

# ANALOGUE INSTRUMENTS



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Direct ammeters - Moving iron - 90° scale	56	Induction phase meters	72
Interchangeable Sc. ammeters - Moving iron	56	Rotary switches - Panel mounting	72
Ammeters (mA) - Moving iron	57	Resistance boxes	73
Ammeters with switch - 4 positions	57	Double voltmeters	73
Direct voltmeters - Moving iron	58	Differential voltmeters	74
Interchangeable Sc. voltmeters - Moving iron	58	Zero voltmeters	74
Voltmeters with switch - 3 and 6 positions	59	Differential frequency meters	75
Ammeters through resistors (Shunt)	59	Double frequency meters (reeds)	75
Ammeters and voltmeters - Moving coil	60	Synchrosopes	76
Ammeters and voltmeters - With converter	61	Synchronisation column	76
Ammeters and voltmeters - With rectifier	62		
Ammeters and voltmeters - Interchangeable sc.	63	Naval series	
Nominal value voltmeters	63	Digital synchronisation relay	77
Hour meter	64	Lamp synchroscope	77
Phase sequence indicators	64	Alarm sequence relay	78
Contact instruments	65	Reverse power relay	78
Maximeters - Maximum ammeters	66	Synchronism relay	79
Maximeters - Double ammeters	66	Maximum current relay	79
Non-electrical unites indicators - DC	67	Min. - max. voltage and frequency	80
Temperature indicators	67	Isolation indicators	80
CR2C Mobile equipment - Special executions	68	RPM indicators	81
Shunts - DC	68	Rudder degree indicator for vessels	81
Reeds frequency meters	69	Position indicators	82
Pointer frequency meters	69	Resistance indicators (ohmmeter)	82
Electronic wattmeters	70	Alarm module	83
Electronic varmeters	70	RSN - Ship monitoring relay	84
Induction wattmeters and varmeters	71	R2M/ R2MC - Current or power relay	85
Electronic phase meters	71	Voltage and current monitoring relay	85
		Specialities - Framing Instruments	86

## Direct input ammeters

Moving iron - 90° Scale



### General features

- **Alternate current**
- **Accuracy:** 1,5%
- **Self-consumption:** 0,3 - 1 VA
- **Frequency:** 15-100Hz



Model	EC5VR*	EC5V**	EC4V	EC3V	EC2V	ECb7**	ECb3**	ECb8**	
Dimensions (mm)	45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100	
Measuring range	In	1; 1,5; 2,5; 4; 5; 6; 10; 15; 20; 25; 30; 40; 50; 60; 75 or 100 A							
	2xIn	1..2; 1,5..3; 2..4; 2,5..5; 3..6; 4..8; 5..10; 6..12; 10..20; 15..30; 20..40; 25..50; 30..60; 40..80; 50..100; 60..120; 75..150 or 100..200A							
	5xIn	1..5; 1,5..7,5; 2..10; 2,5..7,5; 3..15; 4..20; 5..25; 6..30; 10..50; 15..75; 20..100; 25..125; 30..150; 40..200; 50..250; 60..300; 75..375 or 100..500A							

\* Maximum measuring range: 40A; 40-80A; 40-200A.  
 \*\*Maximum measuring range: 50A; 50-100A; 50-250A.

## Ammeters - Interchangeable scale

Moving iron - 90° Scale



### General features

- **Alternate current**
- **Accuracy:** 1,5%
- **Frequency:** 15-100Hz
- **Self-consumption:** 0,4 VA
- **Measuring range:** x/1 A, x/5A



Model	EC5VR	EC5V	EC4V	EC3V	EC2V	ECb7	ECb3	ECb8
Dimensions (mm)	Interchangeable scale					Fixed scale		
	45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100
Module	In	X/5A or X/1A						
Standard scales		10; 15; 20; 25; 30; 40; 50; 60 or 75 A and multiples						
Module	2xIn	2X/5A or 2X/1A						
Standard scales		10..20; 15..30; 20..40; 25..50; 30..60; 40..80; 50..100; 60..120 or 75..150 A and multiples						
Module	5xIn	5X/5A or 5X/1A						
Standard scales		10..50; 15..75; 20..100; 25..125; 30..150; 40..200; 50..250; 60..300 or 75..375A and multiples						

## Ammeters (mA)

Moving iron - 90° Scale



### General features

- **Alternate current**
- **Accuracy:** 1,5%
- **Burden:** 0,3 - 1 VA
- **Frequency:** 15-100Hz



Model		EC5VR	EC5V	EC4V	EC3V	EC2V	ECb7	ECb3	ECb8
Dimensions (mm)		45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100
Measuring range	In	100; 150; 200; 250; 300; 400; 500; 600mA							
	2xIn	100..200; 150..300; 200..400; 250..500; 300..600; 400..800; 500..1000; 600..1200 mA							
	5xIn	100..500; 150..750; 200..1000; 250..1250; 300..1500; 400..2000; 500..2500; 600..3000 mA							

## Ammeters with switch

4 positions - Interchangeable scale



### General features

- **4-position switch:** 0, L1, L2, L3
- **Alternate current**
- **Accuracy:** 1,5%
- **Measuring range:** x/1A, X/5A
- **Scale:** 90°
- **Burden:** 0,4 VA
- **Frequency:** 15 - 100Hz



Model		EC4V4	EC3V4
Dimensions (mm)		72x72	96x96
Module	In	X/5A or X/1A	
Standard scales		10; 15; 20; 25; 30; 40; 50; 60 or 75 A and multiples	
Module	2xIn	2X/5A or 2X/1A	
Standard scales		10..20; 15..30; 20..40; 25..50; 30..60; 40..80; 50..100; 60..120 or 75..150 A and multiples	
Module	5xIn	5X/5A or 5X/1A	
Standard scales		10..50; 15..75; 20..100; 25..125; 30..150; 40..200; 50..250; 60..300 or 75..375A and multiples	

## Direct input voltmeters



Moving iron - 90° Scale



### General features

- **Alternate current**
- **Accuracy:** 1,5%
- **Burden:** 1,5...3 VA
- **Frequency:** 45-65Hz



Model	EC5VR	EC5V	EC4V	EC3V	EC2V	ECb7	ECb3	ECb8
Dimensions (mm)	45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100
Measuring range	Vn	6; 10; 15; 25; 30; 40; 50; 60; 100; 150; 250; 300; 400; 500; 600 V						

## Voltmeters - Interchangeable scale



Moving iron - 90° Scale



### General features

- **Measuring range:** 100V, 110V
- **Accuracy:** 1,5%
- **Burden** 1,5 - 3 VA
- **Frequency:** 45 - 65Hz



Model	EC5VR	EC5V	EC4V	EC3V
Dimensions (mm)	45x52,2 DIN	48x48	72x72	96x96
Module (Vn)	1,2 x/100 V or 1,2 x/110V			
Scale (Vn)	1,2 times the primary of the voltage transformer			

## Voltmeters with switch

3 and 6 positions



### General features

- **Scale:** 90°
- **3 position switch:** L12, L23, L31
- **6 position switch:** L1, L2, L3, L12, L23, L31
- **Burden:** 1,5...3 VA
- **Frequency:** 45-65Hz
- **Accuracy:** 1,5%



Model	EC4V3	EC3V3	EC4V6	EC3V6	EC4V7	EC3V7
Switch	3 positions		6 positions		6 positions + sequence meter	
Dimensions (mm)	72X72	96x96	72x72	96x96	72x72	96x96
Module	Vn	Operated voltmeters				
		1,2 x/100V or 1,2 x/110V				
		Direct input voltmeters				
Measuring range	Vn	150, 200, 250, 300, 400, 500 and 600V				

## Ammeters through resistances (Shunt)

Moving coil - Interchangeable scale - 90° scale



### General features

Current Voltage measurement in DC circuits.

