
ANALOGUE
INTRUMENTS
JBC
400°C
10
20
30
40
V

ANALOGUE INSTRUMENTS

General features

Analogue instruments

General technical specifications

• Overloads	1,2 Vn permanent, 2 Vn 5s
	1,5 In permanent, 5 In 30s, 10 In 5s, 40 In 1s
• Vibration resistance	VDE 0410, Section 27: 2,5g, ± 0,25 mm, 50 Hz
• Shock resistance	VDE 0410, Section 28: 15g
• Operating temperature	- 25°C .... + 40 °C
• Reference temperature	+ 10°C ... + 30 °C (for accuracy class)
• Test voltage	2 kV, 50 Hz, 1 min
• Tropicalization	DIN 40040 (on request)
• Protection	Casings: IP52 (IP54, IP65 on request)
	Terminals: IP00 (IP20 on request)
• Casings	72 x 72 // 96 x 96 // 144 x 144
	Modular for DIN rail
	IEC 61554
• Scales	Full scale value DIN 43701
	Scale division DIN 438802
• Pointers	DIN 43802

Standards

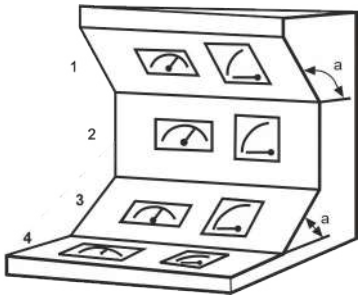
- EN 60051
- BS 89
- EN 50082
- VDE 0410
- EN 50081
- EN 61010

Certificates

- ISO 9001: 2015
- DER NORSKE VERITAS

Mounting position

Mounting options	
1	a > 90°
2	⊥
3	a < 90°
4	⊓



Reed frequency meters

Alternating current

General features

Measurement of network frequency.

- **Voltage range:** ±15% Vn
- **Voltage (Vn):** 100√3, 110√3, 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	Vn	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

Alternating current - 90° Scale

General features

- **Scale:** 90°
- **Voltage range:** ±15% Vn
- **Voltage (Vn):** 100, 110, 230, 400, 440V
- **Accuracy:** 0,5%
- **Burden:** 10mA
- **Moving coil with converter**

90° Scale

Model		FC5AR	FC5A	FC4A	FC3A	FC2A	FC5ARI	FC5AI	FC4AI	FC3AI	FC2AI
Dimensions	mm	45x52,2	48x48	72x72	96x96	144x144	45x52,2	48x48	72x72	96x96	144x144
Rated Voltage	Vn	100,110, 230		100, 110, 230, 400, 440			100,110, 230	100, 110, 230, 400, 440			
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
Rated Voltage	Vn	100, 110, 230, 400, 440				100, 110, 230, 400, 440			
Scale	In	45..55; 48..52; 55..65; 58..62; 380..420 Hz				45...65Hz			

(*) Additional module included

Direct input ammeters

Alternating current - 90° Scale

General features

- **Moving-iron device**
- **Accuracy:** 1,5%
- **Self-consumption:** 0,3 - 1 VA
- **Frequency:** 15-100Hz

Ammeters (A)

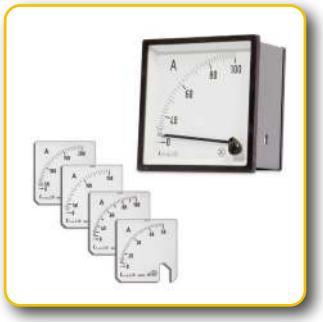
Ammeters (mA)

Model		EC5VR*	EC5V**	EC4V	EC3V	EC2V	ECb7**	ECb3**	ECb8**
Dimensions (mm)		45x52,2	48x48	72x72	96x96	144x144	80x64	105x80	130x100
		Ammeters (A)							
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							
		Ammeters (mA)							
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							

* Maximum measuring range for Ammeters (A): 40A; 40-80A; 40-200A. **Maximum measuring range for Ammeters (A): 50A; 50-100A; 50-250A.

Indirect input ammeters

Alternating current - 90° Scale



General features

- **Moving-iron device**
- **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
		Interchangeable scale				Fixed scale			
Dimensions (mm)		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 (A)

Alternating current - 240° Scale

General features

Current measurement in alternating current circuits. True RMS value.

