



- Three phase Current Protection with VATOR, Definite time or two individually settable O/C trip function
- The Predictor function (The Blackout Preventer)
- The Pathfinder function eases fault finding
- For use with 1A or 5A current transformers
- Triple relay operation gives more flexibility
- Up to two individually very fast analogue output signals (<50mS), (optional)
- DIN96 Slave Indicator with full current scale (optional)

## Specifications

Auxiliary Voltage:	100-120V, 200-240V, 380-415V, 440-460V, 480VAC, 40-70Hz (Fuse 0,5A)
Optional Auxiliary Voltage:	24-60VDC (Fuse 0,5A) 110-220VDC (Fuse 1A)
Supply tolerance:	+10%, -20%
Power rating:	5VA
Current Input:	1A CT or 5A CT, <0,1VA
Contact rating:	AC: 100VA -250V/2A max. DC: 50W -100V/1A max.
Adjustments:	Depending on the selected model (see page 2 & 3)
Ampere range:	Any % of the CT value
Analogue output 1:	mA: Up to 20mA, max 500R V: Up to 10V, min 100kohm (other on request)
Analogue output 2:	mA: Up to 20mA, max 500R V: Up to 10V, min 5kohm or optional 500ohm (other on request)
(see page 4 for available outputs)	
Accuracy:	Class 0,5
Temperature:	-20 to +70°C
Humidity, relative:	0-95%
Weight:	0,6kgs
Front protection:	IP21
Flammability:	UL94-V0

The unit meets EN 60255-27 Cat. III, Pollution degree 2 and the relevant environmental and EMC tests specified in EN 60255-26 to comply with the requirements of the major Classification Societies.

Related information:  
The KCC115x and KCC116x series are also available for panel mounting as KEC115x and KEC116x series.

## Description

The digitally controlled true RMS measurement on the KCC115x & KCC116x provides precision (1,0%) three phase current protection for AC generators, motors, transformers etc. for alarms or tripping of a non-essential load or breaker.

User settable trip levels and delays. Colour of LEDs indicate alarm status. Alarm LEDs flash during count-down.

See page 3 for models with 2 x O/C

LED status			LED status		
Power	O/C	S/C	Power / O/C1	O/C2	S/C
Normal	Alarm	Alarm	Normal / Alarm	Alarm	Alarm

Up to two individual very fast analogue output signals (optional) proportional to highest up current (see pages 2 and 3 for models with outputs). This may be used as an input to a control system, to detect abnormal current conditions (loss of excitation etc). The analogue output is isolated from the CT and auxiliary power.

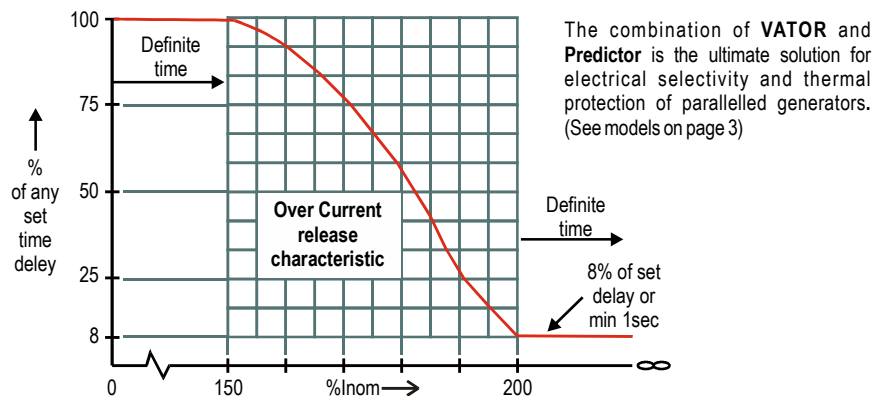
### Predictor

The main feature of the Predictor function is to open bus-tie breakers or trip heavy loads to prevent a total blackout situation. The predictor relay(s) trips at set over current (O/C) or short circuit current (S/C) level, prior to the generator breaker trip. If the overload condition is still present after this load reduction the generator breaker will trip 1sec or 200mS later relative to set O/C or S/C time delays.

