Low Voltage Compensation and Filtering Products

Low voltage products for better power quality and improved network efficiency.

NOKIAN CAPACITORS
An Alstom Grid company

Alstom Grid compensation equipment helps customers improve performance through energy savings and better power quality. With our products and solutions, customers save money and reduce the environmental impact of their operations.

Applications	Alstom Grid products	Typical customers
• Improving power quality and power factor correction	**Active filters**	• Windparks • Companies with welding machinery • Companies with lifts • Companies with fast variable loads
• Power factor correction with fast variable loads, such as harbor cranes and lifts	**Thyristor swiched capacitor banks**	• Harbor cranes • Premises with lifts • Machine builders
• Improving the power factor and power quality	**Harmonic filter capacitor banks**	• Commercial premises • Industries of all kinds • Greenhouses • Contractors
• Power factor correction in distorted networks	**Detuned filter capacitor banks**	• Commercial premises • Industries of all kinds • Contractors
• Reactive power compensation in low voltage networks without harmonics	**Automatic capacitor banks**	• Commercial premises • Industries of all kinds • Power utilities • Contractors
• All types of capacitor banks	**Low voltage capacitor units Electronic discharge devices XKIB iron core blocking reactors Power factor controllers**	• Panel builders • LV switchboard manufacturers

Customer Benefits

- Reduce harmonics
- Compact solutions
- Lower losses
- Improved Power Quality
- Money saving

Alstom Grid compensation equipment - a wide range of products and one-off solutions at low voltage levels. We analyze your needs and engineer the right solutions for optimal efficiency and economy.

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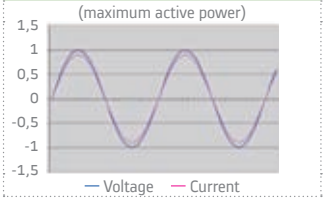
GRID | ALSTOM | we are shaping the future

Why do we need Power Compensation?

Power factor correction

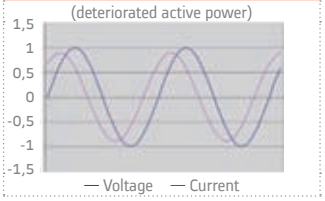
Connected equipment (transformers, motors, air-conditioning, refrigerators, etc.) cause a phase angle between current and voltage.
When the current is phase-shifted, it takes more current to deliver the same amount of active power.

Voltage and Current ▶ should be like this...



Active Power = Apparent Power

▶ but are like that.



Active Power < Apparent Power

Power factor = Active power / Apparent power

Dephasing between current and voltage decreases the active power (only the active power is converted into useful mechanical power).

Impact of reactive power

- Transmission equipment has to be sized for the apparent power, yet only active power is useful
- Increased losses in the network
- You pay for apparent power but use active power (higher electricity bill)
- Penalty fees to customers with a low power factor (example < 0.95)

WHO

- Power consumers, network operators, power supplies, power industry, hospitals, offices, public buildings, factories

SOLUTION

- The power factor of a facility can be improved by installing capacitor banks

Harmonic filtering

Variable speed drives (process industries, lifts, air conditioning pumps, etc.), uninterruptible power supplies for computers, electronic equipment, etc. distort the current (introduce harmonics).

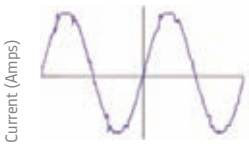
Impact of harmonics on transmission / distribution equipment

- Additional losses (paid for by the end user)
- Heating in power cables
- Audible noise (transformers)
- Penalty fees to customers with a low power factor (example < 0.95)

Impact of harmonics on equipment connected

- Decreased machine efficiency
- Costly process shutdowns
- Disturbed electronic equipment (computers, telephones)

Current ▶ should be like this...