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

Model		EC5CE (*)	EC4CE (*)	EC3CE	EC2CE
Dimensions (mm)		48x48	72x72	96x96	144x144
		CT 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			

*With additional module: model MBRMS

Ammeters with switch

4 positions - Interchangeable scale - AC

General features

- **4-position switch:** 0, L1, L2, L3
- • **Moving-iron device**
- **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

Alternating current - 90° Scale

General features

- **Moving-iron device**
- **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

Alternating current - 90° Scale

General features

- **Moving-iron device**
- **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)	x/100 V or x/110V			
Scale (Vn)	1,2 times the primary of the voltage transformer			

*Standard input 1,2 x/100V or 1,2 x/110V

Voltmeters (V)

Alternating current - 240° Scale

General features

Voltage measurement in alternating current circuits. True RMS value.

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

Model		EC5CE (*)	EC4CE (*)	EC3CE	EC2CE
Dimensions (mm)		48x48	72x72	96x96	144x144
		VT 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

Voltmeters with switch

Alternating current - 3 and 6 positions

General features

- **Moving-iron device**
- **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
		Operated voltmeters					
Module	Vn	x/100V or x/110V					
		Direct input voltmeters					
Measuring range	Vn	150, 200, 250, 300, 400, 500 and 600V					

Rated value voltmeters

Alternating current - 90° or 240° scale

General features

Voltmeter calibrated for a specific nominal value, providing higher accuracy within a limited section of the scale.

- **Moving-coil with rectifier device**
- **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		

Ammeters through resistances (Shunt)

Direct current - Interchangeable scale - 90° scale

General features

Current Voltage measurement in DC circuits.

- **Moving coil device**
- **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			

Ammeters and voltmeters (µA, mA and A)

Alternating current

General features

Accurate measurement of voltage and current starting from zero (average value of the signal).

- **Moving coil with rectifier**
- **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
		Direct Input Ammeters (µA, mA & A)							
Measuring range	In	40; 50; 60; 100,150; 250; 300; 400; 500 or 600 µA							
		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.							
		CT operated ammeters							
Measuring range	In	X/5A or X/1A							
		VT Operated voltmeters							
Measuring range	Vn	x/100V or x/110V							
		Direct input voltmeters							
Measuring range	Vn	100; 150; 250; 300; 400; 500; 600 V							

240° Scale

Model		CC5CG	CC4CG	CC3CG*	CC2CG
Dimensions	mm	48x48	72x72	96x96	144x144
		Direct input ammeters (µA, mA y A)			
Measuring range	In	150; 200; 300; 400; 500 or 600 µA			
		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			
	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			
		CT 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			
		VT Operated voltmeters			
Measuring range	Vn	1,2 x/100V or 1,2 x/110V			
		Direct input voltmeters			
Measuring range	Vn	100; 150; 250; 300; 400; 500 or 600 V			

*Available model **CC3CGS** 96x96mm for 240° interchangeable scale.

Ammeters (µA, mA and A) and voltmeters (mV and V)

Direct current

General features

- **Scale:** 90°
- **Accuracy:** 1,5%
- **Moving coil device**

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 (µA)							
Measuring range	In	40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 µA							
		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(1)							
		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 (2)							
		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 (µA)				
Measuring range	In	30 - 40 - 50 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600 µA				
		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 ó 600 mA				
		4 - 20 mA(1)				
		Ammeters (A)				
Measuring range	In	1 - 1,5 - 2,5 - 4 - 5 - 6 - 10 - 15 - 20 - 25 - 40				
		.../60 mV or ../150 mV (2)				
		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
* Interchangeable scale

Instruments with contacts

Alternating current or direct current

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
- **Burden (V. Aux):** 3VA
- **Repeatability:** ±1% final scale value
- **Output relays:** 2 (Max. 400V, 1A, 200VA AC)
- **Burden:** <1,5 VA for AC
  <1 mA for DC
- **Scale:** 90°
- **Control cover:** Sealable
- **Mechanical life** 10^7 operations
- **Delay time:** 0-30s..±10%
- **Accuracy:** 1,5%
- **Frequency:** 50 or 60 Hz

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 (1)		

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 (2)		
A	1 - 1,5 - 2,5 - 4 - 5 // x/60mV or 150mV (3)		

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 (2)		
A	1 - 1,5 - 2,5 - 4 - 5 // x/1 or x/5 (1)		

(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

Alternating current - Interchangeable scale

General features

Measurement of the average effective (RMS) current over 15- or 8-minute periods.

