LCD with backlit. It shows information about the panel and about the mains parameters. It's also necessary for setting the parameters of BLR-CM:

Mains paramters: voltage, current, kW, kvar, kVA, kvar to target, THD U, THD I, 2nd to 30th harmonic of voltage and current, displacement power-factor, power-factor, frequency, temperature

Panel informations: OPH 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.

Displacement power-factor and status of the control-outputs are shown permanently.

Measuring

BLR-CM is calculating by the measuring of current and voltage the power conditions in electrical network. Generally, it's not important, in which phase voltage and current are connected, because the connection is corrected by BLR-CM after starting the automatic phase correction. The min. sensing current is 15mAmp, which ensures a reliable and exact regulation.

There is no manual changing of any settings necessary, to use either 5Amp or 1Amp CT.

Voltage measuring is possible in a range between 50V and 530V.

By using the integrated temperature sensor, BLR-CM can measure the internal temperature of the compensation panel and can switch by using digital output a fan. Switching-off capacitor steps due to excess temperature can be triggered by reaching the second excess temperature threshold.

Monitoring

The monitoring features of BLR-CM 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 and switch-off by exceeding THD U or THD I
- Recognition of defective capacitors
- Alarming, when target of regulation cannot be reached
- Signaling of the need for maintenance
- Fan control
- external alarm by digital input

Failures and announcements of the panel are shown in LCD. Failures can also be forwarded by the volt free alarm-contact (sign-of-life signal)

For switching the fan, digital output can be used.

Data logger

Datalogger (option -DM) is split into 4 parts:

SETUP HISTORY: modification of paramter is logged with date and time. The logged information can be seen in LCD.

ALARM HISTORY: Beginning and End of alarms are logged with date and time. The logged information can be seen in LCD.

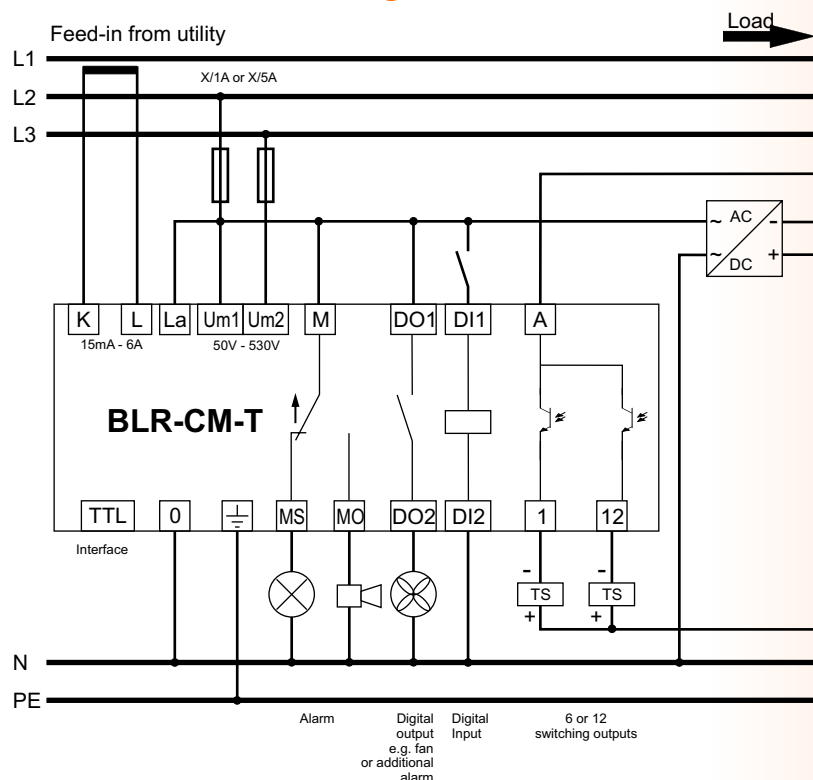
LOGGER OF MEASURING VALUES: logging of measuring values in adjustable intervals from 1 to 720 minutes. The measuring values are recorded with minimum, maximum and mean value per interval.

LOGGER of SYSTEMINFORMATION: daily logging of kWh, kvarh, number of switching operations and step size per step, average power-factor and average power-factor of the last 24h.

Measuring values and system information can be downloaded by TTL-interface with TTL-USB converter cable and saved to CSV-file on pc. Analysis of the data can be done by spreadsheet program.

Connection Diagram

Order Codes



Available Versions:

BLR-CM06T:	BLR-CM with 6 transistor outputs
BLR-CM12T:	BLR-CM with 12 transistor outputs
BLR-CM12RT	BLR-CM with 6 relay outputs and 6 transistor outputs

Options:

-MB:	RS485 Modbus RTU
-DM:	RS485 Modbus RTU, data logger RTC, digital input 24VDC
-VT	Transparent cover with lock

Accessories:

UMS9	Data cable TTL/USB
3ZWC	Wall mounting bracket

Technical Data

Type of Device:	Reactive power regulator
Control Variable:	Real time mode: Electrical displacement reactive power in real time Standard mode: Average of electrical displacement reactive power
Principle of Regulation:	2 parallel working control modes for real time and for standard mode.
Special Features:	<ul style="list-style-type: none"> - graphical LCD with backlight - Automatic detection and correction of the phase of current and voltage connection - Automatic detection of the engaged outputs - Automatic detection and adaption of the capacitor ratings (not in real time mode) - Over- and undervoltage monitoring - Monitoring of THD U and THD I - Overtemperature switch-off
Measuring Display:	V, A, kVA, kW, kvar, cosphi, PF, Δkvar, Hz, °C, kWh imp, kWh exp, kvarh ind, kvarh cap, THD U, THD I, 2nd to 30th and 3rd to 29th harmonic of voltage and current.
Information Display:	Switch cycles per step, capacitor rating, status of the exits, operating hours of the panel, max.temperature, average PF
Auxiliary Voltage:	230V AC with tapping point 115V AC, +/- 10%, 45-65HZ, 10VA, max. fuse 6A
Measuring- Voltage:	50- 530V AC, single phase, 45-65HZ, <1VA, max. fuse 6A, VT ratio from 1,0 to 350,0
Current Measuring:	15mA - 6A, single phase, burden 20mOhm, CT ratio from 1 to 9600
Control Outputs:	transistor, open collector, switching capacity 8-32V DC / 100mA relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Temperature measuring:	By integrated NTC
Alarm contact:	Relay, voltfree, C/O, max. fuse 4A, breaking capacity: 250V AC / 5A
Digital output:	relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Fan Control:	By using a digital output
Digital input 1:	50 - 250V AC, programmable
Digital input 2:	10 - 30V DC, for synchronizing of data-logger (only available in option -DM)
Interface1:	TTL, rear
Interface 2:	RS485 Modbus RTU Slave (only available in options -MB and -DM)
Ambient Temperature:	Operation: -20°C-70°C, storage: -20°C-85°C
Humidity:	0% - 98%, without moisture condensation
Overvoltage class:	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)
Standards:	DIN VDE 0110-1 (IEC 60664-1:1992 +A1:2000 +A2:2002) VDE 0411-1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843-20-1:2006 (DIN EN 61326-1:2006 / IEC 61326-1: 2005) VDE 0843-20-2-2:2006 (DIN EN 61326-2-2:2006 / IEC 61326-2-2: 2005)
Conformity and Listing:	
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 between relay and panel) Rear: IP20
Weight:	approx. 1,0kg
Dimensions:	144x144x58mm hwxwd, cutout 138 (+0,5) x 138 (+0,5)mm

BELUK

Power Factor Control Relay BLR-CM3phase

Display of Information



BLR-CM3phase is equipped with graphical LCD with backlit. It shows information about the panel and about the mains parameters. It's also necessary for setting the parameters:

Mains paramters: voltage, current L1/L2/L3, kW L1/L2/L3/tot, kvar L1/L2/L3/tot, kVA L1/L2/L3/tot, kvar to target L1/L2/L3/tot, THD U, THD I L1/L2/L3, 2nd to 30th harmonic of voltage and current L1/L2/L3, displacement power-factor L1/L2/L3, power-factor L1/L2/L3/tot, frequency, temperature

Panel informations: OPH 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.

Displacement power-factor and status of the control-outputs are shown permanently.

Measuring

BLR-CM3phase is calculating by the measuring of current and voltage the power conditions in electrical network. Generally, it's not important, in which phase voltage and current are connected, because the connection is corrected by BLR-CM3phase after starting the automatic phase correction. The min. sensing current is 15mAmp, which ensures a reliable and exact regulation.

There is no manual changing of any settings necessary, to use either 5Amp or 1Amp CT.

Voltage measuring is possible in a range between 50V and 530V.

By using the integrated temperature sensor, BLR-CM3phase can measure the internal temperature of the compensation panel and can switch by using digital output a fan. Switching-off capacitor steps due to excess temperature can be triggered by reaching the second excess temperature threshold.

Monitoring

The monitoring features of BLR-CM3phase 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
- Overttemperature switch-off
- Monitoring of THD and switch-off by exceeding THD U or THD I
- Recognition of defective capacitors
- Alarming, when target of regulation cannot be reached
- Signaling of the need for maintenance
- Fan control
- external alarm by digital input

Failures and announcements of the panel are shown in LCD. Failures can also be forwarded by the volt free alarm-contact (sign-of-life signal)

For switching the fan, digital output can be used.

Data logger

Datalogger (option -DM) is split into 4 parts:

SETUP HISTORY: modification of paramter is logged with date and time. The logged information can be seen in LCD.

ALARM HISTORY: Beginning and End of alarms are logged with date and time. The logged information can be seen in LCD.

LOGGER OF MEASURING VALUES: logging of measuring values in adjustable intervals from 1 to 720 minutes. The measuring values are recorded with minimum, maximum and mean value per interval.

LOGGER of SYSTEMINFORMATION: daily logging of kWh, kvarh, number of switching operations and step size per step, average power-factor and average power-factor of the last 24h.

Measuring values and system information can be downloaded by TTL-interface with TTL-USB converter cable and saved to CSV-file on pc. Analysis of the data can be done by spreadsheet program.

Description

Due to the 3ph-phase measuring system BLR-CM3phase can recognize asymmetric load. The regulation algorithm of BLR-CM3phase is working with as well with three phase as with single phase capacitors. This is a warranty for optimum results of reactive power compensation of unbalanced load conditions. Short compensation times combined with the smallest amount of switching operations which are shared equally to all steps with same size are pointing up the predominant intelligence of BLR-CM3phase.

