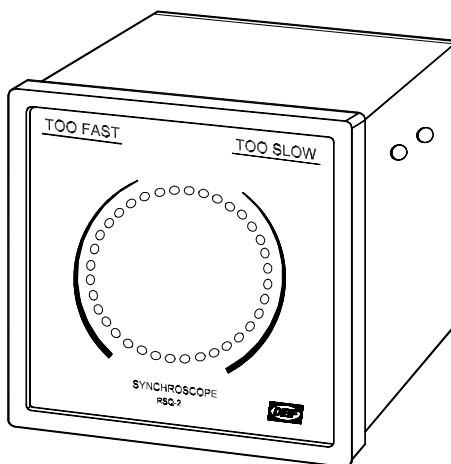


# User's manual



## Read synchroscope type RSQ-2

4189340222E (UK)



- Precision LED synchroscope
- High immunity to harmonic distortion

DEIF A/S



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## **1. Warnings, legal information and notes to CE-marking**

This manual gives general guidelines on how to install and operate the RSQ-2. Installing and operating the RSQ-2 implies work with dangerous currents and voltages. Therefore, this should only be done by qualified personnel. DEIF A/S takes no responsibility for operation or installation. If there is any doubt about how to install or operate the system on which the RSQ-2 is measuring, the company responsible for the installation or the operation must be contacted.

The RSQ-2 is CE-marked with respect to the EMC directive for residential, commercial and light industry plus industrial environment. This covers all environmental types where the RSQ-2 can normally be used.

The RSQ-2 is CE-marked with respect to the low-voltage directive for up to 300V phase to ground voltage, installation category (overvoltage category) III and pollution degree 2. 300V phase to ground voltage corresponds to 480V phase to phase voltage in 4-wire networks and 500V phase to phase voltage in 3-wire networks.

The package contains the following items:

- Read synchroscope RSQ-2 unit
- User's manual
- Two fixing clamps
- A plugable connection (mounted on the unit)

## **2. Application and functionality summary**

The RSQ-2 read synchroscope is a microprocessor-based synchronising unit providing visual information for synchronising a generator to a net.

It is used in any kind of installation where manual synchronising is required.

### Display/reading

The unit measures the two input voltages; Generator (GEN) and Busbar (BB), respectively. The phase difference from GEN's zero crossing to BB's zero crossing is calculated by the processor and is shown on the LED-circle, consisting of 36 red LEDs.

The red LEDs are only lit one at a time and its position indicates the phase difference between GEN and BB. The lit LED simulates the pointer tip of an analog pointer instrument. If the LED is lit in the 12 o'clock position, the phase difference is 0 degrees. In the 6 o'clock position, 180 degrees etc. With 36 LEDs the resolution is 10 degrees.

The movement of the lit LED's position indicates the frequency difference between GEN and BB. If the indication is turning clockwise (too fast), the GEN frequency is too high in proportion to the BB frequency. If the indication is turning counter-clockwise, the proportion is inversed. The rate of the motion tells about the frequency difference. The faster the rotation, the bigger the frequency difference e.g. 1 rotation pr. second = 1Hz. If the BB frequency is 50 Hz and the rotation turns right, the GEN frequency will be 51Hz in this example.

If the frequency difference between GEN and BB is becoming too big (>3Hz), the circular motion stops and a LED will be lit at the "too slow" or "too fast" mark, dependent on which direction the GEN frequency has to be adjusted to.

### Power up reset

The unit will operate when the GEN-voltage exceeds 80% of the nominal value. Below this level no functionality is obtained.

