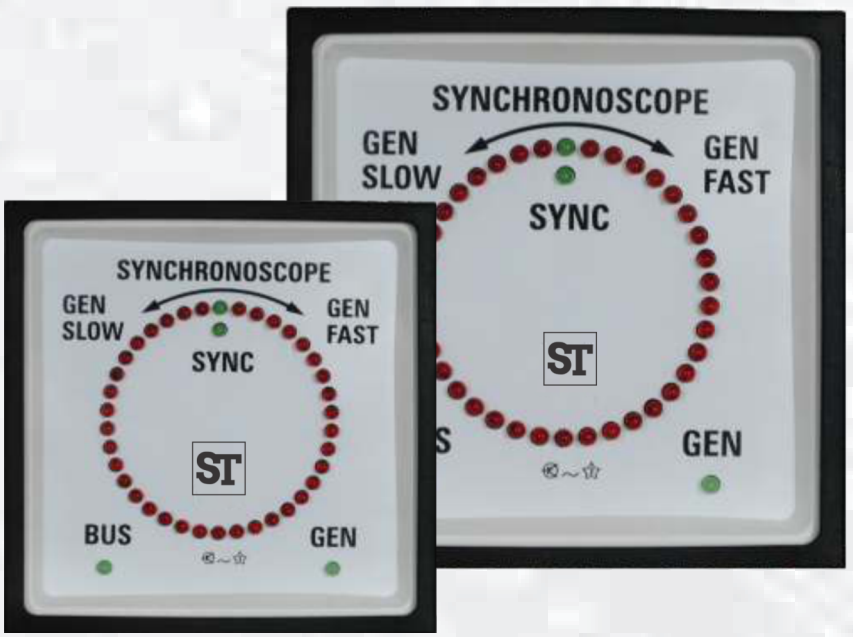
Technical Data Sheet

Synchroscope (SQ 94)



Synchroscope (SQ 94) The Electronic Synchroscope is designed to provide an illuminated indication of actual phase difference between the BUS Voltage (reference voltage) & the GENERATOR Voltage (incoming voltage)

Application

- The Electronic Synchroscope is designed to provide an illuminated indication of actual phase difference between the BUS Voltage (reference voltage) & the GENERATOR Voltage (incoming voltage)
  It denotes the actual frequency difference corresponding to the inverse of time taken for one rotation of the illuminated vector spot. When two alternators are paralleled,it is necessary that,
  1)Frequency must be equal.
  2)Phase must be same.
  Sychroscope is,hence used to indicate the Phase & Frequency
  difference between two AC alternators,which are to be paralleled.

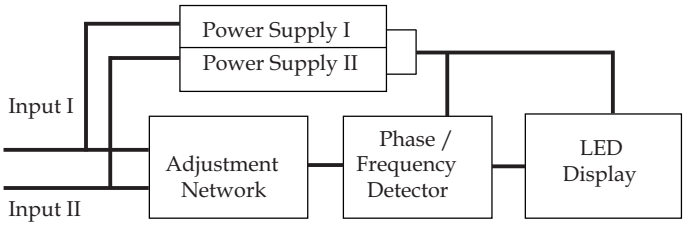
Description

The rotation of the vector spot is with reference to the bus voltage. If the vector spot LED turns clockwise,it indicates the GENERATOR frequency is greater than the BUS frequency. It means the speed of the generator must be reduced by the operator.
If the spot LED turns anticlockwise,the GENERATOR frequency is less than BUS frequency. In this case speed of the generator must be increased.
If 'T' is the time taken for one rotation, the frequency difference can be calculated as 1/ T = A f
Example: Let the bus frequency be 50 Hz.The vector spot takes 10 Sec. for one rotation,clockwise.
1/10 = 0.1 Hz.
The frequency difference = 0.1Hz. Hence we can infer that GENERATOR frequency is 50.1 Hz.
GENERATOR signal,the two green led's at 12 o'clock position glow. If the Frequency matches & Phase does not, then one red led corresponding to the phase difference will glow.

Favorable condition for" Switching in" the Generator

1. Ensure that the frequency difference between two inputs is within the requirements of user as follows:
   Measure time taken for 1 complete rotation of the vector spot in SECOND(T).
   The frequency difference will be Af = 1/T(Hz)
2. Provided the frequency difference is within acceptable limits, wait till the SYNC mark LED s (two green LED s at 12 o'clock position) glow. At this instant , it is safe to CONNECT the GENERATOR to BUS

Functional Principle



The Bus & Gen inputs are fed to the Frequency & Phase detection network. The output duty cycle of the network corresponds to the frequency difference between Bus & Generator Voltage. The detector network also determines the actual phase difference.