To get an optimization of the control mode of the compensation panel to the local conditions different parameters can be changed. These settings can be done in two separate user menus. The "Start" menu contains only the settings, which can be necessary for commissioning, like language, nominal voltage, CT and VT ratio and the automatic correction of current and voltage connection, control on/off, target-cosphi1, switch interval, discharge lock time and step types.

These and furthers 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 OPH, reset average PF, reset max. Temperature, temperature offset

Regulation: sensitivity, target-cosphi 1 and 2, switch interval, delay step exchange, stepexchange, autom. capacitorsize detection, blocking of defective steps, Control modes: Best-Fit, LIFO, combi, progressive, Offset reactive power, asym.-switch interval, avoid leading power factor

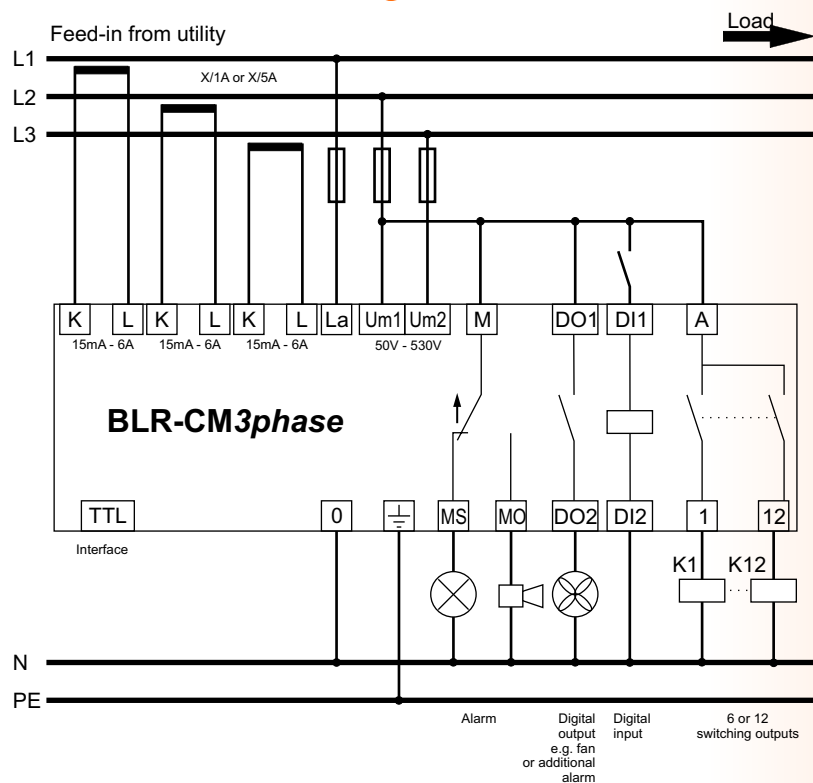
Steps: discharging time, step size in kvar, steptype (e.g. Fix-steps), reset step database

Alarming: control alarm, defective step alarm, power loss of capacitors, THD U Alarm, THD I Alarm, overtemperature, cosphi alarm, kW overload, kvar overload, kW Export, external alarm, limit switching operations, limit temp1/temp2 I=0 alarm (failure in current path), etc.

To start regulation, only the correct setting of nominal voltage is necessary. Differing voltage is blocking control function for protecting the capacitors. A wrong connection can be corrected by starting the automatic phase correction. For maintenance work, each individual step can be switched manually.

Connection Diagram

Order Codes



Available Versions:

BLR-CM06R-3A:	BLR-CM3ph with 6 relay outputs
BLR-CM12R-3A:	BLR-CM3ph with 12 relay outputs
BLR-CM06T-3A:	BLR-CM3ph with 6 transistor outputs
BLR-CM12T-3A:	BLR-CM3ph with 12 transistor outputs
BLR-CM12RT-3A:	BLR-CM3ph with 6 relay outputs and 6 transistor outputs

Options:

-MB:	RS485 Modbus RTU
-DM:	RS485 Modbus RTU, data logger RTC, digital input 24VDC
-VT	Transparent cover with lock

Accessories:

UMS9	Data cable TTL/USB
3ZWC	Wall mounting bracket

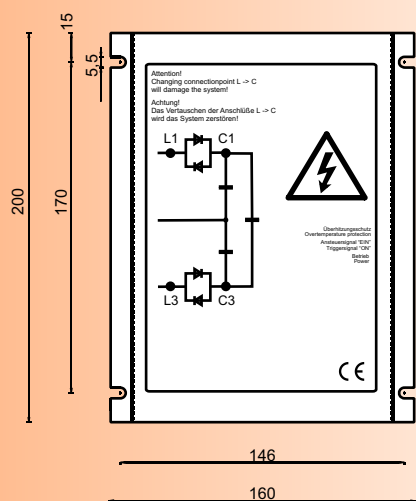
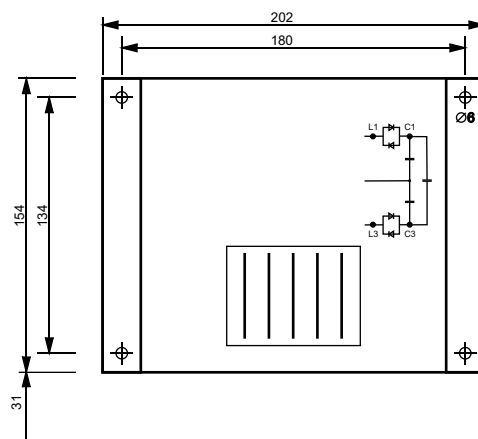
Technical Data

Type of Device:	Reactive power regulator
Control Variable:	Electrical displacement reactive power individual per phase
Principle of Regulation:	Gradational regulation with the following modes: - Best-Fit: starting with the biggest suitable capacitor - LIFO: last in-first out - Combifilter: Best-Fit, with more connected reactive power of odd outputs
Special Features:	- graphical LCD with backlit - Automatic detection and correction of the phase of current and voltage connection - Automatic detection of the engaged outputs - Automatic detection and adaption of the capacitor ratings - Over- and undervoltage monitoring - Monitoring of THD U and THD I - Overtemperature switch-off
Measuring Display:	V, A, kVA, kW, kvar, cosphi, PF, Δkvar, Hz, °C, kWh imp, kWh exp, kvarh ind, kvarh cap, THD U, THD I, 2nd to 30th and 3rd to 29th harmonic of voltage and current.
Information Display:	Switch cycles per step, capacitor rating, status of the exits, operating hours of the panel, max.temperature, average PF
Auxiliary Voltage:	230V AC with tapping point 115V AC, +/- 10%, 45-65HZ, 10VA, max. fuse 6A
Measuring- Voltage:	50- 530V AC, single phase, 45-65HZ, <1VA, max. fuse 6A, VT ratio from 1,0 to 350,0
Current Measuring:	15mA -6A, single phase, burden 20mOhm, CT ratio from 1 to 9600
Control Outputs:	Upto 12 relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A transistor, open collector, switching capacity 8-32V DC / 100mA
Temperature measuring:	By integrated NTC
Alarm contact:	Relay, voltfree, C/O, max. fuse 4A, breaking capacity: 250V AC / 5A
Digital output:	relay, N/O, voltfree with common point, max. fuse 6A, breaking capacity: 250V AC / 5A, 400V AC / 2A
Fan Control:	By using a digital output
Digital input 1:	50 - 250V AC, programmable
Digital input 2:	10 - 30V DC, for synchronizing of data-logger (only available in option -DM)
Interface1:	TTL, rear
Interface 2:	RS485 Modbus RTU Slave (only available in options -MB and -DM)
Ambient Temperature:	Operation: -20°C-70°C, storage: -20°C-85°C
Humidity:	0% - 98%, without moisture condensation
Overvoltage class:	II, pollution degree 3 (DIN VDE 0110, part 1 / IEC60664-1)
Standards:	DIN VDE 0110-1 (IEC 60664-1:1992 +A1:2000 +A2:2002) VDE 0411-1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843-20-1:2006 (DIN EN 61326-1:2006 / IEC 61326-1: 2005) VDE 0843-20-2-2:2006 (DIN EN 61326-2-2:2006 / IEC 61326-2-2: 2005)
Conformity and Listing:	
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 between relay and panel) Rear: IP20
Weight:	approx. 1,0kg
Dimensions:	144x144x58mm hwxwd, cutout 138 (+0,5) x 138 (+0,5)mm

BELUK

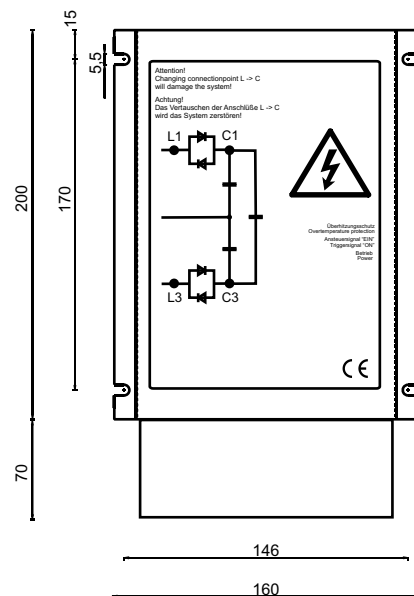
Thyristor-Switch 400-480V BEL-TS

Nominal power	15kvar		
Nominal voltage / V (+/-10%)	400	440	480
Nominal current / A	22	20	18
Controlled phases	2, semi-controlled		
Dimensions H x W x D / mm	188 x 202 x 200		
Weight / kg	2,9		
Losses / W	41	37	33
Cooling	AN, air natural		
Protection degree	IP20		



Nominal power	25kvar			50kvar		
Nominal voltage / V (+/-10%)	400	440	480	400	440	480
Nominal current / A	36	33	30	72	66	60
Controlled phases	2, semi-controlled					
Dimensions H x W x D / mm	200 x 160 x 215					
Weight / kg	4,3					
Losses / W	68	61	52	122	111	104
Cooling	AN, air natural					
Protection degree	IP10					