## **3. Terminal list**

### **3.1 Overview of the connection terminals**

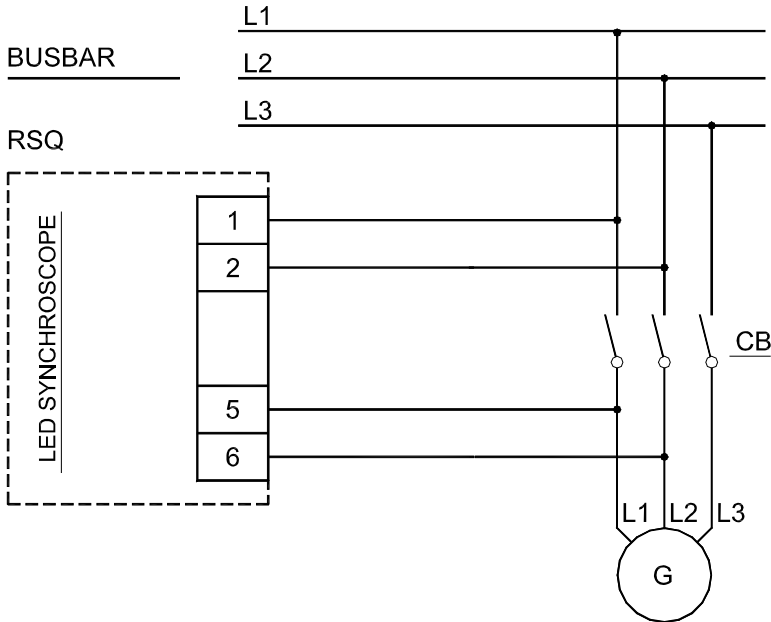
<b>Terminal no.</b>	<b>Signal symbol</b>	<b>Signal name</b>
1	L1	Busbar voltage
2	L2	Busbar voltage
3	No connection	
4	No connection	
5	L1	Generator voltage
6	L2	Generator voltage

## 4. Wiring diagrams

### 4.1 AC input connections

When ordering the RSQ-2, the correct range of voltage inputs must be specified. They must be connected as shown below.

#### 4.1.1 Connection diagram



## 5. Commissioning

### Before commissioning:

Check phases for correct voltage and correct direction of rotary.

### Warning:

Incorrect voltage may lead to malfunction and damage of the unit.

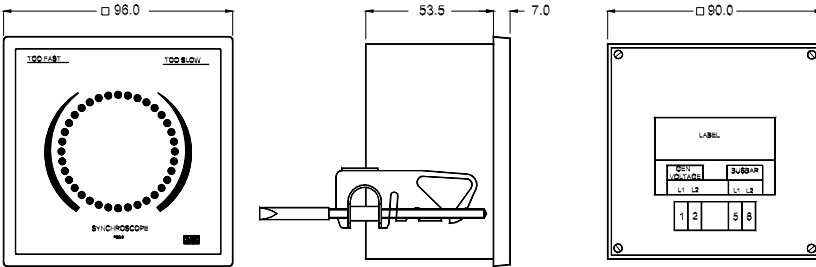


## 6. Technical data

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Accuracy:	$\pm 2^\circ$ (electrical degrees)
Resolution:	$10^\circ$ (36 LEDs)
Max. freq. difference:	No limit
Input range ( $U_N$ ):	100...127VAC (115VAC) or $\pm 20\%$ 220...240VAC (230VAC) or $\pm 20\%$ 380...415VAC (415VAC) or $\pm 20\%$ 440...450VAC (450VAC) or $\pm 20\%$
Busbar input:	Load $2\text{k}\Omega/\text{V}$
Generator input:	(Max. 3.0VA at nominal voltage)
Max. input voltage:	$1.2 \times U_N$ , continuously $2 \times U_N$ for 10 seconds
Frequency range:	40...70Hz (supply)
Temperature:	-10...55°C (nominal) -25...70°C (operating) -40...70°C (storage)
Temperature drift:	Set points: Max. 0.2% of full scale per $10^\circ\text{C}$
Galvanic separation:	Between inputs 2.2kV - 50Hz - 1 minute
Climate:	HSE, to DIN40040
EMC:	According to EN50081-1/2, EN50082-1/2, SS4364503 (PL4) and IEC255-3
Connections:	Max. $2.5 \text{ mm}^2$ (single-stranded) Max. $1.5 \text{ mm}^2$ (multi-stranded)
Materials:	All plastic parts are self-extinguishing to UL94 (V0)
Protection:	Front: IP52. Terminals: IP20 According to IEC529 and EN60529
Dimensions:	See drawing in section 9
Panel cut-out:	$91 \times 91 \pm 1 \text{ mm}$
Weight:	$< 0.35 \text{ kg}$

## 7. Dimensions



All dimensions in mm

## 8. Order specifications

The input range must be specified when ordering the RSQ-2.

Order specification for the RSQ-2 consists of the following:

RSQ-2 - U<sub>N</sub>

where U<sub>N</sub> is as follows:

Code	Function	Options
U <sub>N</sub>	Determines the options:	"115V": Means 100...127VAC input range "230V": Means 220...240VAC input range "415V": Means 380...415VAC input range "450V": Means 440...450VAC input range

Errors and changes excepted