

Test & Measurement

2015



Hand-held, field and laboratory test
and measurement instruments

Measure up



Black and yellow

An amazing story!

1895 reflection galvanometer



Every story starts somewhere. The story of the Chauvin Arnoux company as an inventor and manufacturer of measurement instruments since 1893 is rich in developments and innovations. Today, its products bear witness to and reflect the sociological and technological changes and the industrial innovations which marked the previous century. A fascinating story that explains why and how Chauvin Arnoux's image and personality evolved... in two colours.

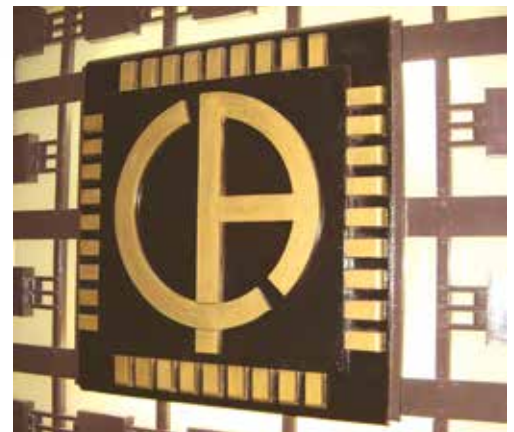
It is often said that at the root of knowledge is language, or that the origin of an innovation was an idea,... yet it is the individual, the person, who is really the source of knowledge and discoveries. This also applies to electricity, which was not invented in the 19th century, but discovered in the 6th century BCE by a Greek philosopher and scientist named Thales, the first person to note the electrostatic properties of amber.

From the beginning of the 19th century, there was the yellow of amber. Then manufactured goods began to include the yellow of brass and copper, materials used in measurement instruments, either for the casings of galvanometers or for the connections of electrical measurement instruments. Beige was also introduced with the use of varnished wood in the casings, while black was reserved for the instruments' dials. Right from the start in 1893, the contrast between black and the yellow of varnished wood soon became the norm for the measurement instruments produced by Chauvin Arnoux.

In a relatively short time, between 1900 and 1936, with the development of new technologies and new techniques for working materials, yellow brass began to be used with black Bakelite, eventually spreading to nearly all our instruments.

Already known for its sense of design and the combination of its original colours yellow brass and black, in its measurement instruments, Chauvin Arnoux reproduced these colours in its first corporate logo in 1927.

In the 1940s, many measurement instruments only used black or black and the silver-grey of ferrous metals, sometimes painted.

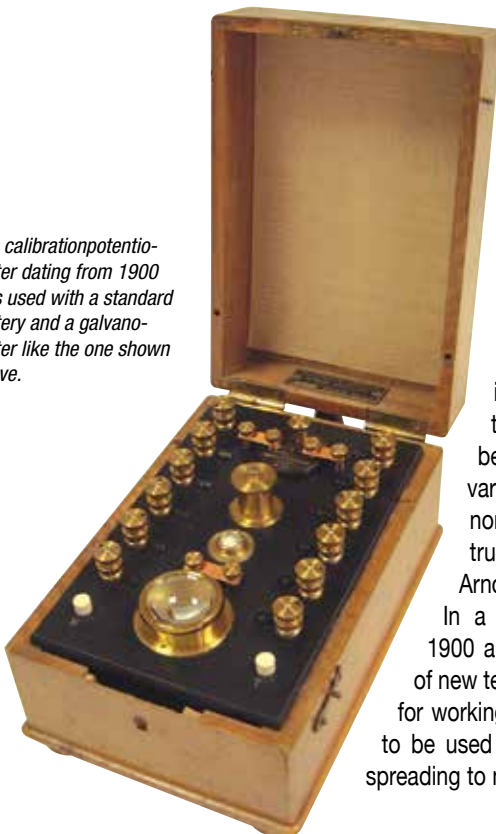


Logo on the company's former main gate

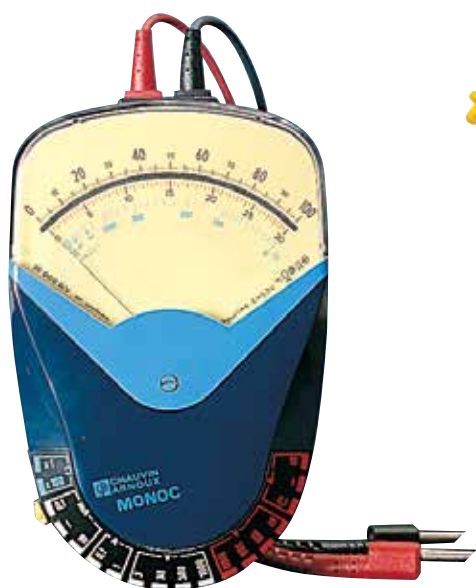
Chauvin Arnoux adapted its original visual identity to suit the fashions of the time, which also corresponded to technical criteria for safety, life-span extension or weight considerations linked to the metal and the manufacturing process used.

The 1950s saw the arrival of rubber-like materials, used for the bases of portable instruments, and subsequently for the shockproof sheaths made of black neoprene, first designed and patented by Metrix® and Chauvin Arnoux in 1958. These shockproof sheaths later became widely used on the handheld instrument market.

The calibration potentiometer dating from 1900 was used with a standard battery and a galvanometer like the one shown above.



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The Monoc L



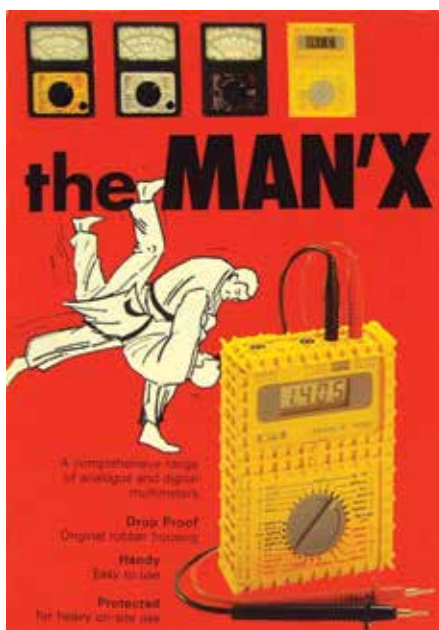
On both the French MICA multi-meter in 1985 and the ANAGRAF American version available the same year, the yellow of Chauvin Arnoux is clearly in evidence.

With the 1970s came plastics technology. This was when Chauvin Arnoux launched worldwide its first innovative products made of black and yellow plastic: the CdA 8 tester in 1979, the CdA 600 multi-meter clamp in 1982, followed by the whole range. Some earth testers, such as the Terca in 1985 and the Prowatt wattmeters in 1989, also had a yellow casing. The combination of yellow and black for on-site equipment began to spread with its use for safety signage and for identifying hazardous areas on site.



Polypince CdA 600 (1982)

The MAN'X 500 series launched by Chauvin Arnoux, the very first multimeters made of a flexible material, further strengthened the company's visual identity.



At about the same time, Metrix launched several products with yellow casings and black platens, including the instruments in its MX 44 series (1988) followed by the MX 51 series. Over the years, Chauvin Arnoux has developed its visual identity across all its product ranges: its multimeters, wattmeters, megohmmeters and installation testers all bear the company's colours.

One last remark about colours: while yellow is always seen as the colour of the sun and of certain kings or emperors in Asia, it is not so widely known that in physics, black is the symbol of a "black body", meaning a system which absorbs all the light it receives. Black and yellow? A historic tandem for Chauvin Arnoux which was the first company to use this pairing for its corporate visual identity in the early 20th century when it first designed its logo in 1927.

Axel Arnoux



MX 51



Chauvin Arnoux is an industrial Group with a comprehensive product offering for the measurement sector

The Group's three areas of expertise (handheld, thermal process and electrical instruments) are marketed respectively by the three French companies **Chauvin Arnoux, Pyrocontrol and Enerdis**.

90 % of our products are entirely designed and manufactured in one of the Group's **six Research and development centres**. Chauvin Arnoux has **4** production sites in France, **1** in the USA and **1** in Italy. We offer a range of more than **5,000 product references** every year to meet the needs of self-employed electricians, local authorities and major accounts in industry.

Integrated service!

To accompany this comprehensive offering, the Group also has **12 agencies** under the **Manumasure** brand to provide top-quality all-round after-sales service (repair, metrological verification, calibration, pollution measurement, etc.) in France. This expertise is also provided internationally via our ten local subsidiaries.

Designed and produced in-house

Every year, the Group invests **nearly 10% of its sales revenue in Research and Development** to maintain its technological leadership and its reputation for design and constant innovation. Designed in the R&D Centres in France, Austria and the USA, the Group's measurement instruments are **manufactured in Chauvin Arnoux's production plants**. The plastic and metal parts are manufactured at Vire, while the printed circuit boards are etched at Villedieu. Assembly, conditioning, storage and shipment worldwide are all handled on the site at Reux (Pont-l'Évêque) in Normandy.

Eco Conception

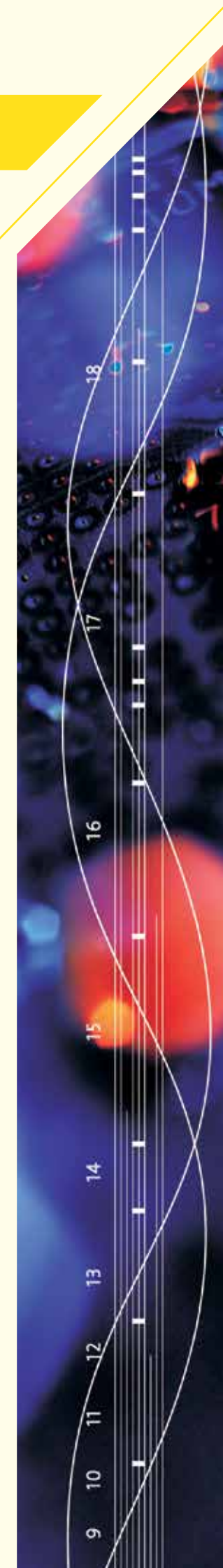
Several years ago, the Group launched a civic-minded initiative with the purpose of reconciling protection of the environment with the economic imperatives. The Chauvin Arnoux Group's **Eco Conception label** (eco-design in English) highlights the company's commitment to recycling and recovery of product materials from the design phase onwards.

An international presence

10 subsidiaries in Europe, **the United States**, China and the Middle East, backed by export sales teams, support the Chauvin Arnoux Group's international development, enabling it to market its Chauvin Arnoux, Metrix, Multimetrix, Enerdis, Pyro-Contrôle, **AEMC** and **AMRA** brands on all five continents.



All the Chauvin Arnoux Group's sites have received ISO 9001 and ISO 14001 certification.



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Accessories

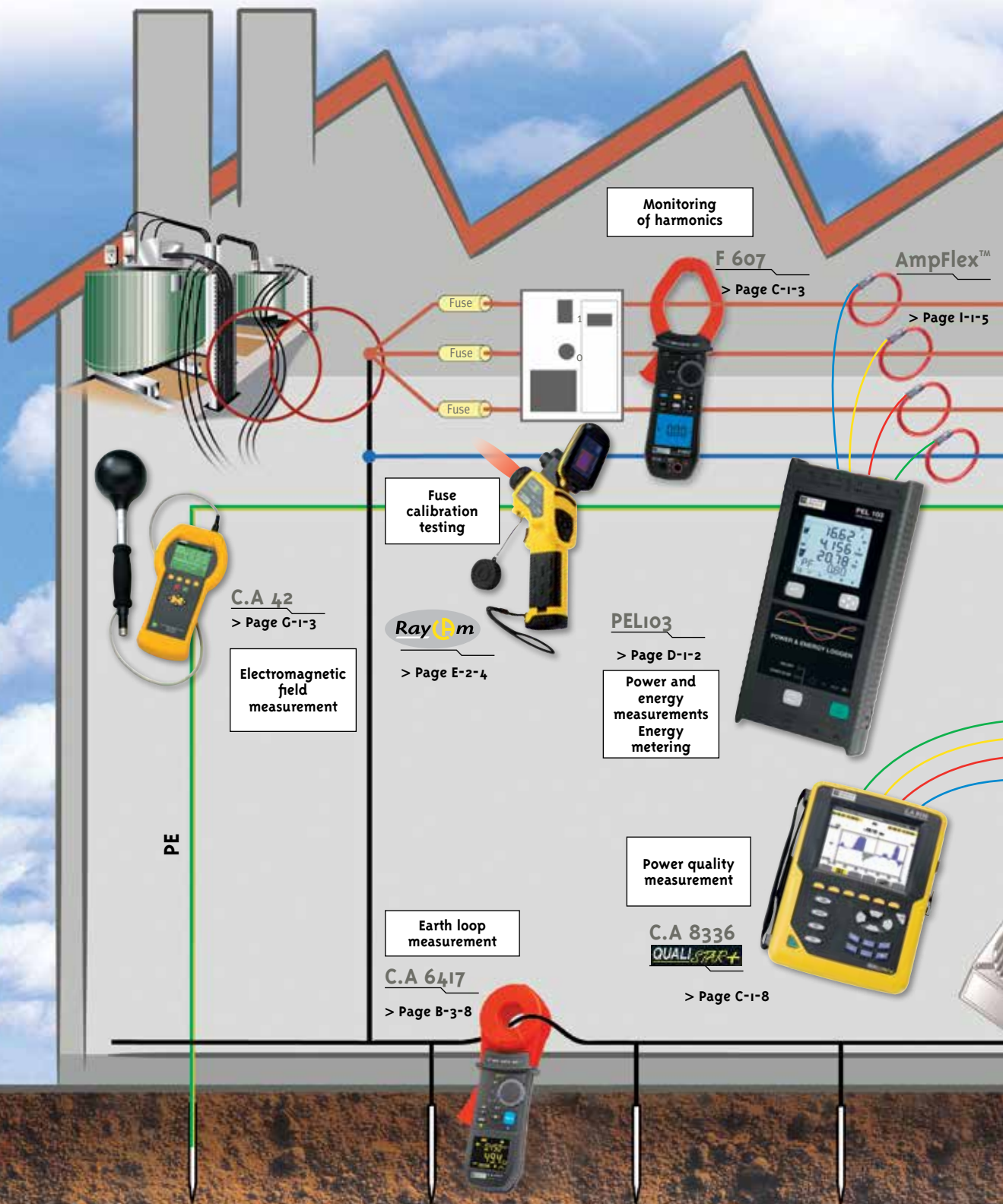
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Industry and tertiary sector

*In the context of your activities, you use some of our products.
Discover a few of their applications.*