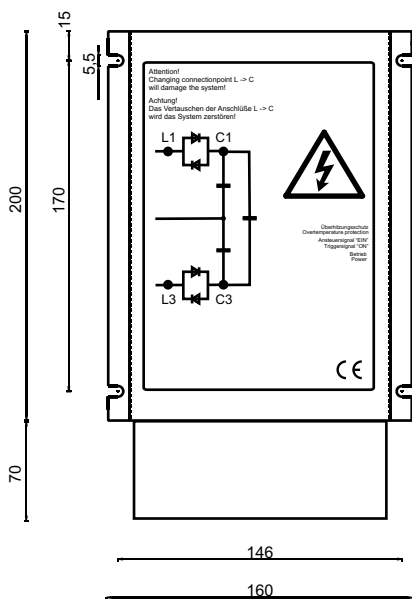
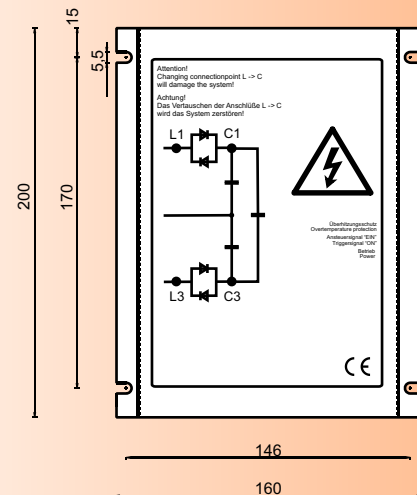
Nominal power	75kvar			100kvar			125kvar
Nominal voltage / V (+/-10%)	400	440	480	400	440	480	480
Nominal current / A	109	99	90	144	131	120	150
Controlled phases	2, semi-controlled						
Dimensions H x W x D / mm	270 x 160 x 215						
Weight / kg	5,6						
Losses / W	205	184	172	250	224	244	261
Cooling	AF, air forced (fan voltage can be chosen)						
Protection degree	IP10						



Discharging of capacitors	Using discharge reactors is not allowed! For dimensioning the discharge resistors, please consider high DC-voltage levels!
Recovery time	Typical after 1 period
Supply voltage	Direct from power connection. (Optional is separate supply available)
Consumption of supply	max. 9VA
Voltage trigger signal	8 - 30V DC
Consumption of trigger signal	2mA at 12V DC
Max. Altitude	1000m NN (higher altitude is possible with reduced current ratings)
Ambient temperature	-10 °C - 45°C (temperature up to +65°C is possible with reduce current ratings)
Humidity	10% - 95% (without moisture condensation)

BEL-TS Thyristor-Switch 525-690V

Nominal power	65kvar	130kvar
Nominal voltage / V (+/-10%)	525	
Nominal current / A	72	144
Controlled phases	2, semi-controlled	
Dimensions H x W x D / mm	200 x 160 x 215	270 x 160 x 215
Weight / kg	4,3	5,6
Losses / W	122	250
Cooling	AN, air natural	AF, air forced
Protection degree	IP10	



Nominal power	50kvar	100kvar
Nominal voltage / V (+/-10%)	690	
Nominal current / A	42	84
Controlled phases	2, semi-controlled	
Dimensions H x W x D / mm	200 x 160 x 270	270 x 160 x 270
Weight / kg	4,6	5,9
Losses / W	75	145
Cooling	AN, air natural	AF, air forced
Protection degree	IP10	

Discharging of capacitors	Using discharge reactors is not allowed! For dimensioning the discharge resistors, please consider high DC-voltage levels!	
Recovery time	Typical after 1 period	
Supply voltage	230V 50/60Hz, other voltage levels are available on request	
Consumption of supply	max. 9VA	
Voltage trigger signal	8 - 30V DC	
Consumption of trigger signal	2mA at 12V DC	
Max. Altitude	1000m NN (higher altitude is possible with reduced current ratings)	
Ambient temperature	-10 °C - 45°C (temperature up to +65°C is possible with reduce current ratings)	
Humidity	10% - 95% (without moisture condensation)	

BELUK

Active Harmonic Filter BEL-AF

Description

A reliable electric power supply is in companies the basic requirement for all operational sequences. Many electrical devices are polluting electrical grid by non-linear load current. Effect is, that electrical devices are disturbing each other and correct function is not possible. Also load in electrical grid is much more as necessary. In extreme situations, this can cause shortage in electrical power-supply. An

indication for such situation are harmonics, unbalanced load, neutral current and bad power-factor.

Function of active filter BEL-AF is improvement of voltage quality by filtering the current. BEL-AF is compensating harmonics upto 51st order, balancing phase current and improvement of power-factor. By this neutral current will be reduced.

Function

Unbalanced load current with high harmonic content can be the reason that required quality of mains-voltage cannot be met.

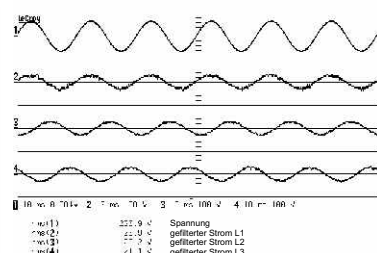
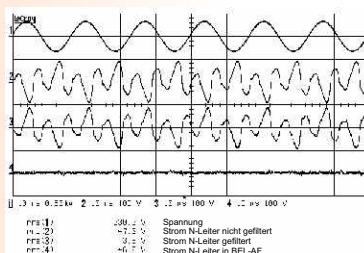
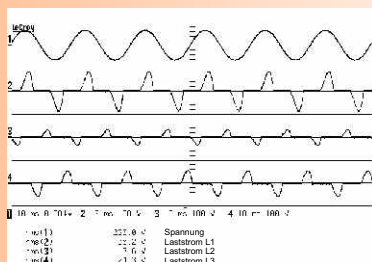
Examples for electrical load which creates these problems are power supplies of electronic devices, inverter and energy saving lamps.

Current of harmonics divisible by three and unbalanced current create neutral current. This is often larger than phase current.

BEL-AF is compensating harmonic current and unbalanced load. By this way neutral current is reduced.

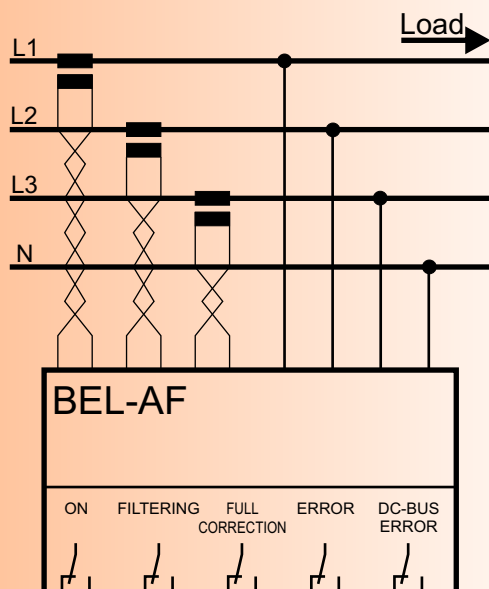
Filtering of current by BEL-AF causes symmetrical sinusoidal phase current.

Condition for this is, that BEL-AF is sized with sufficient capacity. With enough power reserve real-time compensation of phase-shift is also possible.

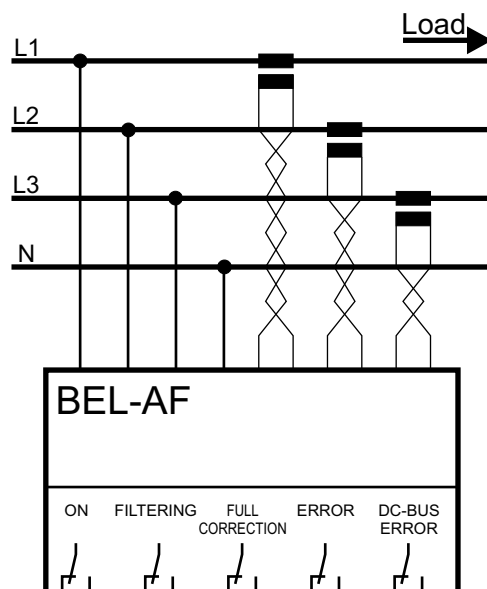


Connection Diagram

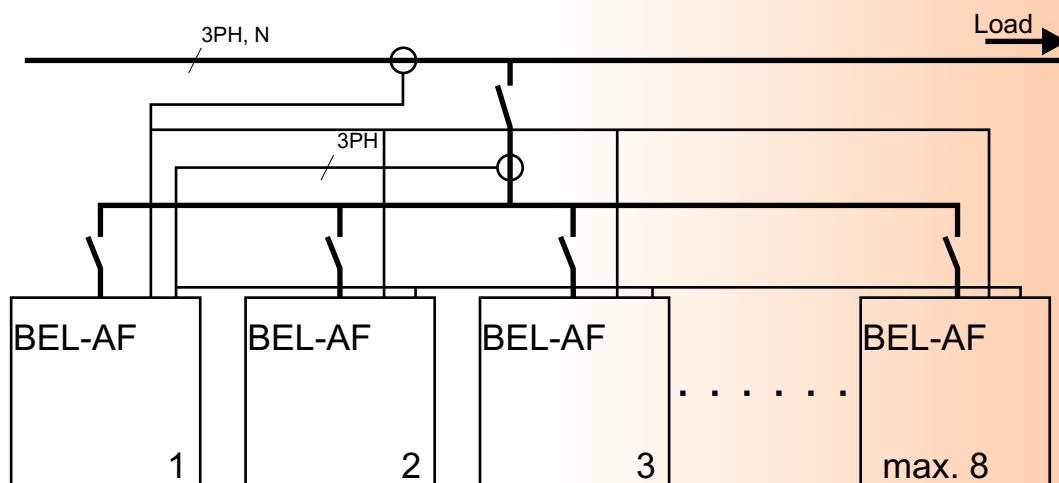
closed loop



open loop



Parallel Operation



Current inputs of the filters are connected in series!

Technical Data

		BEL-AFW435@400C	BEL-AFW460@400C	BEL-AFW490@400C	BEL-AFW4120@400C
Compensation current	3 phase / 3 wires	35A	60A	90A	120A
	3 phase / 3 wires	35A	60A	90A	120A
Current limit		at full correction			
Inrush current		less than rated current			
Compensated harmonic orders		2nd to 51st. Order			
Response time		< 20ms			
Power factor correction		ind. 0,70 - cap. 0,70			
Input voltage		400V +15% -20%			
Frequency		47 - 63 Hz			
Current transformer	standard	100A:1A - 10000A:1A			
	optional	100A:5A - 10000A:5A			
CT location	source side	closed loop control			
	load side	open loop control			
Max. Heat losses		< 700W	< 1350W	< 2000W	< 2650W
Cooling		AF, air forced			
Altitude		< 1000m NN			
Ambient temperature	operation	0°C - + 40°C			
	storage	-20°C - + 70°C			
Display		LCD			
Indication in LCD	meter	paramter, wave form and spectrum			
	event log	Up to 300 records (FIFO)			
	configuration	all necessary settings and modes			
	language setting	upto 10 different languages			
Interfaces	standard	RS232 / USB			
	optional	RS485 / RS422 / Ethernet			
I/O's	standard	5 output dry contacts			
	standard	1 input dry contact			
	standard	1 EPO			

BELUK

Unbalance protection relay KSR1



Description

High voltage capacitors taken into operation must be supervised all the time. Most of these capacitors are manufactured by using insulating oil for the dielectricum, which could catch fire in any case of fail. When considering some liters of oil which are filled in the capacitor, there is a fire load not to be disregarded. Therefore it's necessary to separate the capacitors from the grid before a failure causes an accident.