- **Scale:** 90°
- **Measuring range:** 60mV, 150mV
- **Accuracy:** 1,5%
- **Burden:** 60 - 150 Ω



Model	CC5VR	CC5V	CC4V	CC3V	
Dimensions	mm	45X52,5 DIN	48X48	72x72	96x96
Module	Vn	X/60mV or X/150mV			
Scale	In	5 - 6 - 10 - 15 - 20 - 25 - 30 - 40 - 50 - 60 - 80 - 100 - 150 - 200 - 250 - 300 - 400 - 500 - 600 - 750 - 800 - 1000 - 1.200 - 1.500 - 2.000 - 2.500 - 3.000 - 4.000 A			

# ANALOGUE INSTRUMENTS

## Ammeters ( $\mu\text{A}$ , mA and A) and voltmeters (mV and V)

### Moving coil



#### General features

- Scale:  $90^\circ$
- Accuracy: 1,5%
- Alternate current



Voltmeters



Ammeters

#### 90° Scale



Model		CC5VR	CC5V	CC4V	CC3V	CC2V	CCb7	CCb3	CCb8
Dimensions	mm	45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100
Ammeters ( $\mu\text{A}$ )									
Measuring range	In	40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 $\mu\text{A}$							
Ammeters (mA)									
Measuring range	In	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 mA							
		4 - 20 mA <sup>(1)</sup>							
Ammeters (A)									
Measuring range	In	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 30 - 25 - 40 - 50 A							
		.../60 mV or .../150 mV <sup>(2)</sup>							
Voltmeters (mV)									
Measuring range	Vn	50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 mV							
Voltmeters (V)									
Measuring range	Vn	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 30 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 V							

(1) Connection to converter  
(2) Connection to external shunt

#### 240° Scale



Model		CC5C	CC4C	CC3C	CC2C	CC3CS
Dimensions	mm	48x48	72x72	96x96	144x144	96x96
Ammeters ( $\mu\text{A}$ )						
Measuring range	In	30 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 $\mu\text{A}$				
Ammeters (mA)						
Measuring range	In	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 mA				
		4 - 20 mA <sup>(1)</sup>				
Ammeters (A)						
Measuring range	In	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40				
		.../60 mV or .../150 mV <sup>(2)</sup>				
Voltmeters (mV)						
Measuring range	Vn	50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 mV				
Voltmeters (V)						
Measuring range	Vn	50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 mV				

(1) Connection to converter  
(2) Connection to external shunt

## Ammeters and voltmeters

Moving coil with converter



### General features

Voltage and current measurement in alternating current circuits. True RMS value.

- **Accuracy:** 1,5%
- **Scale:** 240°
- **Burden:** 2,5 VA
- **Frequency:** 20 - 100Hz



Voltmeters



Ammeters



Model		EC5CE (*)	EC4CE (*)	EC3CE	EC2CE
Dimensions (mm)		72X72	96x96	72x72	96x96
Switch		3 positions		6 positions	
Operated ammeters					
Module	In	X/5A or X/1A			
Standard scales		10; 15; 20; 25; 30; 40; 50; 60 or 75 A and multiples			
Module	2xIn	2X/5A or 2X/1A			
Standard scales		10..20; 15..30; 20..40; 25..50; 30..60; 40..80; 50..100; 60..120 or 75..150 A and multiples			
Module	5xIn	5X/5A or 5X/1A			
Standard scales		10..50; 15..75; 20..100; 25..125; 30..150; 40..200; 50..250; 60..300 or 75..375A and multiples			
Direct input ammeters					
Measuring range	In	1; 1,5; 2; 2,5; 3; 4; 5; 6 or 10 A			
	2xIn	1..2; 1,5..3; 2..4; 2,5..5; 3..6; 4..8; 5..10; 6..12 or 10..20 A			
	5xIn	1..5; 1,5..7,5; 2..10; 2,5..12,5; 3..15; 4..20; 5..25; 6..30 or 10..50 A			
Operated voltmeters					
Measuring range	Vn	x/100V or x/110V			
Direct input voltmeters					
Measuring range	Vn	50; 60; 100; 150; 250; 300; 400; 500 or 600 V			

\*With additional module: model MBRMS



# ANALOGUE INSTRUMENTS

## Ammeters and voltmeters ( $\mu\text{A}$ , mA and A)

Moving coil with converter



### General features

Voltage and alternating current measuring (average value of the signal).

- **Scale:** 90°
- **Accuracy:** 1,5%
- **Frequency:** 50 or 60 Hz



Voltmeters



Ammeters

90° Scale



Model	CC5VRG	CC5VG	CC4VG	CC3VG	CC2VG	CCb7G	CCb3G	CCb8G
Dimensions (mm)	45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100
Ammeters ( $\mu\text{A}$ , mA & A)								
Measuring range	In	40; 50; 60; 100; 150; 250; 300; 400; 500 or 600 $\mu\text{A}$						
		1; 1,5; 2; 2,5; 3; 4; 5; 6; 10; 15; 20; 25; 40; 50; 60; 100; 150; 250; 300; 400; 500 or 600 mA						
		1; 1,5; 2; 2,5; 3; 4 or 5 A.						
Operated voltmeters								
Measuring range	Vn	x/100V or x/110V						
Direct input voltmeters								
Measuring range	Vn	6; 10; 15; 25; 30; 40; 50; 60; 100; 150; 250; 300; 400; 500; 600 V						

240° Scale



Model	CC5CG	CC4CG	CC3CG	CC2CG
Dimensions (mm)	48x48	72x72	96x96	144x144
Direct input ammeters ( $\mu\text{A}$ , mA y A)				
Measuring range	In	150; 200; 300; 400; 500 or 600 $\mu\text{A}$		
		1; 1,5; 2,5; 4; 5; 6; 10; 15; 20; 25; 40; 50; 60; 100; 150; 250; 300; 400; 500; 600 mA or 4-20 mA		
		1; 1,5; 2,5; 4; 5; 6; 10; 15 A		
		1..2; 1,5..3; 2..4; 2,5..5; 3..6; 4..8; 5..10; 10..20 or 15..30 A		
	2xIn	1..5; 1,5..7,5; 2..10; 2,5..12,5; 3..15; 4..20; 5..25; 10..50 or 15..75 A		
	5xIn	1..5; 1,5..7,5; 2..10; 2,5..12,5; 3..15; 4..20; 5..25; 10..50 or 15..75 A		
Operated ammeters				
Module	In	X/5A or X/1A		
Standard scales		10; 15; 20; 25; 30; 40; 50; 60 or 75A and multiples		
Module	2xIn	2X/5A or 2X/1A		
Standard scales		10..20; 15..30; 20..40; 25..50 30..60; 40..80; 50..100; 60..120 or 75..150 A and multiples		
Module	3xIn	5X/5A or 5X/1A		
Standard scales		10..50; 15..75; 20..100; 25..125; 30..150; 40..200; 50..250; 60..300 or 75..375A and multiples		
Operated voltmeters				
Measuring range	Vn	1,2 x/100V or 1,2 x/110V		
Direct input voltmeters				
Measuring range	Vn	6; 10; 15; 25; 30; 40; 50; 60; 100; 150; 250; 300; 400; 500 or 600 V		

## Ammeters and voltmeters ( $\mu\text{A}$ , mA and A)

Moving coil with rectifier. Interchangeable scale



### General features

Voltage and alternating current measurement (sinusoidal waveforms).