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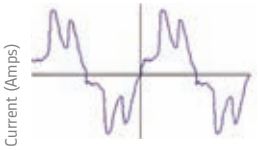


Current oscillogram before filtration

WHO

- Power consumers, network operators, power supplies, power industry

SOLUTION

- Harmonics can be filtered through a combination of reactors and capacitors (passive filtering) or by injecting the exact opposite of the harmonics detected (active filter) into the network.

Power compensation brings

ECONOMIC BENEFITS

- Saving the costs of reactive power
- Additional savings through reduced active power losses
- Reduction in investment cost

➔ Return on investment is generally below 18 months

ENVIRONMENTAL BENEFITS

- **Reduced CO_2 emissions**
  Customers see environmental benefits through energy savings and more efficient power systems.

➔ By saving millions of tons of CO_2, power compensation makes an active contribution to protecting the environment

N-series low voltage capacitor units

Product features

Capacitor elements made of metallized polypropylene film are self-healing and dry without impregnation liquid. Each capacitor element is individually protected with patented internal fuse protection.

Capacitors have low losses, and are constructed to be compact size and light in weight. The low voltage power capacitors comply with most national and international standards.

Standard series, for 50 Hz or 60 Hz frequencies, are available for the following voltages: 220, 230, 240, 380, 400, 415, 440, 480, 525, 600, 660 and 690 V.
Other voltages up to 1000 V are available on request.

Applications

- All kinds of capacitor banks

Typical Alstom Grid customers

- Panel builders
- LV switchboard manufacturers

Customer advantages

- Low losses
- Compact size
- Light in weight
- Self-healing
- Easy-to-install components

Technical data	
Rated voltage	200 V to 1000 V
Rated frequency	50 Hz or 60 Hz
Insulation level	4 kV rms/12 kV crest
Power losses	≤ 0.5 W/kvar
Continuous overvoltage	1.1 x U_N
Continuous overcurrent	1.3 x I_N
Mounting arrangement	indoor
Enclosure IP class	IP42
Temperature class Average 24h: Average 1 year:	-40° C to + 55° C + 45° C + 35° C
Weight	2.5 to 5 kg
Color	RAL7032
Standards	IEC 60831 - 1&2

L1 and L2-series low voltage capacitor units

Product features

Capacitor elements made of metallized polypropylene film are self-healing and dry without impregnation liquid. Each capacitor element is individually protected with patented internal fuse protection.

Capacitors come with internal discharge resistors up to 690 V (3min. 75 V) and terminal boxes (IP42) or without terminal box (IP00). Electronic discharge devices up to 550 V are available.

Standard series, for 50 Hz or 60 Hz frequencies, are available for the following voltages: 220, 230, 240, 380, 400, 415, 440, 480, 525, 600, 660 and 690 V.
Other voltages up to 1000 V are available on request.

Applications

- All kinds of capacitor banks

Typical Alstom Grid customers

- Panel builders
- LV switchboard manufacturers

Customer advantages

- Easy and robust cable termination
- Internal discharge resistors
- Simple, safe and solid construction
- Self-healing
- Easy-to-install components

Technical data	
Rated voltage	200 V to 1000 V
Rated frequency	50 Hz or 60 Hz
Rated power	2.5 to 125 kvar
Output	3- or 1-phase applications
Capacitance tolerance	- 5 to +10%
Insulation level	4.1 kV (≤ 690 V) or 5 kV (> 690 to 1000 V)
Continuous overvoltage	1.1 x U_N
Continuous overcurrent	1.3 x I_N
Power losses	≤ 0.4 W/kvar (with discharge resistors)
Mounting arrangement	indoor
Enclosure IP class	IP00 or IP42
Temperature class	- 40° C as standard (- 5/D on request)
Container	Painted steel container
Weight	2.8 to 25 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2

Electronic discharge devices

Product features

- Connection through 3-phase diode bridge
- When a capacitor is connected to AC then a discharge circuit is in very high resistance mode
- When the AC supply is switched off then a discharge circuit is supplied by DC and automatically set to discharge mode, discharging through the power resistor
- If AC is reconnected before discharging is completed, discharging is automatically stopped and the discharge circuit returns to a very high resistance mode