The KSR1 is designed to protect the capacitors against internal failures in a versatile way without generating useless and expensive cut offs. The KSR1 can be set to monitor current or voltage, selectable from the menu. The device can monitor two threshold levels for Alarm / Trip. All thresholds / readings can be either a current or voltage value or a % value respective setting of the maximum value. Once the Alarm or Trip level is reached the appropriate relay will operate, after the programmed delay time has elapsed.

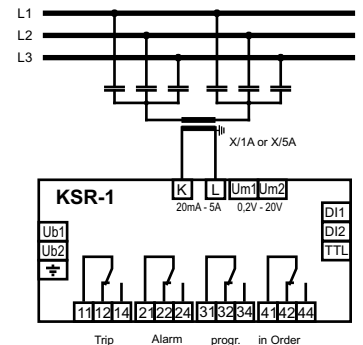
The signaling relays can be programmed to be held in the Alarm/Trip position until reset by the user if required, alternatively they can be set to automatically reset if the fault is cleared.

A further relay can be used to operate when the Alarm/Trip or both Alarm+Trip have operated. The KSR1 can record details of the last 5 Alarm and Trip operations.

An natural unbalance (out of balance or asymmetrical value) can be programmed into the device if required. This natural unbalance is subtracted from the measured value and allows a more exactly setting of the thresholds.

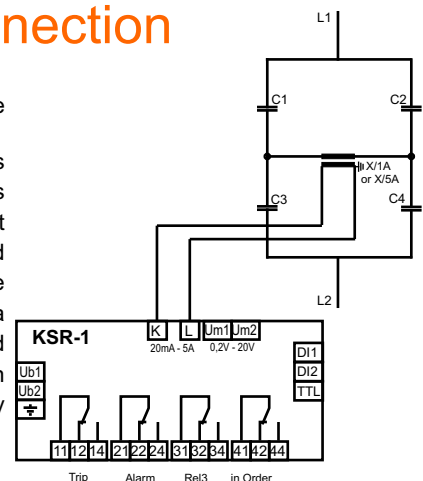
Double star- connection

6 identity capacitors are connected in two star connections. The current transformer is located in the conductor which is connecting the two star points. The measured current is an indicator of the capacitor symmetry. In case of a internal failure, the changed symmetry will cause a variation of the current and is signaling by this an capacitor fault.



H-Bridge connection

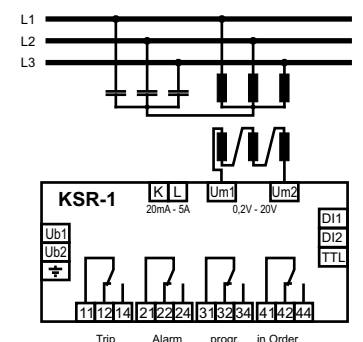
4 identity capacitors are connected to form a H. The current transformer is located in the conductor which is connecting the middle of the left and right branch. The measured current is an indicator of the capacitor symmetry. In case of a internal failure, the changed symmetry will cause a variation of the current and is signaling by this an capacitor fault



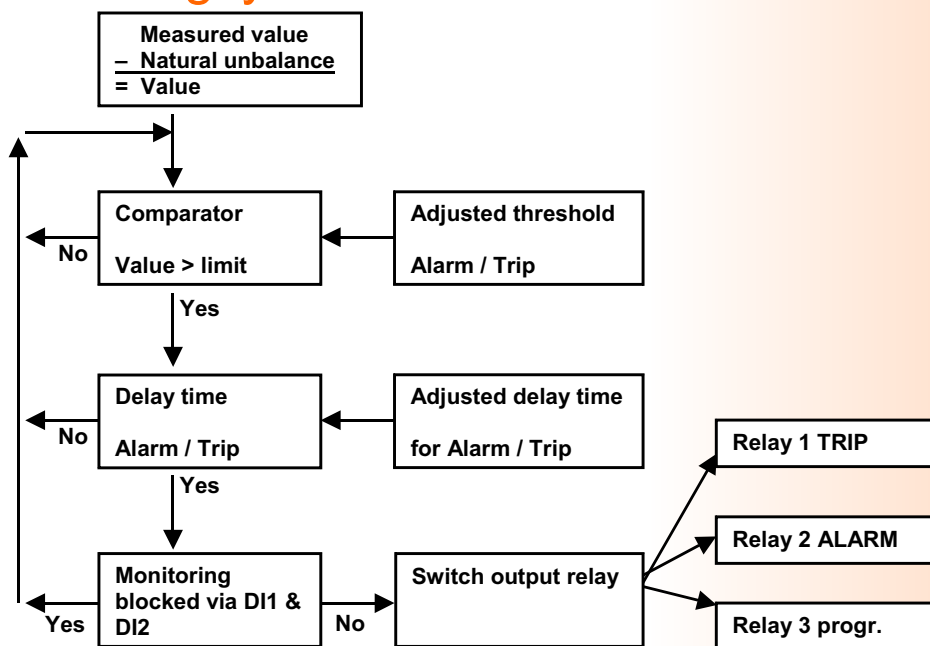
Voltage monitoring

3 identity capacitors are connected in star connection. Via three 2 pole insulated voltage transformers the voltage of each capacitor is taped. The secondary sides of the VT's are connected in series.

The measured voltage is an indicator of the capacitor symmetry. In case of a internal failure, the changed symmetry will cause a variation of the voltage and is signaling by this an capacitor fault



Monitoringsystem



Technical Data

Supply voltage: 40 - 250V AC, 45-65HZ / 40 - 300VDC, 5VA; max fuse 6A

Measuring voltage: 0,2 – 20V; burden 284kOhm; vt-ratio from 1 – 350, with low pass filter
Continuous overload: 120V; Short term overload: 500V for ten seconds
Accuracy: 0.5% from upper range value

Current measuring: 20mA – 5A; burden 20mOhm; ct-ratio from 1-4000, with low pass filter
Continuous overload: 25A; Short term overload: 100A for one second
Accuracy: 0.5% from upper range value

Relay outputs: Max. output rating AC: 1250VA, max switching voltage: 440VAC
Max. output rating DC (ohmic): 30V / 5A; 60V / 1A; 110V / 0,5A; 220V / 0,3A

Digital input: Blocking Alarm / Trip via digital input

Interface: TTL, rear

Ambient temperature: Operation: -20°C – 70°C, storage: -40°C – 85°C

Humidity: 0% - 95%, without moisture condensation

Overvoltage class: II, pollution degree 3 (DIN VDE 0110, Teil 1 / IEC 60664-1)

Standards: IEC 60255-1 Oscillatory Waves
IEC 60255-2 Electrostatic Discharge
IEC 60255-3 RF-Electromagnetic Fields
IEC 60255-4 Electrical fast transients
IEC 60255-5 Impulse Test Voltage (Surge)
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

Terminals: screw-type, max. 4mm²

Casing front: instrument casing plastic (UL94-VO), rear: metal

Protection class Front: IP50, (IP54 by using a gasket), Rear: Ip20

Weight: approx. 0,65 kg

BELUK

Capacitor protection relays KSR

Measurementsystem

The KSR measurement system provides 3 voltage measurement channels and 4 current measurement channels.

For voltage measurement the connection of N is not necessary in all cases. If left open, an artificial N potential is provided by an internal resistor network.

For the current measurement CT's must be used. Depending on the device type the KSR comes with inputs for 1 A or 5 A. CT ratio range is 1-10000. It must be considered that the channels 1-3 are using the same ratio but ratio for channel 4 is to be adjusted separately.

Each input channel contains a high precision input filter with a 3dB-cutoff-frequency in the range of 2.5kHz -3 kHz.

Monitoringsystem

For the KSR are 32 „protection settings“ available. The following settings can be done for each of the „Protection Settings“:

Source = monitored value

Trigger = monitored value < or > compared to the threshold

Limit = threshold

T-ON = delay time after violating the adjusted threshold

T-OFF = delay time for the alarm reset after the monitored threshold is becoming normal

Output = selection of the relays, which shall be activated if alarm condition is true and after T-ON is over. For giving alarm signals there are 6 relay outputs available (2 c/o and 4 n/o) available. Each relay can be triggered from more than one „Protection Setting“. All relays can be programmed to be inverted and to be latching. If a relay is set to be „latched“, it can be reset only at the device, a missing power supply does not reset it.

It should be considered that without the powersupply the relays are not active! The alarm display feature can be selected here too, as if it was another relay output.

Faultrecorder

The fault recorder (Option -DM) provides the following informations in 64 storage cells. All informations below are shown in the display:

SOURCE: which value is monitored

DATE/TIME: timestamp of the event

LIMIT: adjusted threshold

EXT-VAL: maximum measured value between violation of the threshold and trip.

Moment of start and end of the alarm event is stored with date and time. This data can be also read out via the LCD. Additionally to fault recorder, the option -DM provides a modbus interface and a digital input for blocking alarms.



Description

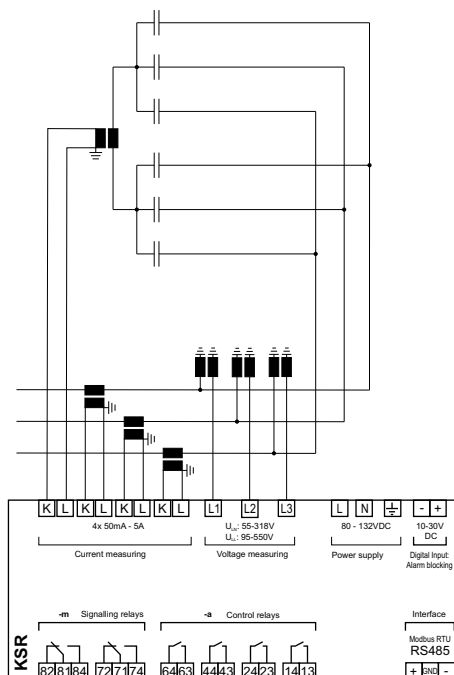
High voltage capacitors taken into operation must be supervised all the time. Most of these capacitors are manufactured by using insulating oil for the dielectricum, which could catch fire in any case of fail. When considering some liters of oil which are filled in the capacitor, there is a fire load not to be disregarded. Therefore it's necessary to separate the capacitors from the grid before a failure causes an accident.

