

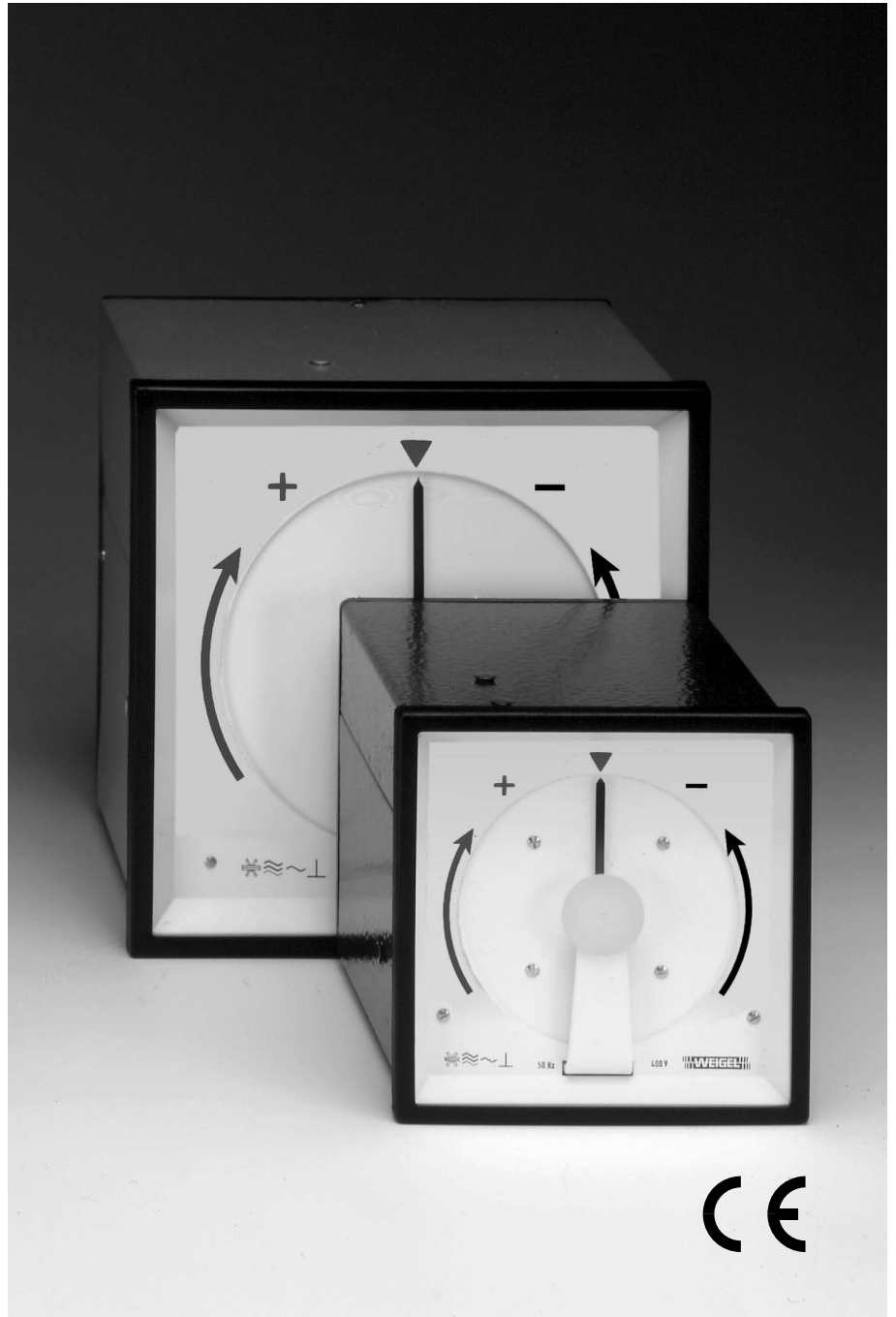


Data Sheet

M Series
080.D.101.06

Analog Meters for Phase Comparison Synchronoscopes

SY 96 S
SY 144 S



WEIGEL

Application

The synchronoscopes **SY 96/144 S** (M series) are used to measure phase difference of two AC voltages, e.g. those of a generator and the mains.

The dial carries a zero marker, a red arrow marked with “+” and a black arrow marked with “-”

When the frequencies of the two voltages differ less than approximately 1.5 Hz¹⁾, they can be compared approximately:

The pointer rotates according to frequency ratio (and to meter connection) clockwise or anticlockwise. The pointer stands still when the frequencies get equal. The pointer rests at the zero marker when the phases coincide also; the AC voltages can be connected to each other.

