QUALITYENERGY

Product Guide

Reactive Power Solutions for Your Business

Power Factor Correction

About Quality Energy

Quality Energy is an Australian power quality and energy efficiency solutions manufacturer. Founded in 1989, the company was one of the first local companies to offer specialised power quality solutions to electricity-dependent operators in Australia and abroad.

Quality Energy solves the problem of ever-increasing energy costs and inconsistent, unreliable power supply.

Today, Quality Energy is the industry leader in energy solutions with a team of highly specialised electrical engineers and industrial electricians, complete with our own equipment manufacturing hub in Victoria.

Our dedication to delivering high-quality electrical equipment and excellent customer service have made us a market leader in the field, trusted by some of Australia's biggest companies.

Our Clients

VISY FOR A BETTER WORLD

The University of Melbourne

The Royal Melbourne Hospital

Northland HOME TO THE NEW NORTH

Murray Goulburn

The Glen

AMP

Rialto

Qantas

Crown

Arts Centre Melbourne

Goodyear

Accreditations and Awards

New Energy Tech Approved Seller

neca MEMBER Since 2023 national electrical and communications association

Gold Coast Business Excellence Awards

Power Factor Correction

What is Power Factor?

Power Factor is a measure of how efficiently the equipment on your site is using electricity.

Running motors, machinery, and other equipment uses a lot of power. The electricity needed to keep things running is called active power or real power. This is measured in kilowatts (kW) on your electricity bill.

However, anything with an electric motor or transformer needs additional power to maintain the magnetic field that starts them up and keeps them running. Examples include most types of industrial machinery, refrigeration units, air conditioning units and fluorescent lights.

This power is referred to as reactive power because although it keeps equipment running, it isn't actually doing the work. Much of it is considered wasted energy.

The combination of active and reactive power is called total power and is measured in kVA.

Reactive power puts additional demand on the electricity network and inflates your power charges.

Power Factor is the ratio of real power to total power, expressed as a numerical value between 0 and 1. If your power factor is 0.7, you're using - and being charged for - 30% more power than you should be. The closer your power factor is to 1, the more efficiently the business consumes electricity.