The KSR is designed to protect the capacitors in a versatile way without generating useless and expensive cut offs. The device provides a big liquid crystal display for easy reading of values and settings. The backlight provides a good visibility even in poor light conditions. Four context-sensitive soft-keys provide easy, instant usage without the need to read the manual along when using the device.

Nearly all displayed values are true RMS (TRMS) values, which means they are correct even if the waveform is not a sine function. Harmonics are considered in all measurement values automatically.

A full range "Fast Fourier Transformation" is performed on the input data of all channels (3 voltage channels, 4 current channels). This provides information about the harmonic contents which distort the sine waveform of the signals.

For monitoring of out of balance current the KSR comes with a separate 4th current channel. For this channel it's possible to adjust a separate CT ratio. To grant an exact setting for the out of balance current, the natural unbalance can be compensated (set to „0“). For this a value of the natural unbalance is stored from the device as absolute value and in phase. This is done only by pushing one button.



Available option models:

KSR-am-V:	Power supply 110VDC
KSR-am-W:	Power supply 220VDC
KSR-am-S:	Power supply 24VDC
KSR-am-T:	Power supply 48VDC
KSR-am-B:	Power supply 110VAC
KSR-am-C:	Power supply 230VAC

Options:

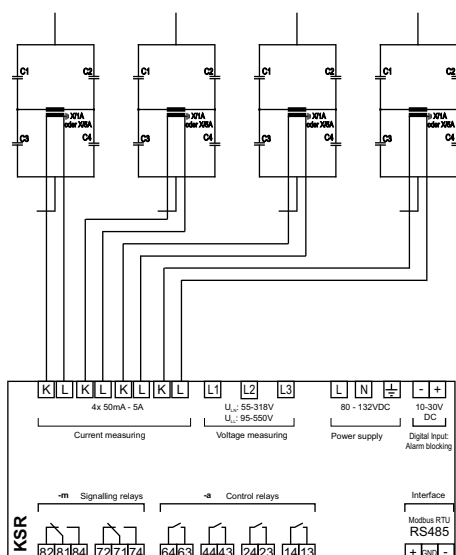
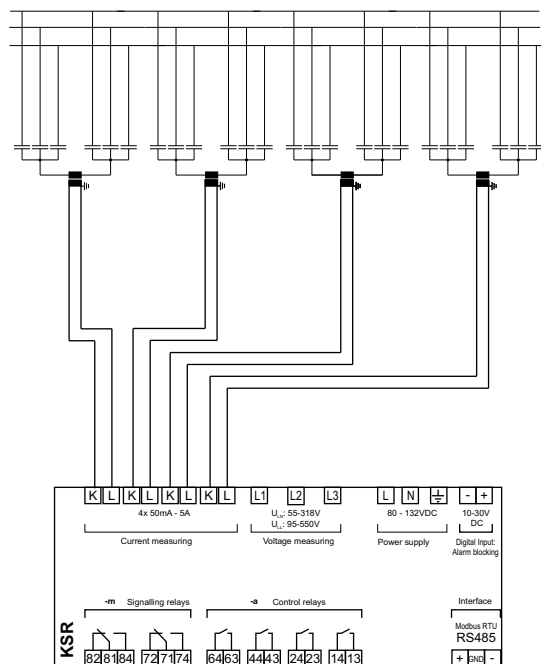
-E	galvanically insulated current measurement channels
-DM:	short term overload 200A for 1 Sec
-MB:	RS485 Modbus RTU, faultrecorder, real time clock,
-VT	digital input 24VDC
	RS485 Modbus RTU
	Transparent cover with lock Ip5

Accessories:

UMS9	Data cable TTL/USB
3ZWC	Wall mounting bracket

Technical Data

Voltage measuring:	ULL: 95V - 550V, ULN: 55 - 318V, 45-65Hz, VT-ratio 1 - 4000
Current measuring:	50mA -5A (Typ 5) or 20mA-1A (Typ 1) burden 15 mOhm ext. CT is required, CT-ratio 1 - 10000, Overload: 20% continuous, 200A for 1 Sec
Switching outputs:	2 c/o contacts, voltfree, 250V AC / 5A 4 n/o contacts, voltfree, 250V AC / 5A
Switching power:	250V AC / 5A, 30VDC / 5A (ohmic) 110V DC / 0,4A (ohmic), 110V DC / 0,3A (inductive)
Fan control:	temperature sensor on rear, control outputs can be programmed to switch a fan depending on the temperature
Interfaces:	standard: TTL optional: RS485 Modbus RTU Slave
Ambient temperature:	Operation: 0°C ...+70°C, Storage: -20°C ...+85°C
Humidity:	0% - 95%, without moisture condensation
Overvoltage category:	II, pollution degree 3
Standards:	IEC 60255-1 Oscillatory Waves IEC 60255-2 Electrostatic Discharge IEC 60255-3 RF-Electromagnetic Fields IEC 60255-4 Electrical fast transients IEC 60255-5 Impulse Test Voltage (Surge) DIN VDE 0110, Part 1 / IEC 60664-1 DIN VDE 0110 Part 1 (IEC 60664-1:1992) VDE 0411 Part1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Part 20 (DIN EN 61326 / IEC 61326:1997 +A1:1998 +A2:2000)
Approvals:	CE
Connection:	screw type, max. 2,5qmm
Case:	Instrument case
Protection class:	Front: IP50 (IP54 by mounting a gasket), Rear: IP20
Dimensions:	144 x 144 x 59 mm H x B x T, Ausschnitt 138 ^{+0,5} x 138 ^{+0,5} mm
Weight:	ca. 650 gr



Capacitor protection relays KSR-Z

Monitoringsystem



Description

The KSR-Z is the next generation of our KSR. It has been designed to fulfill special applications too.

The KSR-Z is always equipped with the fault recorder, modbus interface and a digital input for alarm blocking. The KSR-Z comes with factory set „protection settings“ to allow a easy and fast commissioning even without the powerful adjustment software.

Additionally to the standard time delay, the KSR-Z can use tripping curves according to ANSI/IEC to give alarm / trip only depending on the height of violation of the adjusted threshold.

Also there are some calculated values like „Earth fault“ and „Voltage Asymmetric“ for monitoring available. Each threshold can be monitored in two independent Steps (alarm/trip) with a separately adjustable delay time respective threshold.

For all „protection settings“ is a additional timer available to detect repetitive short time threshold violations (memory effect) as well as failure.

Measurementsystem

The KSR-Z measurement system provides 3 voltage measurement channels and 4 current measurement channels.

For voltage measurement the connection of N is not necessary in all cases. If left open, an artificial N potential is provided by an internal resistor network.

For the current measurement CT's must be used. Depending on the device type the KSR-Z comes with inputs for 1 A or 5A. CT ratio range is 1-10000. It must be considered that the channels 1-3 are using the same ratio but ratio for channel 4 is to be adjusted separately.

Each input channel contains a high precision input filter with a 3dB-cutoff-frequency in the range of 2.5kHz -3 kHz.

The following „Protection Settings“ are factory set at the KSR-Z. For each of this „Protection Settings“ it's only necessary to adjust the threshold. Source and output is factory set.

Following „protection settings“ can be monitored in two steps (alarm / trip) independently:

OL: “Overload” monitoring TRMS current (greater than threshold)

Olth: “Overload thermal” current as thermal damped value. The corresponding „tau“ value can be set in the device.

Olf: “Overload fundamental” monitoring current as fundamental value (Only ground wave 50 or 60 Hz)

UL: “Underload” monitoring TRMS current (less than threshold)

OV: “Overvoltage” monitoring TRMS voltage (greater than threshold)

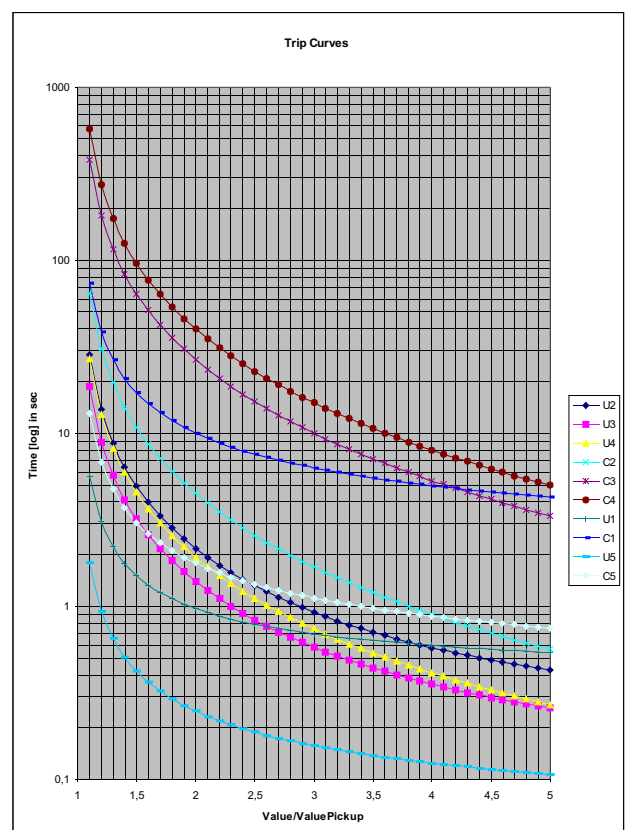
UV: “Undervoltage” monitoring TRMS voltage (less than threshold)

UB: “Unbalance” out of balance current at double star respective H-Bridge connection.