Applications

- Fast discharge in low voltage capacitor units up to 550 V

Typical Alstom Grid customers

- Panel builders
- LV switchboard manufacturers

Customer advantages

- Compact
- Light
- Faster than traditional discharge resistors
- Saves energy, no loss of power
- Compatible with any LV capacitor units
- Reliable
- Patented

Technical data	
Rated voltage	200 V to 550 V
Rated frequency	50 Hz or 60 Hz
Mounting arrangement	indoor
Dimensions (wxdxh)	102 x 12 x 32 mm
Weight	50 g
Color	RAL7032 (light grey)

XKIB iron core blocking reactors

Product features

Energy needs to be saved – everywhere. Better electrical efficiency comes from modern technology, frequency converters, uninterruptible power supplies and other power electronic devices. The main concern is harmonic currents in the supply system.

Given the pressure to compensate reactive power, harmonics may cause resonance with the supplying transformer and capacitors. The solution is to install blocking reactors in series with capacitors. The detuned system design keeps the tuning frequency below the lowest harmonic in the system. Reactive power at the fundamental frequency is possible, with no risk of resonance.

Applications

- All types of detuned capacitor banks

Typical Alstom Grid customers

- Panel builders
- LV switchboard manufacturers

Customer advantages

- XKIB iron core blocking reactors are designed to work together with our capacitor banks, resulting in a number of advantages
- Optimized size, weight and losses (MultiCap design)
- Long operating time (high quality insulation and tested temperature rise)
- Optimized compensation result (adjusted tuning frequency and high linearity)
- Easy-to-install components

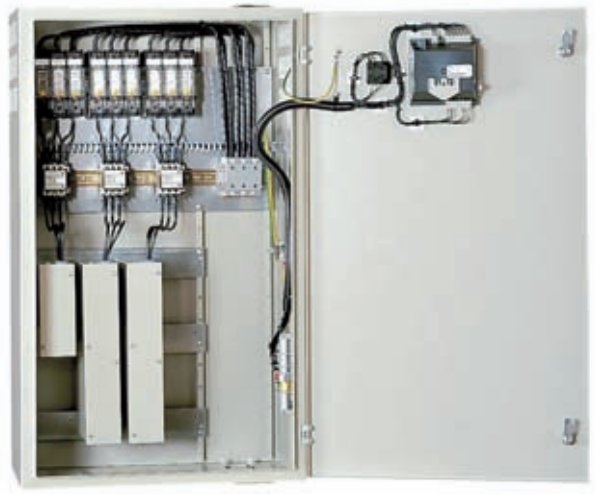
Technical data	
Rated voltage	200 V to 690 V
Rated frequency	50 Hz or 60 Hz
Rated power	5 to 75 kvar
Inductance tolerance	± 3%
Tuning frequency	6, 7, 13 or 14%
Insulation level	3 kV
Mounting arrangement	indoor
Enclosure IP class	IP00, vertical position
Temperature category	F
Standards	IEC 60289

Wall mounted automatic capacitor banks

Product features

Automatic capacitor banks are used for centralized power factor correction at the main and sub distribution boards. Power factor correction means that reactive power charges imposed by electricity utilities can be avoided. Automatic capacitor banks consist of steps controlled by a reactive power controller, which ensures that the required reactive power is always connected to the system.

In Alstom Grid's wall-mounted automatic capacitor banks, all components (capacitor units, contactors and fuses) are built into a compact steel case. This makes installation easy. Capacitor banks can also be easily extended if necessary. Extension is allowed within the limits of the cabling recommendations.