- **Scale:** 240°
- **Accuracy:** 1,5%
- **Frequency:** 50 or 60 Hz



Voltmeters



Ammeters



Model		CC3CGS
Dimensions (mm)		96x96
		Ammeters ( $\mu\text{A}$ , mA)
Measuring range	In	150; 200; 300; 400; 500 or 600 $\mu\text{A}$ 1; 1,5; 2,5; 4; 5; 6; 10; 15; 20; 25; 40; 50; 60; 100; 150; 250; 300; 400; 500 or 600 mA
		Ammeters (A)
Measuring range	In	1; 1,5; 2; 2,5; 3; 4; 5; 10 or 15 A
	2xIn	1..2; 1,5..3; 2..4; 2,5..5; 3..6; 4..8; 5..10; 10..20 or 15..30 A
	5xIn	1..5; 1,5..7,5; 2..10; 2,5..12,5; 3..15; 4..20; 5..25; 10..50 or 15..75 A
		Operated voltmeters
Measuring range	Vn	x/100V or x/110V
		Direct input voltmeters
Measuring range	Vn	6; 10; 15; 25; 40; 60; 100; 150; 250; 300; 400; 500 or 600 V

## Rated value voltmeters

90° or 240° scale



### General features

- **Scale:** 90° or 240°
- **Accuracy:** 1,5%
- **Burden:** 2 mA
- **Frequency:** 50 or 60 Hz



Model		CC4VGN	CC3VGN	CC2VGN	CC4CGN	CC3CGN	CC2CGN
Dimensions	mm	72x72	96x96	144x144	72x72	96x96	144x144
Measuring range	Vn	100; 110; 230 or 400 V			100; 110; 230 or 400 V		
Standard scales	Vn	0 .. 90 ÷ 110 V or ± 10 % x/100V			0 .. 90 ÷ 110 V or ± 10 % x/100V		
		0 .. 100 ÷ 120 V or ± 10 % x/110V			0 .. 100 ÷ 120 V or ± 10 % x/110V		
		0 .. 210 ÷ 250 V			0 .. 210 ÷ 250 V		
		0 .. 380 ÷ 420 V			0 .. 380 ÷ 420 V		

## Elapsed time meter

AC current



### General features

Control of operating time of machines and equipment.

- **Meter:** mechanical, 7 digits (99999,99)
- **Voltage (Vn):** 115, 230, 400 V AC  
24, 48, 110 V DC
- **Voltage range:**  $\pm 10\%$  Vn
- **Frequency:** 50 or 60 Hz
- **Burden:** 10mA

Model	HC5	HC4	HC3
Dimensions (mm)	48x48	72x72	96x96

## Phase sequence indicators

AC current



### General features

Phase sequence detection on a three-phase system

- **Voltage (Vn):** 100..600 V
- **Burden:** 1,2VA
- **Frequency:** 50 or 60 Hz

Model	IRC4E	IRC3E
Dimensions (mm)	72x72	96x96

## Instruments with contacts

Moving iron or moving coil



### General features

2 contacts and 2 control LEDs. Rear adjustment. 2 channels. 2 potentiometers per channel.

- **Setting:** 0-100% of the final scale value  
±100% (bidirectional)
- **Auxiliary power supply:** 110, 230, 400 V AC
- **Repeatability:** ±1% final scale value
- **Output relays:** 2 (Max. 400V, 1A, 200VA AC)
- **Burden:** <1,5 VA for AC  
<1 mA for DC
- **Mechanical life:** 10<sup>7</sup> operations
- **Control cover:** Sealable
- **Burden:** 3VA
- **Delay time:** 0-30s..±10%
- **Accuracy:** 1,5%
- **Frequency:** 50 or 60 Hz
- **Scale:** 90°



Moving iron (Ammeters)		EC3VA/1	EC3VA/2
	Number of contacts	1 Min. - 1 Max.	2 Max.
mA	100 - 150 - 250 - 300 - 400 - 500 - 600	96 x 96 mm	
A	1 - 1,5 - 2,5 - 4 or 5 // x/1 or x/5 <sup>(1)</sup>		

Moving coil (Ammeters and voltmeters)		CC3VA/1	CC3VA/2
	Number of contacts	1 Min. - 1 Max.	2 Max.
mV	40 - 50 - 60 - 100 - 150 - 200 - 300 - 400 - 500 - 600 - 800	96 x 96 mm	
V	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40 - 50 - 60 - 100		
µA	20 - 25 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600		
mA	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600		
	4 - 20 <sup>(2)</sup>		
A	1 - 1,5 - 2,5 - 4 - 5 // x/60mV or 150mV <sup>(3)</sup>		

Moving coil with rectifier (Ammeters and voltmeters)		CC3VGA/1	CC3VGA/2
	Number of contacts	1 Min. - 1 Max.	2 Max.
mV	60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 - 800	96 x 96 mm	
V	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40 - 50 - 60 - 100 - 150 - 200 - 250 - 300 - 400 - 500 - 600		
mA	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 // 4 - 20 <sup>(2)</sup>		
	1 - 1,5 - 2,5 - 4 - 5 // x/1 or x/5 <sup>(1)</sup>		

(1) External shunt connection. (2) Connection to inverters. (3) Connection to external transformer  
Auxiliary voltages 12 - 24 - 48 - 110 or 220 V DC

## Maximum demand ammeters



Bimetallic system - Interchangeable scale



### General features

Maximum demand ammeters for alternating current. Average value of the r.m.s. current over a time period of 15 or 8 minutes.

- **Scale:** 90°
- **Burden:** 2,3 VA
- **Measuring range:** 5A, 1A
- **Accuracy:** 2,5%
- **Frequency:** 0..1000 Hz



Model		BC4V	BC3V	BC2V*
Dimensions (mm)		72x72	96x96	144x144
Transformation relations		5 - 10 - 15 - 20 - 25 - 30 - 40 - 50 - 60 - 75 - 100 - 125 - 150 - 200 - 250 - 300 - 400 - 500 - 600 - 750 - 800 ó 1000 - 1.200 - 1.500 - 2.000 - 2.500 - 3.000 - 4.000 - 5.000 A		
Module	1,2xIn	1,2X/5A or 1,2X/1A		
Scale		1,2; 6; 12; 18; 24; 30; 36; 48; 60; 72; 90 A or 120% and multiples		

\* Interchangeable scale not available

## Maximeters - Double Ammeters



Bimetallic system and moving iron - Interchangeable scale



### General features

Maximum demand ammeters (bimetal system) with mobile iron system.