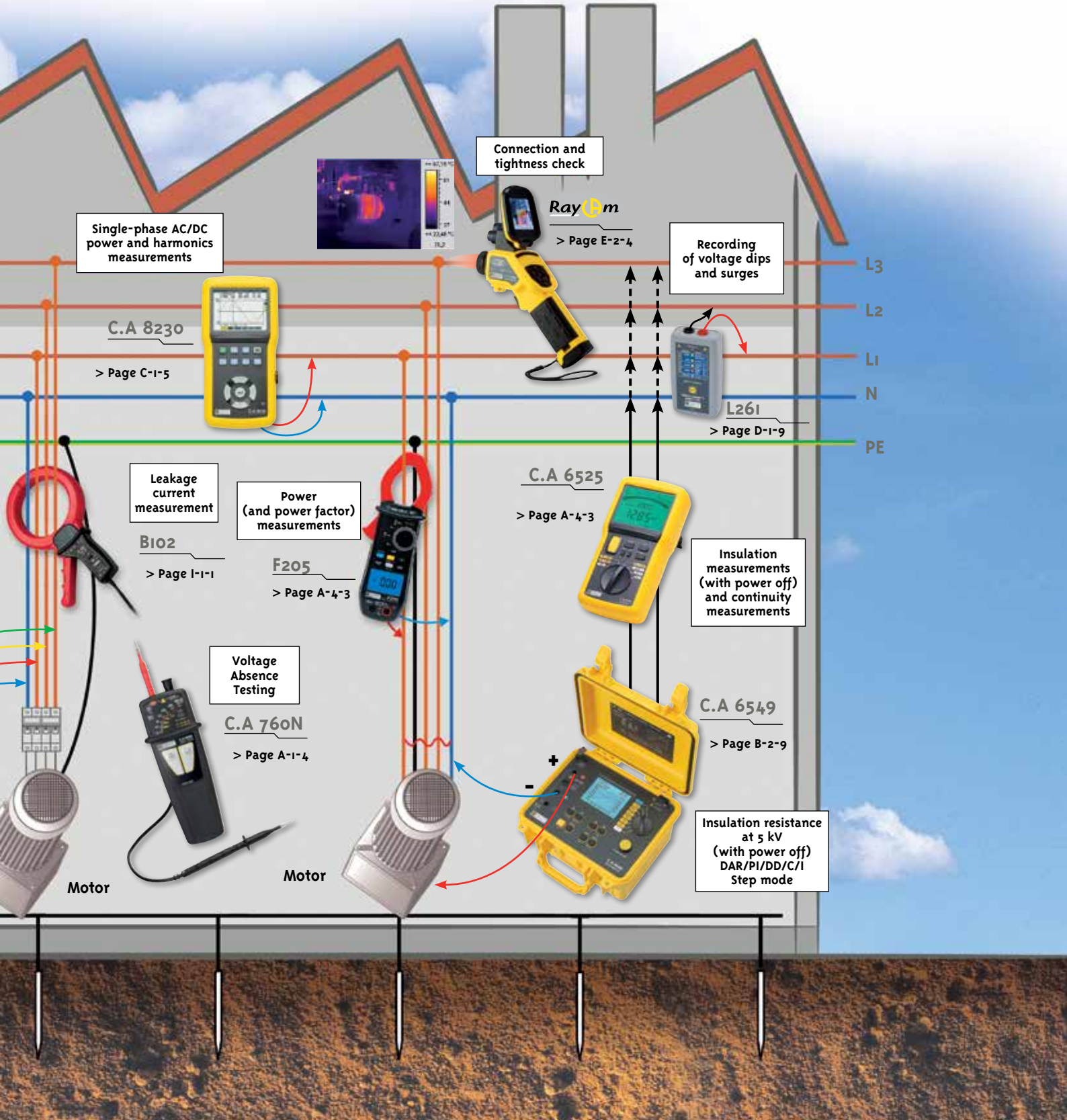


Parallel earth-electrode networks

See our product index on page k-1-1

New

In each section, the selection guide will help you choose your instrument and its accessories

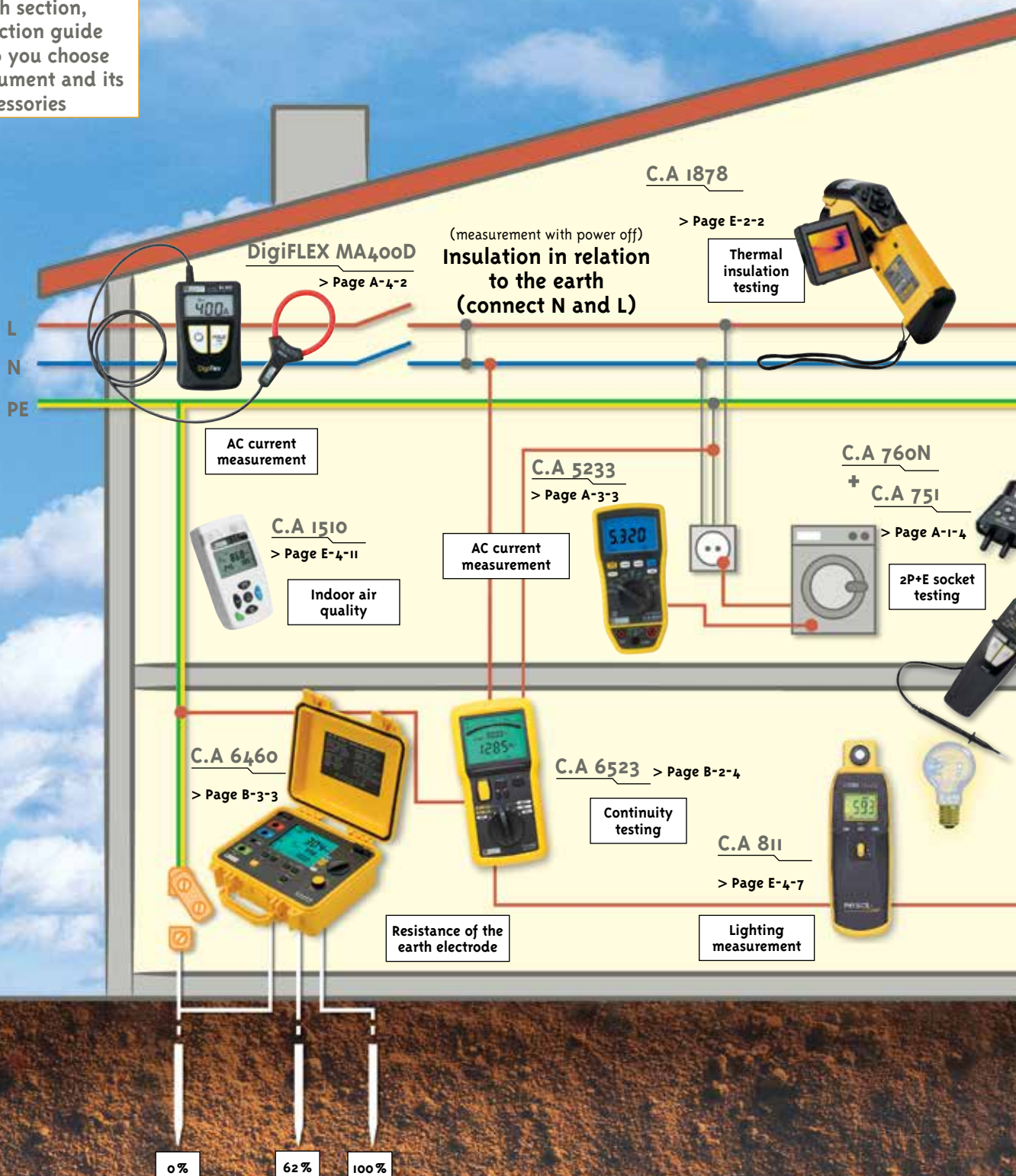


Housing

You use our products for your work.
Discover a few of their applications.

New

In each section, the selection guide will help you choose your instrument and its accessories



See our product index on page k-1-1

Reminders

> **The NFC 15-100 standard imposes the following tests:**

■ **Earth measurement**
The resistance of the earth stake must be greater than 100 Ω to allow the fault currents to flow to earth.

■ **Insulation measurement**
between conductors and of the entire Installation in relation to the earth For an installation with a nominal voltage of 230 V_{AC}, inject 500 V_{DC} and find the resistance > 0.5 MΩ. This measurement is carried out on noncurrent-carrying installations.

■ **Continuity measurement**
(test at 200 mA) Check that the earth conductor is in good condition and properly connected to the earth. Find R < 2 Ω.

■ **Correct operation of RCDs**
They should trip for a current greater than their rated current and within < 300 ms.

> **The French Labour Code makes it mandatory to use a VAT** (instrument compliant with IEC 61243-3) for any work requiring isolation of equipment.

FTV 100
> Page C-2-2

Checking of solar-power installations

F203
> Page A-4-3

AC current measurement

C.A 745
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Phase identification

C.A 5273

Voltage measurement

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C.A 6030

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RCD testing

C.A 8335
QUALISTAR+

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Power quality verification

Checking of connection tightness (prevents any fire hazard)

C.A 1864

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C.A 6116N
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Comprehensive testing of electrical safety on installations

Testing of heat diffusion in rooms (walls, floors, ceilings)

C.A 871

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F205

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Inrush current measurement

Automotive

*You use our products for your work.
Discover a few of their applications.*

C.A 1866 > Page E-3-3

Surface
temperature
measurement
(laser sight)

F205 > Page A-4-3

DC current
measurement

F203 > Page A-4-3

DC current
measurement

C.A 5275 > Page A-3-5

Battery voltage
measurement

See our product index on page k-1-1

Domestic

Testing of comfort parameters...



C.A. 5275
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Ionization current and flame temperature

C.A. 1226
> Page E-4-3

Verification of air circulation

C.A. 895
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Gas detection

C.A. 811
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Checking of lighting

C.A. 6521
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Checking of earth connections of power sockets

C.A. 1244
> Page E-4-2

Ambient humidity measurement

C.A. 871
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Temperature measurement

C.A. 832
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Sound environment measurement

...to live in a healthy home

Standards

EN 60529

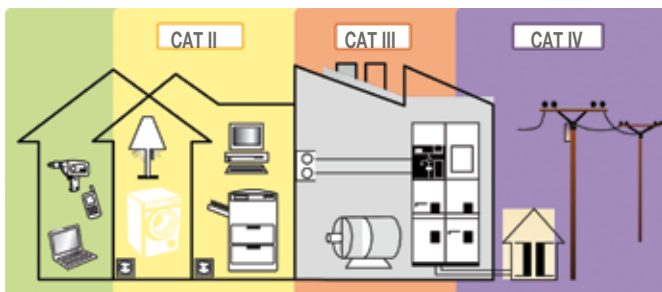
The EN 60529 standard defines the level of tightness (leakproofing) of an instrument against penetration by solids or water. The IP rating corresponds to the instrument's level of protection against penetration by solids (1st digit) and by water (2nd digit). The higher the rating, the more effective the protection. A product without protection corresponds to a rating of IP00 (minimum rating), whereas a product totally protected against penetration by solids and liquids would have a rating of IP68 (maximum rating).

IEC 61010

This international standard defines the safety rules for electrical measuring, control and laboratory instruments. It helps to ensure that the design and construction of the instruments protect users and their environment against: electric shocks, burns, mechanical hazards, the spread of fire from these instruments, excessive temperatures, etc.

For some types of instrument, this standard is completed by specific instructions.

The development of industrial and domestic equipment is increasing the hazards which may be encountered on an electrical installation, notably in terms of ever-higher voltage surges. On LV installations, where the voltages are limited to 1,000 V_{AC} and 1,500 V_{DC}, the hazard levels depend the type of installation and the voltage level.



CAT II Measurements on circuits connected directly to the low-voltage installation

Examples: domestic distribution system, portable or domestic appliances and equipment, mains power sockets.

CAT III Measurements on the building's installation

Examples: fixed installations involved in industrial distribution and the input circuits for electrical maintenance of a building (lighting, lift, etc.).

CAT IV Measurements at the source of the low-voltage installation

Examples: direct distribution circuit, primary sources, overhead-line and cable systems, including distribution busbars and the associated protective equipment against voltage surges.

The international standards in the IEC 61010 family concern the safety rules for electrical measuring, control and laboratory instruments and their uses. More specifically, the IEC 61010-031 standard and its amendment A1 which define the safety rules for measuring instruments and accessories used with them. In the new edition which came into force on 1st March 2011, this stan-

dard has been completed with Chapter 13 covering "prevention of hazards linked to short-circuits and electric arcs":

This addition stipulates the following rules for work on CAT III and CAT IV installations:

- The conductive part of test probes must not exceed 4 mm in length
- The external surfaces of the jaws of crocodile clips must be non-conductive and the conductive parts must not be accessible when the clip is closed.

The IEC 61010-2-033 standard, first published on 09/02/2013, has brought changes concerning multimeters, multimeter clamps, etc.

From 9th March 2015, these instruments will have to guarantee a minimum safety level corresponding at least to CAT III 300 V.

IEC 61557

This international standard specifies the electrical safety characteristics in 1,000 V_{AC} and 1,500 V_{DC} low-voltage distribution networks.

It defines all the requirements for combined performance measurement and monitoring devices which measure and supervise the electrical parameters in electrical distribution networks. These requirements also define the performance levels in single and three-phase AC or DC networks with rated voltages less than or equal to 1,000 V AC or 1,500 V DC.

The parts of the IEC 61557 standard applicable to our areas of test and measurement include:

- Part 1: IEC 61557-1: General
- Part 2: IEC 61557-2: Insulation resistance
- Part 3: IEC 61557-3: Loop impedance
- Part 4: IEC 61557-4: Resistance of earth conductors and equipotential bonding
- Part 5: IEC 61557-5: Resistance to earth
- Part 6: IEC 61557-6: Effectiveness of residual current devices (RCDs) in TT, TN and IT networks
- Part 7: IEC 61557-7: Phase sequence

NF C 15-100

This is the official safety standard concerning the protection of low voltage electrical installations, the protection of people and the ease of managing, operating and upgrading the installation. Installations in housing (house or apartment) must comply with this standard. In particular, NF C 15-100 defines the protective systems, RCD circuit-breakers, wiring, number and type of lighting counts and number of power outlets in each type of room (bathroom, kitchen...), etc.