Reactive Power kVAr

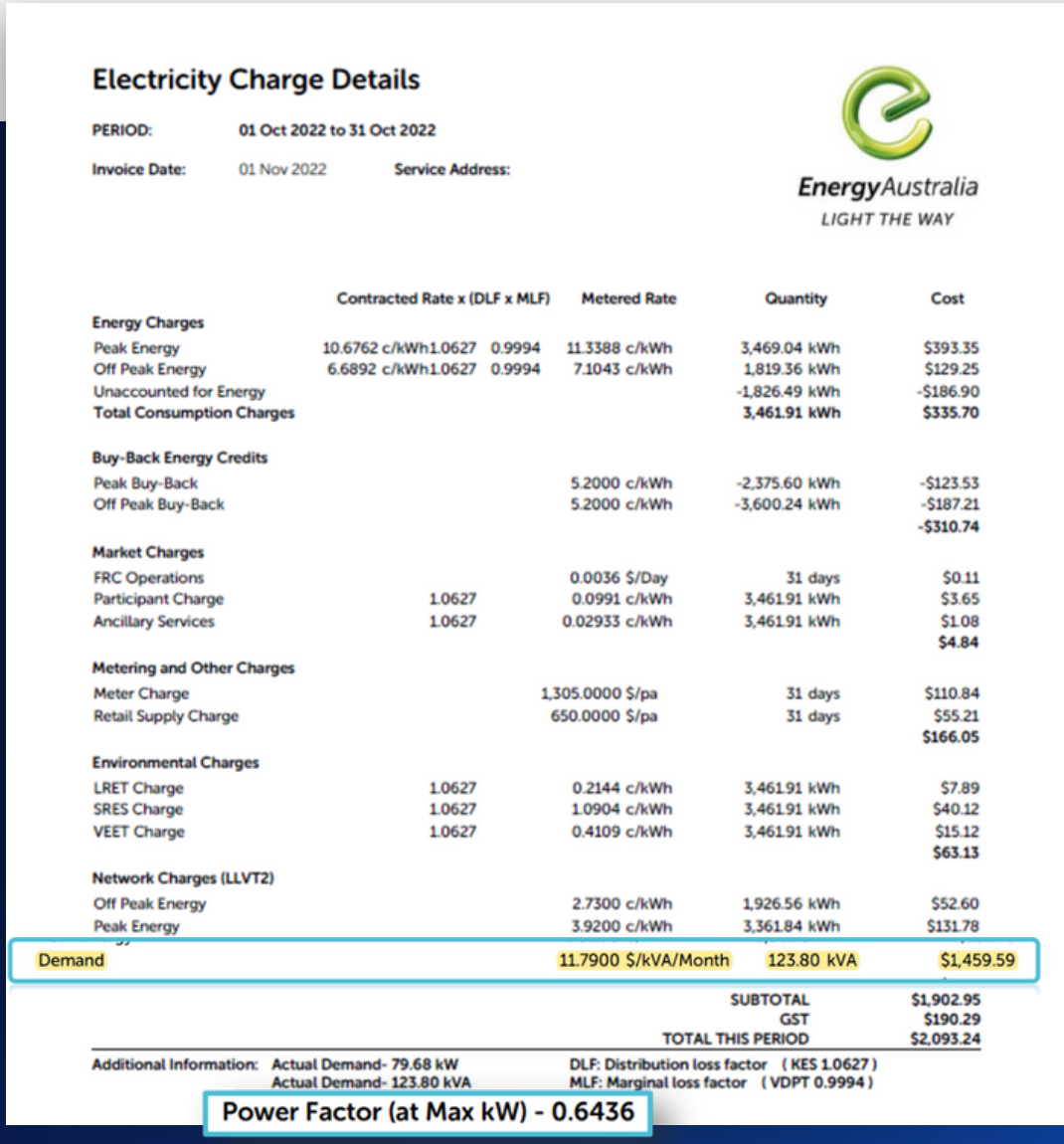
Active Power kW

Apparent Power kVA

Imagine you've got a loaded wheelbarrow to move across the room. You can only start pushing it once you've lifted it off the ground and onto its front wheel. This energy you use to hold the wheelbarrow off the ground doesn't help to move it forward, but you can't do without it. The active or real power in this analogy is the energy used to push the wheelbarrow, while the energy needed to hold it off the ground is the reactive power.

Why You Should Worry About Power Factor?

Drawing more electricity current than necessary, which is indicated by a low power factor, can result in higher costs for your electricity supplier due to energy wastage and increased investment in wires and equipment. The Australian Energy Regulator permits electricity suppliers to penalise businesses for this extra demand on the electricity grid. If your most recent power bill has a charge for kVA (kilo-volt-ampere), it is likely that your Power Factor is inflating your bill.



Electricity Charge Details

PERIOD: 01 Oct 2022 to 31 Oct 2022

Invoice Date: 01 Nov 2022 **Service Address:**

EnergyAustralia
LIGHT THE WAY

	Contracted Rate x (DLF x MLF)		Metered Rate	Quantity	Cost
Energy Charges					
Peak Energy	10.6762 c/kWh	1.0627 0.9994	11.3388 c/kWh	3,469.04 kWh	$393.35
Off Peak Energy	6.6892 c/kWh	1.0627 0.9994	7.1043 c/kWh	1,819.36 kWh	$129.25
Unaccounted for Energy				-1,826.49 kWh	-$186.90
Total Consumption Charges				**3,461.91 kWh**	**$335.70**
Buy-Back Energy Credits					
Peak Buy-Back			5.2000 c/kWh	-2,375.60 kWh	-$123.53
Off Peak Buy-Back			5.2000 c/kWh	-3,600.24 kWh	-$187.21
					-$310.74
Market Charges					
FRC Operations			0.0036 $/Day	31 days	$0.11
Participant Charge		1.0627	0.0991 c/kWh	3,461.91 kWh	$3.65
Ancillary Services		1.0627	0.02933 c/kWh	3,461.91 kWh	$1.08
					$4.84
Metering and Other Charges					
Meter Charge			1,305.0000 $/pa	31 days	$110.84
Retail Supply Charge			650.0000 $/pa	31 days	$55.21
					$166.05
Environmental Charges					
LRET Charge		1.0627	0.2144 c/kWh	3,461.91 kWh	$7.89
SRES Charge		1.0627	1.0904 c/kWh	3,461.91 kWh	$40.12
VEET Charge		1.0627	0.4109 c/kWh	3,461.91 kWh	$15.12
					$63.13
Network Charges (LLVT2)					
Off Peak Energy			2.7300 c/kWh	1,926.56 kWh	$52.60
Peak Energy			3.9200 c/kWh	3,361.84 kWh	$131.78
Demand			11.7900 $/kVA/Month	123.80 kVA	$1,459.59

SUBTOTAL	$1,902.95
GST	$190.29
TOTAL THIS PERIOD	$2,093.24

Additional Information: Actual Demand- 79.68 kW
Actual Demand- 123.80 kVA

DLF: Distribution loss factor (KES 1.0627)
MLF: Marginal loss factor (VDPT 0.9994)

Power Factor (at Max kW) - 0.6436

How to Improve Power Factor?