Applications

- Reactive power compensation in low voltage networks without harmonics
- Centralized
- Usually connected into the main board or sub board

Typical Alstom Grid customers

- Small commercial premises
- Small industries of all kinds
- Power utilities
- Contractors

Customer advantages

- Small space requirement 600 x 300 x 1000 mm (wxdxh)
- Wide range of cable connections
- Expandability

Technical data	
Rated voltage	400 V to 690 V
Rated frequency	50 Hz or 60 Hz
Rated power	15 to 100 kvar
Number of steps	1 to 5
Capacitance tolerance	- 5% /+ 10%
Tuning frequency	-
Insulation level	3 kV
Continuous overvoltage	1.1 x U_N
Continuous overcurrent	1.3 x I_N
Power losses	< 1.3 W
Mounting arrangement	indoor
Enclosure IP class	IP30
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 30° C + 20° C
Dimensions (wxdxh)	600 x 300 x 1000 mm
Weight	45 to 65 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1

Fixed detuned filter capacitor banks

Product features

Power transmission and distribution networks are designed to operate with sinusoidal voltage and current having a constant frequency. However, there are a number of non-linear loads, such as thyristor drives and converters, that generate harmonics on the network, causing distortion in the voltage and current waveforms.

The natural frequency in the resonant circuit formed by the capacitance of the power capacitor and the network inductance may match a harmonic frequency. If there is a harmonic current source for that particular harmonic frequency in the network, the harmonic current of this frequency may reach values as high as 20 times the normal level. The voltage and current waveforms are distorted due to the amplified harmonics caused by the resonance. This leads to further current and voltage distortions.
Power factor correction by conventional capacitors is not possible in systems affected by harmonics.

Applications

- Compensation of the reactive power in individual, standard-power loads or groups of loads in networks affected by harmonics
- Used to compensate stable reactive power in the networks affected by harmonic
- Usually connected in parallel with the load switching on and off simultaneously with the load

Typical Alstom Grid customers

- Industries of all kinds
- Contractors

Customer advantages

- Small and robust construction
- Low losses
- For individual loads
- IN-OUT (passing) cabling

Technical data	
Rated voltage	400 V to 690 V
Rated frequency	50 Hz or 60 Hz
Rated power DFC 0607-series	≤ 50 kvar
Rated power DFL 0611-series	50 to 100 kvar
Rated power DFL 0612-series	100 to 150 kvar
Tuning frequency	7% or 12.6% (other frequencies on request)
Insulation level	3 kV
Continuous overvoltage	1.1 x U_N
Harmonic dimensioning	according to IEC 1000 - 2 - 2
Mounting arrangement	indoor
Enclosure IP class	IP32
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 35° C + 25° C
Dimensions (wxdxh)	DFC 560 x 475 x 660 mm DFL 600 x 600 x 1100 mm or 1200 mm
Weight	DFC ≤ 83 kg, DFL ≤ 200 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1

DW-series detuned filter capacitor banks

Product features

Alstom Grid DW-series automatic capacitor banks with blocking reactors are intended for power factor correction in systems where harmonic distortion is present.

The new modular and compact design saves space and is available with options for wall or floor monting. The DW-series is available in two variants, standard and extendable. The extendable type includes space for fast and easy increase of the output of the c-bank. Reactive power compensation is controlled with the N-6 high performance reactive power controller.

Power factor correction by means of conventional capacitor banks is not possible in systems affected by harmonics. This is because the harmonic currents are amplified in the parallel resonant circuit formed by the capacitor and the network. As a result, current and voltage distortion are further increased.

Wall or floor mounted detuned filter capacitor banks are manufactured for 400 V/50 Hz networks with 141 Hz and 189 Hz tuning frequencies. Other configurations are available to order.

Applications

- Power factor correction in distorted networks

Typical Alstom Grid customers

- All kinds of commercial buildings
- Small industries
- Contractors

Customer advantages

- Compact
- Wall or floor mounting
- Optimized for small steps/outputs

Technical data	
Rated voltage	400 V to 690 V
Rated frequency	50 Hz or 60 Hz
Rated power	15 to 75 kvar
Number of steps	3 to 4
Tuning frequency	7% or 12.6%
Insulation level	3 kV
Continuous overvoltage	1.1 x U_N
Harmonic dimensioning	according to IEC 1000 - 2 - 2
Mounting arrangement	indoor, on floor or wall
Enclosure IP class	IP20C
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 35° C + 25° C
Dimensions (wxdxh)	750 x 320 x 1200 mm
Weight	80 to 130 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1

D-series detuned filter capacitor banks

Product features

Power transmission and distribution systems are designed to operate with sinusoidal voltage and current having a constant frequency. When non-linear loads – such as thyristor drives and converters – are connected to the system, harmonics are generated, causing voltage and current distortion.