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

Model		BC4V	BC3V	BC2V*
Dimensions (mm)		72x72	96x96	144x144
Measuring range		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

Alternating current - Interchangeable scale

General features

Measurement of the average effective (RMS) current over 15- or 8-minute periods. In addition, they feature a second scale that measures instantaneous current.

- **Scale:** 90°
- **Burden:** 2,15 VA
- **Measuring range:** 5A, 1A
- **Bimetallic system and moving-iron device**
- **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

Electronic Phase meters

Alternating current with converter

General features

System power factor measurement.

- **Scale:** 90° or 240°
- **Voltage range:** ±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
Model		AC Single phase - Balanced three phase								
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

Induction Phase meters

Alternating current

General features

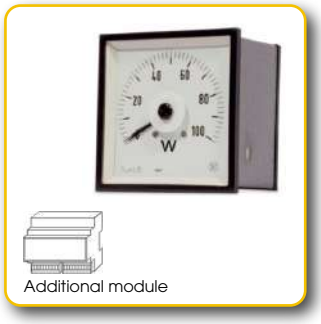
System power factor measurement.

- **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°)
- **Alternating 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
		AC Single phase - Balanced three phase			
AC Single phase		SC3V	SC2V	SC3C	SC2C
Three phase 3 wire		SC3VI	SC2VI	SC3CI	SC2CI
		Balanced three phase			
Three phase 3 wire		SC3VII	SC2VII	SC3CII	SC2CII
Three phase 4 wire		SC3VIIn	SC2VIIn	SC3CIIn	SC2CIIn

Electronic Wattmeters

Alternating current



General features

System active power measuring

- **Scale:** 90° or 240°
- **Voltage range:** ±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
Model		**AC Single phase - Balanced three phase**								
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
Model		**Unbalanced three phase**								
Three phase 3 wires		WC5VRIIE	WC5VIIE	WC4VIIE	WC3VIIE	WC2VIIE	WC5CIIE	WC4CIIE	WC3CIIE	WC2CIIE
Three phase 4 wires		WC5VR3E	WC5V3E	WC4V3E	WC3V3E	WC2V3E	WC5C3E	WC4C3E	WC3C3E	WC2C3E

(*) Additional module included.

Induction Wattmeters

Alternating current

General features

System active power measuring

- **Scale:** 90°
- **Voltage range:** ±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

Dimensions	mm	96x96	144x144
Model		**AC Single phase - Balanced three phase**	
AC Single phase		WC3V	WC2V
Three phase 3 wires		WC3VI	WC2VI
Three phase 4 wires		WC3VIn	WC2VIn
Model		**Unbalanced three phase**	
Three phase 3 wires		WC3VII	WC2VII
Three phase 4 wires		WC3VIIn	WC2VIIn

Electronic varmeters

Alternating current with converter

General features

System reactive power measuring.

- **Scale:** 90° or 240°
- **Voltage range:** ±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
Model		**AC Single phase - Balanced three phase**								
AC Single phase		WC5VRrE*	WC5VrE*	WC4VrE*	WC3VrE	WC2VrE	WC5CrE	WC4CrE	WC3CrE	WC2CrE
Three phase 3 wires		WC5VRIrE	WC5VIrE	WC4VIrE	WC3VIrE	WC2VIrE	WC5CIrE	WC4CIrE	WC3CIrE	WC2CIrE
Three phase 4 wires		WC5VRInrE	WC5VInrE	WC4VInrE	WC3VInrE	WC2VInrE	WC5CInrE	WC4CInrE	WC3CInrE	WC2CInrE
Model		**Unbalanced Three phase**								
Three phase 3 wires		WC5VRIIrE	WC5VIIrE	WC4VIIrE	WC3VIIrE	WC2VIIrE	WC5CIIrE	WC4CIIrE	WC3CIIrE	WC2CIIrE
Three phase 4 wires		WC5VR3rE	WC5V3rE	WC4V3rE	WC3V3rE	WC2V3rE	WC5C3rE	WC4C3rE	WC3C3rE	WC2C3rE

(*) Additional module included.