Power Factor Correction (PFC) is one of the most effective ways to improve energy efficiency long-term, short of installing new and more energy-efficient equipment.

A PFC system consists of capacitor modules and a controller that works as a buffer between your incoming power supply and your main distribution panel. PFC equipment corrects energy supply inefficiencies, reduces the total current and apparent power (kVA) demand on the electricity network and brings the power factor closer to 1 (unity).

Benefits of Quality Energy's Power Factor Correction System

- Reduce electricity bills by reducing the total amount of power used
- Minimise any penalties from electricity suppliers for low power factor
- Reduce carbon emissions
- Reduce the wear and tear on motors, reduce maintenance costs and extend machinery lifetime
- Provide better protection against voltage spikes and power surge
- Reduce your site's electricity demand and allow you to install more equipment without expensive power upgrades.

What Types of Businesses and Industries Can Benefit From PFC?

- Factories and workshops running heavy load appliances
- Offices with many transformer-based appliances
- Restaurants and entertainment venues
- Sporting venues
- High-rise buildings
- Shopping centres and retail outlets
- Universities and schools
- Mining sites and oil rigs

Quality Energy Power Factor Correction Systems

World-Leading Technology Tailored to Your Needs

At Quality Energy, we know that one size doesn't fit all. Our revolutionary power factor correction systems are custom-built to meet the needs of each client. Our units are designed and manufactured here in Australia by our electrical engineers and electricians using premium European components.

The first step to get started is undertaking a comprehensive energy audit of your business. Our experienced team will then analyse your power bill and determine what specifications your PFC unit requires.

PFC Custom Range Assembly

Quality Energy's Power Factor Correction Units feature a modular design that makes fully customisable system configurations possible.

QE ECO Range

Simplistic Design for Easy Maintenance

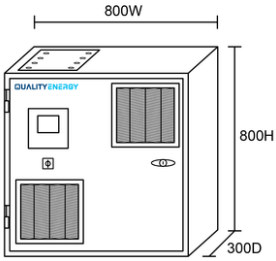
Quality Energy's ECO Range offers our revolutionary customisable power factor correction systems at highly competitive pricing, delivering maximum energy efficiency and cost-savings.

Product Features

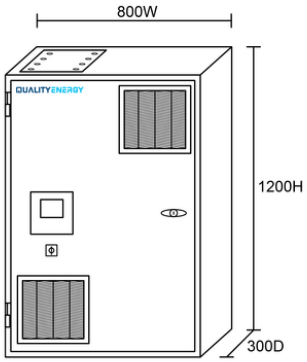
- Wall-mountable or free-standing
- Compact enclosure
- Competitive pricing
- Simplistic design for ease of maintenance
- European components
- IP30 protection
- Top and bottom entry options
- Choice of incomer: direct connect, isolator switch or circuit breaker
- Variety of colours to choose from
- Exhaust fan to remove heat
- 6 watts of losses per 1kVAr (50kVAr module)

Optional Features

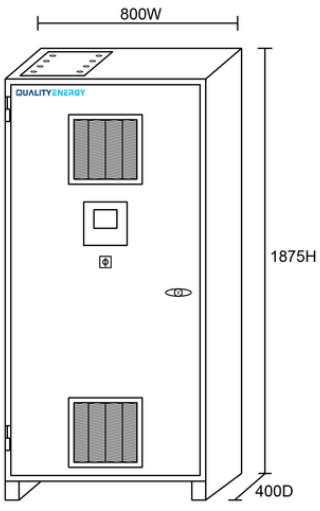
- Stainless steel enclosure
- IP54 and IP56 options
- Circuit breaker or isolator handle on door
- Communication port