Capacitor capacitance and network inductances may form a parallel resonant circuit, where harmonic currents may be as much as 20 times the normal level. Should the natural frequency of the resonant circuit match an existing harmonic frequency, the current distortion caused by resonance leads to further voltage distortion. Power factor correction by means of conventional capacitors is not possible in systems affected by harmonics.

In systems where harmonics are present, power factor correction should be done with detuned filters. These consist of capacitors and reactors connected in series, capable of compensating reactive power at fundamental frequency without amplifying the harmonics.

Applications

- Power factor correction in distorted networks
- Centralized compensation
- Used in networks affected by harmonics
- Detuned filter is usually connected into the main board or sub board

Typical Alstom Grid customers

- Commercial premises of all kinds
- Industries of all kinds
- Contractors

Customer advantages

- Low losses
- Modular, clear construction
- Extendability

Technical data	
Rated voltage	400 V to 690 V
Rated frequency	50 Hz or 60 Hz
Rated power	45 to 450 kvar
Number of steps per cubicle	3 to 7
Tuning frequency	7% or 12.6% (other frequencies on request)
Insulation level	3 kV
Continuous overvoltage	1.1 x U_N
Harmonic dimensioning	according to IEC 1000 - 2 - 2
Mounting arrangement	indoor
Enclosure IP class	IP20C
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 35° C + 25° C
Dimensions (wxdxh) (option height 2000 mm) (option height 2000 mm) (option height 2000 mm)	600 x 600 x 1800 mm 800 x 600 x 1800 mm 1000 x 600 x 1800 mm 1200 x 600 x 1800 mm
Weight	180 to 610 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1

Third harmonic filter capacitor banks

Product features

Harmonic filters are usually designed on a case-by-case basis according to the dimensions and assembled from standard components.
This guarantees the best reactive power compensation and harmonic filtering with reasonable investment costs.

Computers and other loads with SMPS (Switch Mode Power Supply) generate third harmonic current. This causes problems to all loads and networks.

All harmonic currents cause both current and voltage distortion.
In addition, third harmonic currents accumulate in the neutral wire, increasing the risk of overloading and causing the magnetic field to have the frequency of 150 Hz or 180 Hz. By filtering the third harmonic out of the network these problems can be totally eliminated.

Applications

- Improving power quality
- Power factor correction

Typical Alstom Grid customers

- Commercial premises of all kinds
- Greenhouses
- Contractors

Customer advantages

- Reduces 3rd harmonic current in both phases and neutral
- Nokian Capacitors Ltd. patented capacitor/reactor series connection

Technical data			
Type	3HF50/400–50/150–108/77–0816	3HF35/400–50/150–127/116–0816	3HF15/400–50/150–50/44–0812S
Nominal Voltage	400 V	400 V	400 V
Fundamental frequency	50/60 Hz	50/60 Hz	50/60 Hz
Reactive Power	50 kvar	35 kvar	15 kvar
3rd harmonic current phase/neutral	77/230 A	116/348 A	44/132 A
Mounting arrangement	indoor, on floor	indoor, on floor	indoor, on wall
Enclosure IP class	IP20C	IP20C	IP20C
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 35° C + 25° C	0° C to + 40° C + 35° C + 25° C	0° C to + 40° C + 35° C + 25° C
Dimensions (wxdxh)	800 x 600 x 1600 mm	800 x 600 x 1600 mm	750 x 320 x 1200 mm
Weight	300 kg	310 kg	130 kg
Color	RAL7032 (light grey)	RAL7032 (light grey)	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1	IEC 60831 - 1&2, EN 60439 - 1	IEC 60831 - 1&2, EN 60439 - 1

F-series harmonic filter capacitor banks

Product features

Power transmission and distribution systems are designed for operation with sinusoidal voltage and current waveforms at a constant frequency. However, when non-linear loads – such as thyristor drives, converters and arc furnaces – are connected to the system, excessive harmonic currents are generated, causing both current and voltage distortion.