- **Scale:** 90°
- **Burden:** 2,15 VA
- **Measuring range:** 5A, 1A
- **Accuracy:** 2,5% (bimetallic system)  
1,5% (movable iron system)
- **Frequency:** 15..100 Hz



Model		BEC4V	BEC3V	BEC2V*
Dimensions	mm.	72x72	96x96	144x144
Module				
Bimetallic system	1,2xIn	1,2X/5A or 1,2X/1A		
Moving iron	2xIn	2X/5A or 2X/1A		
Scale				
Bimetallic system	1,2xIn	1,2; 6; 12; 18; 24; 30; 36; 48; 60; 72; 90 A or 120%		
Moving iron	2xIn	1..2; 5..10; 10..20; 15..30; 20..40; 25..50; 30..60; 40..80; 50..100; 60..120 or 75..150 A and multiples		

\* Interchangeable scale not available

## Non-electric unit indicators

Direct current



### General features

Measurement from transducers or converters, calibrated according to their function curves.

- **Scale:** 90° or 240°
- **Accuracy:** 1,5%



		90° Scale			240° Scale		
Model		CC5V	CC4V	CC3V	CC5C	CC4C	CC3C
Dimensions	mm	48x48	72x72	96x96	48x48	72x72	96x96
Voltmeters (V)							
Measuring range	Vn	0-1; 0-5; 0-10; 1-5; 2-10					
Ammeters (mA)							
Measuring range	In	0-1; 0-5; 0-10; 1-5; 0-20; 4-20					

### Units

mA - A - kA - N - mV - V - kV - kN - Hz - °φ - °C - °F - W - kW - MW - VA - var - kvar - Mvar - kVA - kW - MW - Ω - rpm - % - min<sup>-1</sup> - m - l/h - pH - m<sup>3</sup>/h - m<sup>3</sup>/min - mbar - bar - mm - kg - Kgcm - Kg/cm<sup>2</sup> - mm/sec - mmHg - mmH<sub>2</sub>O - dB - kPa - MPa

## Temperature indicators

DIN thermocouples and thermoresistances



### General features

Temperature measuring via thermocouples or thermoresistances

- **Scale:** 90°
- **Accuracy:** 1,5%



Model	CC4V					CC3V				
Dimensions (mm)	72x72					96x96				
DIN thermocouple										
Type	J <sub>FE-Const</sub> <sup>†</sup> k <sub>CHR-ALU</sub> <sup>†</sup> E <sub>CHR-Const</sub> <sup>†</sup> T <sub>CU-Const</sub> <sup>†</sup> S <sub>PT-PIRH</sub>									
Scale	20-400°	20-600°	20-900°	20-600°	20-900°	20-1200°	20-1000°	20-400°	20-1200°	20-1600°
Outreach	20,83	32,08	50,86	24,10	36,53	48,03	75,16	20,08	11,83	16,66
Thermoresistances										
Type	PT-100 DIN; NI-100 DIN									
Scale	0-100°; 0-150°									
Vaux (V)	12, 24, 48, 110 V DC					12, 24, 48, 110 V DC				
	-					110, 230, 400 V AC				

## Mobile instruments - CR2C



### Special executions



#### General features

Moving coil instrument for mobile equipment (railways, tractor). Scale colour: black or white. Pointer, numbering and division: white or yellow.

- **Measuring range and scales:** Consult
- **Scale:** 240°
- **Accuracy:** 1,5%
- **Illumination:** 12 or 24 V DC
- **Auxiliary voltage:** 12 or 24 V DC
- **Shock resistance:** 15G
- **Vibration resistance:** 10..55Hz

General features	Model
Mobile equipment for special executions	CR2C

## Shunts

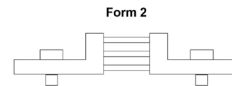
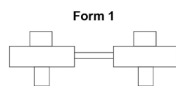
### DC Current



#### General features

High value current connection on direct current circuits

- **Accuracy:** 0,5%
- **Operating temperature** -20°..+60°C
- **Overloads:** 1,2 In continuously  
10 In 5s (10..500A)  
5 In 5s (600..200A)  
2 In 5s (2500..4000A)



Model		Form 1		Form 2		Form 3	
Voltage drop	mV	60mV	150mV	60mV	150mV	60mV	150mV
Measuring range	In	0 1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 30 - 40 - 50 - 60 - 80 - 100 - 150		200 - 250 - 300 - 400 - 500 - 600 - 750 - 800 - 1000 - 1200 - 1500 - 2000 - 2500	200 - 250 - 300 - 400 - 500 - 600 - 750 - 800 - 1000	3000 - 4000	1200 - 1500 - 2000 - 2500

## Reed frequency meters

Alternating current



### General features

Measurement of network frequency.

- **Voltage range:**  $\pm 15\% V_n$
- **Voltage (V<sub>n</sub>):** 100, 110, 230, 400, 440V
- **Accuracy:** 0,5%
- **Burden:** 1,2..2,2 VA FC3VI, FC2VI: 2x(1,2..2,2 VA)



Model		FC5V	FC4V	FC3V		FC2V	FC3VI	FC2VI
Dimensions	mm	48x48	72x72	96x96		144x144	96x96	144x144
Reeds	V <sub>n</sub>	7	13	13	17	21	2x17	2x21
Scale	50Hz	48,5..51,5	47..53	47..53	46..54	45..55	46..64	45..65
	60Hz	58,5..61,5	57..63	57..63	56..64	55..65		

## Pointer frequency meters

Moving coil with converter - 90° Scale



### General features

- **Scale:** 90°
- **Voltage range:**  $\pm 15\% V_n$
- **Voltage (V<sub>n</sub>):** 100, 110, 230, 400, 440V
- **Accuracy:** 0,5%
- **Burden:** 10mA

90° Scale



Model		FC5VR	FC5A	FC4A	FC3A	FC2A	FC5ARI	FC5AI	FC4AI	FC3AI	FC2AI	
Dimensions	mm	45x52,2	48x48	72x72	96x96	144x144	45x52,2	48x48	72x72	96x96	144x144	
Scale	In	45..55; 48..52; 55..65; 58..62; 380..420 Hz						45..65Hz				

240° Scale



Model		FC5C	FC4C	FC3C	FC2C	FC5CI	FC4CI	FC3CI	FC2CI	
Dimensions	mm	48x48	72x72	96x96	144x144	48x48	72x72	96x96	144x144	
Scale	In	45..55; 48..52; 55..65; 58..62; 380..420 Hz						45..65Hz		



## Electronic Wattmeters

Moving coil with converter



### General features

System active power measuring

- **Scale:** 90° or 240°
- **Alternate current**
- **Voltage range:**  $\pm 15\%$  Vn
- **Voltage (Vn):** 100, 110, 230, 400, 440V
- **Accuracy:** 1,5%
- **Current range:** 20-120%
- **Current input (In):** 5A, 1A
- **Frequency:** 50 or 60 Hz