Tester and VAT selection guide

								
	C.A 732	C.A 730	C.A 735	C.A 745	C.A 740N	C.A 760N	C.A 771	C.A 773
Voltage Absence Testing (VAT)					■	■	■	■
Compliant with IEC 61243-3					■	■	■	■
Integrated self-test		■		■	■	■	■	■
LED display	■	■	■	■	■	■	■	■
Digital display								■
Single-pole phase detection				■	■	■	■	■
No-contact phase detection	■	■						
AC or DC voltage test			■	■	■	■	■	■
Stray voltage detection							■	■
RCD tripping							■	■
Audible continuity				■	■	■	■	■
Resistance				■		■	■	■
"2-wire" phase rotation						■	■	■
Removable test probe			■	■	■	■	■	■
IP2X version					■	■	■	■
Extended climatic class							■	
IP65					■	■	■	■
CAT III 600V		■	■	■				
CAT III 1000V	■							
CAT IV 600V					■	■		
CAT IV 1,000V							■	■
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Testers



C.A 730, C.A 732, C.A 735 & C.A 745

- > **C.A 730**
 - No-contact phase detection
 - Operates on closed power sockets
- > **C.A 732**
 - No-contact phase identification
 - Moulded body for exceptional handling
 - Built-in torch
- > **C.A 735**
 - Voltage test up to 690 V_{AC/DC}
 - No risk of tripping high-sensitivity RCDs during phase/earth tests
- > **C.A 745**
 - Phase test with a single test probe
 - Phase test with a single test probe
 - Continuity and resistance testing
 - No risk of tripping high-sensitivity RCDs during phase/earth tests

State at delivery



- > **C.A 732** delivered in blister pack with 2 x 1.5 V battery and 1 operating manual
- > **C.A 730** delivered in blister pack with 1 x 9 V battery and 1 operating manual
- > **C.A 735** delivered in blister pack with 1 x 9 V battery, 1 test probe and 1 operating manual
- > **C.A 745** delivered in blister pack with 1 x 9 V battery, 1 removable test probe and 1 operating manual

References to order

- > **C.A 732** >P01191745Z
- > **C.A 730** >P01191733Z
- > **C.A 735** >P01191734Z
- > **C.A 745** >P01191736Z



Testers

C.A 730, C.A 732, C.A 735 & C.A 745

	C.A 730	C.A 732	C.A 735	C.A 745
Specifications				
Voltage test			12 V to 690 V~ (7 LEDs)	
Buzzer			U > 50 V~	
Impedance	No-contact phase detection 195 V~ < U < 265 V~	No-contact phase detection with built-in torch	400 kΩ	
Phase/neutral identification			Flashing "Ph" LED and intermittent buzzer if U > 100 V~	
Operating frequency	45 Hz to 400 Hz	50/60 Hz	DC and 50/60 Hz	
Polarity test			"+" and "-" LEDs	
Voltage protection			Up to 1,000 V for 30 seconds	
Audible continuity test			R < 2 kΩ	
Resistance test			2 kΩ to 300 kΩ	
Resistance protection			Up to 550 V	
Standards	IEC 61010 600 V CAT III	IEC 61010 1,000 V CAT III	IEC 61010 600 V CAT III	
Power supply	Standard 9 V battery	2 x 1.5 V AAA	Standard 9 V battery	
Other features			Built-in 1.2 mm lead with test-probe. Safety test probe	Built-in 1.2 mm lead with test-probe. Lockable removable red safety test probe
Dimensions / weight	179 x 47 x 33 mm / 120 g	176 x 26 mm / 48 g	193 x 47 x 36 mm / 170 g	

Accessories / Replacement parts

- > **For C.A 730 and C.A 735**
Wrist strap > P03100824
- > **For C.A 730, C.A 735 and C.A 745**
9 V alkaline battery > P01100620
Carrying bag no. 10 > P01298012
Blister-pack carrying bag no. 10 > P01298012Z
200 x 100 x 40 mm soft case
with belt attachment > P01298065Z
- > **For C.A 732**
1.5 V alkaline battery > P01296032
- > **For C.A 735 and C.A 745**
Soft case no. 5 > P03100850
Carrying bag > P01298007
- > **For C.A 745**
Test probe with locking stud > P01103061Z

Other accessories:
test, transport and protection accessories

> See pages J-1-0 to J-4-0



Low-voltage two-pole Voltage Absence Testers



- > **C.A. 740N & C.A. 760N**
- Comply with Edition 2 of the IEC 61243-3 standard
- Full integrated autotest
- Voltage test up to 690 V_{AC} (16 2/3-800 Hz) / 750 V_{DC}
- Single-pole phase test
- Phase order up to 400 Hz
- Continuity test
- Removable test probe and lead
- Automatic standby and wake-up
- Fulfil the requirements of the standards: EN 50110-1, NF C 18-510 1, etc.

Specifications

Voltage Absence Tester

Voltage	12 V _{AC} ≤ U ≤ 690 V _{AC} 12 V _{DC} ≤ U ≤ 750 V _{DC}
Frequency	DC, 16 2/3 to 800 Hz
Impedance	> 300 kΩ
Max. peak current	3.5 mARMS
Polarity indication	Yes
Redundant dangerous voltage indication	
Phase / Neutral identification	Above 50 V (45 – 65 Hz) Above 150 V (16 2/3 – 45 Hz)
Continuity with buzzer	
Trigger threshold	100 Ω typical (150 Ω max.)
Extended continuity test	2 kΩ, 60 kΩ, 300 kΩ
Test current	≤ 1 mA
Open-circuit voltage	≤ 3.3 V
Protection	up to 1,000 V
Phase rotation	No
Ph/Ph voltage	50 V ≤ U ≤ 690 V _{AC} (45 ~ 400 Hz)
Buzzer	Intermittent beep for voltage detection Continuous beep for continuity
Standards and electrical safety	IEC 61243-3: 2009 / EN 61243-3: 2010 concerning Voltage Absence Testers (VATs)
Enclosure protection	Casing: IP65 Test probes (option): IP2X
Climatic conditions	Operation from -15 °C to +45 °C / 20 to 95% RH
Power supply	2 x 1.5 V batteries (AAA or LR3)
Battery life	7,500 x 10s measurements
Dimensions / weight	163 x 64 x 40 mm / 210 g

C.A. 740N & C.A. 760N / IP2X

C.A. 740N

C.A. 760N

	C.A. 740N	C.A. 760N
Voltage	12 V _{AC} ≤ U ≤ 690 V _{AC} 12 V _{DC} ≤ U ≤ 750 V _{DC}	
Frequency	DC, 16 2/3 to 800 Hz	
Impedance	> 300 kΩ	> 400 kΩ
Max. peak current	3.5 mARMS	
Polarity indication	Yes	
Redundant dangerous voltage indication		
Phase / Neutral identification	Above 50 V (45 – 65 Hz) Above 150 V (16 2/3 – 45 Hz)	
Continuity with buzzer		
Trigger threshold	100 Ω typical (150 Ω max.)	
Extended continuity test		2 kΩ, 60 kΩ, 300 kΩ
Test current	≤ 1 mA	
Open-circuit voltage	≤ 3.3 V	
Protection	up to 1,000 V	
Phase rotation	No	2-wire method
Ph/Ph voltage	–	50 V ≤ U ≤ 690 V _{AC} (45 ~ 400 Hz)
Buzzer	Intermittent beep for voltage detection Continuous beep for continuity	
Standards and electrical safety	IEC 61243-3: 2009 / EN 61243-3: 2010 concerning Voltage Absence Testers (VATs)	
Enclosure protection	Casing: IP65 Test probes (option): IP2X	
Climatic conditions	Operation from -15 °C to +45 °C / 20 to 95% RH	
Power supply	2 x 1.5 V batteries (AAA or LR3)	
Battery life	7,500 x 10s measurements	7,000 x 10s measurements
Dimensions / weight	163 x 64 x 40 mm / 210 g	

State at delivery

- > 1 voltage absence tester delivered in blister pack with 1 black Ø 2 mm test-probe lead with crystal safety cover, 1 red Ø 2 mm test-probe with crystal safety cover, 1 wrist-strap, 2 x 1.5V LR03/AAA batteries & 1 operating manual in 5 languages.
- > IP2X version: delivered with 1 set of IP2X Ø 4 mm test-probe leads 0.85 m (black) and 0.25 m (red) long, 1 wrist strap, 2 x 1.5 V LR03/AAA batteries and 1 operating manual in 5 languages.

References to order

- > **C.A. 740N** > P01191741Z
- > **C.A. 760N** > P01191761Z
- > **C.A. 740N IP2X** > P01191741B
- > **C.A. 760N IP2X** > P01191761B

Accessories / Replacement parts

- Adapter for 2P+E sockets > P01101997Z
- Red test probe, replacement for VAT. > P01102008Z
- Complies with IEC 61243-3
- Black test-probe lead, replacement for VAT. > P01102009Z
- Complies with IEC 61243-3
- Adapter for safety rod > P01102034
- Measurement adapter for 2P+E socket - C.A. 753 model > P01191748Z
- Crystal safety cover for test probe D2 (x10) > P01102033
- Set of 2 leads 0.25m and 0.85m long with Ø4 IP2X probes > P01295285Z
- Set of 2 leads 1.5m long with Ø4 IP2X probes > P01295462Z
- Soft case 200X100X40 > P01298065Z
- Wrist strap > P03100824
- Multifix bag 120 x 20 x 60 > P01298074

CAT IV 1000 V two-pole LV Voltage Absence Testers

C.A 771, C.A 771 IP2X, C.A 773, C.A 773 IP2X

Specifications

	C.A 771	C.A 773
Display	LEDs	LEDs + Backlit digital display
Voltage detection	$12 V_{AC} \leq U \leq 1,000 V_{AC}$ $12 V_{DC} \leq U \leq 1,400 V_{DC}$	
Voltage	DC, 162/3 to 800 Hz	
Frequency	> 500 k Ω	
Impedance	3.5 mA RMS	
Max. peak current	Yes	
Polarity indication	Yes (by low-impedance load switching)	
Stray voltage detection	Yes (by low-impedance load switching) (approx. 30 mA at 230 V).	
RCD tripping	The ELV (Extra-Low Voltage) LED indicates a voltage higher than the SELV (Safety Extra-Low Voltage) with a flashing rate proportional to the voltage	
Redundant hazardous-voltage indication	Above 50 V (45 - 65 Hz) / Above 150 V (162/3 - 45 Hz)	
Phase/Neutral identification		
Continuity & Resistance		
Buzzer trigger threshold	100 Ω typical (150 Ω max.)	100 Ω typical (150 Ω max.)
Extended continuity test (Resistance)	2 k Ω , 60 k Ω , 300 k Ω	0.5 Ω to 2.999 k Ω
Test current / Open-circuit voltage	≤ 1 mA / ≤ 3.3 V	
Phase rotation	2-wire method	
Ph/Ph	$50V \leq U \leq 1,000 V_{AC}$ (45 - 400 Hz)	
Buzzer	Intermittent beep for voltage detection / Continuous beep for continuity	
Standards and electrical safety	IEC 61243-3:2009, EN 61243-3:2010 IEC 61010 1,000V CAT IV	
Enclosure protection	IP65	
Climatic conditions	-30 °C to +60 °C (extended "Class S")	-15 °C to +45 °C ("Class N")
Battery life	> 5,000 measurements of 10s each	> 2,500 measurements of 10s each
Dimensions / Weight	228 x 60 x 39 mm (without test probe) / approx. 350 g	



AVAILABLE IN MID-2015

> C.A 771 & C.A 773

- 1,000 V CAT IV to cover all LV applications and installations
- Complete autotest with indication of the type of fault
- Lighting of the test probe
- Compliant with the requirements of the EN 50110-1 standard, NF C 18-510, etc.
- Detection of stray or spurious voltages
- Tripping of protective RCDs
- "2-wire" phase rotation with microprocessor
- Automatic standby
- Extended climatic class

State at delivery

- The C.A 771 and C.A 773 are delivered with an operating manual in 5 languages, 2 x 1.5V LR03/AAA batteries, 1 set of removable RD/BK \varnothing 2 test probes with crystal safety covers, 1 probe protector, 1 Velcro strap
- The C.A 771 IP2X and C.A 773 IP2X are delivered with an operating manual in 5 languages, 2 x 1.5V LR03/AAA batteries, 1 set of removable RD/BK \varnothing 4 IP2X test probes, 1 Velcro strap

Accessories / Replacement parts

- | | |
|---|--------------|
| CAT IV test probes for VAT | > P01102123Z |
| D2 test probes for VAT | > P01102124Z |
| D4 test probes for VAT | > P01102125Z |
| Probe protector for VAT | > P01102126Z |
| IP2X CAT IV test probes for VAT | > P01102127Z |
| IP2X D4 test probes for VAT | > P01102128Z |
| Measurement adapter for 2P+E socket C.A 753 | > P01191748Z |

References to order

- | | |
|--------------------|--------------|
| > C.A 771 DTT | > P01191771 |
| > C.A 771 DDT IP2X | > P01191771A |
| > C.A 773 DTT | > P01191773 |
| > C.A 773 DDT IP2X | > P01191773A |



Technical reminders

NUMBER OF (MEASUREMENT) COUNTS

This is one of the fundamental characteristics of instruments using analogue-digital conversion. In general, it can be used to define the measurement range and resolution on the basis of the value chosen for the rated calibre.

MEASUREMENT RANGE

This represents the limits within which the instrument retains all its capabilities and the indications obtained are not affected by an error greater than the maximum tolerated error.

It is defined by minimum and maximum measurable values.

RATED CALIBRE

An instrument's calibre is the value of the quantity to be measured which corresponds to the upper limit of the measurement range. For example, for an ammeter, if the upper limit is 5 A, it is said to have a calibre of 5 A.

RESOLUTION

This is the smallest measurable value difference. It is also the value of a measurement count or quantification unit, usually called the "unit".

MINIMUM MEASURABLE VALUE (OR THRESHOLD)

This is the smallest measurable value. For an instrument with good conversion linearity, it may be the same as the resolution.

This is not always the case, however, and the manufacturer should indicate it clearly, as this minimum value also determines the accuracy and, in particular, the constant error.

If the constant error is too high, valid measurement of very low values becomes impossible.

RMS (ROOT MEAN SQUARE)

By definition, the RMS value of any current is the value of the DC current which would cause the same heating when flowing through a resistor.

$$V_{rms} = \sqrt{\frac{1}{T} \int_0^T V(t)^2 dt}$$

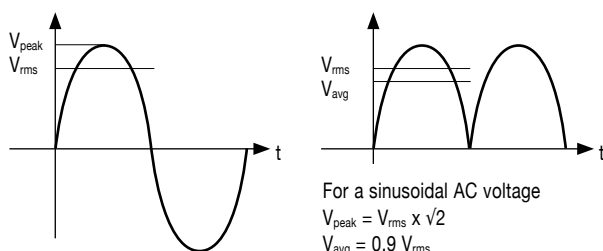
In the specific case of a sinusoidal quantity, application of the above relation yields:

$$v = V_{peak} \cos \omega t$$

$$V_{rms} = \sqrt{\frac{1}{T} \int_0^T V_{peak}^2 \cos^2(\omega t)^2 dt} = \frac{V_{peak}}{\sqrt{2}}$$

The amplitude (V_{peak}) of a voltage or a sinusoidal current is $\sqrt{2}$ times its RMS value ($V_{peak} = \sqrt{2} V_{rms}$).