Harmonic filters can be operated in the same way as automatic capacitor banks: they are controlled by means of a power factor controller according to reactive power requirements.

Harmonic filters are custom designed for each application using standard components. This ensures that the best possible power factor correction and filtering characteristics are achieved with a reasonable investment.

Applications

- Improving power quality and power factor correction
- Used to filter harmonics
- Usually connected into the main or sub board

Typical Alstom Grid customers

- Commercial premises of all kinds
- Industries of all kinds
- Contractors

Customer advantages

- Filter system for 5^{th}, 7^{th}, 11^{th} and 13^{th} harmonics controlled by power factor controller
- Reduced harmonics
- Customized for your network
- Improves the quality of the electricity

Technical data	
Rated voltage	≤ 750 V
Fundamental frequency	50 Hz or 60 Hz
Filter tuned to	5^{th}, 7^{th}, 11^{th} or 13^{th} order of harmonics
Reactive power per cubicle	60 to 300 kvar
Insulation level	3 kV
Mounting arrangement	indoor
Enclosure IP class	IP20C
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 35° C + 25° C
Dimensions (wxdxh)	600 x 600 x 2000 mm 800 x 600 x 2000 mm
Weight	180 to 500 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1

DT-series thyristor switched capacitor banks

Product features

Thyristor switched capacitor banks with high-speed switching capability are designed to support the supply voltage of distribution systems and to correct the power factor of connected loads.

Thyristor switches do not suffer from mechanical wear, operate without noise, and are capable of practically transient-free switching.

For power factor correction with minimal delay, control signals can be transmitted to the control system of the capacitor bank straight from the loads.

Applications

- For power factor correction where there are fast variable loads, such as harbor cranes and lifts

Typical Alstom Grid customers

- Harbors
- Companies with welding machines
- Companies with lifts
- Machine builders

Customer advantages

- Small dimensions
- Fast response time
- Extendability
- Low switching transient reduction
- Supports the supply voltage of the distribution system and corrects the power factor of connected loads
- Does not cause transient during switching operations
- Control by the reactive power of the network (response time < 20 ms)
- Control signal can also be taken directly from the load to be compensated

Technical data	
Rated voltage	400 V to 690 V
Rated frequency	50 Hz or 60 Hz
Rated power	50 to 450 kvar
Number of steps	2 to 12
Tuning frequency	7% or 12.6% (other frequencies on request)
Insulation level	2.5 kV
Continuous overvoltage	1.1 x U_N
Harmonic dimensioning	according to IEC 1000 - 2 - 2
Mounting arrangement	indoor
Enclosure IP class	IP20C
Temperature class Average 24h: Average 1 year:	0° C to + 40° C + 35° C + 25° C
Dimensions (wxdxh)	1000 x 600 x 2000 mm 1200 x 600 x 2000 mm
Weight	250 to 700 kg
Color	RAL7032 (light grey)
Standards	IEC 60831 - 1&2, EN 60439 - 1

MaxSine active harmonic filters

Product features

The most effective way to eliminate harmonics is MaxSine active harmonic filter.