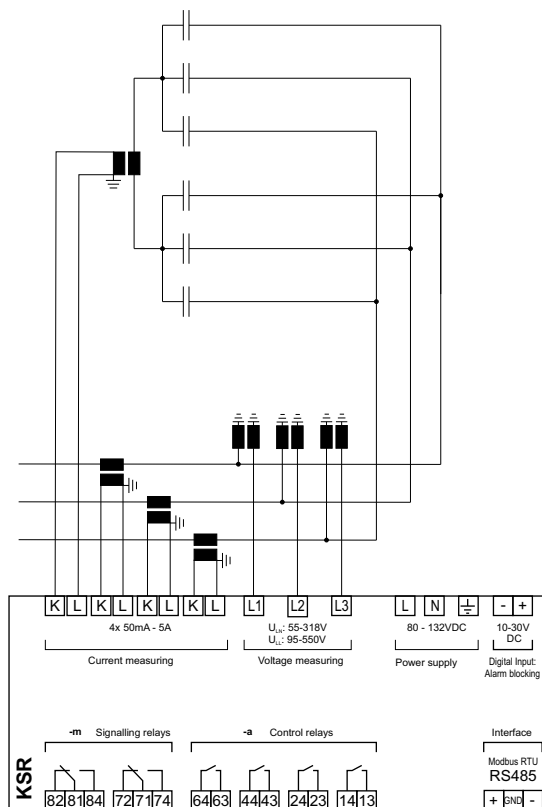
EF: “Earth fault” KSR-Z is calculating the earth fault current as absolute value from the vector sum of the phase currents.

VA: “Voltage Asymmetric” KSR-Z is comparing the phase voltage of the individual phases. The threshold is adjusted in % of deviation.

Tripping curves ANSI / IEC



Sample application



Voltage measuring:

Current measuring:

Switching outputs:

Switching power:

Fan control:

Interfaces:

Ambient temperature:

Humidity:

Overvoltage category:

Standards:

ULL: 95V - 550V, ULN: 55 - 318V, 45-65Hz, VT-ratio 1 - 4000

50mA -5A (Typ 5) or 20mA-1A (Typ 1) burden 15 mOhm
ext. CT is required, CT-ratio 1 - 10000,
Overload: 20% continuous, 200A for 1 Sec

2 c/o contacts, voltfree, 250V AC / 5A
4 n/o contacts, voltfree, 250V AC / 5A

250V AC / 5A, 30VDC / 5A (ohmic)
110V DC / 0,4A (ohmic), 110V DC / 0,3A (inductive)

temperature sensor on rear, control outputs can be
programmed to switch a fan depending on the temperature

TTL
RS485 Modbus RTU Slave

Operation: 0°C ...+70°C,
Storage: -20°C ...+85°C

0% - 95%, without moisture condensation

II, pollution degree 3

IEC 60255-1 Oscillatory Waves
IEC 60255-2 Electrostatic Discharge
IEC 60255-3 RF-Electromagnetic Fields
IEC 60255-4 Electrical fast transients
IEC 60255-5 Impulse Test Voltage (Surge)
DIN VDE 0110, Part 1 / IEC 60664-1
DIN VDE 0110 Part 1 (IEC 60664-1:1992)
VDE 0411 Part1 (DIN EN 61010-1 / IEC 61010-1:2001)
VDE 0843 Part 20 (DIN EN 61326 / IEC 61326:1997
+A1:1998 +A2:2000)

Approvals:

Connection:

Case:

Protection class:

Dimensions:

Weight:

CE

screw type, max. 2,5qmm

Instrument case

Front: IP50 (IP54 by mounting a gasket),
Rear: IP20

144 x 144 x 59 mm H x B x T, Ausschnitt 138^{+0,5} x 138^{+0,5} mm
ca. 650 gr

Alarmmatrix

Protection setting:	Monitored values:	Operated Relay	Relay N/C	Store in FR	Blocked by DI	Display message	Display	
							Auto reset	Man. reset
OL Alarm	TRMS current	Relay 1	✓	✓	✓	✓	✓	
OL Trip	L1, L2, L3	Relay 4	✓	✓	✓	✓		✓
UL Alarm	TRMS current	Relay 2	✓	✓	✓	✓	✓	
UL Trip	L1, L2, L3	Relay 4	✓	✓	✓	✓		✓
OL th Alarm	Thermal damped current	Relay 1	✓	✓	✓	✓	✓	
OL th Trip	L1, L2, L3	Relay 4	✓	✓	✓	✓		✓
OL f Alarm	Fundamental current	Relay 1	✓	✓	✓	✓	✓	
OL f Trip	L1, L2, L3	Relay 4	✓	✓	✓	✓		✓
UB Alarm	Current channel 4	Relay 2	✓	✓	✓	✓	✓	
UB Trip		Relay 4	✓	✓	✓	✓		✓
EF Alarm	Calculated earth fault current	Relay 8	✓	✓	✓	✓	✓	
EF Trip		Relay 4	✓	✓	✓	✓		✓
VA Alarm	Voltage asymmetry between	Relay 7	✓	✓	✓	✓	✓	
VA Trip	all phases	Relay 4	✓	✓	✓	✓		✓
OV Alarm	TRMS voltage	Relay 7	✓	✓	✓	✓	✓	
OV Trip	L1-L2, L2-L3, L1-L3	Relay 4	✓	✓	✓	✓		✓
UV Alarm	TRMS voltage	Relay 7	✓	✓	✓	✓	✓	
UV Trip	L1-L2, L2-L3, L1-L3	Relay 4	✓	✓	✓	✓		✓

BELUK

Capacitor protection relay KSR-V

Measurementsystem

The KSR-V measurement system provides 7 input channels:

For Voltage measurement the connectors L1, L2, L3, (N) have to be connected with the corresponding points of the supervised system. The connection of N is not necessary in all cases. If left open, an artificial N potential is provided by an internal resistor network. The max. possible VT ratio is 4000

The out of balance voltage is measured at voltage measurement channels V1-4 via voltage measurement transformers (secondary connections open delta). The measurement range is from 0-20VAC. The maximum overload is 120V. To adjust a vt ratio is not possible. Each input channel contains a high precision input filter with a 3dB-cutoff-frequency in the range of 2.5kHz -3 kHz.

Monitoringsystem

For the KSR-V are 32 „protection settings“ available. The following settings can be done for each of the „Protection Settings“:

Source = monitored value

Trigger = monitored value < or > compared to the threshold

Limit = threshold

T-ON = delay time after violating the adjusted threshold

T-OFF = delay time for the alarm reset after the monitored threshold is becoming normal

Output = selection of the relays, which shall be activated if alarm condition is true and after T-ON is over. For giving alarm signals there are 6 relay outputs available (2 c/o and 4 n/o) available. Each relay can be triggered from more the one „protection setting“. All relays can be programmed to be inverted and to be latching. If a relay is set to be „latched“, it can be reset only at the device, a missing power supply does not reset it.

It should be considered that without the powersupply the relays are not active! The alarm display feature can be selected here too, as if it was another relay output.

Order codes

Available option models:

KSR-amv-V:	Power supply 110VDC
KSR-amv-W:	Power supply 220VDC
KSR-amv-S:	Power supply 24VDC
KSR-amv-T:	Power supply 48VDC
KSR-amv-B:	Power supply 110VAC
KSR-amv-C:	Power supply 230VAC

Options:

-MB:	RS485 Modbus RTU
-VT	Transparent cover with lock Ip5

Accessories:

UMS9	Data cable TTL/USB
3ZWC	Wall mounting bracket



Description

High voltage capacitors taken into operation must be supervised all the time. Most of these capacitors are manufactured by using insulating oil for the dielectricum, which could catch fire in any case of fail. When considering some liters of oil which are filled in the capacitor, there is a fire load not to be disregarded. Therefore it's necessary to separate the capacitors from the grid before a failure causes an accident.

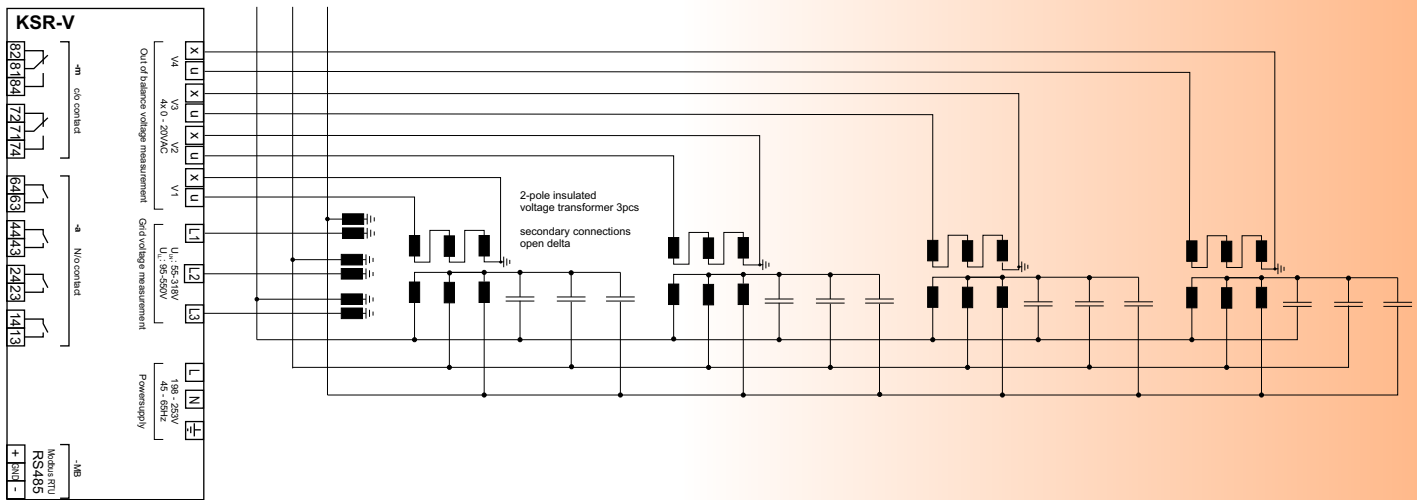
The KSR-V is designed to protect the capacitors in a versatile way without generating useless and expensive cut offs. The device provides a big liquid crystal display for easy reading of values and settings. The backlight provides a good visibility even in poor light conditions. Four context-sensitive soft-keys provide easy, instant usage without the need to read the manual along when using the device.

Nearly all displayed values are true RMS (TRMS) values, which means they are correct even if the waveform is not a sine function. Harmonics are considered in all measurement values automatically.

A full range "Fast Fourier Transformation" is performed on the input data of all channels (3 voltage channels). This provides information about the harmonic contents which distort the sine waveform of the voltages. This is important when protecting capacitors, because capacitors can be damaged by voltage harmonics.

For monitoring of out of balance voltage the KSR-V comes with 4 special voltage measurement channels. By using this, the unbalance of 4 capacitor banks can be measured and monitored. Each value can be monitored in two steps (Alarm / Trip), for each step it's possible to adjust the threshold as well as a delay separately.

