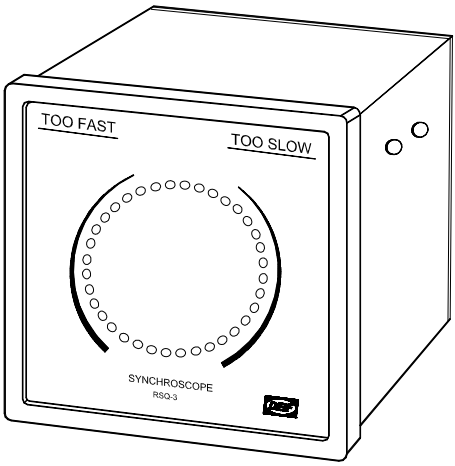
User's manual

Read synchroscope type RSQ-3

4189340264F (UK)



- *Precision LED synchronoscope*
- *High immunity to harmonic distortion*

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CE

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1. Warnings, legal information and notes to CE-marking and UL listing

This manual gives general guidelines on how to install and operate the RSQ-3. Installing and operating the RSQ-3 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-3 is measuring, the company responsible for the installation or the operation must be contacted.

The RSQ-3 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-3 can normally be used.

The RSQ-3 is CE-marked with respect to the low-voltage directive for up to 600V phase to ground voltage, installation category (overvoltage category) III and pollution degree 2.

The RSQ-3 can be delivered with UL listing on request. Please refer to the section 'Technical data' for installation information as required by the UL.

The package contains the following items:

- Read synchroscope RSQ-3 unit
- User's manual
- Two fixing clamps
- A plugable connection (mounted on the unit)

2. Application and functionality summary

The RSQ-3 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 analogue 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 per second = 1Hz. If the BB frequency is 50Hz 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

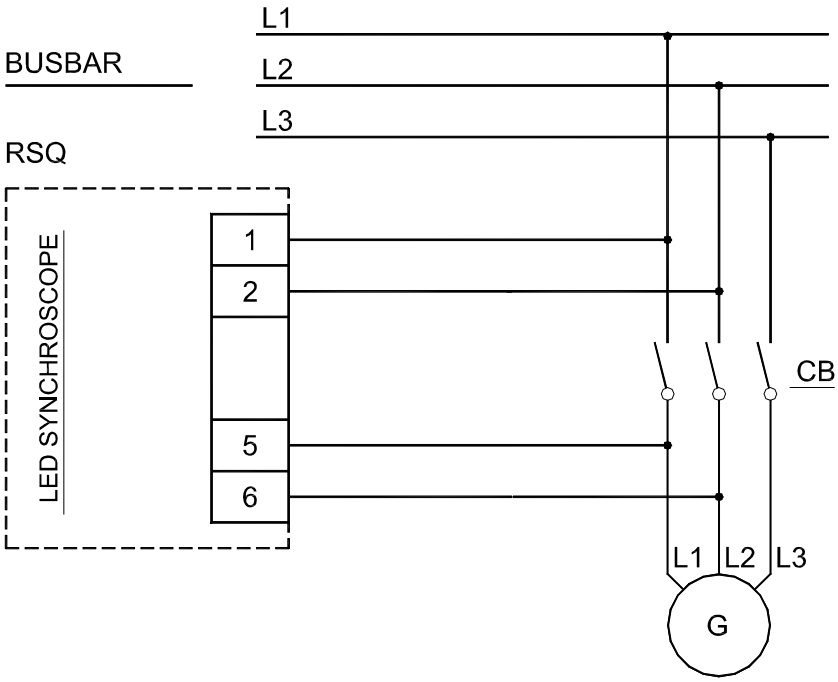
Terminal no.	Signal symbol	Signal name
1	R (L1)	Busbar voltage
	x	Not used
2	S (L2)	Busbar voltage
	x	Not used
	x	Not used
	x	Not used
	x	Not used
5	R (L1)	Generator voltage
	x	Not used
6	S (L2)	Generator voltage

4. Wiring diagrams

4.1 AC input connections

When ordering the RSQ-3, the correct range of voltage inputs must be specified. They must be connected as shown below (unused terminals are not shown).

4.1.1 Connection diagram



5. Commissioning

Before commissioning: Check phases for correct voltage and correct phase sequence.

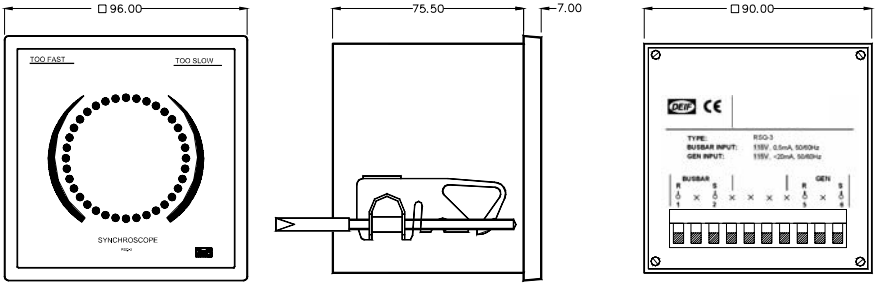
Warning: Incorrect voltage may lead to malfunction and damage of the unit.

6. Technical data

Accuracy:	±2° (electrical degrees)
Resolution:	10° (36 LEDs)
Max. freq. difference:	No limit
Input range (U_N):	100…127VAC (115VAC) or ±20% 220…240VAC (230VAC) or ±20% 380…415VAC (415VAC) or ±20% 440…480VAC (450VAC) or ±20%
Busbar input:	Load 2kΩ/V
Generator input:	(Max. 3.0VA at nominal voltage)
Max. input voltage:	1.2 x U_N, continuously Above 450V: 1.1 x U_N, continuously 2 x 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°C
Galvanic separation:	According to EN/IEC61010-1 All inputs to ground: 3.75kV Between input groups: 3.75kV Test conditions: 50Hz, 1 min.
Climate:	HSE, to DIN40040
EMC:	CE-marked according to EN50081-1/2, EN50082-1/2 and IEC255-3
Connections:	Max. 2.5 mm^2 (single-stranded) Max. 1.5 mm^2 (multi-stranded)
Materials:	All plastic parts are self-extinguishing to UL94 (V0)
Protection:	Front: IP52. Terminals: IP20 According to IEC529 and EN60529

UL listing:	On request, the instrument can be delivered according to UL listing: UL508, E230690 T_{ambmax} 50°C For use in a flat surface of type 1 enclosure Wire: 24-12 AWG Use 60/75°C copper conductors only Main disconnect is to be provided by installer Terminal screw torque: 5-7 lb-in. Installed in accordance with the NEC (United States) or the CEC (Canada) **CAUTION: Risk of electrical shock. More than one main disconnect may be required to de-energize equipment before servicing.**
Dimensions:	See drawing in section 7
Panel cut-out:	91 x 91 ±1 mm
Weight:	< 0.40 kg

7. Dimensions



All dimensions in mm

8. Order specifications

The input range must be specified when ordering the RSQ-3.

Order specification for the RSQ-3 consists of the following:

RSQ-3 - U_N

where U_N is as follows:

Code	Function	Options
U_N	Determines the options:	'115V': Means 100…127VAC input range '230V': Means 220…240VAC input range '415V': Means 380…415VAC input range '450V': Means 440…480VAC input range

Errors and changes excepted