AC GENERATOR SHORT CIRCUIT AND OVER CURRENT GUARD KEC115x/116x

- **Three phase Current Protection with VATOR, Definite time or Two level O/C trip function**
- **"PREDICTOR" function, The Blackout Preventer**
- **"Pathfinder" function eases fault finding**
- **Independent ammeter with Full Load Current (FLC) mark on scale**
- **Triple relay operation gives more flexibility**
- **Built-in fast analogue Amp transducer (Optional)**

Specifications

Auxiliary Voltage:	100-120V, 200-240V, 380-415V, 440-460 or 480VAC 40-70Hz (Fuse 0,5A)
Optional Auxiliary Voltage:	24, 48 or 110VDC (Fuse 2A)
Supply tolerance:	± 10%
Power rating:	2VA
Current Input:	1A CT or 5A CT, <0,1VA
Current burden:	CT I/P : <0,4VA Meter I/P : 0,5VA
Contact rating:	
AC:	100VA -250V/2A max.
DC:	50W -100V/1A max.
Adjustments:	
Trip level O/C1:	50-150% of FLC
Trip time O/C1:	0-120 Sec
Trip level O/C2:	50-250% of FLC
Trip time O/C2:	0-120 Sec
Trip level S/C:	150-300% of FLC
Trip time S/C:	0,1-1 Sec
Hysteresis:	Fixed 3%
(O/C2 is only for H-versions)	(FLC = Full Load Current)
Analogue outputs:	Up to 20mA, max 500R Up to 10V, min 100kohm (other on request)
KEC116x (Amp transducer)	Ampere range: Any % of the CT value.
Temperature:	-20 to +70ºC
Weight:	0.64kgs
Front protection:	IP52 (IP65 optional)

The unit meets EN 61010-1 Cat. III, Pollution degree 2 and the relevant environmental and EMC tests specified in EN 61326-2-4 to comply with the requirements of the major Classification Societies.

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

Application

The digitally controlled true RMS measurement on the KEC115x 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. It can also be supplied with a built-in current transducer (KEC116x).

The independent class 1,5 moving iron ammeter input (term. 26 & 27) **MUST** be externally connected or switched to read individual phase currents..

User settable trip levels and delays. LEDs flash during countdown and indicate the alarm status.

KEC115x range is the standard range with relay outputs for overcurrent and short circuit current trip. The highest phase current will activate the OC/SC levels.

KEC116x range also include a fast response (<50mS) built-in current transducer proportional to the HIGHEST phase current signal. This may be used as an input to a control system, to detect abnormal current conditions (loss of excitation etc).

VATOR (VAriable Time Overcurrent Release function)
Versions with VATOR function have definite delay time trip up to 150% generator over current load. Between 150-200% the trip time will be reduced dynamically based on a curve calculated to maintain full thermal capability protection and selective protection between parallelled generators.

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

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.

The combination of VATOR and Predictor is the ultimate solution for electrical selectivity and thermal protection of parallelled generators.

PATHFINDER
The Pathfinder indicates the phase causing an over current or short circuit trip by the flashing pattern of the relevant LED.

KEC115x/116x

Description

KEC115E - KEC116E

Short Circuit and Over Current VATOR Guard

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

KEC115E2 - KEC116E2

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.

KEC115F - KEC116F

Short Circuit and Over Current Guard

Replaces the **classic** KEC115. Definite time O/C and S/C trip delays. Fail-safe S/C relay. All relays latch after trip. Either R1 (S/C) and R2 (O/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.

KEC115F2 - KEC116F2

Short Circuit and Over Current Guard

Definite time O/C and S/C trip delays. Either R1 (S/C) and R2 (O/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.

KEC115G - KEC116G

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 (R2) and non-failsafe S/C trip relay (R1). If an engine is set as an emergency generator only R1 (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

KEC115E - KEC116E

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115E	X	-
KEC116E	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

KEC115E2 - KEC116E2

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115E2	X	-
KEC116E2	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

KEC115F - KEC116F

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115F	X	-
KEC116F	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

KEC115F2 - KEC116F2

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115F2	X	-
KEC116F2	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

KEC115G - KEC116G

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115G	X	-
KEC116G	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs
Hysteresis (R2):	Fixed 3%	

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.

IS range

KEC115x/116x

Description

KEC115H - KEC116H

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.

KEC115H4 - KEC116H4

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.

KEC115H5 - KEC116H5

Short Circuit and 2-level Over Current Predictor 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 is used for bus-tie breaker opening or for preference load tripping.

KEC115P - KEC116P

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, R2 will trip after full set O/C and R1 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.

KEC115P2 - KEC116P2

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, R2 will trip after full set O/C and R1 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.

KEC115P3 - KEC116P3

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.