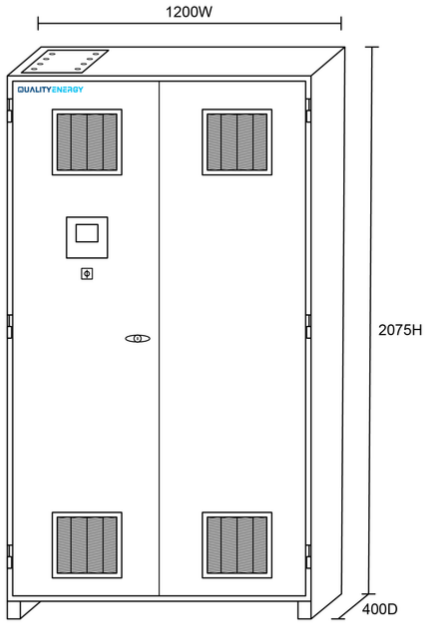
ECO-8080 (Wall Mount)
Up to 2 Stages/50 kVAr



ECO-1280 (Wall Mount)
Up to 3 Stages/75 kVAr



ECO-1880 (Free Standing)
Up to 4 Stages/200 kVAr



ECO-2012 (Free Standing)
Up to 8 Stages/400 kVAr

QE MODU Range

Segregated and Modular Design

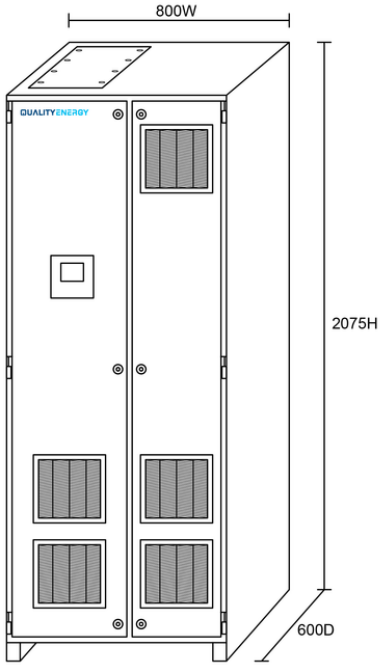
Quality Energy's MODU Power Factor Correction System is a premium solution with a fully modular design, allowing for various configurations. The system design offers options for cable entry, incomer type, and colour selection. Functional trays allow for selectable correction granularity, making servicing easy.

Product Features

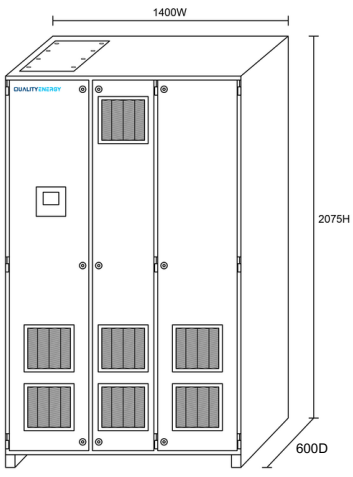
- IP30 protection
- Reactors segregated from capacitors
- Top and bottom entry options
- Choice of incomer: direct connect, isolator switch or circuit breaker
- Variety of colours to choose from
- Large exhaust fan to remove heat
- 6 watts of losses per 1kVAr (50kVAr module)

Optional Features

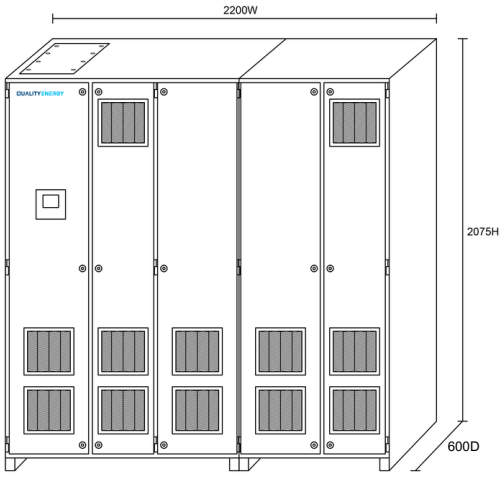
- Panel mount air-conditioner
- Stainless steel enclosure
- IP54 and IP56 options
- Circuit breaker or isolator handle on door
- Communication port