It is crucial to know this RMS value in the industrial field because this value defines a current.



Thus, for the 230 V/50 Hz mains network:
 $V_{rms} = 230 \text{ V}$; $V_{peak} = 325 \text{ V}$; $V_{avg} = 207 \text{ V}$

An "average-value" measuring instrument measures the average value of a sinusoidal current after rectification and filtering and then displays the RMS value after applying a coefficient of $1/0.9 = 1.111$

This indirect measurement method is simple and accurate but only valid for an undistorted sinusoidal current; it only tolerates distortion of a few per cent.

This is why the use of "RMS" measuring instruments is growing. They are based on direct measurement principles: the thermal method (mainly used in metrology) and analogue or digital calculation methods requiring sophisticated electronic components.

PEAK VALUE - CREST FACTOR

The crest factor is defined as follows:

$$CF = V_{peak} / V_{rms}$$

It is information complementing the RMS value which helps to assess the distortion of a signal in qualitative terms.

For a sinusoidal signal, $CF = \sqrt{2} = 1.414$

Advice:

When we talk of a 230 V mains voltage, it is an RMS voltage. For a long time, the linear loads (incandescent lamps, heating) connected to the network only caused slight distortion on the network. The spread of non-linear loads (switching power supplies, dimmers, variable speed drives or compact fluorescent lamps) is calling this approach into question, because "pure" sine signals are increasingly rare on the mains network.

Conventional measuring instruments (giving the RMS value on the basis of the average value) are only accurate with sinusoidal currents. Otherwise, the measurement error may be as high as 50 %!

You are advised to choose "RMS" measuring instruments which are capable of giving correct measurements whatever the waveform of the current or voltage.

SAFETY RULES AND GOOD PRACTICE:

- Use measuring instruments and accessories suitable for application and the measurement conditions.

Prefer CAT IV instruments:

- They withstand voltage surges up to 50 % higher than CAT III instruments
- CAT IV 1,000 V provides protection against electric shocks of 12,000 V, while CAT IV 600 V protects up to 8,000 V.
- If you use a lower-category instrument, you must check that the installation is equipped with functioning protective systems (disconnectors, circuit-breakers, etc.) in good condition. This is often the case... but not always !
- For outdoor installations which are temporary or upstream of the protective systems, CAT IV instruments are mandatory.





- The level of protection is defined by the weakest element. If you use accessories with a lower category or rated voltage than your measuring instrument, it reduces the global safety level offered by your measuring system.

- Use accessories in perfect condition.

Any accessory showing the slightest defect must be replaced immediately because it no longer ensures safety.

- Fuses are protective elements. If you replace them with cheaper models or, even worse, by a piece of metal (copper wire, aluminium foil, etc.), you will no longer be protected against possible voltage surges on the installation.

Analogue multimeters selection guide

	 C.A 5001	 C.A 5003	 C.A 5005	 C.A 5011
Analogue	■	■	■	■
Digital				■
Anti-parallax mirror	■	■	■	
4,000-count display				■
Backlighting				■
TRMS AC + DC measurement method				■
Max.				■
AC and DC voltage up to 1,000 V	■	■	■	■
Low-impedance calibre (LowZ)	■	■	■	
AC and DC current	■	■	■	■
Current via clamp			■	
µA calibre	■	■	■	
5 A calibre	■			
10 A calibre			■	■
15 A calibre		■		
Resistance	■	■	■	■
Audible continuity	■	■	■	■
Frequency				■
dB	■	■	■	■
Fuse test LED	■	■	■	■
Voltage presence LED in ohmmeter mode				■
Page	A-2-2	A-2-2	A-2-2	A-2-3

Analogue multimeters



State at delivery and references

- > **C.A 5001** delivered with 1 set of silicone leads with straight banana plug/elbowed banana plug, 1 set of test-probe leads, 1.5 V LR6 battery and 1 operating manual
>P01196521E
- > **C.A 5001** complete in hard case >P01196521F
- > **C.A 5003** delivered with 1 set of silicone leads with straight banana plug/elbowed banana plug, 1 set of test-probe leads, 9 V battery and 1 operating manual
>P01196522E
- > **C.A 5003** complete in hard case >P01196522F
- > **C.A 5005** delivered with 1 MN89 AC clamp, 1 set of silicone leads with straight banana plug/elbowed banana plug, 1 set of test-probe leads, 9 V battery and 1 operating manual
>P01196523E
- > **C.A 5005** complete in hard case >P01196523F



Accessories / Replacement parts

- | | |
|---|--------------|
| Accessories kit for electricians | > P01295459Z |
| CMI214S current measurement lead | > P03295509 |
| C.A 1871 Infrared probe for multimeter | > P01651610Z |
| C.A 801 1-channel temperature adapter | > P01652401Z |
| C.A 803 2-channel temperature adapter with differential measurement | > P01652411Z |
| Carrying bag no. 21 (250 x 165 x 60 mm) with strap | > P06239502 |
| Carrying bag for multimeter and clamp | > P01298033 |
| Carrying case no. 5 | > P01298036 |
| Hard case for CA 50XX analogue multimeter | > P01298037 |
| MN89 CV 200/20 clamp | > P01120415 |

C.A 5001, C.A 5003 & C.A 5005

- > "Fus" LED for checking HRC fuses
- > "Voltest™" LED shows presence of voltage for resistance measurements*
- Automatic offset for resistance measurements*
- µA calibres
- Compact shockproof casing with "Multistand™" multi-purpose fold-away stand

*for C.A 5003 and C.A 5005

■ C.A 5001 ■ C.A 5003 ■ C.A 5005

Specifications

DC voltage	8 calibres: 100 mV / ... / 1,000 V		
AC voltage	5 calibres: 10 V / ... / 1,000 V		
Internal resistance	20 kΩ/V		
Operating frequency	10 Hz ... 100 kHz depending on calibre		
DC intensity	5 cal.: 50 µA / ... / 5 A	7 cal.: 50 µA / ... / 15 A	6 cal.: 50 µA / ... / 10 A
AC intensity	4 cal.: 5 mA / ... / 5 A	5 cal.: 1.5 mA / ... / 15 A	5 cal.: 3 A / ... / 300 A (2)
Resistance	2 cal.: 10 kΩ and 1 MΩ		
Audible continuity test	R < 50 Ω		
Scale in dB for V~	0 ... +22 dB		
Typical accuracy (3)	1.5 % for V ~, 2.5 % for V ~ and A ~ • 10 % for Ω		
Power supply	1.5 V battery	9 V battery	
Battery life	10,000 measurements of 15 s	10,000 measurements of 10 s	
Electrical safety (4)	IEC 61010-1 Edition 2- 600 V CAT III		
Protection (5)	HRC fuses 0.5 A and 5 A	HRC fuses 1.6 A and 16 A	HRC fuses 1 A and 10 A
Protection	IP 40		IP 53
Climatic conditions	-10 °C ... +55 °C and RH < 90 %		
Dimensions / weight	160 x 105 x 56 mm / 500 g		

(1) Additional Voltest™ function for checking possible presence of voltage during resistance measurement and audible continuity test – (2) Limited to 240 A maxi by the MN 89 miniclamp – (3) In % of full scale – (4) Pollution 2 – (5) Electronic protection and HRC fuses for the current calibres with fuse check LED.

Accessories / Replacement parts

- > **For C.A 5001 & C.A 5003**
 MN11 LCA 200/0.2 clamp >P01120404
- > **For C.A 5001**
 0.5 A HRC fuses (x 10) > P01297028
 5 A HRC fuses (x 10) > P01297035
 1.5 V LR6 battery > P01296033
- > **For C.A 5003**
 1.6 A HRC fuses (x 10) > P01297036
 16 A HRC fuses (x 10) > P01297037
 alkaline 9 V > P01100620
- > **For C.A 5005**
 10 A HRC fuses (x 10) > P01297038
 1 A HRC fuses (x 10) > P01297039
 alkaline 9 V > P01100620
 MINI 09 1 A/100 mV_{DC} > P01105109Z
 Hard case with pre-cut foam insert for C.A 5005 > P01298037A

TRMS analogue and digital multimeter

C.A 5011

- > **Extra safety thanks to 2 LEDs:**
 - "Fus" for checking HRC fuses
 - "Voltest™" for checking on voltage presence for resistance measurements
- > **Two complementary read-outs:**
 - Digital for accuracy, with backlighting
 - Analogue for quick reading
- > **Automatic recognition of AC/DC**
- > **Compact, shockproof casing with Multistand™ multi-purpose fold-away stand**

Specifications

	C.A 5011
Voltage $\bar{\dots}$ and \sim	2 x 5 calibres 400 mV... 1,000 V
Impedance	10 M Ω
Operating frequency ⁽¹⁾	20 Hz...10 kHz
Current $\bar{\dots}$ and \sim	2 x 6 calibres: 400 μ A ... 10 A
Resistance ⁽²⁾	6 calibres: 400 Ω ... 40 M Ω
Audible continuity test ⁽²⁾	R < 400 Ω
Frequency	3 calibres: 4 kHz... 400 kHz
Scale in dB for V \sim	-20 dB... +16 dB
Max. value	Over 500 ms
Typical accuracy ⁽³⁾	0.5 % for V – 1 % for A and Ω
Power supply	9 V battery
Battery life	300 hours
Electrical safety ⁽⁴⁾	IEC 61010-1 EDITION 2 1,000 V CAT III 600 V CAT IV
Protection ⁽⁵⁾	1 A and 10 A HRC fuses
Protection	IP 53
Climatic conditions	-10 °C... +55 °C and RH < 90 %
Dimensions / weight	160 x 105 x 56 mm / 500 g

(1) Crest factor ≤ 5 – (2) Additional Voltest™ function for checking possible presence of voltage – (3) In digital mode. In analogue mode: 2.5 % – (4) Pollution 2 – (5) Electronic protection and HRC fuses for the intensity calibres with fuse check LED.



State at delivery & references

- > **C.A 5011** delivered with 1 set of silicone leads, straight banana male plug/elbowed banana male plug , 1 set of safety test-probes, 9 V battery and 1 operating manual > P01196311E
- > **C.A 5011** delivered complete **in hard case** > P01196311F

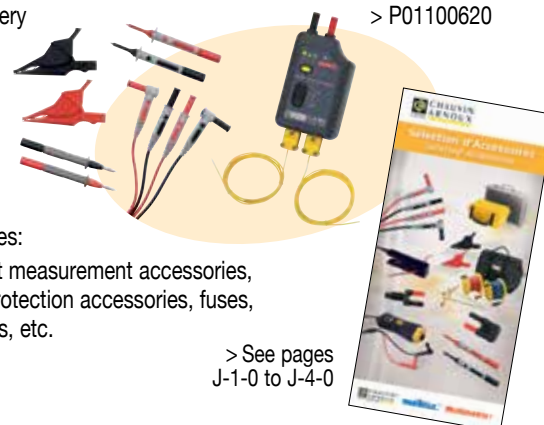


Accessories / Replacement parts

- Accessories kit for electricians > P01295459Z
- PVC lead with test probe, isolated elbowed male plug \varnothing 4 mm (x 2) > P01295456Z
- IP2X test-probe lead for multimeters (x 2) > P01295461Z
- Moulded PVC lead, straight male plug/isolated elbowed male plug \varnothing 4 mm (x 2) > P01295451Z
- Red/black moulded silicone lead, straight male plug/isolated elbowed male plug \varnothing 4 mm (x 2) > P01295453Z
- Safety test probe (x 2) > P01295454Z
- Crocodile clip (x 2) > P01295457Z
- Crocodile wire grip (x 2) > P01102053Z
- Insulation-piercing clip (x 2) > P01102055Z
- \varnothing 4 mm CAT II 300 V test probe (x 2) > P01295458Z
- \varnothing 2 mm CAT II 300 V test probe (x 2) > P01295460Z
- CMI214S current measurement lead > P03295509

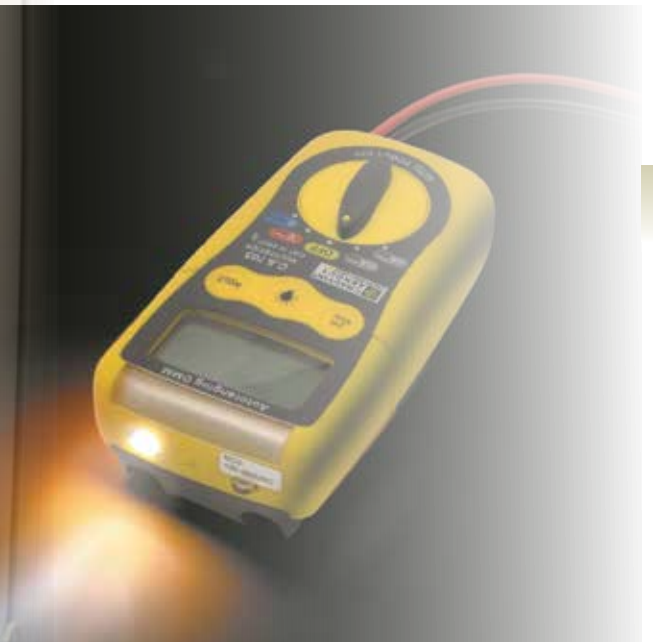
Accessories / Replacement parts

- I/R probe for multimeter > P01651610Z
- C.A 801 single-channel temperature adapter > P01652401Z
- C.A 803 2-channel temperature adapter with differential measurement > P01652411Z
- 9 V alkaline battery > P01100620










Other accessories:
Test and current measurement accessories, transport and protection accessories, fuses, K thermocouples, etc.