Applications

- Improving power quality and power factor correction in real time

Typical Alstom Grid customers

- Hospitals
- Companies with fast-changing loads (welding machines, lifts)
- Windparks
- All users with fast variable loads

Customer advantages

- Harmonic filtering
- Power factor correction
- Flicker compensation/active peak leveling
- Real time filtering and compensation
- Filters all harmonics up to 50
- Network impedance does not affect the filtering result

Technical data

MaxSine	Rated output	Line current	Neutral current	Weight	Width	Depth	Height
	at 400 V	L1, L2, L3	N				
Type	(kVA)	(A)	(A)	(kg)	(mm)	(mm)	(mm)
MaxSine 50A-3L	35	50	-	150	600	500	1200
MaxSine 100A-3L	70	100	-	240	600	500	1900
MaxSine 400A-3L	280	400	-	900	1200	800	2100
MaxSine 100A-4Lx1	70	100	100	350	600	500	2100

Power factor controllers N-6, N-12 and NC-12

Product features

Alstom Grid power factor controllers provide your network with efficient reactive power compensation, measurement and supervision.

Improved user-friendliness and condition monitoring

Improved user-friendliness due to multilingual user interface, clear text and symbol messages, graphics, alarm log and communication. Alstom Grid's power factor controller offers advanced condition monitoring for your network as well as for the capacitor bank.

The supervision and condition monitoring functions add to the simplified programming with intelligent self set-up to ensure optimal use of the reactive power compensation system.

Applications

- Automatic power thyristor control of low and medium voltage capacitor banks (tuned, detuned and conventional)

Typical Alstom Grid customers

- Panel builders
- LV switchboard manufacturers

Customer advantages

- Optimized user interface for easy operation
- Intelligent stepping algorithm for optimum step utilization and fast response
- All traditional stepping sequences also availabe
- Quick and simple mounting and wiring
- Intensive to current transformer polarity and phase sequence
- Monitoring and protection
- User-friendly
- Several language versions
- Robust constructions
- Various step programs

N-6 & N-12
Maximum 6 or 12 capacitor steps
Microprosessor-based technology
C/K auto search
Accuracy class 2.5%
Ambient temperature 0 to + 60° C
Protection class IP41 at panel and IP20 DIN-rail installation
Measurements; cos, P, Q, S, THD(U), temperature

NC-12
Maximum 12 capacitor steps
Microprosessor-based technology
C/K auto search
Measures / Alarms of UTHD
Separate C/K setting for inductive and capacitive side
Accuracy class 1.5%
Ambient temperature 0 to + 60° C
Protection class IP41 at panel and IP20 DIN-rail installation
Measurements; cos, Ip, Iq, Irms/I1, P, Q, S,THD(U), harmonics
Communication RS485/modbus via optional auxiliaries

NCM-20 digital capacitance meters

Product features

Capacitance meter NCM-20 is designed to measure capacitor units in a capacitor bank without removing any connecting wire between capacitor units. This measurement is used to locate capacitor units with blown fuses.

NCM-20 has 3 capacitance ranges and a 3 ½-digit display. Thus it is possible to achieve a 0.05% resolution between 1 and 2000 µF.

NCM-20 has two voltage clips by which the test current is supplied to the bank. The voltage output is short-circuit proof.

The current in each capacitor unit is measured with a current clamp. The capacitance of the unit is shown on the digital display in microfarads. Thus the measurement is made very rapidly without any manual balancing procedure.

Applications

- Service and maintenance

Technical data	
Range Display	2000 µF (0 to 1999 µF) s µF (0 to 199.9 µF) 20 µF (0 to 19.99 µF)
Loading capacitance	2000 µF max.
Measuring frequency	111.86 Hz
Measuring voltage	1.41 Vrms
Error	±1% of reading ±2% digits
Resolution	0.05% between 1 and 2000 µF
Temperature range	-10 to + 50° C
Dimensions	450 x 350 x 250 mm
Weight	approx. 9.5 kg

Typical Alstom Grid customers

- Power utilities
- Consultant companies
- Service and maintenance companies

Accessories supplied with every meter

- Clamp-on current transformer (100 mm opening)
- Voltage clips with 1 m cable and connector
- 1 carrying strap for display unit
- 1 suspension strap for generator unit
- Instruction manual
- Battery charger 230VAC/18VDC 50/60 Hz

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