		90° Scale					240° Scale			
Dimensions	mm	45x52,2	48x48	72x72	96x96	144x144	48x48	72x72	96x96	144x144
<b>Model</b>		<b>AC Single phase - Balanced three phase</b>								
AC Single phase		WC5VRE*	WC5VE*	WC4VE*	WC3VE	WC2VE	WC5CE	WC4CE	WC3CE	WC2CE
Three phase 3 wires		WC5VRIE	WC5VIE	WC4VIE	WC3VIE	WC2VIE	WC5CIE	WC4CIE	WC3CIE	WC2CIE
Three phase 4 wires		WC5VInRE	WC5VInE	WC4VInE	WC3VInE	WC2VInE	WC5CInE	WC4CInE	WC3CInE	WC2CInE
<b>Model</b>		<b>Unbalanced three phase</b>								
Three phase 3 wires		WC5VRIIE	WC5VIIIE	WC4VIIIE	WC3VIIIE	WC2VIIIE	WC5CIIIE	WC4CIIIE	WC3CIIIE	WC2CIIIE
Three phase 4 wires		WC5VR3E	WC5V3E	WC4V3E	WC3V3E	WC2V3E	WC5C3E	WC4C3E	WC3C3E	WC2C3E

(\*) Additional module included.

## Electronic wattmeters

Moving coil with converter



### General features

System reactive power measuring.

- **Scale:** 90° or 240°
- **Alternate current**
- **Voltage range:**  $\pm 15\%$  Vn
- **Voltage (Vn):** 100, 110, 230, 400, 440V
- **Accuracy:** 1,5%
- **Current range:** 20-120%
- **Current input (In):** 5A, 1A
- **Frequency:** 50 or 60 Hz



		90° Scale					240° Scale			
Dimensions	mm	45x52,2	48x48	72x72	96x96	144x144	48x48	72x72	96x96	144x144
<b>Model</b>		<b>AC Single phase - Balanced three phase</b>								
AC Single phase		WC5VRrE*	WC5VrE*	WC4VrE*	WC3VrE	WC2VrE	WC5CrE	WC4CrE	WC3CrE	WC2CrE
Three phase 3 wires		WC5VRrIE	WC5VrIE	WC4VrIE	WC3VrIE	WC2VrIE	WC5CrIE	WC4CrIE	WC3CrIE	WC2CrIE
Three phase 4 wires		WC5VRInrE	WC5VInrE	WC4VInrE	WC3VInrE	WC2VInrE	WC5CInrE	WC4CInrE	WC3CInrE	WC2CInrE
<b>Model</b>		<b>Unbalanced Three phase</b>								
Three phase 3 wires		WC5VRrIIE	WC5VrIIE	WC4VrIIE	WC3VrIIE	WC2VrIIE	WC5CIIIE	WC4CIIIE	WC3CIIIE	WC2CIIIE
Three phase 4 wires		WC5VR3rE	WC5V3rE	WC4V3rE	WC3V3rE	WC2V3rE	WC5C3rE	WC4C3rE	WC3C3rE	WC2C3rE

(\*) Additional module included.

# ANALOGUE INSTRUMENTS

## Wattmeters and varmeters

Induction system



### General features

System active/reactive power measuring

- **Scale:** 90°
- **Alternate current**
- **Voltage range:**  $\pm 15\%$  Vn
- **Voltage (Vn):** 100, 110, 230, 400, 440V
- **Accuracy:** 1,5%
- **Current range:** 20-120%
- **Current input (In):** 5A, 1A
- **Frequency:** 50 or 60 Hz



Wattmeters



Varmeters



		Wattmeters			Varmeters	
Dimensions	mm	96x96	144x144	96x96	144x144	
<b>Model</b>		<b>AC Single phase - Balanced three phase</b>				
AC Single phase		WC3V	WC2V	WC3C	WC2C	
Three phase 3 wires		WC3VI	WC2VI	WC3CI	WC2CI	
Three phase 4 wires		WC3VIn	WC2VIn	WC3CIn	WC2CIn	
<b>Model</b>		<b>Unbalanced three phase</b>				
Three phase 3 wires		WC3VII	WC2VII	WC3CII	WC2CII	
Three phase 4 wires		WC3VIIn	WC2VIIn	WC3CIInr	WC2CIInr	

## Electronic Phase meters

Moving coil with transducer



Additional module

### General features

System power factor measurement.

- **Scale:** 90° or 240°
- **Alternate current**
- **Voltage range:**  $\pm 15\%$  Vn
- **Voltage (Vn):** 100, 110, 230, 400, 440V
- **Accuracy:** 1,5% of 90° electric
- **Current range:** 20 -120%
- **Current input(In):** 5A, 1A
- **Frequency:** 50 or 60 Hz
- **Scale:** CAP 0,5 - 1 - 0,5 IND



		90° Scale					240° Scale			
Dimensions	mm	45x52,2	48x48	72x72	96x96	144x144	48x48	72x72	96x96	144x144
<b>Model</b>		<b>AC Single phase - Balanced three phase</b>								
AC Single phase	Cos φ	SC5VRE*	SC5VE*	SC4VE*	SC3VE	SC2VE	SC5CE	SC4CE	SC3CE	SC2CE
Three phase 3 wires	Cos φ	SC5VRIE*	SC5VIE*	SC4VIE*	SC3VIE	SC2VIE	SC5CIE	SC4CIE	SC3CIE	SC2CIE

(\*) Additional module included

# ANALOGUE INSTRUMENTS

## Phase meters

Induction system



### General features

System power factor measurement.

- **Scale:** 90° or 360°
- **Voltage range:** ±15% Vn
- **Voltage (Vn):** 100, 110, 230, 400, 440V
- **Scale:** CAP 0,5-1-0,5 IND (90°)  
CAP 0,8-1-0,2 IND (90°)  
CAP 0,1-1-0,1 IND 4 quadrants (360°)
- **Alternate current**
- **Accuracy:** 1,5% of 90° electric
- **Current range:** 20 -120%
- **Current input (In):** 5A, 1A
- **Frequency:** 50 or 60 Hz



		90° Scale		360° Scale	
Dimensions	mm	96x96	144x144	96x96	144x144
<b>AC Single phase - Balanced three phase</b>					
AC Single phase		SC3V	SC2V	SC3C	SC2C
Three phase 3 wire		SC3VI	SC2VI	SC3CI	SC2CI
<b>Balanced three phase</b>					
Three phase 3 wire		SC3VII	SC2VII	SC3CII	SC2CII
Three phase 4 wire		SC3VIIn	SC2VIIn	SC3CIIn	SC2CIIn

## Rotary switches

Panel mounting



### General features

- **Diameter:** Ø 22,3mm
- **Front panel dimensions:** 48x48mm
- **Working voltage (Ue):** 24 - 110 - 240 - 440 V
- **Number of poles:** 3P and 4P
- **Conventional thermal current (Ith):** 20 A
- **Operated insulation voltage (Ui):** 690 V

General features	Model
<b>Voltmeter switches</b>	
4 positions (line - line measurement)	CTP-4
7 positions (line - line and line - neutral measurement)	CTP-7
<b>Ammeter switches</b>	
4 positions	CCP-4

## Resistance boxes



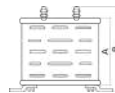
### Accessory



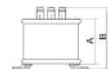
#### General features

Connection to measuring elements.