> See pages J-1-0 to J-4-0



Digital multimeters selection guide

								
	C-A 702	C-A 703	C-A 5231	C-A 5233	C-A 5271	C-A 5273	C-A 5275	C-A 5277
2,000-count display	■	■						
6,000-count display			■	■	■	■	■	■
Bargraph			■	■	■	■	■	■
Bi-mode bargraph (Full Scale - Central zero)						■	■	■
Backlighting			■	■		■	■	■
AVG measurement method	■	■						
TRMS AC/DC measurement method			■	■	■	■	■	■
TRMS AC+DC measurement method							■	■
Autoranging	■	■	■	■	■	■	■	■
Max				■		■	■	■
Peak								■
AC and DC voltage up to 600 V	■	■						
AC and DC voltage up to 1,000 V			■	■	■	■	■	■
No-contact voltage detection	■	■	■	■				
Low-impedance calibre (LowZ)			■	■	■	■	■	■
LowZ voltage with low-pass filter					■	■	■	■
AC and DC current		■		■	■	■	■	■
Current via clamp			■					
µA calibre		■					■	■
10 A calibre				■	■	■	■	■
Resistance	■	■	■	■	■	■	■	■
Audible continuity	■	■	■	■	■	■	■	■
Semi-conductor testing	■	■	■	■	■	■	■	■
Frequency				■		■	■	■
Capacitance				■		■	■	■
Temperature				■		■		■
CAT III 600 V				■				
CAT III 1,000 V	■	■	■		■	■	■	■
CAT IV 600 V	■	■	■	■	■	■	■	■
Page	A-3-2	A-3-2	A-3-3	A-3-3	A-3-4	A-3-4	A-3-5	A-3-5

Pocket digital multimeters



600 V CAT IV



C.A. 702 & C.A. 703

> Easy handling and safety

- Their compact size and built-in test probes mean you can take them with you anywhere
- Compliant with IEC 61010 600 V CAT IV / 1,000 V CAT III for safety in all conditions with a tool that is always available

Specifications

Display	
Calibre selection	
V _{DC} / accuracy	
V _{AC} / accuracy (40-400 Hz)	
No-contact voltage detection	
IDC / accuracy Protection	
IAC / accuracy Protection	
Resistance · Accuracy · Protection	
Diode test · Test signals · Protection	
Audible continuity · Buzzer · Protection	
Built-in torch	
Standards	
Power supply	
Other features	
Dimensions / weight	

■ C.A. 702

■ C.A. 703

Display	2,000 counts
Calibre selection	Automatic (AUTORANGE)
V _{DC} / accuracy	200 mV / ± 0.5 % R + 3 D 2,000 V; 20.00 V; 200.0 V; 600 V / ± 1.2 % R + 3 D > 600 V / outside specifications
V _{AC} / accuracy (40-400 Hz)	2,000 V; 20.00 V / ± 1.0 % R + 8 D 200.0 V; 600 V / ± 2.3 % R + 10 D > 600 V / outside specifications
No-contact voltage detection	Yes
IDC / accuracy Protection	Yes 200.0 µA; 2,000 µA / ± 2.0 % R + 8 D 20.00 mA; 200.0 mA / ± 2.0 % R + 8 D 200 mA / 500 V Electronic fuse
IAC / accuracy Protection	200.0 µA; 2,000 µA / ± 2.5 % R + 10 D 20.00 mA; 200.0 mA / ± 2.5 % R + 10 D Protection 200 mA / 500 V Electronic fuse
Resistance · Accuracy · Protection	200.0 Ω / ± 0.8 % R + 5 D · 2,000 kΩ, 20.00 kΩ, 200.0 kΩ / ± 1.2 % R + 5 D 2,000 MΩ / ± 5.0 % R + 5 D · 20.00 MΩ / ± 10.0 % R + 5 D · 600 Vrms
Diode test · Test signals · Protection	1.999 V · V Test ≤ 1.5 V I Test ≤ 1.5 A · 600 Vrms
Audible continuity · Buzzer · Protection	199.9 Ω · R < approx. 60 Ω · 600 Vrms
Built-in torch	Yes
Standards	IEC 61010 1,000 V CAT III / 600 V CAT IV
Power supply	2 x 1.5 V AAA batteries
Other features	Built-in test-probe leads connected to the instrument
Dimensions / weight	104 x 55 x 32.5 mm / 145 g

State at delivery

- > **C.A. 702 & C.A. 703** delivered in blister pack with 2 x 1.5 V AAA batteries, 1 operating manual



Accessories / Replacement parts

- 1.5 V LR03 alkaline battery > P01296032
- Soft case 200 x 100 x 40 mm > P01298065Z

References to order

- > **C.A. 702** > P01191739Z
- > **C.A. 703** > P01191740Z

TRMS digital multimeters

C.A 5231 & C.A 5233

> Compact and ergonomic

- TRMS measurements
- AC/DC voltage up to 1,000 V
- AC/DC current up to 600 A with 1,000/1 current clamp (option)



Specifications

	C.A 5231	C.A 5233
Display	6,000-count display + 61-segment bargraph	
Backlighting	Yes	
Measurement	True RMS AC	
Autorange / Manual range	Yes / Yes	
Best accuracy	0.02%	
AC voltage	6 calibres / 1,000 V / resolution: 0.01 mV	
LowZ AC voltage	Yes	
DC voltage	6 calibres / 1,000 V / resolution: 0.01 mV	
AC/DC current	With optional AC or DC clamp (1 mV/A): 1 calibre / 600 A / resolution: 0.1 A	2 calibres / 10 A / resolution 0.01 A
Resistance measurement	6 calibres / 60 MΩ / resolution: 0.1 Ω	
Audible continuity / Diode test	Yes / Yes	
Frequency	3 calibres: up to 3 kHz	
Duty cycle	Yes	
Capacitance	6 calibres / 1,000 μF / Resolution: 0.01 nF	
Temperature	2 calibres / 20 °C to 760 °C / -4 °F to 1,400 °F Resolution: 0.1°	
No-contact voltage detection (NCV)	Yes	Yes
Display Hold function	Yes	Yes
Relative mode		Yes
Min-Max		Yes
Power supply	9 V alkaline battery	
Protection	IP54	
Standards	IEC 61010-1, IEC 61010-2-033 CAT IV 600 V / CAT III 1,000 V	IEC 61010-1, IEC 61010-2-033 CAT IV 600 V / CAT III 600 V
Dimensions / weight	155 x 75 x 55 mm / 320 g	

State at delivery & references

- > **C.A 5231** delivered with 1 set of red/black test-probe leads, 9 V battery and 1 operating manual >P01196731
- > **C.A 5231 kit** C.A 5231 + MINI 03 100 A_{AC} current clamp >P01196734
- > **C.A 5233** delivered with 1 set of red/black test-probe leads, 1 K thermocouple adapter for DMM, 1 wire K thermocouple, 9 V battery and 1 operating manual > P01196733

Accessories / Replacement parts

- Accessories kit for electricians > P01295459Z
- 2 PVC test-probe leads, isolated Ø 4 mm elbowed male plug (red/black) > P01295456Z
- 2 PVC IP2X test-probe leads for multimeters > P01295461Z
- 2 moulded PVC leads, isolated Ø 4 mm straight male plug / elbowed male plug (red/black) > P01295451Z
- 2 moulded silicone leads, isolated Ø 4 mm straight male plug / elbowed male plug (red/black) > P01295453Z
- 2 safety test probes (red/black) > P01295454Z
- 2 crocodile clips (red/black) > P01295457Z
- 2 crocodile wire grips (red/black) > P01102053Z
- 2 insulation-piercing clips (red/black) > P01102055Z
- Ø 4 mm CAT II 300 V moulded test probe (x 2) > P01295458Z
- Ø 2 mm CAT II 300 V moulded test probe (x 2) > P01295460Z
- Infrared probe for multimeter > P01651610Z
- C.A 801 single-channel temperature adapter > P01652401Z
- C.A 803 two-channel temperature adapter with diff. measurement > P01652411Z

Accessories / Replacement parts

- 40 kV_{DC}/28 kV_{AC} high-voltage probe > P01102097
- Multi-position mounting accessory for DMM > P01102100Z
- 9 V alkaline battery > P01100620
- > **For C.A 5231**
- 100 A_{AC} MINI 03 current clamp > P01105103Z
- 400 A_{AC} / 600 A_{DC} PAC10 current clamp > P01120070
- > **For C.A 5233**
- CM1214S current measurement lead > P03295509
- Safety adapter and K-sensor
- wire temperature probe -50 °C to +450 °C > P01102107Z
- Safety thermocouple adapter for multimeters (x 2) > P01102106Z

Other accessories: test and current measurement accessories, K thermocouples, transport and protection accessories, fuses, etc.

> See pages J-1-0 to J-4-0



TRMS digital multimeters



**600 V CAT IV
1,000 V CAT III**

C.A 5271 & C.A 5273

> Simple and automatic for maximum effectiveness, comprehensive functions for electrical maintenance

- Auto AC/DC, Autorange
- Large 6,000-count display
- VLowZ low-impedance voltage setting with low-pass filter
- 3-year warranty
- Double backlit display
- Bargraph central zero mode
- Temperature measurement
- Capacitance measurement
- Manual range selection
- Max / Min storage

Specifications

	C.A 5271	C.A 5273
Display	6,000 counts	2 x 60002 x 6,000 counts with backlighting
Bargraph (60 elements)	Yes	Dual mode (full scale/ central zero)
Acquisition	TRMS AC / DC	
Measurement rate	5 measurements / second	
Automatic / manual ranges	Yes / No	Yes / Yes
V _{DC} / V _{AC}	600.0 mV / 6,000 V / 60.00 V / 600.0 V / 1,000 V	
Typical accuracy (V _{DC})	0.2% + 2 cts	
Bandwidth (V _{AC})	40 Hz to 3 kHz	
V _{LowZ AC}	Low-impedance mode with low-pass filter	
A _{DC} / A _{AC}	6,000 A / 10.00 A (20 A/30 s)	
Ω	600.0 Ω / 6,000 Ω / 60.00 kΩ / 600.0 kΩ / 6,000 MΩ / 60.00 MΩ	
Audible continuity / Diode test	Yes / Yes	
Hz	No	600.0 Hz / 6,000 kHz / 50.00 kHz
Capacitance	No	8 ranges: 6,000 nF to 60.00 mF
Temperature	No	-59.6 °C to +1,200°C / -4°F to 2,192 °F
Hold	Yes	
Min / MAX (100 ms)	No	Yes
Automatic power-off	Yes (deactivatable)	
Safety	IEC 61010-1, IEC 61010-2-033 / CAT IV 600 V / CAT III 1,000V	
Protection and leakproofing	IP54	
Power supply	1 x 9 V battery	
Dimensions / weight	90 x 190 x 45 / 400 g	

State at delivery and references

- > **C.A 5271** delivered with a set of banana leads, a set of test probes, a 9 V battery, a start-up guide and a CD containing the operating manual > P01196771
- > **C.A 5273** the same as the **C.A 5271** with a K thermocouple temperature sensor in addition > P01196773



Accessories / Replacement parts

- Accessories kit for electricians > P01295459Z
- 2 PVC test-probe leads, isolated Ø 4 mm elbowed male plug (red/black) > P01295456Z
- 2 PVC IP2X test-probe leads for multimeters > P01295461Z
- 2 moulded PVC leads, isolated Ø 4 mm straight male plug / elbowed male plug (red/black) > P01295451Z
- 2 moulded silicone leads, isolated Ø 4 mm straight male plug / elbowed male plug (red/black) > P01295453Z
- 2 safety test probes (red/black) > P01295454Z
- 2 crocodile clips (red/black) > P01295457Z
- 2 crocodile wire grips (red/black) > P01102053Z
- 2 insulation-piercing clips (red/black) > P01102055Z
- Ø 4 mm CAT II 300 V test probe (x 2) > P01295458Z
- Ø 2 mm CAT II 300 V test probe (x 2) > P01295460Z
- Infrared probe for multimeter > P01651610Z
- C.A 801 single-channel temperature adapter > P01652401Z

TRMS AC+DC digital multimeters

C.A 5275 & C.A 5277



C.A 5275 | **C.A 5277**

Specifications

Display	2 x 6,000 counts with backlighting	
Bargraph	63 elements, dual mode (full scale/ central zero)	
Acquisition	TRMS AC / DC / AC+DC	
Measurement rate	5 measurements / second	
Automatic / manual ranges	Yes / Yes	
V_{DC} / V_{AC} / V_{AC+DC}	60.00 mV / 600.0 mV / 6 V / 60.00 V / 600.0 V / 1,000 V	
Typical accuracy (V_{DC})	0.09% + 2 cts	
Bandwidth (V_{AC})	40 Hz to 10 kHz	
$V_{LowZ AC}$	Low-impedance mode with low-pass filter	
$A_{DC} / A_{AC} / A_{AC+DC}$	6,000 μ A / 60.00 mA / 600.0 mA / 6,000 A / 10.00 A (20 A / 30 s) Ionization current: 0.2 μ A to 20.0 μ A	
Ω	600.0 Ω / 6,000 Ω / 60.00 k Ω / 600.0 k Ω / 6,000 M Ω / 60.00 M Ω	
Audible continuity / Diode test	Yes / Yes	
Hz	600.0 Hz / 6,000 kHz / 50,00 kHz	
Capacitance	6.000 nF / 60 nF / 600 nF / 6 μ F / 60 μ F / 600 μ F / 6 mF / 60 mF	
Temperature	No	-59.6 $^{\circ}$ C to +1,200 $^{\circ}$ C / -4 $^{\circ}$ F to 2,192 $^{\circ}$ F
Hold	Yes	
Min / MAX (100 ms)	Yes	
Peak+ / Peak- (1 ms)	No	Yes
Differential (Δ X) / RELative (Δ X/X%) measurements	No	Yes
Automatic power-off	Yes (deactivatable)	
Safety	IEC 61010-1, IEC 61010-2-033 / CAT IV 600 V / CAT III 1,000 V	
Protection and leakproofing	IP54	
Power supply	1 x 9 V battery	
Dimensions / weight	90 x 190 x 45 / 400 g	

> Versatile and safe for testing small electrical signals such as for maintenance of electrical networks up to 1,000 V

- TRMS AC+DC measurement of voltage and current
- 5 measurements/ s
- 12-bit converter
- Double 6,000-count backlit display
- Bi-mode bargraph with 61+2 segments
- Deactivatable autorange
- VLowZ low-impedance voltage setting with low-pass filter
- 1000 V / 10 A
- 10 μ V resolution
- Current from 1 μ A
- Measurement of ionization currents
- Temperature / Capacitance
- Min / Max / Peak+ / Peak- acquisition
- Differential (Δ X) and RELative (Δ X/X%) measurements
- 3-year warranty

State at delivery and references

C.A 803 2-channel temperature adapter with differential measurement C.A 803 >P01652411Z
 40 kV_{DC} / 28 kV_{AC} high-voltage probe >P01102097
 CMI214S current measurement lead >P03295509
 MultiFix multi-position mounting accessory >P01102100Z
 Carrying bag compatible with MultiFix 120x200x60mm >PP01298074
 9 V alkaline battery >P01100620

> **C.A 5275** C.A 5275 delivered with a set of banana leads, a set of test probes, a 9 V battery, a carrying bag, a MultiFix mounting accessory, a start-up guide and a CD containing the operating manual >P01196775

> **C.A 5277** C.A 5277 the same as the C.A 5275 with a K thermocouple temperature sensor in addition >P01196777

> For C.A 5273 & C.A 5277

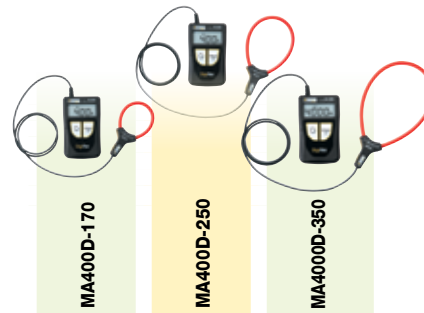
Safety adapter and wire K-sensor temperature probe, -50 $^{\circ}$ C to +450 $^{\circ}$ C >P01102107Z
 Safety thermocouple adapter for multimeters (x 2) >P01102106Z

Other accessories: test and current measurement accessories, K thermocouples, transport and protection accessories, fuses, etc.