The connection of the meter can be chosen so that the pointer rotates clockwise or counterclockwise when the frequency f_1 (e.g. generator) is higher.

When the meter is not in work, the pointer cannot be seen.

The instruments are suitable to be mounted in generating sets, power supply control panels, switchboards or mosaic panels.

1) 1.5 Hz for multi-phase synchronoscopes
1 Hz for single-phase synchronoscopes

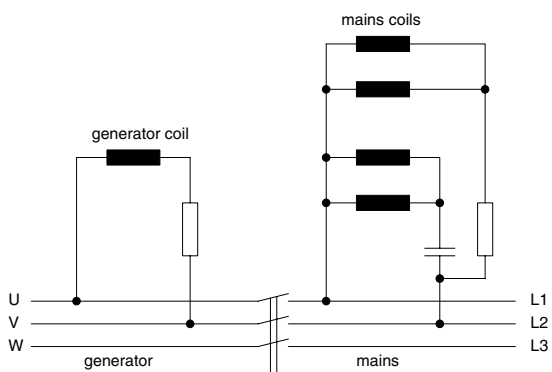
Movements

The synchronoscopes SY 96 S and SY 144 S are supplied with an ironless electrodynamical quotient movement.

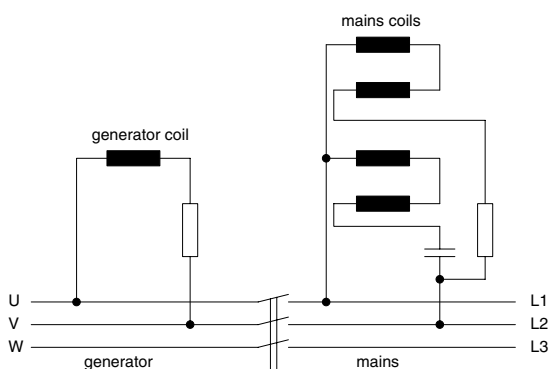
The pointer is able to rotate over 360 degrees in both directions.

Principle Circuit Diagrams

for voltages 100/110 V



for voltages 230/400/500 V



Mechanical Data

case details	square case suitable to be mounted in switchboards or mosaic grid panels, stackable ▶	
material of case	pressed steel	
material of window	glass ▶	
colour of bezel	black (similar to RAL 9005) ▶	
terminals	hexagon studs, M3 screws and wire clamps C6 ▶ connector blades 6.3 x 0.8 for protective wire	
terminal protection against accidental contact	full-sized terminal cover (SY 96 S) / protective sleeves SW6 (SY 144 S) included	
position of use	vertical $\pm 5^\circ$ ▶	
dimensions	SY 96 S	SY 144 S
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 137 mm
depth	119 mm	117 mm
panel cutout	□ 92 ^{+0.8} mm	□ 138 ⁺¹ mm
panel thickness	1...15 mm	1...40 mm
panel fixing	4 pieces WEIGEL screw clamps	2 pieces type B screw clamps acc. to DIN 43 835
weight approx.	1.0 kg	1.1 kg

Electrical Data

measuring unit	phase angle of two sinusoidal AC voltages	
Measuring Ranges		
frequency	rated value 50 Hz ▶	frequency range 48.5 ... 51.5 Hz (multi-phase) 49 ... 51 Hz (single-phase)
voltage	rated voltage U_N 60; 100; 110 V 230; 400; 415 V 400 V 440; 500 V ▶	operating voltage 300 V 300 V 300 V 300 V
power consumption approx.		
at rated voltage	generator side	mains side
110 V	0.7 VA	4.0 VA
230 V	1.5 VA	5.3 VA
400 V	3.2 VA	4.8 VA
500 V	3.5 VA	6.7 VA
operating range	$U_N \pm 10\%$	
overload capacity	$U_N + 20\%$	
measurement category	CAT III	
operating voltage	refer to Measuring Ranges	
pollution level	2	
enclosure code	IP 52 case front side ▶ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact	

Scaling

pointer	bar pointer
pointer deflection	360°
zero	triangle on dial top
accuracy class	1 according to DIN EN 60 051

▶ also refer to "Options"



Analog Meters for Phase Comparison Synchronoscopes

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540, sheet 2
operating temperature range	-10 ... +40 °C
storage temperature range	-25 ... +65 °C
relative humidity	≤ 75% annual average, non-condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz
stray magnetic field	0.5 mT