- **Accuracy:** 0,5%



Model	1.2.1	1.4.1	1.6.1	2.2.1	2.3.1	2.4.1	2.6.1	2.8.1
Terminals	2	4	6	2	3	4	6	8
A - Case dim. (mm)	64 x 50 x 120			99 x 50 x 120				
B - Total dim. (mm)	86 x 50 x 152			121 x 50 x 152				



Model	3.3.1	3.3.2	4.5.1
Terminals	3	3	5
A - Case dim. (mm)	69 x 50 x 120	102 x 50 x 120	100 x 135 x 135
B - Total dim. (mm)	101 x 50 x 155	148 x 50 x 155	123 x 170 x 170

## Double voltmeters



### For synchronizing instruments



#### General features

Two moving iron systems. True RMS

- **Scale:** 90°
- **Alternate current**
- **Measuring range:** 100, 110, 230, 400, 440V
- **Accuracy:** 1,5%
- **Frequency:** 45..65 Hz
- **Burden:** 1,5..3 VA



Model		EC3VII			EC2VII	
Dimensions	mm	96x96			144x144	
Measuring range	Vn	2x100V	2x110V	2x230V	2x400V	2x440V
Scale	Vn	2x165V	2x180V	2x380V	2x660	2x720V

# ANALOGUE INSTRUMENTS

## Differential voltmeters

For synchronizing instruments



### General features

Difference (%) between two synchronizing voltages.

- **Scale:** 90° or 240°
- **Alternate current**
- **Measuring range:** 100, 110, 230, 400, 440V
- **Accuracy:** 1,5%
- **Frequency:** 50 or 60 Hz
- **Burden:** 10 mA



		Moving coil (DC)				Moving coil with rectifier (AC)			
Model		CC3VD	CC2VD	CC3CD	CC2CD	CC3VGD	CC2VGD	CC3CGD	CC2CGD
Dimensions	mm	96x96	144x144	96x96	144x144	96x96	144x144	96x96	144x144
Scale type		90°		240°		90°		240°	
Scale	Vn	100..15 - 0 - 15..100% ΔV							

## Zero voltmeters

For synchronizing instruments



### General features

Measurement of the voltage difference between the two (homonymous) phases of a line and a generator. Moving iron system.

- **Voltage (Vn):** 100, 110, 230, 400, 440 V
- **Scale:** 90°
- **Frequency:** 15..100 Hz
- **Accuracy:** 1,5%
- **Burden:** 1,5..3,5 VA

Model		EC3V0	EC2V0
Dimensions	mm	96x96	144x144
Scale		115 - 200 - 127 - 220 - 460 - 800 - 880	

## Differential frequency meters



For synchronizing instruments



### General features

Detection of the frequency difference between two alternating current networks with more sensitivity than double frequency meters.

- **Voltage (Vn):** 100, 110, 230, 400, 440 V
- **Voltage range:**  $\pm 15\%$  Vn
- **Accuracy:** 0,2%
- **Burden:** 10 mA
- **Frequency:** 50 or 60Hz



Model		FC3AD	FC2AD	FC3CD	FC2CD
Dimensions	mm	96x96	144x144	96x96	144x144
Scale type		90°		240°	

## Double frequency meters (reeds)



For synchronizing instruments



### General features

Double measurement (two systems) of two system frequencies

- **Voltage (Vn):** 100, 110, 230, 400, 440 V
- **Voltage range:**  $\pm 15\%$  Vn
- **Accuracy:** 0,5%
- **Burden:** 1,2..2,2 mA



Model		FC3VII		FC2VII
Dimensions	mm	96x96		144x144
Reeds		13	17	21
Scale	Hz	47..53	46..54 or 56..64	45...55 or 55..65

## Synchrosopes

For synchronizing instruments



### General features

Phase synchronism measurement (frequency and phase equality) between two alternating current networks, single-phase or three-phase, or between network and generator.

- **Voltage (Vn):** 100, 110, 230, 400, 440 V
- **Burden:** 20..30 mA
- **Voltage range:**  $\pm 15\%$  Vn
- **Frequency:** 50 or 60Hz
- **Accuracy:** 1,5% of 90° electric

		AC Single phase		Balanced three phase	
Model		SC3V-360°	SC2V-360°	SC3VI-360°	SC2VI-360°
Dimensions	mm	96x96	144x144	96x96	144x144

## Synchronisation column

3 or 4 instruments



### General features

Equipment with three instruments: double or differential voltmeter; double or differential frequency meter and synchroscope, for parallel connection of two generators, or of a generator with the network. It is possible to add a fourth instrument.

Position: Vertical (with rotating arm 180°)  
Horizontal (with 2 supports)

Model	Voltmeters	Frequency meters	Synchrosopes
ES3V	EC3VII or CC3VGD	FC3VII or FC3AD	SC3V-360°
ES3VI	EC3VII or CC3VGD	FC3VII or FC3AD	SC3VI-360°
ES3C	CC3CGD	FC3CD	SC3V-360°
ES3CI	CC3CGD	FC3CD	SC3VI-360°
ESV2	EC2VII or CC2VGD	FC2VII or FC2AD	SC2V-360°
ES2VI	EC2VII or CC2VGD	FC3VII or FC2AD	SC2VI-360°
ES2C	CC2CGD	FC2CD	SC2V-360°
ES2CI	CC2CGD	FC2CD	SC2VI-360°

		90° Scale		360° Scale	
Dimension (equipment)	mm	410x223x120	576x258x170	410x223x120	576x258x170
Dim. (instruments)	mm	96x96	144x144	96x96	144x144
Single phase		ES3V	ES2V	ES3C	ES2C
Three phase balanced		ES3VI	ES2VI	ES3CI	ES2CI

## Digital synchronizing relay

Naval Series



### General features

It allows both the display of the phase and the magnitude of the two voltages coming from two networks, as well as the synchronization maneuver between them.

- **Input:** 110, 230, 400, 440 V  $\pm$  20%
- **Frequency range:** 45..65 Hz
- **Phase difference range:**  $\pm$ 180°
- **Voltage difference margin:**  $\pm$ 100%
- **Accuracy:** 0,5%
- **Accuracy:** 0,1%
- **Accuracy:** 1%
- **Accuracy:** 1%

Model		RSS1 (2 wire)	RSS3 (3 wire)
Voltage	V	110 or 230 V	110, 230, 400, 440V
Dimensions	mm	96x96	

## Lamp synchronoscope

Naval Series



### General features

Synchronization of groups for manual operation.

- **Voltage (Vn):** 110, 230, 400, 440 V  $\pm$  20%
- **Frequency:** 50 or 60Hz
- **Alternate current**

Model		SC3VL	SC2VL
Dimensions	mm	96x96	144x144



## Sequence relay with alarm

Naval Series



### General features

It displays the correct phase sequence in a three-phase network, and provides a contact to enable connection of the receiving device.