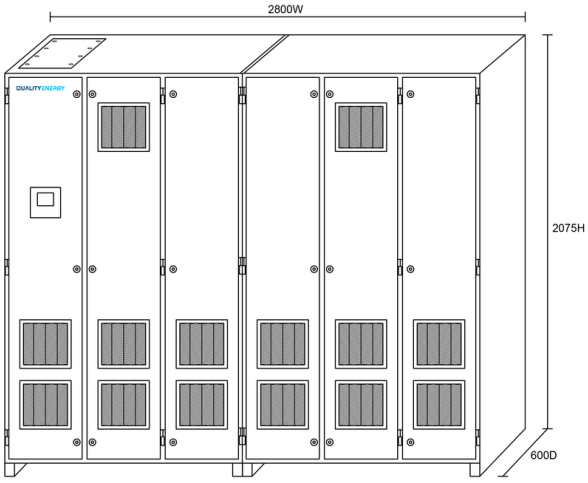
MODU-2080 (Free Standing)
Up to 5 Stages/250 kVAr



MODU-2014 (Free Standing)
Up to 11 Stages/550 kVAr



MODU-2022 (Free Standing)
Up to 16 Stages/800 kVAr



MODU-2028 (Free Standing)
Up to 20 Stages/1000 kVAr

PFC Component Specifications

Quality Energy's Power Factor Correction systems are engineered with premium-grade European components that have a proven track record of delivering superior results and reliability over time.

Power Factor Controller **CX Plus**

The CX Plus Controller is a power factor control regulator designed to compensate, analyse and protect the installation. It features best fit algorithm to protect the capacitors thoroughly via regular distribution of switching cyles and operating hours.

Application

- Controls capacitive or inductive by controlling contactors or thyristors switches
- Capacitors can be switched or choke coils
- Measuring method: True RMS
- Determination of the cos related to the
- fundamental wave
- 1 phase voltage connection
- Voltage range: 90-550V AC, 45-65Hz

Compliance and Listing	CE, c NRTL us (c UL us), EAC	
Connections	Type	Screw terminals, pluggable
	Cross section	Max. 4mm
Housing	Front	Plastic housing (UL94 V-0)
	Back	Metal cover
Protection Class	Front	IP41
	Back	IP20
Weight	Approx. 0.6kg	
Dimensions	Device	H x B x T: 144 x 144 x 58mm
	Cut-out	H x B: 138 (+0,5) x 138 (+0,5)mm

Technical Specifications			
Voltage measurement/ supply	Connection		Single phase
	Range		90 - 550 V AC, 45 - 65Hz
	Protection		Max. 6 VA
	Power consumption		6 VA
	Transformer factor		Adjustable 1.0 ... 350.0
Current measurement	Connection		Single phase
	Range		5 mA - 5 A
	Transformer factor		Adjustable 1 ... 9600
Stage outputs	Outputs		6 or 12 stage outputs
	Option -xxR	Type	Relay, normally-open, potential-free
		Supply	Common, max. 10A
		Switching capacity per relay	250 V AC / 5A; 400 V AC / 1A; 48 V DC / 1A; 110 V DC / 0.2A
	Option -xxT	Type	Transistor, normally-open, open collector output
		Supply	Max. 1,2A
		Switching capacity per transistor	100 mA / 8 - 48 V DC
Alarm output	Default	Type	Relay, normally-closed, potential-free
		Switching capacity	5 A/ 250 V AC
	Option—nc	Type	Relay, normally-closed, potential-free
		Switching capacity	5 A/ 250 V AC
Temperature measurement	Type		NTC under the housing cover
	Accuracy		±5°C
Fan output	Type		Relay, normally-open, potential-free
	Switching capacity		250 V AC / 5A; 400V AC / 1A; 48 V DC / 1A; 110 V DC / 0.2 A
Digital input	Logic		Adjustable, high or low active
	Input signal		90 - 250 V AC
Service interface	For service purpose only		
Modbus Alarms	Default		Unassembled
	Option-MB	Protocol	Modbus-RTU
		Interface	RS485
		Common-mode range	-7-12 V
		Differential-mode range	-12-12V
		Output current	-60 -60mA
Ambient Temperature	Operating		Operating -20 °C - 70 °C
	Storing		Storing -40 °C - 85 °C
Humidity	Range		0 - 95%
	Condensation		Not allowed
Overvoltage Category	300 VLN / 519 VLL -> CATIII ; 519 V-500V -> CATII ; Degree of contamination -> 2		
Standards	IEC 61010-1, IEC 61000 6-2, IEC 61000 6-4: Level B, IEC 61326-1, UL 61010		

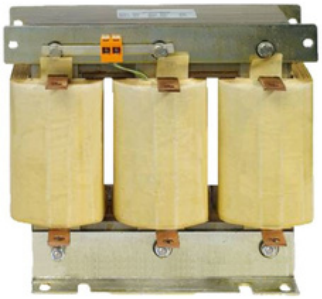
Tubular Capacitor **Iskra KNK-3053 Series**

The Iskra KNK-3053 Series is a heavy duty, 3-phase, dry capacitor that is suitable for a wide range of power and voltage ratings at 50Hz, making them ideal for extreme working conditions.