Rules and Standards

DIN 43 718	Measurement and control; front-frames and frontpanels of measurement and control equipment; principal dimensions
DIN 43 802	Line scales and pointers for indicating electrical measuring instruments; general requirements
DIN 16 257	Nominal positions and position symbols used for measuring instruments
DIN EN 60 051	Direct acting indicating analogue electrical measuring instruments and their accessories
-1	Part 1: Definitions and general requirements common to all parts
-5	Part 5: Special requirements for phase meters, power factor meters, and synchronoscopes
-9	Part 9: Recommended test methods
DIN EN 60 529	Enclosure codes by housings (IP -code)
DIN EN 61 010 - 1	Safety requirements for electrical measuring, control and laboratory equipment Part 1: General requirements
DIN EN 61 326 - 1	Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: General requirements
DIN IEC 61 554	Panel mounted equipment – Electrical measuring instruments – Dimensions for panel mounting
VDE/VDI 3540 sheet 2	Reliability of measuring and control equipment (classification of climates)

Options

electrical data

frequency	rated frequency	frequency range
	16 ² / ₃ Hz	16 ¹ / ₃ ... 17 Hz
	60 Hz	58.5 ... 61.5 Hz
voltage	rated voltage U _N : 60 V, 415 V, 440 V others (≥24 V ... ≤500 V) on request	
voltage range	100 ... 120 V : √3 100 ... 120 V 208 ... 230 V 380 ... 400 V	

case

window	non-glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	on request 15...165°

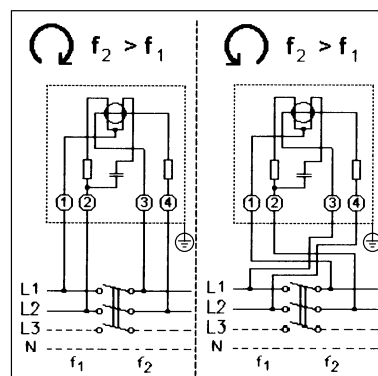
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	climatic class 3 according to VDE/VDI 3540
with operating temperature range	-10 ... +55 °C
(relative humidity)	≤ 75% annual average, non-condensing
climatic suitability	"limited use in the tropics"
with operating temperature range	-25 ... +55 °C
(relative humidity)	≤ 75% annual average, non-condensing
marine application	non-certified
enclosure code	IP 54 splash-water protected front
terminals	connector blades 6.3 x 0.8
terminal protection	rubber nozzles
against accidental contact	

dial

logo on the dial	none or on request
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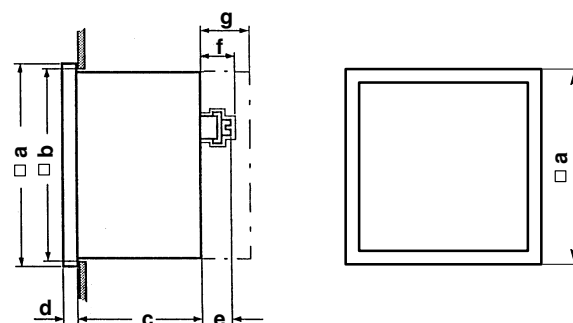
Connections

Note: The rotation direction depends on connection.



See also meter label

Dimensions



dimensions (in mm)	SY 96 S	SY 144 S
a	96	144
b	92	138
c	100	103
d	5	8
e	6.5	3
f	19*)	-
g	-	14

*) including cover for external series resistor

Ordering Information

type SY	synchronoscope
front dimensions 96 S 144 S	96 mm x 96 mm 144 mm x 144 mm
rated voltage	60 V 100 V 110 V 230 V ¹⁾ 400 V 415 V 440 V 500 V others ²⁾ (≥ 24 V ... ≤ 500 V)
rated frequency	16 ² / ₃ Hz 50 Hz ¹⁾ 60 Hz
window	glass ¹⁾ non-glaring glass
colour of bezel	black (similar to RAL 9005) ¹⁾ gray (similar to RAL 7037)
position of use	vertical ¹⁾ on request 15 ... 165° ²⁾
mechanical loads	shock 15 g, vibration 2.5 g ¹⁾ shock 30 g, vibration 5 g
climatic suitability	class 2, -10 ... +40°C ¹⁾ class 3, -10 ... +55°C "limited use in the tropics", -25 ... +55°C
marine application	none ¹⁾ non-certified
enclosure code	IP 52 ¹⁾ IP 54 splash-water protected front
terminals	screws M3 x 6 and wire clamps ¹⁾ connector blades 6.3 x 0.8 additional lettering on request ²⁾
logo	WEIGEL ¹⁾ none OEM logo ²⁾

¹⁾ Standard

²⁾ Please clearly add the desired specifications.

ordering example

SY 96 S, rated voltage AC 230 V, rated frequency 50 Hz,
window non-glaring glass, no logo

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– specifications subject to change without notice; date of issue 12/10 –