Induction Varmeters

Alternating current

General features

System reactive power measuring.

- **Scale:** 90°
- **Voltage range:** ±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

Dimensions	mm	96x96	144x144
Model		**AC Single phase - Balanced three phase**	
AC Single phase		WC3Vr	WC2Vr
Three phase 3 wires		WC3VIr	WC2VIr
Three phase 4 wires		WC3VInr	WC2VInr
Model		**Unbalanced three phase**	
Three phase 3 wires		WC3VIIr	WC2VIIr
Three phase 4 wires		WC3VIInr	WC2VIInr

Synchronization column

3 instruments

General features

Equipment with three instruments: double or differential voltmeter; double or differential frequency meter and synchronoscope, for parallel connection of two generators, or of a generator with the network.

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

Model	Volmeters	Frequency meters	Synchroscopes
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°
ES2V	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**

Synchroscopes

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
- **Voltage range:** ±15% Vn
- **Accuracy:** 1,5% of 90° electric
- **Burden:** 20..30 mA
- **Frequency:** 50 or 60Hz

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

Double frequency meters

For synchronizing instruments

General features

Double measurement (two systems) of two system frequencies

- **Voltage range:** ±15% Vn
- **Accuracy:** 0,5%
- **Burden:** 1,2..2,2 mA
- **Frequency** 50 - 60 Hz

		Reeds			Pointer
Model		**FC3VII**		**FC2VII**	**FC3AII**
Dimensions	mm	96x96		144x144	96x96
Measuring range	Vn	100, 110, 230, 400, 440			100, 110, 230, 400, 440
Scale	Hz	47÷ 53	46÷54; 56÷64	45 ÷ 55; 55 ÷ 65	45 ÷ 65Hz 45 ÷ 55; 48 ÷ 52; 55 ÷ 65; 58 ÷ 62; 90 ÷ 110; 140 ÷ 160; 180 ÷ 220; 380 ÷ 420 Hz
Reeds		13	17	21	—

Reeds

Pointer

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:** ±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°	

Differential voltmeters

For synchronizing instruments

General features

Difference (%) between two syncronizing voltages.

- **Scale:** 90° or 240°
- **Alternating current**
- **Measuring range:** 100, 110, 230, 400, 440V
- **Moving coil with rectifier (AC)**
- **Accuracy:** 1,5%
- **Frequency:** 50 or 60 Hz
- **Burden:** 10 mA

Model		CC3VGD	CC2VGD	CC3CGD	CC2CGD
Dimensions	mm	96x96	144x144	96x96	144x144
Scale type		90°		240°	
Scale	Vn	100..15 - 0 - 15..100% ΔV			

Double voltmeters

For syncronizing instruments

General features

Two moving iron systems. True RMS

- **Scale:** 90°
- **Alternating 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	2x660V	2x720V

Non-electric unit indicators

Direct current

General features

Measurement from transducers, 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^{-1} - m - l/h - pH - m^3/h - m^3/min - mbar - bar - mm - kg - Kgcm - Kg/cm^2 - mm/sec - mmHg - mmH_2O - dB - kPa - MPa

Phase sequence indicators

Alternating current

General features

Phase sequence detection on a three-phase system

- **Burden:** 1,2VA
- **Frequency:** 50 or 60 Hz

Model	IRC4E	IRC3E
Dimensions (mm)	72x72	96x96
Measuring range	100 ÷ 600 V AC	

Elapsed time meter

Alternating current

General features

Control of operating time of machines and equipment.

- **Meter:** mechanical, 7 digits (99999,99)
- **Voltage range:** ±10% Vn
- **Frequency:** 50 or 60 Hz
- **Burden:** 10mA

Model	HC5	HC4	HC3
Dimensions (mm)	48x48	72x72	96x96
Measuring range		115, 230, 400 V AC 24, 48, 110 V DC	

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%
- **Lightning:** 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

For other electrical specifications, contact us.