### VATOR (Variable Time Overcurrent Release function)

Versions with VATOR function have definite trip time up to 150% generator over current load. Between 150-200% the trip time will be reduced dynamically based on a calculated curve to maintain thermal capability protection and selective protection between paralleled generators.

Refer to the VATOR calculation excel sheet for further details of the time release curve.



Release characteristic combining definite time and dynamic response to maintain thermal capability protection and selective protection between paralleled generators.

## Pathfinder

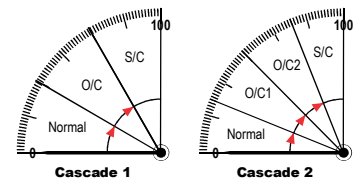
The Pathfinder indicates the phase causing an over current or short circuit trip by the flashing pattern of the relevant LED. When either short circuit or over current trips have operated the relevant LED will flash in the following pattern to indicate the phase producing the trip.



## Relay Configurations

The relay operation is delayed in the arrow direction.

Both trip levels can, independently, individually set over the scale range.



## Description

### KCC115E - KCC116EA - KCC116EB

#### Short Circuit and Over Current VATOR Guard

O/C VATOR and definite time S/C trip delays maintain discrimination between paralleled generators. The fail-safe relay R3 (O/C & S/C) should be used to open the generator breaker. R1 (O/C) and R2 (S/C) can be used for local indication, alarm system or PM-System etc. All relays latch after trip.

### KCC115E2 - KCC116E2A - KCC116E2B

#### Short Circuit and Over Current VATOR Guard

O/C VATOR and definite time S/C trip delays. R2 (O/C) and the fail-safe relay R1 (S/C) should be used to open the generator breaker. The common alarm relay R3 (S/C & O/C) can be used for local indication, alarm system or PM-System etc. All relays latch after trip.

### KCC115F - KCC116FA - KCC116FB

#### Short Circuit and Over Current Guard

Replaces the classic KCC115. Definite time O/C and S/C trip delays. Fail-safe S/C relay. All relays latch after trip. Either R1 (O/C) and R2 (S/C) can be used to trip generator breaker with R3 as a common alarm or R3 can trip the generator breaker with R1/R2 used for local indication, PMS or alarm system input etc.

### KCC115F2 - KCC116F2A - KCC116F2B

#### Short Circuit and Over Current Guard

Definite time O/C and S/C trip delays. Either R1 (O/C) and R2 (S/C) can be used to trip generator breaker with R3 as a common alarm or R3 can trip the generator breaker with R1/R2 used for local indication, PMS or alarm system input etc. NON fail- safe latching relays. Since all relays are NON fail-safe this version is only suitable as a replacement for older installations.

### KCC115G - KCC116GA - KCC116GB

#### Short Circuit and Over Current Guard

For marine emergency/harbour generator sets. Definite time O/C and S/C trip delays. Non-latching O/C trip relay (R1) and non-failsafe S/C trip relay (R2). If an engine is set as an emergency generator only R2 (S/C) shall be used to open the generator breaker as per the requirements of classification societies. In harbour operation both relay R1 and R2 shall open the breaker. R3 operates on both S/C and O/C and can be used for alarm system input etc.

## Relay Operation

(FLC = Full Load Current)

### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X				X			X	
R2			X		X		X		
R3	X		X	X	X		X	X	

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115E	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116EA	X	-		O/C2:	N/A	N/A
KCC116EB	X	X		S/C:	150-300% of FLC	0,1-1secs

### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1			X	X	X		X		
R2	X				X			X	
R3	X		X		X		X	X	

Models	Output 1	Output 2	Relays shown de-energised. R1 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115E2	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116E2A	X	-		O/C2:	N/A	N/A
KCC116E2B	X	X		S/C:	150-300% of FLC	0,1-1secs

### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X				X	X			
R2			X	X	X		X		
R3	X		X	X	X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R2 & R3 are fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115F	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116FA	X	-		O/C2:	N/A	N/A
KCC116FB	X	X		S/C:	150-300% of FLC	0,1-1secs

### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X				X	X			
R2			X		X		X		
R3	X		X		X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R2 & R3 are fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115F2	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116F2A	X	-		O/C2:	N/A	N/A
KCC116F2B	X	X		S/C:	150-300% of FLC	0,1-1secs

### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X					X			
R2			X		X		X		
R3	X		X	X	X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115G	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116GA	X	-		O/C2:	N/A	N/A
KCC116GB	X	X		S/C:	150-300% of FLC	0,1-1secs

Hysteresis (R1) Fixed 3%

The MEGAICON policy is one of continuous improvement, consequently equipment supplied may vary in detail from this publication.

Depending on application, select the model that matches the electrical installation. If none of the listed models fit your purpose please contact Megacon for customer adaptation.



## Description

## Relay Operation

(FLC = Full Load Current)

### KCC115H - KCC116HA - KCC116HB

#### Short Circuit and 2-level Over Current Predictor Guard

2-level O/C settings. Definite time O/C and S/C trip delays. Instead of the VATOR function the H-versions have 2 over current set trip levels to reduce trip time in high over load situations. "Predictor" early action on relays R1 and R2, both relays will trip after full set O/C or S/C time. R3 is delayed and will trip after full set O/C time + 1sec or S/C time + 200mS. R3 is used to open the generator breaker. R1 or R2 are used for bus-tie breaker opening or for preference load tripping.

#### Relays: Cascade 2

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X	X	X			X	X		X
R2	X	X	X		X	X	X		X
R3	X	X	X	X	X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115H	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116HA	X	-		O/C2:	50-250% of FLC	0-120secs
KCC116HB	X	X		S/C:	150-300% of FLC	0,1-1secs
				Hysteresis (R1) Fixed 3%		

### KCC115H4 - KCC116H4A - KCC116H4B

#### Short Circuit and 2-level Over Current Guard

2-level O/C settings. Definite time O/C and S/C trip delays. Instead of the VATOR function the H-versions have two over current set trip levels to reduce trip time in high over load situations. All relays will trip after full set time. Individual alarm relay outputs give flexibility for a variety of applications.

#### Relays: Cascade 2

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X				X	X			
R2		X			X	X			
R3			X	X	X		X		

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115H4	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116H4A	X	-		O/C2:	50-250% of FLC	0-120secs
KCC116H4B	X	X		S/C:	150-300% of FLC	0,1-1secs

### KCC115H5 - KCC116H5A - KCC116H5B

#### Short Circuit and 2-level Over Current Guard

2-level O/C settings. Definite time O/C trip delays. "Predictor" early action on R1 and R2, both relays will trip after full set O/C or S/C time. R3 is delayed and will trip after full set O/C time + 1sec or S/C time + 200mS. R3 is used to open the breaker. R1 and R2 are used for bus-tie breaker opening or for preference load tripping.

#### Relays: Cascade 2

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X	X	X			X	X		X
R2	X	X	X		X	X	X		X
R3	X	X	X	X	X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115H5	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116H5A	X	-		O/C2:	50-250% of FLC	0-120secs
KCC116H5B	X	X		S/C:	150-300% of FLC	0,1-1secs
				Hysteresis (R1 & R2) Fixed 3%		

### KCC115P - KCC116PA - KCC116PB

#### Short Circuit, VATOR Over Current and Predictor Guard

The best choice for diesel electric systems to prevent totally black out. VATOR O/C trip delay. Fail safe and latching R3. "Predictor" early action on relays R1 and R2, R1 will trip after full set O/C and R2 after full set S/C time. R3 is delayed and will trip after full set O/C time + 1sec or S/C time + 200mS. R3 is used to open the generator breaker. R1 and/or R2 are used for bus tie breaker opening, preference load tripping, PMS or alarm system input etc.

#### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X							X	X
R2		X						X	X
R3	X		X	X	X		X	X	

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115P	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116PA	X	-		O/C2:	N/A	N/A
KCC116PB	X	X		S/C:	150-300% of FLC	0,1-1secs
				Hysteresis (R1 & R2) Fixed 3%		

### KCC115P2 - KCC116P2A - KCC116P2B

#### Short Circuit and Over Current Predictor Guard

Definite time O/C and S/C trip delays. Fail safe and latching R3. "Predictor" early action on relays R1 and R2, R1 will trip after full set O/C and R2 after full set S/C time. R3 is delayed and will trip after full set O/C time + 1sec or S/C time + 200mS. R3 is used to open the generator breaker. R1 and/or R2 are used for bus tie breaker opening, preference load tripping, PMS or alarm system input etc.

#### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1	X					X			X
R2		X					X		X
R3	X		X	X	X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115P	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116P2A	X	-		O/C2:	N/A	N/A
KCC116P2B	X	X		S/C:	150-300% of FLC	0,1-1secs
				Hysteresis (R1 & R2) Fixed 3%		

### KCC115P3 - KCC116P3A - KCC116P3B

#### Short Circuit and Over Current Predictor Guard (S/C only)

Definite time O/C and S/C trip delays. Fail safe and latching R3. "Predictor" early action on relay R1 and R2, both relays will trip after full set S/C time. R3 is delayed and will trip after full set O/C time + 1sec or S/C time + 200mS. R3 is used to open the generator breaker. R1 and R2 are used for bus tie breaker opening, preference load tripping, PMS or alarm system input etc.

#### Relays: Cascade 1

Relay	O/C 1	O/C 2	S/C	Fail Safe	Latch	Definite Time O/C	Definite Time S/C	VATOR	Predictor
R1			X				X		X
R2	X		X		X	X	X		X
R3	X		X	X	X	X	X		

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
KCC115P	-	-		O/C1:	50-150% of FLC	0-120secs
KCC116P3A	X	-		O/C2:	N/A	N/A
KCC116P3B	X	X		S/C:	150-300% of FLC	0,1-1secs
				Hysteresis (R1) Fixed 3%		

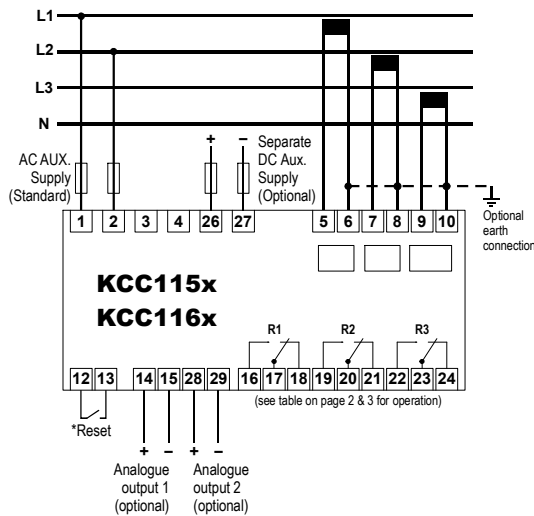
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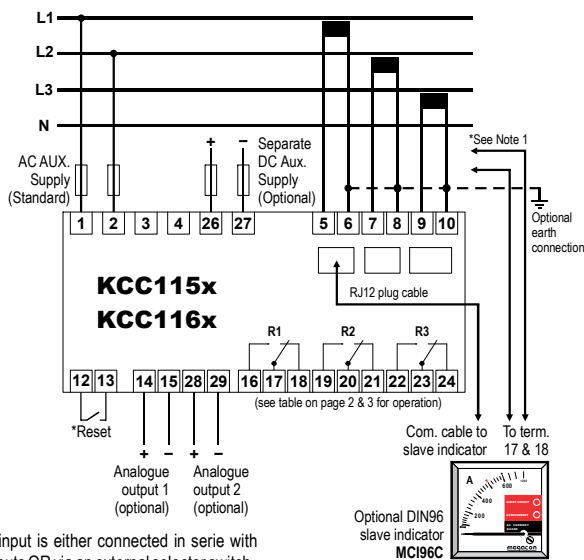


## Connection Diagram

### Connection Diagram without optional slave instrument



### Connection Diagram with optional slave instrument



**\*Note 1**  
Slave Ammeter input is either connected in serie with one of the C.T. inputs OR via an external selector switch.