> See chapter J














Multimeter clamps selection guide



	MA400D-170	MA400D-250	MA400D-350
45 mm clamping diameter	■		
70 mm clamping diameter		■	
100 mm clamping diameter			■
AC current	■	■	■
True Root Mean Square (TRMS) measurement	■	■	■
4,000-count display	■	■	■
Max.	■	■	■
CAT IV 600 V	■	■	■
Page	A-4-2	A-4-2	A-4-2



Multimeter clamps selection guide

											
	F201	F203	F205	F401	F403	F405	F407	F601	F603	F605	F607
26 mm clamping diameter											
34 mm clamping diameter	■	■	■								
42 mm clamping diameter											
48 mm clamping diameter				■	■	■	■				
60 mm clamping diameter								■	■	■	■
AC current	■	■	■	■	■	■	■	■	■	■	■
DC current		■	■	■	■	■	■	■	■	■	■
Automatic DC zero		■	■	■	■	■	■	■	■	■	■
True Root Mean Square (TRMS) measurement	■	■	■	■	■	■	■	■	■	■	■
Measurement with DC component (AC+DC)		■	■	■	■	■	■	■	■	■	■
Measurement on non-linear loads	■	■	■	■	■	■	■	■	■	■	■
4,000-count display											
6,000-count display	■	■	■								
10,000-count display				■	■	■	■ (x 3)	■	■	■	■ (x 3)
Backlighting		■	■	■	■	■	■	■	■	■	■
Bargraph											
AC and DC voltage measurement	■	■	■	■	■	■	■	■	■	■	■
Resistance	■	■	■	■	■	■	■	■	■	■	■
Audible continuity	■	■	■	■	■	■	■	■	■	■	■
Semi-conductor test	■	■	■	■	■	■	■	■	■	■	■
Frequency	■	■	■	■	■	■	■	■	■	■	■
Temperature	■	■						■	■		
Active power (W)			■			■				■	■
Apparent and reactive power (VA, var)			■			■				■	■
Power Factor (PF/DPF)			■ / -			■ / -	■ / ■			■ / -	■ / ■
AC / DC / AC+DC power measurement			■ / ■ / ■			■ / ■ / ■	■ / ■ / ■			■ / ■ / ■	■ / ■ / ■
Phase rotation (2 wires)			■			■				■	■
Total harmonic distortion (THDf% / THDr%)			■ / ■			■ / ■	■ / ■			■ / ■	■ / ■
Harmonic decomposition: Harm0...Harm25							■				■
Crest factor (CF)							■				■
Automatic deactivatable AC/DC recognition	■	■	■	■	■	■	■	■	■	■	■
Motor InRush	■	■	■	■	■	■	■	■	■	■	■
Overcurrent with load (TrueInrush)	■	■	■	■	■	■	■	■	■	■	■
Min.	■	■	■	■	■	■	■	■	■	■	■
Max.	■	■	■	■	■	■	■	■	■	■	■
Peak			■			■	■			■	■
Smooth											
ΔX differential measurement / ΔX/X relative measurement		■ / ■	■ / ■		■ / ■	■ / ■			■ / ■	■ / ■	
Presence of hazardous voltage (Mlive)											
Compensation of measurement lead resistance											
Adapter input (external probe)		■			■				■		
Analogue output											
Data-logging							■				■
PC interface / Bluetooth interface							■				■
CAT III 600 V											
CAT IV 600 V	■	■	■								
CAT IV 1,000 V				■	■	■				■	■
Page	A-4-3	A-4-3	A-4-3	A-4-4	A-4-4	A-4-4	A-4-4 C-1-2	A-4-5	A-4-5	A-4-5	A-4-5 C-1-3

TRMS digital ammeters with flexible sensors



MA400D & MA4000D

DigiFlex

- Compact, stand-alone and simple to use
- Direct current readings
- Measurement from a few tens of mA
- Storage of the maximum value

Specifications

	■ MA400D			■ MA4000D		
Display range	4 A AC	40 A AC	400 A AC	40 A AC	400 A AC	4,000 A AC
Measurement range	0.020 A ... 3.999 A	4.00 A ... 39.99 A	40.0 A ... 399.9 A	0.01 A ... 39.99 A	40.0 A ... 399.9 A	400 A ... 3,999 A
Resolution	1 mA	10 mA	100 mA	10 mA	100 mA	1 A
Accuracy	± (2% + 10 cts)	± (1.5% + 2 cts)	± (1.5% + 2 cts)	± (2% + 10 cts)	± (1.5% + 2 cts)	± (1.5% + 2 cts)
Clamping diam. / Sensor length	MA400D-170: Ø 45 mm / 170 mm MA400D-250: Ø 70 mm / 250 mm			MA4000D-350: Ø 100 mm / 350 mm		
Bandwidth	10 Hz ... 3 kHz					
Power supply	2 x 1.5 V AAA/LR3 batteries					
Safety	IEC 61010 CAT IV 600 V					
Operating temperature	0°C to +50°C					
Weight	130 g approx.					
Casing dimensions	100 x 60 x 20 mm					
Length of built-in connection cable	0.8 m					

State at delivery

- > 1 DigiFLEX sensor delivered in a blister pack with 2 x 1.5 V AAA batteries, 1 Velcro mounting strap and an operating manual in 5 languages

Accessories / Replacement parts

Bag 120 x 200 x 60
MULTIFIX accessories
Velcro strap (set of 5)

- > P01298074
- > P01102100Z
- > P01102113

References to order

- > MA400D-170 > P01120575Z
- > MA400D-250 > P01120576Z
- > MA4000D-350 > P01120577Z



Compact TRMS digital multimeter clamps

F200 Series

> The clamp specially designed for the needs of self-employed electricians and SMEs/SMLs in the electrical sector

> Low and medium-power LV applications

- 600 A_{AC} (or A_{AC+DC}) / 900 A_{DC}
- Clamping diameter 34 mm
- TRMS acquisition
- TrueInRush function

Specifications

	F201	F203	F205
Clamping diameter	34 mm		
Display	LCD Backlit LCD screen		
Resolution	6,000 counts		
No. of values displayed	1		
Acquisition	TRMS AC	TRMS AC/DC	TRMS AC, DC, AC+DC
Automatic calibres (Autorange)	Yes		
Automatic AC/DC detection	Yes		
A _{AC}	600 A		
A _{DC}	900 A peak		
A _{AC+DC}	600 A (900 A peak)		
Best accuracy	1%R + 3 cts		
V _{AC}	1,000 V		
V _{DC}	1,000 V		
V _{AC+DC}	1,000 V (1,400 V peak)		
Best accuracy	1%R + 3 counts		
Frequency of V / I	Yes / Yes		
Resistance	60 kΩ		
Audible continuity	Adjustable from 1 Ω to 599 Ω		
Diode test (semi-conductor junction)	Yes		
Temperature (K type)	°C: -60.0 to +1,000 °C °F: -76 to +1,832 °F		
Adapter	Yes		
Single-phase and total three-phase power values	AC, DC, AC+DC		
Active power (W)	Yes		
Reactive power (var)	Yes		
Apparent power (VA)	Yes		
PF	Yes		
Harmonic analyses THD _i / THD _v	Yes / Yes		
Phase rotation (2-wire method)	Yes		
Functions			
Overcurrent measurement	Yes		
Motor InRush	Yes		
Load variation (TrueInrush)	Yes		
Hold	Yes		
Min / MAX	Yes		
Peak+ / Peak-	Yes		
RELative ΔX / Differential ΔX/X(%)	Yes / Yes	Yes / Yes	Yes / Yes
Auto Power Off	Yes		
Electrical safety as IEC 61010-1, IEC 61010-2-032, IEC 61010-2-033	600 V CAT IV - 1,000 V CAT III		
Power supply	1 x 9 V LF22		
Dimensions / weight	78 x 222 x 42 mm / 340 g		



**1,000 V CAT III
600 V CAT IV**



TrueInRush

State at delivery & References

- > **F201** delivered with 1 PVC lead with built-in test-probe/insulated elbowed t Ø 4 mm male banana plugs, 1 wire thermocouple with built-in insulated Ø 4 mm banana connections, spacing 19 mm, 9 V alkaline battery, 1 bag pre-equipped for MultiFix, 1 start-up guide on paper and 1 mini-CD with operating manual
> P01120921
- > **F203** same as F201
> P01120923
- > **F205** delivered with 2 PVC leads with insulated elbowed Ø 4 mm male banana plug / straight banana plug, 2 safety test-probes, 1 crocodile clip, 9 V alkaline battery, 1 bag pre-equipped for MultiFix, 1 start-up guide on paper and 1 mini-CD with operating manual
> P01120925

1,000 / 1,500 A TRMS digital multimeter clamps



F400 Series

> Low and medium-power LV applications

- 1,000 A_{AC} (or AC+DC) / 1,500 A_{DC}
- Clamping diameter 48 mm
- TRMS acquisition
- TrueInRush function

F401 ■ F403 ■ F405 ■ F407

Specifications

Clamping diameter	48 mm			
Display	Backlit LCD screen			
	Resolution			
	10,000 counts			
	No. of values displayed			
	1		3	
Acquisition	TRMS AC	TRMS AC/DC	TRMS AC, DC, AC+DC	
Autorange	Yes			
Automatic AC/DC detection	Yes			
A _{AC}	1,000 A			
A _{DC}	1,500 A peak			
A _{AC+DC}	1,000 A (1,500 A peak)			
Best accuracy	1% R + 3 cts			
V _{AC}	1,000 V			
V _{DC}	1,000 V			
V _{AC+DC}	1,000 V (1,400 V peak)			
Best accuracy	1% R + 3 cts			
Frequency of V / I	Yes / Yes			
Resistance	100 kΩ			
Audible continuity	Adjustable from 1 Ω to 999 Ω			
Diode test (semi-conductor junction)	Yes			
Temperature (K type)	°C: -60.0 to +1,000 °C °F: -76 to +1,832 °F			
Adapter	Yes			
Single-phase and total three-phase power values			Yes	
	Active power (W)		Yes	
	Reactive power (VAR)		Yes	
	Apparent power (VA)		Yes	
	FP / DPF		Yes / - Yes / Yes	
Harmonic analysis	THD _r / THD _r		Yes / Yes	
	Frequency analysis			
	No		25th order	
Phase rotation (2-wire method)	Yes			
Functions				
Overcurrent measurement	Yes			
	Motor Inrush			
	Load variation (TrueInrush)			
Hold	Yes			
Min / MAX	Yes			
Peak+ / Peak-	Yes			
RELative ΔX Differential ΔX/X(%)	Yes Yes		Yes Yes	
Auto Power Off	Yes			
Data recording	Yes			
Communication interface	Bluetooth			
Electrical safety as IEC 61010-1, IEC 61010-2-032, IEC 61010-2-033	1,000 V CAT IV - 1,000 V CAT III			
Power supply	4 x 1.5 V AA batteries			
Dimensions / weight	92 x 272 x 41 mm / 600 g			

True **InRush**

1,000 V CAT IV

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State at delivery & References

Delivered in bag pre-equipped for MultiFix with 2 PVC leads with elbowed insulated Ø 4 mm male banana plug / straight insulated Ø 4 mm male banana plug, 2 test probes/insulated Ø 4 mm female plug, 4 x 1.5 V AA alkaline batteries, 1 start-up guide on paper and 1 mini-CD with operating manual.

- > **F401** delivered with 1 wire thermocouple with built-in insulated Ø 4 mm banana connections, spacing 19 mm > P01120941
- > **F403** same as F401 > P01120943
- > **F405** delivered with 1 black CAT IV 1,000 V crocodile clip > P01120945
- > **F407** delivered with 1 set of red/black crocodile clips and the PAT (Power Analyser Transfer) PC software > P01120947

2,000/3,000 A TRMS digital multimeter clamps

F600 Series

> High-power LV applications

- 2,000 A_{AC} (or AC+DC) / 3,000 A_{DC}
- Clamping diameter 60 mm
- TRMS acquisition
- TrueInRush function

Specifications

Clamping diameter	60 mm
Display	Backlit LCD screen
No. of counts	10,000 counts
No. of values displayed	1 3
Acquisition	TRMS AC TRMS AC/DC TRMS AC, DC, AC+DC
Autorange	Yes
Automatic AC/DC detection	Yes
A _{AC}	2,000 A
A _{DC}	3,000 A peak
A _{AC+DC}	2,000 A (3,000 A peak)
Best accuracy	1% R + 3 cts
V _{AC}	1,000 V
V _{DC}	1,000 V
V _{AC+DC}	1,000 V (1,400 V peak)
Best accuracy	1% R + 3 cts
Frequency of V / I	Yes / Yes
Resistance	100 kΩ
Audible continuity	Adjustable from 1 Ω to 999 Ω
Diode test (semi-conductor junction)	Yes
Temperature (K type)	°C: -60.0 to +1,000 °C °F: -76 to +1,832 °F
Adapter	Yes
Single-phase and total three-phase power values	Yes
Active power (W)	Yes
Reactive power (VAR)	Yes
Apparent power (VA)	Yes
FP / DPF	Yes / - Yes / Yes
Harmonic analyses THD _i / THD _r	Yes / Yes
Frequency analysis	25th order
Phase rotation (2-wire method)	Yes
Functions	
Overcurrent measurement	Yes
Motor Inrush	Yes
Load variation (TrueInrush)	Yes
Hold	Yes
Min / MAX	Yes
Peak+ / Peak-	Yes
RELative ΔX Differential ΔX/X(%)	Yes Yes Yes
Auto Power Off	Yes
Data recording	Yes
Communication interface	Bluetooth
Electrical safety as IEC 61010-1, IEC 61010-2-032, IEC 61010-2-033	1,000 V CAT IV - 1,000 V CAT III
Power supply	4 x 1.5 V AA batteries
Dimensions / weight	111 x 296 x 41 mm / 640 g

