



- Low differential check synchronising, sector principle
- Bi-directional synchronising
- Manual and semi-automatic synchroniser
- Integral voltage differential protection
- "Easy view" status presentation
- Generator speed reference (analogue output)
- System status output

## Specifications

Monitored Voltage Input:	100-120, 200-240, 380-415, or 440-460VAC, 40-70Hz (Fuse 0,5A)
Separate Aux. Supply: (Only for KSQ331G2)	AC: 100-120, 200-240, 380-415, or 440-460VAC, 40-70Hz (Fuse 0,5A) DC: 24, 48 or 110-250VDC (Fuse 2A)
Monitored Voltage: (Only for KSQ331G2)	25-500VAC, 40-70Hz
Supply tolerance:	± 10%
Contact Rating:	AC: 100VA - 250V/2A max. DC: 50W - 100V/1A max.
Adjustments:	
Phase angle:	4-30 degrees
Retention time:	100-600mS
High voltage:	2-15% of net voltage
Low voltage:	2-15% of net voltage
Analogue output:	-10/0/+10mADC = -5/0/+5Hz max 400ohm
Optional output:	-3/0/+3VDC (-3/0/+3Hz) min 50kohm
Temperature:	-20 to +70°C
Weight:	0.7kgs
Front protection:	IP52 (IP65 optional)

Unit meets IEC60092-504 and relevant environmental and EMC tests specified in IEC60068/60092 and IEC61000/60533 respectively, to comply with Classification Societies requirements.

Megacon is the inventor of the original, now industry standard "rotating" LED display, and a trendsetter in modern synchronisation control.

## Description

The digitally controlled KSQ331x2 provides both visual presentation of relative speed and phase angle relationship, and output signal necessary to permit check synchronising between two systems.

KSQ331E2 is the standard and it takes the auxiliary voltage from the monitored voltage on terminal 3 & 4. KSQ331G2 have separate auxiliary supply on terminal 19 & 20.

The synchronising relay will close when the incomer (generator, busbar, etc.) voltage and phase angle have been within the limits during the set retention time.

A green lamp (CB close) indicates the close command to the breaker.

There is lamp indication for reference source present (BUS PWR, only when generator is powered) and incomer status (GEN PWR).

A green lamp (VOLT OK) is lit when both voltages are within the set limits.

## Applications

KSQ331x2 can be used both for single and three phase systems. Any two phases (or phase-neutral) can be used for synchronising as long as it is the same two phases on both side of the breaker.

The unit is meant for manual and semi-automatic synchronising only. There is no compensation for the breaker closing time.

For automatic synchronising, the KSQ104x2 "SPOT ON" principle should be used to obtain compensation for breaker closing delay.

User settable limits and retention time on the rear.

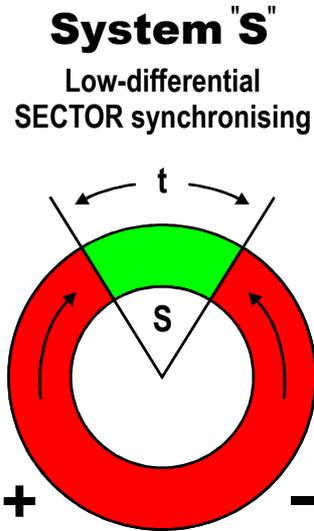
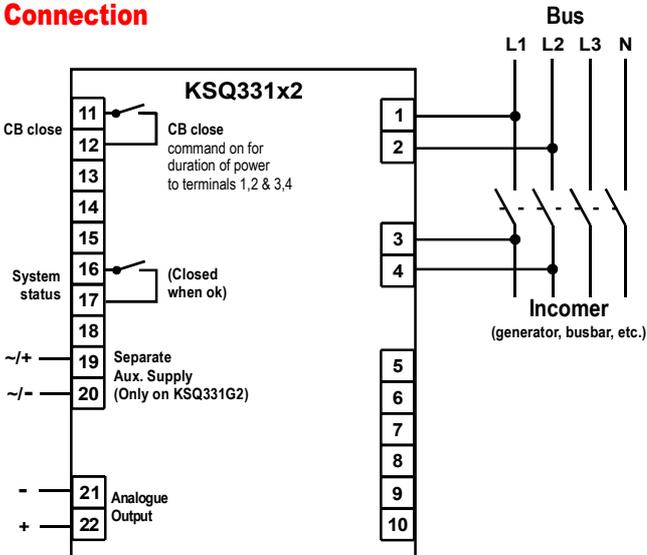
The analogue -10/0/+10mA output signal can be used as speed reference to a generator controller, with polarity and amplitude proportional to frequency difference between the two systems.

## System status:

KSQ331x2 is fitted with a system status relay. As standard the unit is powered from generator side (terminal 3 & 4), when power is ok and unit is working correctly the relay activates. It will release on alarm or when unit is not powered. Separate auxiliary supply is needed for continuously system status.

Normal operation	: Closed contact
Alarm condition/unpowered	: Open contact

## Connection



## Description

**System "S" the sector synchronising principle:**

The KSQ331x2 is a low differential bi-directional check synchronising relay. The synchronising relay closes when the incomer (generator, busbar, etc.) frequency is close enough (diff 0,018- 0,83Hz) to stay within the phase angle sector (S) for the set retention period (t).

Sector synchronisation is the classical alternative for applications which allows synchronisation accuracy and duration of synchronisation process to be interrelated. There is no compensation for the breaker closing time.

Approximate synchronisation accuracy relative to 12 o'clock position (Df) can be calculated by the following formula:

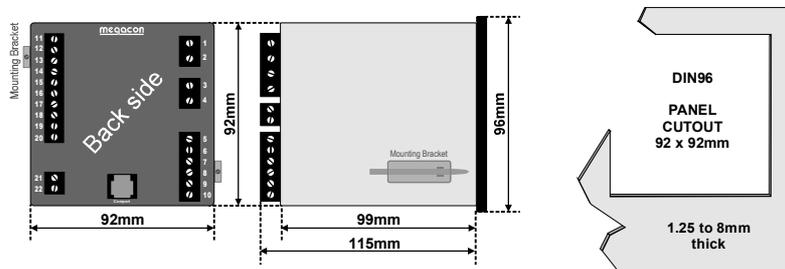
$$Df = (S : 360) / t(\text{secs})$$

**Example: Set phase angle (S) to 10 degrees and retention time (t) to 500mS to obtain an accuracy of Df:**  
 $(10/360) / 0,5 = 0,055\text{Hz}$

If the phase angle limit is set too low and retention time too high for very low differential synchronising, it can be difficult to achieve synchronisation. If there is a continuously fluctuating load between the two systems (for example to synchronise against a shaft generator when a vessel is in rough weather), the KSQ104x2 "SPOT-ON" principle is more suitable.

The "phase angle" setting on the rear of the unit refers to the total phase angle sector (S), centred about 0°. Hence a setting of 10° means the sector spanning from -5° to +5°.

## Dimensions



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

### ORDERING INFORMATION

Product type : KSQ331G2  
 Auxiliary supply : 230VAC  
 Network voltage : 450VAC