Sample application



Technical Data

Auxiliary voltage:	230V +/- 10%, 45-65Hz, 8VA, max. fuse 6A (also available 110V AC, 110V DC, further ratings on request)
Voltage measuring:	ULL: 95V - 550V, ULN: 55 - 318V, 45-65Hz, VT-ratio 1 - 4000
Voltagemasuring for Out of balance detection:	0-20V, minimum sensitivity 0,5V, max 60V continuous
Relay outputs: (optional available)	4 n/o contacts, voltfree, 250V AC / 5A, 110V DC / 0,3A (induktiv) 2 c/o contacts, voltfree, 250V AC / 5A, 110V DC / 0,3A (induktiv)
Fan control:	temperature sensor on rear, control outputs can be programmed to switch a fan depending on the temperature
Interfaces:	standard: serial interface with TTL signals optional: RS485 Modbus RTU
Display:	graphical LCD 128x64 pixel with backlit, menues in cleartext
Operating:	membrane keyboard with 4 Softkeys
Ambient temperature:	operation: -20°C - +70°C; storage: -30°C - +80°C
Humidity:	0% - 95%, without moisture condensation
Overvoltage category:	II, pollution degree 3 (DIN VDE 0110, Teil 1 / IEC 60664-1)
Standards:	IEC 60255-1 Oscillatory Waves IEC 60255-2 Electrostatic Discharge IEC 60255-3 RF-Electromagnetic Fields IEC 60255-4 Electrical fast transients IEC 60255-5 Impulse Test Voltage (Surge) DIN VDE 0110, Teil 1 / IEC 60664-1 DIN VDE 0110 Teil 1 (IEC 60664-1:1992) VDE 0411 Teil1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Teil 20 (DIN EN 61326 / IEC 61326:1997DIN VDE 0110-1 (IEC 60664-1:1992 +A1:2000 +A2:2002) VDE 0411-1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843-20 (DIN EN 61326 / IEC 61326)
Approvals:	CE
Connection:	plugable terminals, screw type, max. 4 sqmm rigid wire
Case:	front: instrument case, plastic (UL94-VO) rear: metal
Protection class:	front IP50 (IP54 by mounting with gasket), rear IP20
Weight:	approx. 650gr
Dimensions:	144x144x58mm, cutout 138(+0,5)x138(+0,5)mm

BELUK

Power-Analyzer EMM-5



32 programable thresholds in EMM5

Selection of 52 different measuring values

Monitoring of exceeding and shortfall

Delay of alarming and drop-off in the range of 0-600 sec

Programmable announcement of alarm:

2 C/O contacts (option -m)

4 N/O contacts (option -a)

Text message in LCD

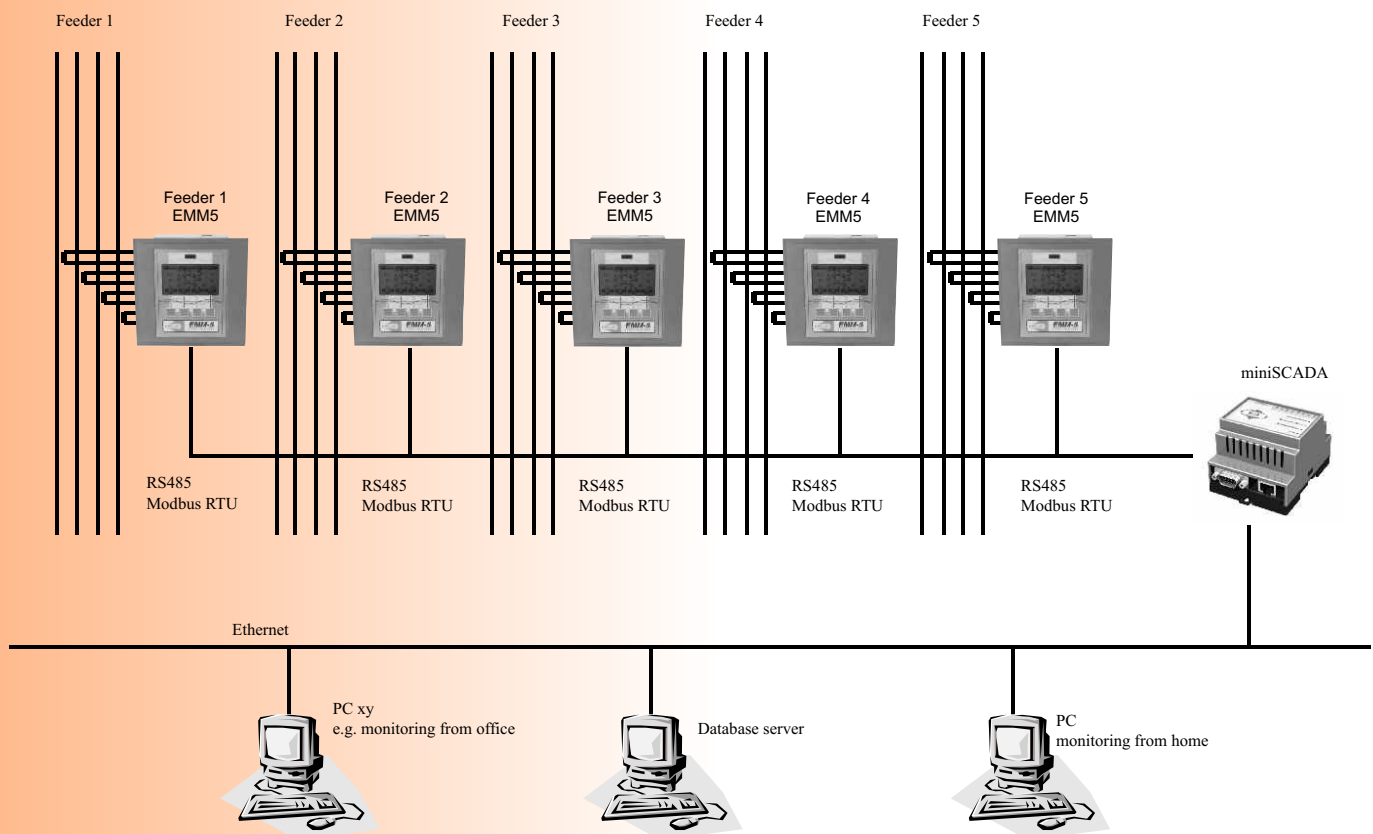
Event logging with date and time of alarm and drop and information about threshold and max. values (option -DM)

Blocking of alarming in special situations (e.g. start of a motor) by signal at digital input (option -DM)

Alarm conditons can be read out by interface RS485 Modbus (Optionen -MB, -DM)

Recording of measuring values in programable intervals. Each interval is recorded with date, time, minimum, maximum and mean value of the measuring values. The data can be downloaded to PC by TTL-USB-Konverter and is saved in a csv-file, which can be used with all spread-sheet programmms.

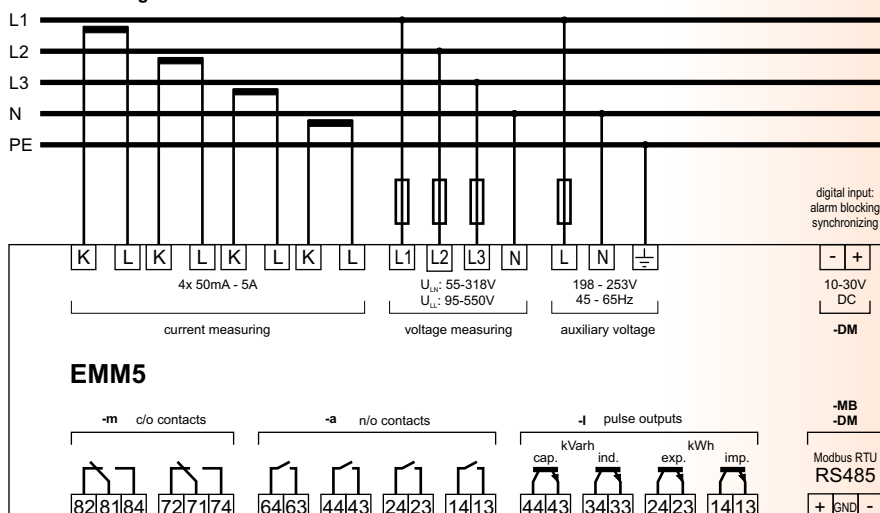
EMM5 and MiniSCADA - the network solution for power applications



Features EMM5 - MiniSCADA:

- Simple installation
- Complet SCADA System in one device
- DIN-rail mounting of MiniSCADA
- Display and parametering is done by using a web-browser
- No software installation at pc
- Licence fee is included in hardware
- access also by internet
- MiniSCADA is working as Modbus Master
- internal webserver with upto 30 pages
- 64 programable Alarms in MiniSCADA
- Alarming by e-mail
- Alarming by SMS (MiniSCADA2 is necessary)
- Programmable command structure for alarm messaging
- Data logging in MiniSCADA with data transmission by e-mail
- MiniSCADA2 is equipped with internal GPRS-modem
- Integration of BLR-CM, BLR-CM3phase and KSR is provided
- Integration of external devices offering a RS485 Modbus RTU slave interface is possible
- 1 MiniSADA can connect upto 32 devices

Connection diagram:



Measurementsystem

Measurement values (Display / Monitoring / Recording)

U_{LN} :	55-318V	+/-0,5%
U_{LL} :	95-550V	+/-0,5%
$I_{L1, L2, L3, N}$	0,05-5A	+/-0,5%
$I_{th, L1, L2, L3, N}$	0,05-5A	+/-0,5%
$I_F, L1, L2, L3, N$	0,05-5A	+/-0,5%
F:	45-65Hz	+/-0,1Hz
Rotation field	right/left	
$\cos\phi, L1, L2, L3$	c0,00 - i0,00	+/-0,01
$\Lambda, L1, L2, L3$	0,00 - 1,00	+/-0,01
S L1, L2, L3, tot	0 - 35GVA	+/-0,5%
P L1, L2, L3, tot	0 - 35GW	+/-0,5%
Q L1, L2, L3, tot	0 - 35Gvar	+/-0,5%
THD U	0 - 100%	
THD I	0 - 100%	
Harm. U 2. - 63.	0 - 100%	
Harm. I 2. - 63.	0 - 100%	
Temperature:	5°C - 80°C	

Counter

Tariff 1:

Active energy import	L1, L2, L3, total	0000000.00kWh	- 4000000.00GWh
Active energy export	L1, L2, L3, total	0000000.00kWh	- 4000000.00GWh
React. energy inductive	L1, L2, L3, total	0000000.00kvarh	- 4000000.00Gvarh
React. energy capacitive	L1, L2, L3, total	0000000.00kvarh	- 4000000.00Gvarh

Tariff 2 (only Option -DM):

Active energy import	L1, L2, L3, gesamt	0000000.00kWh	- 4000000.00GWh
Active energy export	L1, L2, L3, gesamt	0000000.00kWh	- 4000000.00GWh
React. energy inductive	L1, L2, L3, gesamt	0000000.00kvarh	- 4000000.00Gvarh
React. energy capacitive	L1, L2, L3, gesamt	0000000.00kvarh	- 4000000.00Gvarh

Due to separate metering of all three phases plus total value, EMM5 provides 32 meters.