Mechanical Data

Case details	Moulded square case suitable for mounting in Control / Switchgear panels, machinery consoles.	Mounting	Stackable in a single cutout
Case materia	Glass filled polycarbonate, flame retardant and drip proof as per UL 94 V-O.	Panel thickness	≤40 mm
Front facia	Glass	Terminals	Hexagon studs, M4 screws and wire clamps E3 (DIN 46282)
Colour of bezel	Black		
Position of use	Vertical		
Panel fixing	Swivel screws		

Electrical Data

Measured quantity	Frequency & Phase difference
Power consumption	6 VA Max
Enclosures code	IP 52 case
(IEC 529)	IP 00 for terminals
Insulation class	group A according to VDE 0110
Insulation voltage	660 V
Proof voltage	2kV
Frequency range	35-70 Hz
Pull in / drop out Freq.	+ / - 9 Hz
Installation catogory (IEC1010)	300 V CAT III
Insulation resistance	> 50 Mohm at 500 V d.c.
Reference conditions	
Ambient temperature	23°C + 3°C
Input Voltage	Rated voltage + 2%
Ambient temperature	50 Hz ± 0.1 %

Applicable Standards

Nominal case and cutout dimensions for	IS 2419
Indicating measuring instruments	DIN 43700
Connections and Terminal markings for panel meters	IS 1248,IEC51 DIN 43807
Terminal bolts / leads	DIN 46200/46282
Clamp straps for connections	DIN 46282
Safety requirements and protective-measures for Electrical indicating-instruments and their accessories	IS 9249 - 1979 DIN 40050 / 8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010
Performance specification for direct acting indicating analogue electrical	IS 1248-1983 IEC 51/DIN
measuring instrument and their access-ories Environmental conditions	EN 60051 IS 1248 - 1983 IS: 9000 VDE / VDI 3540
Front frames for indicating measuring instruments principal dimensions	DIN 43718
UL Combustibility Class	UL 94 V-0
Technical conditions of delivery for electrical instruments	DIN 43701
Mechanical Strength (Free fall test,Vibration test)	IS 1248/IEC 51 IEC 1010 IS 9000-1979 VDE 0411,part 1 Sec 43/44

Safety Precautions

- Instruments with damaged bezels or window glasses must be disconnected from mains.
- Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing, if non-insulated connector wires are used.
- Bezels and window glasses should be replaced under Voltage free conditions.

Environmental Conditions

Climatic suitability	Climate category II as per IS : 1248 (climatic class 3 according to VDE / VDI 3540)
Operating temperature	- 10...+ 55°C
Storage temperature	-20...+ 65°C
Relative humidity	≤ 75 % annual average non - condensing
Shock resistance	15g, 11ms
Vibration resistance	10-150-10 Hz / 0.15 mm / 5 Cycles / 10 octave per minute.

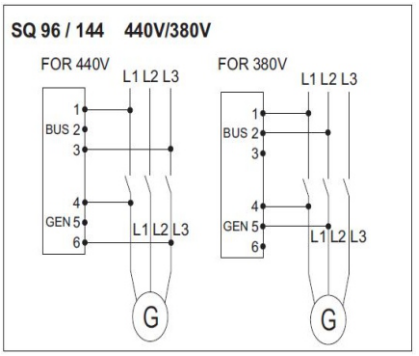
Input Ranges

100V to 500V

Options

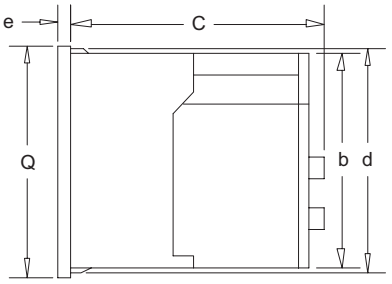
Case	
Front facia	Antiglare glass
Colour of bezel	Red, Yellow, Blue, White.
Colour of LED s	Orange,Yellow
Dial	
Special markings	Numbering / Lettering.

Connections



Type	Terminal	
BUS	1-3	1-2
GEN	4-6	4-5
SQ -96	440V	380V
SQ -144	240V	220V
	480V	415V
	110V	100V
	127V	120V

Dimensions



Dimensions (in mm)		SQ 96	SQ 144
Bezel	a	p96	p144
Case	b	p90	p136
Depth	c	106	106
	d	p 91.5	p137.8
	e	5.5	8.5
Cutout Size		p $92^{+0.8}$	p 138^{+1}
Weight (approx.)		0.60Kg	0.70Kg

Ordering information

Product Code	PR10- X	X	X	X	X	X	0	0	0	0	0ST

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