- **Voltage (Vn):** 110, 230, 400, 440 V  $\pm$  20%
- **Alternate current**
- **Burden:** 1,2VA
- **Frequency:** 50 or 60Hz

Model		RSQ
Dimensions	mm	96x96

## Revers power relay

Naval Series



### General features

Wattmeter relay for reverse power limiting (anti-motorization) between two alternating current generators connected in parallel.

- **Accuracy:**  $\pm$  1,5% (of the Pn)
- **Frequency:** 50 or 60Hz
- **Setting:** 2 - 15% Pn (kW)

Model		RIC2VI
Dimensions	mm	144x144
Un	V	100, 110, 230, 400 or 440
In	A	x/5
Aux. v.	V	100, 230 or 400

## Synchronising relay

Naval Series



### General features

Electronic relay for synchronization of two alternating current generators by comparing their voltage, phase and frequency.

- **Accuracy in phase:**  $\pm 2,5\%$
- **Frequency:** 50 or 60Hz
- **Setting:** 5 - 40°
- **Time:**  $\pm 0,5$  s
- **Un range:**  $\pm 15\%$

Model		RSC2
Dimensions	mm	144x144
Un	V	2x110, 230, 400 or 440

## Maximum current relay

Naval Series



### General features

Electronic overcurrent relay which detects the current level in each phase in three-phase alternators.

- **Voltage (Vn):** 110, 230, 400, 440 V  $\pm 30\%$  AC
- **Alternate current**
- **Setting:** 0,6 - 1,6 In
- **Frequency:** 50 or 60Hz
- **Accuracy:** Current:  $\pm 2.5\%$  (Trigger setting value)  
Time:  $\pm 3\% \pm 1s..$  of set value

Model		RSC2	RMC2A
Dimensions	mm	144x144	
Alarm	V	-	Incorporated

## Min. / Max. voltage and frequency relay



Naval Series



### General features

Instrument for the control of voltage and frequency in a three-phase or single phase network.

- **Frequency:** 50 or 60Hz
- **Accuracy:**  $\pm 2\%$
- **Min. setting voltage:** 60 -100%  $U_n$
- **Max. setting voltage:** 80 -120%  $U_n$
- **Min./Max. setting frequency:** 45-55 Hz or 55-60 Hz

Model		RUFC2
Dimensions	mm	144x144
$U_n$	V	100, 110, 230, 400 or 440
Aux. v.	V	110, 230 or 400 $\pm 30\%$ AC

## Insulation indicators



Naval Series



### General features

Instrument that detects and measures the ground fault of a three phase circuit with insulated neutral, in direct and permanent connection to the network (switch position G). The IAC\_VA models incorporate an alarm system with continuous adjustment control between 0 and 5 M $\Omega$ .

- **Accuracy:**  $\pm 1,5\%$  (from scale arc  $U_n$ )
- **Frequency:** 50 or 60Hz
- **Setting:** 0..50..0 M $\Omega$
- **External switch included**

Model		IAC3V	IAC2V	IAC3VA	IAC2VA
Dimensions	mm	96x96	144x144	96x96	144x144
Voltage	V	230 - 400 or 440 V		230 - 400 or 440 V	
Aux. v.	V	—		110 or 230 V AC	

## RPM indicator

Naval Series



### General features

Fed by the propeller shaft tachodynamo, it indicates the number of RPM of the propeller.

- **Moving coil:** forward: black  
Reverse: red
- **Lighting:** 12 or 24 V
- **Accuracy:**  $\pm 1,5\%$
- **Scale:** 240°
- **Burden:** 10 $\Omega$ /V

Model		CC4C	CC3C	CC2C
Dimensions	mm	72x72	96x96	144x144
Scale		150-0-150; 180-0-180; 200-0-200; 300-0-300		
Range	V	10-0-10		

## Rudder degree indicator for vessels

Naval Series



### General features

Powered by a potentiometer attached to the rudder shaft, it indicates its angular position as a function of the resistance variation.

- **Moving coil:** Port: red bow  
Starboard: green bow
- **Lighting:** 12 or 24 V
- **Accuracy:**  $\pm 1,5\%$
- **Scale:** 90°
- **Burden:** 2000 $\Omega$ /V

Model		CCb8
Dimensions	mm	130x100
Scale		40-0-40 or 45-0-45
Range	V	Scope: 7-0-7 or 12-0-12 V

## Position indicators



### Moving coil



#### General features

Instrument used to know the position of the voltage regulation switch in power transformers.

It incorporates an end-of-scale adjustment potentiometer.

- **Standard scales:** 9, 15, 17, 19, 21, 25 or 27 positions
- **Switch:** 5Ω x 9 to 27 positions (less 1)
- **Frequency:** 50 or 60Hz

Model		CC4V	CC3V
Dimensions	mm	72x72	96x96
Input voltage	V	110 - 230 - 400 V AC	

## Resistance indicators (Ohmmeter)



### Moving coil with or without rectifier



#### General features

The measurement circuit can be either direct current (battery or power supply) or alternating current.

Option of external box with the appropriate power supply for cases in which it is not possible to connect directly to the available voltage.

Model		CC3V	CC2V
Dimensions	mm	96x96	144x144
Input voltage	V	230 or 400 V AC	

## Alarm module

Analogue indicator



### General features

The alarm module is an instrument used to remotely detect, by closing a contact, an LED indication of an occurrence or event.

It has one common point and six inputs.

Model		AC3S
Dimensions	mm	96x96
Auxiliary voltage	V	63 - 5 - 110 - 235 V AC
	V	24 - 48 - 110V DC

## RSN - Naval surveillance relay



Naval Series



### General features

The RSN ship monitoring relay is a unit designed for the protection of generator sets commonly used on ships. It is prepared for connection to a centralized control point, by means of a serial bus, which allows both the configuration and the sending of operating data.

### Configuration types

- Overcurrent relay
- Overvoltage relay
- Undervoltage relay
- Average, maximum and minimum voltage relay
- Maximum average current relay
- Direct and reverse power relay
- Maximum and minimum frequency relay
- Voltage, current, overvoltage and undervoltage unbalance relay

- **No. of digital outputs:** 6
- **Communication:** RS485 / RS232
- **Protocol of com:** MODBUS/ JBUS

Model		RSN
Type		Three phase 4 wire
Dimensions	mm	150x75x115
Voltage	V	500 V (phase-phase) Max.
Current	A	x/5A
Aux V.	V	110, 230, 400 V AC
		24, 48, 110 V DC
		Universal 85-264 V AC and DC

Measuring parameters	Unit
Phase voltage	V
Line voltage	V
Line current	A
Active, reactive and apparent power	kW, kvar, kVA
Power factor (Cos $\phi$ )	PF
Frequency	Hz
THD current and voltage	A, V
Neutral current	A

## R2M/R2MC - Current or power relay



Current input



### General features

Equipment designed to measure the Current or power in a three-phase network, activating the contacts of a step control relay in the event that a certain margin selected on its front control is exceeded.