With option -DM every day the meters are saved, to get a history of the meters.

Tariff switch-over can be done either by an external signal at digital input or every day at a preset time.

Technical Data

Auxiliary voltage:	230V +/- 10%, 45-65Hz, 8VA, max. fuse 6A (also available 110V AC, 110V DC, further ratings on request)
Voltage measuring:	U_{LL} : 95V - 550V, U_{LN} : 55 - 318V, 45-65Hz, VT-ratio 1 - 4000
Current measuring:	50mA - 6A, 50A for 1 sec., burden < 1VA, ext. CT is required, CT-ratio 1 - 10000
Temperature measuring:	+5°C - 80°C, temperature sensor on rear
Switching outputs: (optional available)	-a: 4 n/o contacts, voltfree, 250V AC / 5A, 110V DC / 0,3A (inductive) -m: 2 c/o contacts, voltfree, 250V AC / 5A, 110V DC / 0,3A (inductive) -l: 4 pulse outputs, solid state, max. 250V DC / 0,1A
Interfaces:	standard: serial interface with TTL signals optional: RS485 Modbus RTU
Display:	graphical LCD 128x64 pixel with backlit, menus in cleartext
Operating:	membrane keyboard with 4 Softkeys
Ambient temperature:	operation: -20°C - +70°C; storage: -30°C - +80°C
Humidity:	0% - 95%, without moisture condensation
Overvoltage category:	II, pollution degree 3 (DIN VDE 0110, Teil 1 / IEC 60664-1)
Standards:	DIN VDE 0110-1 (IEC 60664-1:1992 +A1:2000 +A2:2002) VDE 0411-1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843-20 (DIN EN 61326 / IEC 61326)
Approvals:	
Connection:	pluggable terminals, screw type, max. 4 sqmm rigid wire
Case:	front: instrument case, plastic (UL94-VO) rear: metal
Protection class:	front IP50 (IP54 by mounting with gasket), rear IP20
Weight:	approx. 650gr
Dimensions:	144x144x58mm, cutout 138(+0,5)x138(+0,5)mm

Order codes

Available option models:

EMM5	Standard
EMM5 -m	2 c/o contacts
EMM5 -am	2 c/o contacts 4 n/o contacts
EMM5 -lm	2 c/o contacts 4 Impulse outputs

Options:

-MB	RS485 Modbus RTU
-DM	RS485 Modbus RTU Event recorder Measured data storage Real time clock Digital input 2048 kB

Accessories:

MiniSCADA	Web-Gateway RS485 Modbus Ethernet Alarm by E-Mail Webserver
MiniSCADA2	Web-Gateway RS485 Modbus Ethernet Alarm by E-Mail Alarm by SMS Webserver integr. GPRS Modem
UMS9	TTL-USB converter

BELUK

Voltage Control Relay VSR/VCR



Description

The VSR/VCR has been designed to monitor single respective 3 phase grids and detect dangerous situation for connected capacitors or other electronic devices. Capacitors which are in use for e. g. compensation panels can be damaged by overloading or voltage peaks. Due to this a monitoring of the connected voltage including the harmonics is recommended.

If the VSR/VCR is detecting a violation of an adjusted threshold, this will be show in the display and also a relay can switch off the capacitors.

These are the functions a VSR/VCR can perform in a very flexible way. The device provides a big liquid crystal display for easy reading of values and settings. The backlight provides a good visibility even in poor light conditions. Four context-sensitive soft-keys provide easy,

instant usage without the need to read the manual along when using the device.

Nearly all displayed values are true RMS (TRMS) values, which means they are correct even if the waveform is not a sine function. Harmonics are considered in all measurement values automatically.

A full range "Fast Fourier Transformation" is performed on the input data of all channels (3/1 voltage channels). This provides information about the harmonic contents which distort the sine waveform of the voltages. This is important when protecting capacitors, because capacitors can be damaged by voltage harmonics.

Technical Data

Voltage measuring:	55/95V - 318/550V, 45-65Hz, ratio 1 - 4000
Switching outputs:	2 c/o contacts, voltfree, max. fuse gL6A 4 n/o contacts, voltfree, max. fuse gL6A
Breaking capacity:	250V AC / 5A, 30VDC / 5A (ohmic) 110V DC / 0,4A (ohmic), 110V DC / 0,3A (inductive)
Fan control:	temperature sensor on rear, control outputs can be programmed to switch a fan depending on the temperature
Interfaces:	standard: TTL optional: RS485 Modbus RTU Slave
Ambient temperature:	Operation: 0°C ...+70°C, Storage: -20°C ...+85°C
Humidity:	0% - 95%, without moisture condensation
Overvoltage category:	II, pollution degree 3
Standards:	DIN VDE 0110, Part 1 / IEC 60664-1 DIN VDE 0110 Part 1 (IEC 60664-1:1992) VDE 0411 Part1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 Part 20 (DIN EN 61326 / IEC 61326:1997 +A1:1998 +A2:2000)
Approvals:	CE
Connection:	screw type, max. 2,5qmm
Case:	Instrument case
Protection class:	Front: IP50 (IP54 by mounting a gasket), Rear: IP20
Dimensions:	144 x 144 x 59 mm H x B x T, Ausschnitt 138 ^{+0,5} x 138 ^{+0,5} mm
Weight:	ca. 650 gr

Order codes

Available option models single phase:

VCR-am-V:	Power supply 110VDC
VCR-am-W:	Power supply 220VDC
VCR-am-S:	Power supply 24VDC
VCR-am-T:	Power supply 48VDC
VCR-am-B:	Power supply 110VAC
VCR-am-C:	Power supply 230VAC

Available option models three phase:

VSR-am-V:	Power supply 110VDC
VSR-am-W:	Power supply 220VDC
VSR-am-S:	Power supply 24VDC
VSR-am-T:	Power supply 48VDC
VSR-am-B:	Power supply 110VAC
VSR-am-C:	Power supply 230VAC

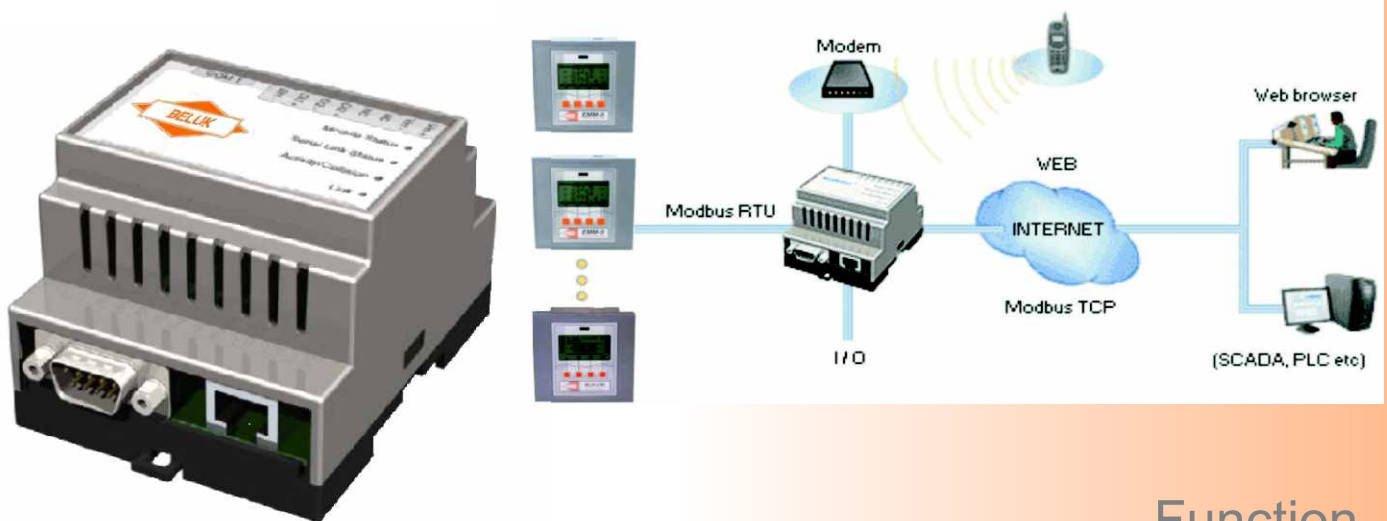
Options:

-MB:	RS485 Modbus RTU
-VT	Transparent cover with lock Ip54

Accessories:

UMS9	Data cable TTL/USB
3ZWC	Wall mounting bracket

configurable web gateway MiniScada



Function

Description

The miniSCADA is an easy-to-use web based SCADA system. Both local and remote monitoring and control is supported over Ethernet, Internet, LANs, Telephone modems, GSM (external modem necessary) and GPRS.

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 are shown automatically on the integrated webpage. There is no need for HTML programming.

Technical Data

Ethernet Protocols:

Modbus TCP, HTTP, SMTP, FTP, SNMP

Ethernet Baud rate: 10 / 100 Mbit/s

Serial interface #1:

RS232 / RS485 for Modbus RTU / ASCII

Serial interface #2:

RS232 (full modem support)

Network baud rate: Configurable up to 57.6 kbit/s

Power supply: 9 - 32V AC/DC

Current consumption: 50mA / 24V

Operation temperature: 0...+60°C

Certifications:

EN 50081-2:1993 und EN 61000-6-2:1999

Humidity range:

5 -93% RH, non condensing

Housing:

Grey plastic, Lexan 940, self-extinguishing acc. to UL94-V0

Din rail mounting, 4 modules, IP 20

Mechanical dimensions: 90mm x 70mm x 58mm

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 inside. The user 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 Email and SMS

The user can configure up to 64 alarms and the conditions to trigger an alarm. The alarm can be sent by email or SMS (external GSM modem necessary) 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 s - 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 must be able to log on with the right user name and password, assigned by the administrator.

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

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