Features
- Dry type
- Low losses
- Self healing
- Over pressure disconnector
- Screw terminal
- Discharge resistors as standard
- Environmentally friendly

Technical Specifications	
Standard	IEC 60831-1/2
Certificate	UL 810 10.000AFC
Connection	Delta
Rated reactive power (Qn)	25 kVAr
Rated voltage (Un)	525 V
Rated frequency (fn)	50 Hz
Rated capacitance (Cn)	3 x 96,2 uF
Capacitance tolerance	-5/10 %
Rated current (In)	3 x 27,5 A
Dielectric losses	≤ 0.2 W/kVAr
Total losses	≤ 0.5 W/kVAr
Temperature category	- 40/D
Max. humidity	95%
Cooling	Forced ventilation or naturally air cooled
Max. overvoltage	• 1.1 x Un (8h/day) • 1.15 x Un (30min/day) • 1.2 x Un (5min - 200 times per lifetime) • 1.3 x Un (1min - 200 times per lifetime)
Max. overcurrent	1,5 x In (Normal duty) (including combined effects of overvoltages, harmonics and capacitance tolerance)
Inrush current	200 x In
Expected life time	> 120.000 h (Normal Duty)
Discharge resistor	to 75V < 3min
Altitude	Up to 4000 m
Insulation level	4/8 kV
Routine Tests	
Terminal to terminal	2.15 x Un, 2 s
Terminal to case	4kV, 2 s
Sealing test	N/A
Mechanical Parameters	
Diameter (D)	116mm
Height (H)	210mm
Terminals per phase / terminal height (TH) / Max. torque / Max. current	2 x 16 mm² / 30 mm / 2 Nm / 35 A for D=75 mm 2 x 25mm² / 35mm / 3Nm / 65 A for D≥75mm
Mounting and grounding / max. torque	Threaded M12 bolt / 10Nm
Mounting position	Vertical with terminal pointing upwards or horizontal
Protection	IP20
Clearance distance	> 16mm
Creepage distance	> 16mm
Safety device	Overpressure disconnector (all phases)
Weight	≈ 2,5 kg
Material Parameters	
Dielectric	Self healing metallized polypropylene film
Filling	Dry (filled with PCB polyurethane resin)
Case	Aluminium

Reactors
Mangoldt



Three-phase, iron core filter reactor with air gaps, PolyGap(R) core design.

Complete unit vacuum-overpressure impregnated with varnish acc. to temperature class H and temperature hardened in furnace. Voltages distortion based on UN: u1=106%, u3=0.5%, u5=5%, u7=5%

Application
Filter reactors protect reactive power compensation equipment from overload caused by excessive harmonic levels in medium and low voltage distribution systems.

Technical Specifications				
		12.5kVAr	**25kVAr**	**50kVAr**
Technical Data	No. of phases	3		
	Rated voltage	400Un/V		
	Rated frequency	50fn/Hz		
	Capacitor (star connection)	231Cy/µF	463Cy/µF	925Cy/µF
	Reactance factor	7p/%		
	Resonance frequency	188.98fr/Hz		
	Rated inductivity	3 x 3.067Ln/mH	3 x 1.533Ln/mH	3 x 0.767Ln/mH
	Negative tolerance	-2%		
	Positive tolerance	+3%		
	RMS current	20.1 Irms/A	40.2 Irms/A	80.3 Irms/A
	Limit of linearity	33Ilin/A	67Ilin/A	134Ilin/A
	Mass/kg	15m/kg	18m/kg	28m/kg
Operating Conditions	Protection class	IP00, Indoor operation		
	Operation mode	Continuous Mode		
	Duty cycle	100%		
	Maximum elevation	1,000 masl		
	Type of cooling (AN)	Natural convection		
	Isolation class	T40/H		
	Minimum ambient temperature	5 Tamin/ °C no condensing, no ice		
	Maximum ambient temperature	40 Tamax/ °C		
	Allowed temperature rise	125dT/K utilised acc. to isolation Class H		
	Temperature sensor	No		
	Temperature sensor middle coil	Prepared		
Standards	IEC standards	IEC/EN60076-6, VDE0532-76-7		
	UL approvals	-		
	Separate source voltage	2 UAC/kV (1 min)		
Mechanical Characteristics	Winding natural Cu/Al	Al		
	Terminal 1	Cu bar 20 x 3mm²/9mm		
	Terminal 2	Cu bar 20 x 3mm²/9mm		

Capacitor Duty Contactors
Iskra KCK

Switching of capacitors in systems for compensation of reactive energy (classic automation devices).