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 ± 20%
- **Frequency range:** 45..65 Hz
- **Phase difference range:** ±180°
- **Voltage difference margin:** ±100%
- **Accuracy:** 0,5%
- **Accuracy:** 0,1%
- **Accuracy:** 1%
- **Accuracy:** 1%

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

Reverse power relay

Naval Series

General features

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

- **Accuracy:** ± 1,5% (of rated power)
- **Frequency:** 50 or 60Hz
- **Setting:** 2 - 15% Pn (kW)

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

Synchronizing relay

Naval Series

General features

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

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

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

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.

- **Alternating current**
- **Burden:** 1,2VA
- **Frequency:** 50 or 60Hz

Model		RSQ
Dimensions	mm	96x96
Measuring range	V	110, 230, 400, 440 V ± 20%

Maximum current relay

Naval Series

General features

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

- **Alternating current**
- **Setting:** 0,6 - 1,6 In
- **Frequency:** 50 or 60Hz
- **Accuracy:** Current: ±2.5% (Trigger setting value)
  Time: ±3% ±1s.. of set value

Model		RMC2	RMC2A
Dimensions	mm	144x144	
Alarm		-	Incorporated
Measuring range	V	110, 230, 400, 440 V ± 30% AC	

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:** ±2%
- **Min. setting voltage:** 60 -100% Un
- **Max. setting voltage:** 80 -120% Un
- **Min./Max. setting frequency:** 45-55 Hz or 55-60 Hz

Model		RUFC2
Dimensions	mm	144x144
Measuring range	V	100, 110, 230, 400 or 440
Aux. voltage	V	110, 230 or 400 ± 30% AC

Lamp synchronoscope

Naval Series

General features

Synchronization of groups for manual operation.

- **Voltage (Vn):** 110, 230, 400, 440 V ± 20%
- **Frequency:** 50 or 60Hz
- **Alternating current**

Model		SC3VL	SC2VL
Dimensions	mm	96x96	144x144
Measuring range	V	110, 230, 400, 440 V ± 20%	

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 MΩ.

- **Accuracy:** ± 1,5% (from scale arc Un)
- **Frequency:** 50 or 60Hz
- **Setting:** 0..50..0 MΩ
- **External switch included**

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

For other voltages, consult us.

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:** ± 1,5%
- **Scale:** 240°
- **Burden:** 10Ω/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:** ± 1,5%
- **Scale:** 90°
- **Burden:** 2000Ω/V

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

For other voltages, consult us.

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 conFiguretion and the sending of operating data.

ConFiguretion 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
Vaux	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 ϕ)	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

ConFiguretion 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
Vaux	V	Self-powered
Current	A	x/5A

Voltage and current monitoring relay

Current input

General features

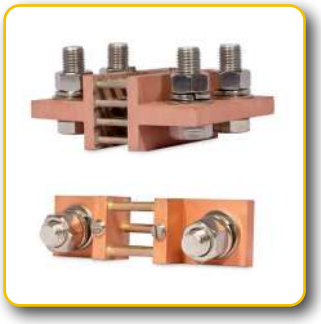
Designed for the supervision of the connection of metering panels in substation or transformer station installations.
Detection of unbalanced currents, voltages, overvoltage and undervoltage.

- **Detection range:**
  Unbalance 0 to 20% of Vn
  Unbalance 0 to 20% of In
  Undervoltage 80 to 100 % of Vn
  Overvoltage 120 % of Vn
- **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	

Shunts

Direct current

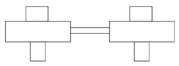


General features

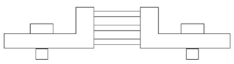
High value current connection on direct current circuits

- **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)

Form 1



Form 2



Form 3

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

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
Voltmeter switches	
4 positions (line - line measurement)	CTP-4
7 positions (line - line and line - neutral measurement)	CTP-7
Ammeter switches	
4 positions	CCP-4

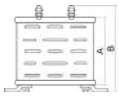
Resistance boxes

Accessory

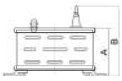
General features

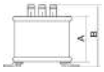
Connection to measuring elements.

- **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

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 (Ω, db, ...)		•			•			•		•		
Internal resistance adjustment (if possible)		•			•			•		•		
Accuracy 1%		•			•			•		•		
600÷900V DC (external potentiometric box)		•			•			•		•		
≥1000÷2000V DC (external potentiom. box)		•			•			•		•		
≥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.

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.