**\*Reset**  
Any latched relay is reset by linking terminals 12 and 13 or by interrupting the auxiliary voltage supply.

## Analogue Output

The output signals are proportional to the meter reading (see page 2 & 3 for an overview of models and functions).

The signal is specifically intended as an input to a control system for monitoring or control.

Add suffix from table below to type designation to specify output required:

### Outputs 1

O/P1	0 - 10mA
O/P2	0 - 20mA
O/P3	4 - 20mA
O/P4	N/A
O/P5	N/A
O/P6	N/A
O/P7	N/A
O/P8	0 - 10V
O/P9	0,2 - 10V
O/P10	4,3 - 20mA

### Outputs 2

O/P11	0 - 10mA
O/P12	0 - 20mA
O/P13	4 - 20mA
O/P14	N/A
O/P15	N/A
O/P16	N/A
O/P17	N/A
O/P18	0 - 10V
O/P19	0,2 - 10V
O/P20	4,3 - 20mA

## Relay Contacts

Burden on supply	: 170mW per relay
Switching voltage (Max)	: 400V AC, 300V DC
Switching voltage (Rated)	: 250V AC, 30V DC
Max I continuous	: 6A RMS, 6A DC
Max breaking capacity	: 1500VA AC, 18-120W DC
Dielectric strength across Open contacts	: 1000V RMS

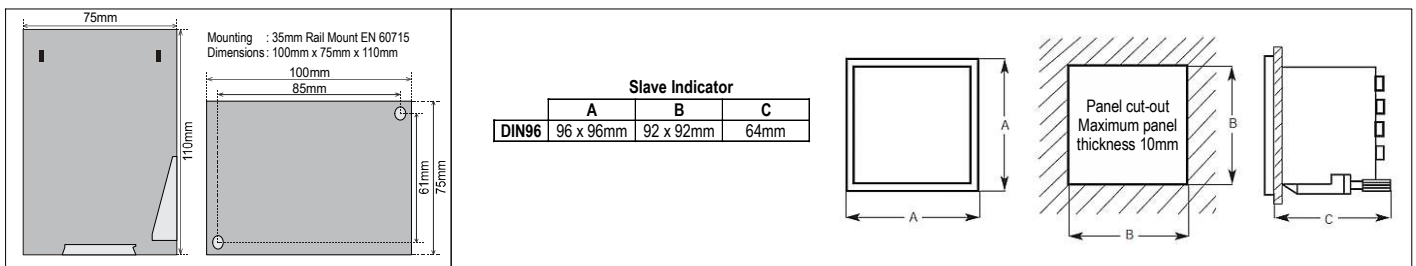
## Connection

Terminal type	: Terminal Clamp and Screw
Wire max.	: T1-T4, T26-T27: AWG 24-14, T5-T10: AWG 12, other terminals: AWG 24-12
Screw Torque	: 0.5Nm

## Overload

Voltage	: 1.2 x Un continuous 2 x Un for 10secs
Current	: 2.5 x In continuous 5 x In for 1secs (max 25A)

## Dimensions



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### ORDERING INFORMATION (Example)

Type	: KCC116FB
Aux. Supply	: 200-240VAC
Input Current C.T.	: 1500/5A
Range	: 0-1,5/3kA
Red mark	: 1250A
Analogue output 1	: O/P3: 4-20mA
Analogue output 2	: O/P18: 0-10VDC

Optional Separate Aux. Supply:  
Add **-SD** for models with  
Separate DC Aux. Supply.  
(Example: KCC116FB-SD)

