

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.

Synchroscope is,hence used to indicate the Phase & Frequency difference between two AC alternators, which are to be paralleled.

Features

- Rotating LED indication of Frequency & Phase difference of two supplies
- Glass filled polycarbonate housing (UL 94-V-0)
- Easy installation with swivel screws.

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.

$1/10 = 0.1 \text{ Hz.}$

The frequency difference = 0.1Hz. Hence we can infer that GENERATOR frequency is 50.1 Hz.

If the Frequency & Phase of BUS signal matches with those of 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:

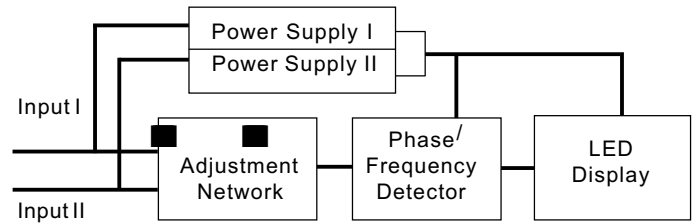
1.Ensure that the frequency difference between two inputs is within the requirements of user as follows:

Measure time taken for 1 complete rotation of the vector spot in SECOND(T).

The frequency difference will be $Af = 1/T(\text{Hz})$

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.

Specifications

Mechanical Data

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

Electrical Data

Measured quantity	Frequency & Phase difference
Power consumption	6 VA Max
Enclosures code (IEC 529)	IP 52 case 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 category (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%
Rated frequency	50 Hz ± 0.1 %

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.

Options

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

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.

Applicable Standards

Nominal case and cutout dimensions for : IS 2419
indicating measuring instruments DIN43700

Connections and Terminal markings for: IS 1248
panel meters DIN43807

Terminal bolts / leads. : DIN 46200/46282

Clamp straps for connections : DIN46282

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 measuring instrument and their accessories : IS 1248-1983
IEC51/DIN EN 60051

Environmental conditions : IS 1248 - 1983
IS: 9000
VDE / VDI 3540

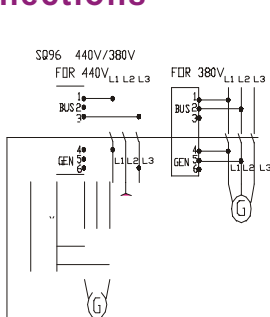
Front frames for indicating measuring instruments principal dimensions : DIN43718

UL Combustibility Class : UL 94 V-0

Technical conditions of delivery for electrical instruments : DIN43701

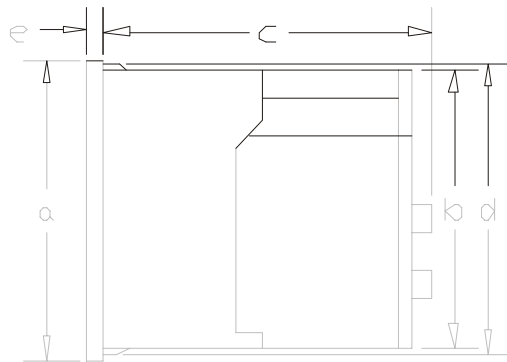
Mechanical Strength : IS 1248/IEC 51
(Free fall test, Vibration test) IEC 1010,
IS 9000-1979
VDE 0411, part 1
Sec 43/44

Connections



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

Dimensions



Dimensions (in mm)

Bezel	a	p 96
Case	b	p 90
Depth	c	106
	d	p 91.5
	e	5.5
Cutout size		p 92 ^{+0.8}
Weight (Approx)		0.60Kg.

SQ 94

Ordering Information

Type SQ	Electronic Sychroscope
Front dimention 96	96 mm x 96 mm
Rated voltages	Refer to selection table inside
Front facia	Normal glass Antiglare glass ^{*3}
Colour of bezel	Black ^{*1} Red, Blue, Yellow, White ^{*3}
Position of use	Vertical (0-360 °)
Dial	Additional lettering on request ^{*3} Additional numbering on request ^{*3}
Logo	RISHABH ^{*1} , for Indian Sales. C.G ^{*1} , for export through Crompton Greaves I.D. Others ^{*3}

*1 standard

*3 Please clearly add the desired specifications while ordering

Ordering example

SQ 96, rated voltage AC 230 V.

Specifications are subject to change without notice(11/11)



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Syncroscope Meter Part Number Coding for SQ94 and SQ14

SQ=> Syncroscope

9=> 96X96 size

4=> Design type we supply to ST

SQ=> Syncroscope

1=> 144X144 size

4=> Design type we supply to ST

Following are the Part # Codes of Syncroscope Meter

For Meter size 96X96:

SQ94-V02XXNXWAW0ST	SYNCHROSCOPE 100-127V For ST
SQ94-V16XXNXWAW0ST	SYNCHROSCOPE 100V For ST
SQ94-V03XXNXWAW0ST	SYNCHROSCOPE 110V-100V For ST
SQ94-V04XXNXWAW0ST	SYNCHROSCOPE 127V-120V For ST
SQ94-V05XXNXWAW0ST	SYNCHROSCOPE 240V-220V For ST
SQ94-V06XXNXWAW0ST	SYNCHROSCOPE 380V-415V For ST
SQ94-V07XXNXWAW0ST	SYNCHROSCOPE 380V-440V For ST
SQ94-V08XXNXWAW0ST	SYNCHROSCOPE 400V For ST
SQ94-V12XXNXWAW0ST	SYNCHROSCOPE 480V-415V For ST
SQ94-V13XXNXWAW0ST	SYNCHROSCOPE 57.8V For ST
SQ94-V14XXNXWAW0ST	SYNCHROSCOPE 63.5V For ST

For Meter size 144X144:

SQ14-V01XXNXWAW0ST	SYNCHROSCOPE 100-120V For ST
SQ14-V02XXNXWAW0ST	SYNCHROSCOPE 100-127V For ST
SQ14-V03XXNXWAW0ST	SYNCHROSCOPE 110-100V For ST
SQ14-V04XXNXWAW0ST	SYNCHROSCOPE 127-120V For ST
SQ14-V05XXNXWAW0ST	SYNCHROSCOPE 240-220V For ST
SQ14-V06XXNXWAW0ST	SYNCHROSCOPE 380-415V For ST
SQ14-V07XXNXWAW0ST	SYNCHROSCOPE 380-440V For ST
SQ14-V08XXNXWAW0ST	SYNCHROSCOPE 400V For ST
SQ14-V09XXNXWAW0ST	SYNCHROSCOPE 415-415V For ST
SQ14-V10XXNXWAW0ST	SYNCHROSCOPE 440-380V For ST
SQ14-V11XXNXWAW0ST	SYNCHROSCOPE 440-440V For ST
SQ14-V12XXNXWAW0ST	SYNCHROSCOPE 480-415V For ST
SQ14-V13XXNXWAW0ST	SYNCHROSCOPE 57.8V For ST
SQ14-V14XXNXWAW0ST	SYNCHROSCOPE 63.5V For ST
SQ14-V15XXNXWAW0ST	SYNCHROSCOPE 110V For ST
SQ14-V16XXNXWAW0ST	SYNCHROSCOPE 100V For ST