It has a current  $x/5A$  input, to which the secondary of a current transformer must be connected, and a voltage input which can be connected directly to the mains.

- **Connection delay:** 5s
- **Switch off delay:** 2s
- **Output relay:** 1

### Configuration type

#### R2M

- Active power relay
- Reactive power relay
- Reverse power relay

#### R2Mc

- Current relay

Model		R2M/ R2Mc
Dimensions	mm	35mm (2 DIN module)
Rated voltage	Un	230 or 400V AC
Frequency	Hz	50 - 60
Aux. v.	V	Self-powered
Current	A	$x/5A$

## Voltage and current monitoring relay



Current input



### General features

Designed for the supervision of the connection of metering panels in substation or transformer station installations.

Detection of unbalanced currents, voltages, overvoltage and undervoltage.

- **Detection range:**
  - Unbalance 0 to 20% of  $V_n$
  - Unbalance 0 to 20% of  $I_n$
  - Undervoltage 80 to 100 % of  $V_n$
  - Overtvoltage 120 % of  $V_n$
- **Class:** 1
- **General output feature:** 250 V, 3 A, 300 VA
- **Consumption:** 0,48 VA per fase





Model		RVIA	RVIB
Type		Three phase 3 wires	Three phase 4 wires
Dimensions	mm	150x70x112	
Voltage	V	110, 230, 400V	
Current	I	$x/5$ or $x/1$ A	



# ANALOGUE INSTRUMENTS

## Specialities

### Panel Instruments

												
	90° Scale				90° Scale			90° Scale	240° Scale			
Dimensions (mm)	48	72	96	144	80x64	105x80	130x100	Modular	48	72	96	144

Pointer												
Knife pointer + fine divisions	—	•	•	•	—	—	—	—	—	—	—	—
Red pointer, set externally	—	•	—	—	•	—	—	—	—	—	—	—

Scale												
Non standard scale (*)	—	•	—	—	•	—	—	•	—	•	—	—
Antiparallax scale	—	—	—	—	—	—	—	—	—	•	•	—
Black background - white figures and pointer	—	•	•	•	•	—	—	—	—	•	•	•
Black background - yellow figures and pointer	—	•	•	•	—	—	—	—	—	•	•	•
Double scale	—	•	•	•	•	—	—	—	—	•	—	—
Double numbering	—	•	•	•	•	—	—	—	—	•	•	•
Red line	—	•	—	—	•	—	—	•	—	•	—	—
Colour arc (up to 20 mm)	—	•	—	—	•	—	—	•	—	•	—	—
Additional text (< 10 letters)	—	•	—	—	•	—	—	•	—	•	—	—

Protections												
Naval series or tropicalized	—	•	—	—	•	—	—	•	—	•	—	—
IP 43 protection	—	•	—	—	•	—	—	—	—	•	—	—
IP 54 protection	—	•	—	—	—	—	—	—	—	•	—	—
IP 20 Terminals protection	•	•	•	—	—	—	—	—	•	•	•	—
Mobile equipment and damping	—	•	—	—	•	—	—	—	—	•	—	—
IP 65 protection	—	•	•	—	—	—	—	—	—	•	•	—

Several												
Makrolon glass	—	•	—	—	•	—	—	—	—	•	—	—
Antireflecting glass	—	•	—	—	•	—	—	—	—	•	—	—
Lighting 12, 24 V (white scale)	—	•	•	•	—	•	•	—	—	•	•	•
Lighting 12, 24 V (black scale)	—	•	•	•	—	•	•	—	—	•	•	•
Rubber gasket (panel)	—	•	•	—	—	—	—	—	—	—	—	—





Moving coil meters												
Non standard input (**)	—	•	—	—	•	—	—	•	—	•	—	—
Insulation 3 Kv	—	•	—	—	•	—	—	•	—	•	—	—
Central zero	—	•	—	—	•	—	—	•	—	•	—	—
Displaced Zero	—	•	—	—	•	—	—	•	—	•	—	—
Mechanically suppressed zero (max 25%)	—	•	—	—	•	—	—	•	—	•	—	—
Non-linear function scale ( $\Omega$ , db, ...)	—	•	—	—	•	—	—	•	—	•	—	—
Internal resistance adjustment (if possible)	—	•	—	—	•	—	—	•	—	•	—	—
Accuracy 1%	—	•	—	—	•	—	—	•	—	•	—	—
600=900V DC (external potentiometric box)	—	•	—	—	•	—	—	•	—	•	—	—
$\geq 1000=2000V$ DC (external potentiom. box)	—	•	—	—	•	—	—	•	—	•	—	—
$\geq 2000=4000V$ DC (ext. potentiom. box)	—	•	—	—	•	—	—	•	—	•	—	—
Potentiometer for 10% end of scale adjustment	—	•	•	•	—	—	—	—	—	•	•	•
Double range	—	•	—	—	•	—	—	•	—	•	—	—

(\*) Scale: Line drawing and numbering.  
 (\*\*) Current or voltage required to bring the needle to the end of the measuring zone.




# ANALOGUE INSTRUMENTS

## Specialities

### Frame Instruments

												
	90° Scale				90° Scale			90° Scale	240° Scale			
Dimensions (mm)	48	72	96	144	80x64	105x80	130x100	Modular	48	72	96	144

Moving iron meters												
Non standard input (**)		•				•			•			•
Calibrated at 150 or 400 Hz (If possible)		•				•			•			—
Calibrated in DC		•				•			•			—
Accuracy 1%		•				•			•			•
Insulation 3 Kv		•				•			•			•
750 - 1000 V (with external box)		•				•			•			—
200% enlarged scale (A, mA)		•				•			•			•
500% enlarged scale (A, mA)		•				•			•			•
Double range		•				•			•			•

											
	90° Scale				90° Scale			240° Scale			
Dimensions (mm)	48	72	96	144	Modular	48	72	96	144		

Induction wattmeters and varmeters												
Non standard voltage						•						—
Accuracy 1 %						•						—
Current 1A (per system)						•						—
Displaced zero						•						—
Central zero						•						—
Calibrated between 1,3 - 1,5 apparent power						•						—
Calibrated between 0,6 - 0,8 apparent power						•						—
Calibrated between 0,4 - 0,6 apparent power						•						—

Electronics wattmeters and varmeters												
Non standard voltage						•						•
Accuracy 1 %						•						•
Current 1 A						•						•
Displaced zero						•						•
Central zero						•						•
Calibrated to 400 Hz						•						•
Calibrated between 1,3 - 1,5 of apparent power						•						•
Calibrated between 0,6 - 0,8 of apparent power						•						•
Calibrated between 0,4 - 0,6 apparent power						•						•

Induction phase meters												
Non standard voltage (single phase)						•						•
Non standard voltage (three phase)						•						•
Current 1 A (per system)						•						•

Electronics phase meters												
Non standard voltage						•						•
Scale 0 - 1 - 0 (single phase) 0,1 - 0 - 0,1 (three phase)						•						•
Current 1 A						•						•

(\*) Scale: Line drawing and numbering.

(\*\*) Current or voltage required to bring the needle to the end of the measuring zone.