Features:

- In conformity with IEC 60947-1, IEC 60947-4-1
- Switching of three-phase capacitors
- Standard control voltage: 24 V AC, 48 V AC, 110 V AC, 230 V AC 400 V AC
- Maximum permissible peak current I < 200 I_e for contactors without resistors
- Maximum permissible peak current I < 100 I_e
- Ambient temperature of 55°C
- Up to 2 extended auxiliary contacts (0NO + 1NC or 1NO + 1NC)
- Installation on DIN rail and mounting plate

Technical Specifications

	Rating at 50/60Hz	Current Carrying Capacity				Rated Current	Insulation Rating	Ambient Temperature	Rated Impulse Withstand	Electrical Endurance (min.)	Frequency of Switching Operations
		230V	400-440V	500-550V	660-690V	400V					
KCK20	20 kVar	11 kVar	20 kVar	24 kVar	30 kVar	29 A	690 A	-25 to +55 °C	8 kV	175.000	120 s/h
KCK25E*	25 kVar	14 kVar	25 kVar	30 kVar	35 kVar	36 A	690 A	-25 to +55 °C	8 kV	125.000	120 s/h
KCK25	25 kVar	14 kVar	25 kVar	30 kVar	35 kVar	36 A	690 A	-25 to +55 °C	8 kV	125.000	120 s/h
KCK33	33 kVar	20 kVar	33 kVar	35 kVar	40 kVar	44 A	690 A	-25 to +55 °C	8 kV	125.000	120 s/h
KCK40	40 kVar	25 kVar	40 kVar	50 kVar	58 kVar	58 A	1000 A	-25 to +55 °C	8 kV	125.000	100 s/h
KCK50	50 kVar	29 kVar	50 kVar	60 kVar	70 kVar	72 A	1000 A	-25 to +55 °C	8 kV	125.000	100 s/h
KCK60	60 kVar	32 kVar	60 kVar	70 kVar	80 kVar	87 A	1000 A	-25 to +55 °C	8 kV	125.000	100 s/h

*Integrated auxiliary contact 1NO or 1NC; without terminal blocks

	Size of connecting conductors (Main circuit - multi-wire connection)	Terminal screw (main circuit)	Screw head (main circuit)	Tightening torque (main circuit)	Size of connecting conductors (auxiliary circuit - multi-wire connection)	Size of connecting conductors (auxiliary circuit-with cable screw)	Terminal screw (auxiliary circuit)	Screw head (auxiliary circuit)	Tightening torque (auxiliary circuit)	Coil (voltage tolerance)	Degree of protection
KCK20	2.5 - 10 mm^2	M4	PZ2	1.6 Nm	1 - 2.5 mm^2	0.75 - 1.5 mm^2	M3.5	PZ2	0.8 Nm	0.85-1.1xU_n	IP20
KCK25E*	2.5 - 10 mm^2	M4	PZ2	1.4 Nm							
KCK25	6 - 25 mm^2	M5	Hexagon socket 2.5	2 Nm							
KCK33	6 - 25 mm^2	M5		2 Nm							
KCK40	16 - 35 mm^2	M6	2.5	3 - 4 Nm							
KCK50	16 - 35 mm^2	M6	PZ2	3 - 4 Nm							
KCK60	16 - 35 mm^2	M6	PZ2	3 - 4 Nm							

*Integrated auxiliary contact 1NO or 1NC; without terminal blocks

World-Class Energy Efficiency Solutions Tailored to Your Needs.

Power Quality
- Power Factor Correction
- Active Harmonic Filter
- Power Quality Audit

Renewable Energy
- Commercial Solar
- EV Charger Installations

Service and Maintenance
- Power Factor Correction Servicing
- Active Harmonic Filter Servicing
- Solar Maintenance
- Preventative Maintenance

Explore our full suite of products and solutions at qualityenergy.com.au

30 Years of experience

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