	F601	F603	F605	F607
Clamping diameter	60 mm			
Display	Backlit LCD screen			
No. of counts	10,000 counts			
No. of values displayed	1 3			
Acquisition	TRMS AC	TRMS AC/DC	TRMS AC, DC, AC+DC	
Autorange	Yes			
Automatic AC/DC detection	Yes			
A _{AC}	2,000 A			
A _{DC}	3,000 A peak			
A _{AC+DC}	2,000 A (3,000 A peak)			
Best accuracy	1% R + 3 cts			
V _{AC}	1,000 V			
V _{DC}	1,000 V			
V _{AC+DC}	1,000 V (1,400 V peak)			
Best accuracy	1% R + 3 cts			
Frequency of V / I	Yes / Yes			
Resistance	100 kΩ			
Audible continuity	Adjustable from 1 Ω to 999 Ω			
Diode test (semi-conductor junction)	Yes			
Temperature (K type)	°C: -60.0 to +1,000 °C °F: -76 to +1,832 °F			
Adapter	Yes			
Single-phase and total three-phase power values	Yes			
Active power (W)	Yes			
Reactive power (VAR)	Yes			
Apparent power (VA)	Yes			
FP / DPF	Yes / - Yes / Yes			
Harmonic analyses THD _i / THD _r	Yes / Yes			
Frequency analysis	25th order			
Phase rotation (2-wire method)	Yes			
Functions				
Overcurrent measurement	Yes			
Motor Inrush	Yes			
Load variation (TrueInrush)	Yes			
Hold	Yes			
Min / MAX	Yes			
Peak+ / Peak-	Yes			
RELative ΔX Differential ΔX/X(%)	Yes Yes Yes			
Auto Power Off	Yes			
Data recording	Yes			
Communication interface	Bluetooth			
Electrical safety as IEC 61010-1, IEC 61010-2-032, IEC 61010-2-033	1,000 V CAT IV - 1,000 V CAT III			
Power supply	4 x 1.5 V AA batteries			
Dimensions / weight	111 x 296 x 41 mm / 640 g			



True **InRush**

1,000 V CAT IV

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State at delivery & References

Delivered in bag pre-equipped for MultiFix with 1 PVC lead with elbowed insulated Ø 4 mm male banana plug/ straight insulated Ø 4 mm male banana plug, 1 test probe/insulated Ø 4 mm female plug, 4 x 1.5 V AA alkaline batteries, 1 start-up guide on paper and 1 mini-CD with operating manual

- > **F601** delivered with 1 wire thermocouple with built-in insulated Ø 4 mm banana connections, 19 mm spacing > P01120961
- > **F603** same as F601 > P01120963
- > **F605** delivered with an additional CAT IV 1,000 V crocodile clip > P01120965
- > **F607** delivered with additional set of red/black crocodile clips and the PAT (Power Analyser Transfer) PC software > P01120967

Electrical installation testing

The risks linked to incorrect use of electricity may include:

- life-threatening danger for people,
- threat of damage to electrical installations and property,
- harmful effects on systems operation and equipment life spans.

So the purpose of electrical installation testing is primarily to ensure that people and goods are kept safe and are protected in the event of a fault. It also facilitates preventive maintenance of installations, preventing serious faults which might prove expensive (production shutdown, etc.).

To guarantee people's safety with regard to these installations and the electrical equipment connected to them, standards have naturally been developed and updated to take changes into account. The IEC 60364 standard and its various national equivalents published in each European country, such as NF C 15-100 in France or VDE 100 in Germany, specify the requirements concerning electrical installations in buildings. Chapter 6 of this standard describes the requirements for testing the compliance of an installation.

The effectiveness of the safety measures implemented can only be guaranteed if regular tests prove they are operating correctly. This is why the standards cover not only the initial verifications when installations are commissioned, but also periodic testing whose frequency depends on the type of installation and equipment, its use and the legislation in the country involved. In addition, the tests must be carried out with measurement instruments that comply with the IEC 61-557 European standard ensuring user safety and reliable measurements.

The electrical testing is divided into 2 parts:

1. Visual inspection to guarantee that the installation complies with the safety requirements (presence of an earth electrode, protective devices, etc.) and does not show any visible evidence of damage.
2. Measurements

There are 4 main measurements required:

1. Earth
2. Continuity
3. Insulation
4. Tests of protective devices

1. EARTH

To guarantee safety on residential or industrial electrical installations, there must be an earth electrode.

If there is no earth electrode, it may endanger people's lives and damage electrical installations and property.

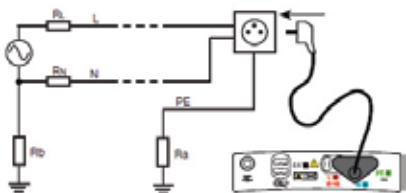
When a large enough area is available to set up stakes, you should measure the earth with the traditional 3-pole method, also known as the 62 % method.

When the 62 % method is not applicable, however, other methods can be used. There are many methods for measuring the earth (1P live earth, PH-PE loop impedance, selective earth with 1-clamp method, etc.), some more suitable than others, depending on the neutral system, the type of installation (residential, industrial, urban, rural, etc.), the possibility of cutting off the power, the area available for planting stakes, etc.

2. CONTINUITY

The purpose of continuity measurement is to check the continuity of the protective conductors and the main and supplementary equipotential bonds. The test is carried out using a measurement instrument capable of generating a no-load voltage of 4 to 24 V (DC or AC) with a minimal current of 200 mA.

The resistance measured must be lower than a threshold specified by the standard applicable to the installation tested, which is usually 2 Ω. As the resistance value is low, the resistance of the measurement leads must be compensated, particularly if very long leads are used.



Example: Approximate measurement of earth resistance by the Zs (Ph-PE) loop measurement method in a TT-type earthing system.

3. INSULATION

Good insulation is essential to prevent electric shocks. This measurement, usually carried out between active conductors and the earth, involves injecting a DC voltage, measuring the current and thus determining the insulation resistance value.

The power must be switched off and the installation must be disconnected before performing this test to ensure that the test voltage will not be applied to other equipment electrically connected to the circuit to be tested, particularly devices sensitive to voltage surges.

According to the IEC 60364 standard, the minimum insulation resistance values must be as follows:

Rated voltage of circuit V	DC test voltage V	Insulation resistance MΩ
SELV or PELV	250	≥ 0.5
Less than or equal to 500 V including LV main switchboard	500	≥ 1.0
Greater than 500 V	1,000	≥ 1.0

4. TESTS OF PROTECTIVE DEVICES

- Fuses / Circuit-breakers

To check the specifications of the protective devices such as fuses or circuit-breakers, a fault loop impedance measurement is carried out to calculate the corresponding short-circuit current. A visual inspection can then be used to check that the sizing is correct.

A fuse table directly integrated in certain installation testers can be used to check automatically that the fuses are correctly sized.

- Residual current devices (RCDs)

RCDs, which detect earth leakage currents, can be tested using two methods:

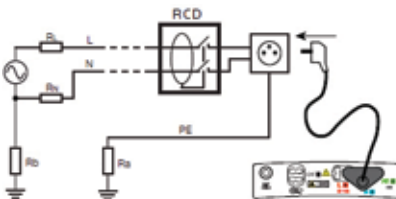
- the basic test, also called a pulse test, which determines the trip time (in milliseconds)
- the step test, which determines the trip time and trip current, thus detecting any RCD ageing.

Type-B RCDs are designed to provide a specified response for DC-only leakage currents. A specific test is then required to check RCDs of this type.

5. OTHER RECOMMENDED MEASUREMENTS

When testing low-voltage installations, other measurements are recommended (mandatory in some countries) such as:

- The voltage drop ΔV% in the cables, obtained by means of two line-impedance measurements to check that their cross-sections are appropriate
 - The correct phase order in three-phase systems, thus ensuring that rotating machines turn in the right direction
 - The installation's voltage and frequency, allowing identification of any poor connections
- Detection of phase current unbalance by measuring with a clamp and first-level assessment of the harmonic content are useful additions to any installation analysis.



Example: RCD test via connection in a wall socket in TT-type earthing systems.

Installation testers selection guide


C.A 6030

C.A 6113

C.A 6116N

C.A 6117

	C.A 6030	C.A 6113	C.A 6116N	C.A 6117
Insulation				
50 / 100 / 250 / 1,000 V		■	■	■
RCD tests				
Non-trip test	■	■	■	■
Tripping time (pulse)	■	■	■	■
Tripping current (Step)	■	■	■	■
Management of standard or selective AC or type-A RCDs	■	■	■	■
Management of type-B RCDs				■
Earth measurement				
2P/3P earth		■	■	■
1P live earth (RA)	■	■	■	■
Selective earth with 1 clamp (RA Sel)		■	■	■
Loop impedance & loop resistance				
Z-loop (L-PE)	■	■	■	■
Z-Line (L- or LL)		■	■	■
Ik calculation (PFC)	■	■	■	■
Ip-p calculation (PSCC)		■	■	■
Integrated fuse table				■
Voltage drop				■
Resistance / Continuity				
Manual and automatic measurement		■	■	■
Other functions				
Voltage / frequency	■	■	■	■
Current / leakage current on clamp	■	■	■	■
Phase order	■	■	■	■
Power values			■	■
Harmonics			■	■
Wiring polarity: check+ inversion		■	■	■
Alarms	■	■	■	■
Storage / Communication				
Storage	■		■	■
3-level tree-structure for storage			■	■
Optical interface	■			
USB interface			■	■
Display and power supply				
B&W LCD	■			
Graphical B&W LCD		■		
Graphical colour LCD			■	■
Online help		■	■	■
Battery operation	■			
Rechargeable-battery operation		Ni-Mh	Li-ion	Li-ion
PC software				
ICT/ DataView®			■	■
Other	■			
Safety / Standards				
CEI 61010-1 600V CAT III	■	■	■	■
CEI 61557	■	■	■	■
Page	B-1-5	B-1-2	B-1-2	B-1-2

Installation testers

C.A 6113, C.A 6116N & C.A 6117



> Functions

- Verification according to the international standards: IEC 60364-6, NF C 15-100, VDE 100, XP C 16-600, etc.
- Simple, reliable connection thanks to the contextual help for each function, including all the connection diagrams
- Earth measurement (3-pole method with stakes, 1-stake method, selective method)
- AC, type-A and type-B RCD tests
- Integrated fuse table for quick reading of the result on the instrument
- Battery with long operating life
- Measurements: voltage, current via clamp, power, waveforms and harmonics
- Measurement of voltage drop ($\Delta U\%$) for correct conductor sizing
- Loop measurement with 1 m Ω resolution
- Automatic continuity measurement to save time in the field
- Multilingual instrument (5 languages available)

> Interface

- User-friendly with its extra-wide graphical screen
- Large number of audio signals and visual symbols with interpretation of the measurements as per the standards
- Integrated contextual help for each function
- Hierarchical storage on 3 levels with possibility of customizing measurement campaigns directly on the instrument or via the ICT software (delivered as standard)

> Software

ICT software delivered as standard to provide the user with a comprehensive solution for generating reports including functions for:

- transferring stored data into the C.A 6116
- performing visual checks as per the standards
- preparing measurement campaigns and transferring them into the C.A 6116N and C.A 6117

Compatibility with the DataView® software which can be used to produce reports in compliance with the applicable standards (IEC 60364-6, VDE 100, etc.)



State at delivery of C.A 6113



State at delivery of C.A 6116N / C.A 6117

	C.A 6113	C.A 6116N	C.A 6117
Specifications			
Continuity / resistance			
Measurement current	I > 200 mA op to 39.99 Ω and 12 mA from approx. 40 Ω to 400 Ω		
Accuracy	±(1.5 % of measurement + 2 cts) with beep		
Range	4 kΩ / 40 kΩ-400 kΩ		
Accuracy	(1.5% of measurement + 2 cts)		
Insulation			
Test voltage	50 / 100 / 250 / 500 / 1,000 V DC		
Range / Accuracy	0.01 MΩ to 2 GΩ ±(5 % of measurement + 3 cts)		
Short-circuit current	≤ 3mA		
Earth			
3P earth	Range	0.50 Ω to 40 Ω 40 Ω to 15 kΩ / 0.1 Ω to 1 Ω / 15 kΩ to 40 kΩ / 10 Ω / ±(10 % of measurement + 2 cts)	
	Accuracy	±(2 % of measurement + 2 cts)	
	Others	Measurement of resistance of auxiliary stakes RH & RS (up to 40 kΩ) Complies with SEV 3569	
U _k			
1P selective earth	Range / Accuracy	0.20 Ω to 399.9 Ω ±(10 % of measurement + 10 cts) (ISel via clamp)	
Loop impedance (Z_i (L-PE) and Z_s (L-N or L-L)) - 1P live earth			
Live earth	Installation voltage / Freq.	90 to 500 V / 15.8 to 17.5 Hz - 45 to 65 Hz	
	High-current mode with TRIP Z _s (L-PE) & Z _i (L-N or L-L)	Max. test current: 7.5 A	
	Range / Accuracy	0.100 Ω to 399.99 Ω / 0.1 Ω / ±(5% of measurement + 2 cts)	
	NO TRIP mode (Z _s (L-PE) only)	Test current: 6 mA – 9 mA – 12 mA (as required) 0.20 Ω to 3999.9 Ω / 1 Ω / ±(5% of measurement + 2 cts)	
	Calculation of I _k short-circuit current (PFC (Z _s)), I Sc PSCC (Z _i)	Fault current and short-circuit current: 0.1 A to 6 kA	
	Integrated fuse table	Yes	
	Voltage drop ΔU% (Z _i)	- 40% to + 40%	
	Others	Measurement of the resistive and inductive components of the Z _s and Z _i impedances	
RCDs			
AC and A-type RCDs			
	Installation voltage / Frequency	90 V to 500 V / 15.8 Hz to 17.5 Hz and 45 Hz to 65 Hz	
	IΔn	10/30/100/300/500/650/1,000 mA (90V – 280V) or variable - 10/30/100/300/500 mA (280-550V) or variable Ramp and pulse test	
	No-trip test	at ½ IΔN – Duration: 1,000 ms or 2,000 ms	
	Tripping current Ramp mode	0.3 x IΔN (U _f) to 1.06 x IΔN in increments of 3.3% x IΔN	
	Trip time measurement - Pulse mode	0.2 to 0.5 x IΔN (U _f) / 0.5 x IΔN / 2 x IΔN (selective) / 5 x IΔN Pulse: 0 to 500 ms., Ramp mode: 0 to 200 ms	
B-type RCDs			
	Installation voltage / Frequency	90 V to 275 V / 15.8 Hz to 17.5 Hz and 45 Hz to 65 Hz	
	IΔN: ramp / pulse 2 x IΔN pulse 4 x IΔN	10/30/100/300/500 mA 10/30/100 mA	
	Test in ramp mode	0.2 x IΔN to 2.2 x IΔN	
	Trip test	1.1 x2 or 2.2x2 or 2.2x4 x IΔN	
Other measurements			
Current	(1mA*) 5.0 mA to 19.99 A (MN77 clamp) / 5.0 mA to 199.9 A (C177A clamp)		
Voltage	0 to 550 V AC/DC / DC and 15.8 to 500 Hz		
Frequency	10 to 500 Hz		
Phase rotation	20 to 500 V _{AC}		
Active power	0 to 110 kW single-phase - 0 to 330 kW three-phase Simultaneous display of voltage and current waveforms		
Harmonics	Voltage and current / up to 50th order / THD-F / THD-R		
General specifications			
Display: large backlit LCD screen, 320 x 240 points	5.7" monochrome graphical screens	5.7" colour graphical screen	
Storage/Communication	1,000 tests, via USB for data transfer and report creation		
Power supply: rechargeable battery	NiMH 9.6 V rated 4 Ah.	Lithium-ion 10.8 V rated 5.8Ah	
Battery life	up to 24 hours	up to 30 hours	
Dimensions / weight	280 x 190 x 128 mm / 2.2 kg		
Protection / EMC	IP 53 / IK04 / IEC 61326-1		
Electrical safety	IEC 61010 -1 – 600 V CAT III – 300 V CAT IV – IEC 61557		

* if a voltage is connected to the instrument

State at delivery

> **C.A 6116N and C.A 6117** 1 tester delivered with a carrying bag, type-2 mains / charger pack, 1 Li-Ion battery pack mounted on the instrument, 1 USB A/B cable 1.80 m long with ferrite, 1 three-point lead - 3 safety leads (red, blue and green), 3 test probes Ø 4 mm (red, blue and green), 3 crocodile clips (red, blue and green), 2 elbowed-straight safety leads 3 m long (red and black), 1 Euro three-point mains lead, 1 EURO 2P mains lead, 1 remote-control probe, 1 wrist strap, 1 anti-scratch film mounted on the instrument, 1 x 4-point hands-free harness, ICT data export software on CD-ROM, 6 operating manuals on CD (one per language), 1 safety datasheet in 20 languages.