Relay Operation

KEC115H - KEC116H

Relays: Cascade 2

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

Model	Latch	Analogue output
KEC115H	X	-
KEC116H	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C2:	50-250% of FLC	0-120secs
O/C1:	50-150% of FLC	0-120secs

Hysteresis (R1): Fixed 3%

KEC115H4 - KEC116H4

Relays: Cascade 2

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

Model	Latch	Analogue output
KEC115H4	X	-
KEC116H4	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C2:	50-250% of FLC	0-120secs
O/C1:	50-150% of FLC	0-120secs

KEC115H5 - KEC116H5

Relays: Cascade 2

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

Model	Latch	Analogue output
KEC115H5	X	-
KEC116H5	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C2:	50-250% of FLC	0-120secs
O/C1:	50-150% of FLC	0-120secs

Hysteresis (R1 & R2): Fixed 3%

KEC115P - KEC116P

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115P	X	-
KEC116P	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

Hysteresis (R1 & R2): Fixed 3%

KEC115P2 - KEC116P2

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115P2	X	-
KEC116P2	X	X

Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

Hysteresis (R1 & R2): Fixed 3%

KEC115P3 - KEC116P3

Relays: Cascade 1

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

Model	Latch	Analogue output
KEC115P3	X	-
KEC116P3	X	X

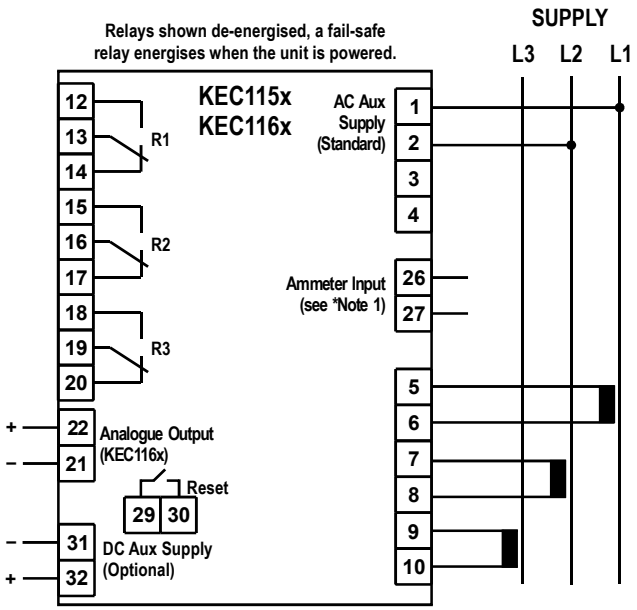
Adjustments	Trip level	Delay
S/C:	150-300% of FLC	0,1-1secs
O/C:	50-150% of FLC	0-120secs

Hysteresis (R1): Fixed 3%

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.

IS range

KEC115x/116x



Analogue Output

The **KEC116x** has an analogue output proportional to the highest up ampere-meter reading.

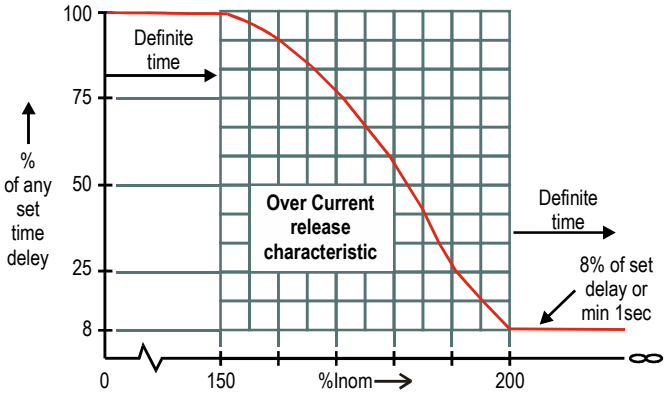
The signal is specifically intended as an input to a control system for monitoring or control. Add suffix from table below to type designation to specify output required:

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

Relay Reset
Any latched relay is reset by linking terminals 29 and 30 or by interrupting the voltage input to terminal 1.

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

VATOR function - Variable Time Over-current Release

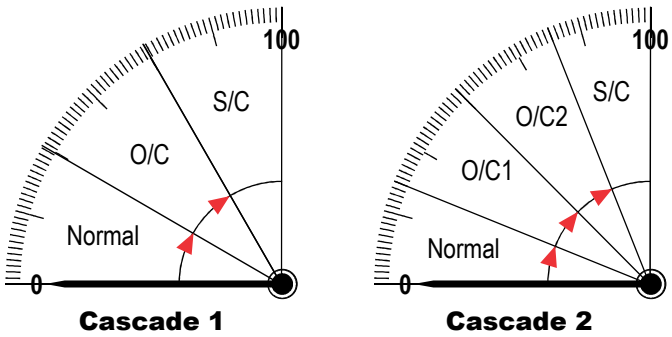


Release characteristic combining definite time and dynamic response to maintain thermal capability protection and selective protection between paralleled generators.

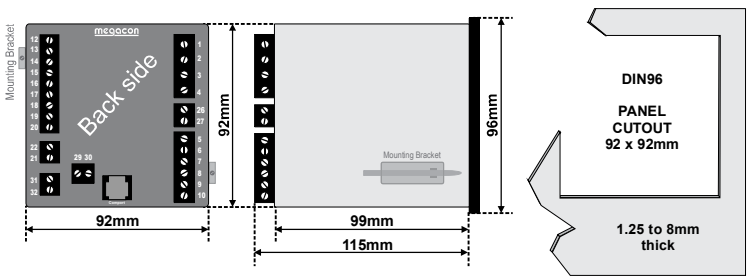
Relay Configurations

The relay operation is delayed in the arrow direction.

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

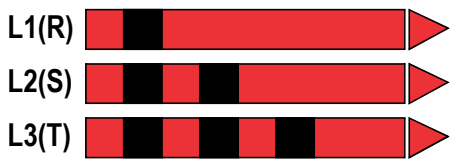


Dimensions



Pathfinder Function

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.



Red indicates LED on

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

ORDERING INFORMATION

Type	: KEC116F
Aux. Supply	: 200-240V
Input Current C.T.	: 1500/5A
Scale	: 0-1,5/3kA
Red mark	: 1250A
Analogue output	: O/P3: 4-20mA = 0-1500A

IS range