> **C.A 6113** 1 tester delivered with a carrying bag with PA 30 W mains power pack, 1 three-point lead - 3 safety leads (red, blue and green), 3 test probes Ø 4 mm (red, blue and green), 3 crocodile clips (red, blue and green), 2 elbowed-straight safety leads 3 m long (red and black), 1 Euro three-point mains lead, 1 remote-control probe, 1 anti-scratch film mounted on the instrument, 1 wrist strap, 1 x 4-point hands-free harness, 6 operating manuals on CD (one per language), 1 safety datasheet in 20 languages.

References to order

> **C.A 6113 EURO** >P01145445
 > **C.A 6116N EURO** >P01145455
 > **C.A 6117 EURO** >P01145460

Accessories for multi-function installation testers

	Article code	Description	C.A 6113	C.A 6116N	C.A 6117	
Measurement leads and sensors	 P01295398	Three-point lead with separate wires 2.5 m long	■	■	■	
	 P01295393	Three-point lead for EURO mains socket testing	■	■	■	
	 P01295094	2 elbowed-straight safety leads - (red and black) 3 m long	■	■	■	
	 P01101921	3 test probes Ø 4 mm - (red, blue and green)	■	■	■	
	 P01101922	3 crocodile clips (red, blue and green)	■	■	■	
	 P01102092	Remote control probe for C.A 6116N	■	■	■	
	 P01101943	Spare black test probe for remote-control probe	□	□	□	
	 P01120335	C177 clamp (20 A)	□			
	 P01120336	C177A clamp (200A)	□	□	□	
	 P01120460	MN77 clamp (20A)	□	□	□	
Power supply / electrical safety	 P01102057	PA 30 W mains power pack	■			
	 P01102129	Type-2 Mains / Charger pack without mains lead (requires P01295174)		■	■	
	 P01296024	NIMH 35 Wh battery pack	■			
	 P01296047	Li-Ion battery pack		■	■	
	 P01102130	Li-Ion charger without mains lead		□	□	
	 P01295174	EURO 2P mains lead	■	■	■	
	 HX0061	DC/DC in-vehicle charger	□			
Other	 P01102084A	Continuity rod	□	□	□	
	 P01102017	15 m earth kit (red / blue / green)	□	□	□	
		P01102018	1P black earth kit (30 m)	□	□	□
		P01102021	3P earth kit (50 m)	□	□	□
		P01102022	3P earth kit (100 m)	□	□	□
	 P01298081	4-point hands-free harness - Model 2	■	■	■	
	 P01298057	Wrist strap	■	■	■	
	 P01102094	C.A 61 screen-protection film	■	■	■	
	 P01298056	Carrying bag no. 22	■	■	■	
	 P01295293	USB-A USB-B lead	□	■	■	
	 P01102095	DataView® software		□	□	

□ Accessory ■ Included in the original State at delivery

Installation tester

C.A 6030

- > **C.A 6030**
- Comprehensive, accurate testing of RCD status
- Earth loop measurement

Specifications

Voltage measurement	
Frequency	
Wiring polarity: testing + reversal	
RCD tests	
Voltage / Rated frequency of the installation	
I Δ n	
No-trip test	
Trip time	
Trip current	
L-PE loops (without RCD trip > 30 mA)	
Voltage / Frequency of the installation	
Measurement range	
Accuracy	
Current measurement	
Calculation of short-circuit current (Isc)	
Earth measurement with power on (1P) (without RCD trip > 30 mA)	
Voltage / Frequency of the installation	
Measurement range	
Accuracy	
Current measurement	
Phase rotation	
Current / Leakage current (using a current clamp option)	
MN20 clamp	
C172 clamp	
C176 clamp	
Compensation of cables	
Alarms	
Memory	
Communication output	
Power supply / electrical safety	
Display	
Dimensions / weight	

C.A 6030

2 to 550 V (DC or RMS) as soon as the instrument is connected
15.3 Hz to 450 Hz as soon as the instrument is connected
Yes
90 to 550 V / 15.3 to 65 Hz
10 / 30 / 100 / 300 / 500 mA + variable from 6 mA to 650 mA
½ I Δ n
I Δ n, 2 I Δ n, 5 I Δ n, 150 mA, 250 mA
Step mode
Z and R measurement
90 to 550 V / 15.3 to 65 Hz
0.1 Ω to 4,000 Ω
10 % R + 15 cts
0.1 to 0.5 I Δ n
Up to 40 kA
90 to 550 V / 15.3 to 65 Hz
0.1 Ω to 4,000 Ω
10 % R + 15 cts
0.1 to 0.5 I Δ n
90 < voltage present < 550 V
5 mA to 20 A
5 mA to 20 A
50 mA to 200 A
Yes
In each function
100 measurements
Optical interface
6 x 1.5 V batteries / IEC 61010-1 - CAT III 600 V
4,000-count backlit LCD screen
211 x 108 x 60 mm / 0.9 kg



600 V CAT III

IP 54

Accessories / Replacement parts

C172 current clamp	> P01120310
C176 clamp	> P01120330
MN20 current clamp	> P01120440
Serial printer no. 5	> P01102903
1P loop kit	> P01102020
3 crocodile clips (red/white/yellow)	> P01101905
3 test probes (red/white/yellow)	> P01101906A
Optical / RS232 connection cable	> P01295252
10 m H green cable winder	> P01102026
Earth T-stake	> P01102031
100 m reel of green cable	> P01295266
33 m reel of green cable	> P01295268
Standard carrying bag no. 5	> P01298066

State at delivery

- > **C.A 6030** delivered in "neck-strap" bag with a carrying bag for accessories containing 1 measurement lead with Euro mains plug, 1 measurement lead with 3 separate cables, 3 crocodile clips, 3 test probes, data transfer software + 1 optical communication cable and 1 operating manual in 5 languages

References to order

- > **C.A 6030** >P01191511
- > **C.A 6030 EURO** + 1P loop kit >P01299921

Technical overview

INSULATION

To ensure that electrical equipment and installation operate correctly in total safety, all the conductors are insulated: sheathing for cables, varnish for windings. When the quality of these insulating materials diminishes, leakage currents may flow from one conductor to the other and, depending on the extent of the insulation faults (the worst being a short-circuit), may cause serious damage.

Equipment with faulty insulation may break down, burn or cause a fault on the installation itself, thus triggering protective devices and shutting down the whole installation...

Furthermore, some particularly sensitive installations (operating theatres in hospitals, chemical industries, etc.) are built using an IT-type neutral system (cf. IEC 60364-6), which tolerates an initial line-earth insulation fault and only shuts down the installation if a second fault occurs.

Measurements are needed to prevent and prepare for the hazards linked to insufficient or damaged insulation. These measurements concern both the electrical equipment and the installations to which it is connected.

These measurements are carried out during commissioning on new or reconditioned items, and then repeated regularly to monitor their evolution over time.

I - INSULATION RESISTANCE MEASUREMENT AND DIELECTRIC TESTING

These two concepts, which characterize the quality of an insulant, require further explanation as they are too frequently confused.

■ **Dielectric strength testing**, also called "breakdown testing", measures an insulant's ability to withstand a medium-duration voltage surge without sparkover occurring. In reality, this voltage surge may be due to lightning or the induction caused by a fault on a power transmission line. The main purpose of this test is to ensure that the construction rules concerning leakage paths and clearances have been respected. This test is often performed by applying an AC voltage but can also be done with a DC voltage. This type of measurement requires a dielectrometer. The result obtained is a voltage value usually expressed in kilovolts (kV). Dielectric testing may be destructive in the event of a fault, depending on the test levels and the available energy in the instrument. For this reason, it is reserved for type tests on new or reconditioned equipment: only equipment that passes the test will be put into service.

■ **Insulation resistance measurement**, however, is non-destructive under normal test conditions.

Carried out by applying a DC voltage with a smaller amplitude than for dielectric testing, it yields a result expressed in k Ω , M Ω , G Ω or T Ω . This resistance indicates the quality of the insulation between two conductors and provides a good idea of the risks of leakage currents. Because it is non-destructive, it is particularly useful for monitoring insulant ageing during the operating life of electrical equipment or installations. This measurement is performed using an insulation tester, also called a megohmmeter.

II - MEASURING LEVELS OF INSULATION

In concrete terms, first of all the installation or equipment is checked to ensure that no voltage is present in it. Then a DC test voltage is applied and the insulation resistance value is read. When measuring an insulation in relation to the earth, you are advised to place the positive pole of the test voltage on the earth to prevent earth polarization problems when carrying out multiple tests.

All the standards concerning electrical installations or equipment specify the measurement conditions and minimum thresholds to be respected for insulation measurements.

III - INSULATION MEASUREMENT APPLICATIONS

A) Insulation measurement on electrical installations

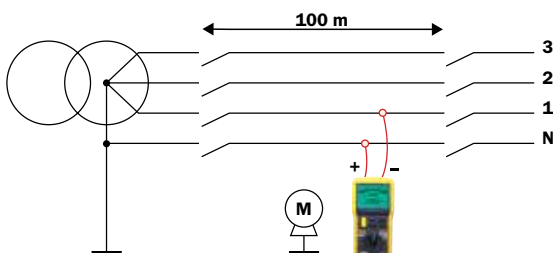
■ Insulation test before powering up

Before powering up a new installation, its insulation must be tested.

Two types of measurements are required:

- Verification of the conductors: this checks that none of the conductors, cut-off devices or connection equipment has suffered damage liable to cause an insulation fault. This is done before commissioning the installation, with all the receivers disconnected.

- Verification of the whole installation in relation to the earth.



■ Verification of insulation after powering up

After powering up the installation, the insulation should be checked regularly to make sure there is no substantial drift away from the initial values.

Because the method used is the same as for testing before powering up, the installations must be switched off.

In both cases, the insulation will be considered acceptable if the insulation resistance measured is greater than the threshold specified by the applicable standard for the installation tested (NF C 15-100 in France, VDE 100 in Germany, European standard IEC 60364, IEEE 43-2000, etc.).

B) Insulation measurement on motors, transformers, etc.

Whether on electrical installations or on machines, the quality of the insulating materials deteriorates as time passes due to the stresses affecting the equipment. This deterioration reduces the electrical resistivity of the insulants, leading in turn to an increase in the leakage currents and causing incidents which may be serious in terms of the safety of people and property, but also in terms of production stoppage costs in industry.

So, in addition to the measurements during commissioning of new or renovated equipment, regular insulation testing of installations and equipment helps to prevent such incidents by organizing preventive maintenance designed to detect ageing and therefore prevent premature deterioration of the insulation properties before they reach a level liable to cause the incidents described above.

Deterioration of the equipment may occur naturally, but it is often also accelerated by external contaminants such as dust, oil, etc. It is therefore strongly recommended to monitor their insulation over time.

To carry out this preventive maintenance effectively, the Chauvin Arnoux range of megohmmeters proposes the following functions:

- PI, DAR and DD quality ratios for a quick assessment of insulation quality, with the added advantage that they are not particularly influenced by temperature, making them easy to use without requiring correction of the results
- Automatic calculation of the insulation resistance at a reference temperature (C.A 6549, C.A 6550, C.A 6555)
- Method based on the influence of test voltage variation (step voltage measurement)

CRITERIA FOR CHOOSING AN INSULATION TESTER

Here are a few tips to help you choose an insulation tester that matches your requirements.

■ The application.

What type of equipment will you be testing: electrical installations, switchgear, telephony, etc.?

Rated operating voltage, manufacturer recommendations, dedicated standards?

Test voltage: 50 – 100 – 250 – 500 – 1,000 – 2,500 – 5,000 – 10,000 – 15,000 V_{DC}?

Measurement range: k Ω , M Ω , G Ω , T Ω ?

■ User comfort.

Reading mode: needle display with logarithmic scale, digital LCD, analogue bargraph?

User-friendly features: programmable alarm thresholds, backlighting, remote control probe?

■ Operating mode.

Hand-cranked generator, normal or rechargeable batteries?

Other measurements required: continuity, current, voltage, etc.?

Single-function or multi-function instrument, for testing installations or machines?

Insulation testers selection guide



	C.A. 6501	C.A. 6503	C.A. 6511	C.A. 6513	C.A. 6521	C.A. 6523	C.A. 6525	C.A. 6531	C.A. 6533	C.A. 6541	C.A. 6543	C.A. 6505	C.A. 6545	C.A. 6547	C.A. 6549	C.A. 6550	C.A. 6555	
Test voltage (V_{DC})																		
50																		
100																		
250		■			■		■		■		■		■		■		■	
500	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	
1,000		■		■		■	■			■	■	■	■	■	■	■	■	
2,500												■	■	■	■	■	■	
5,000												■	■	■	■	■	■	
variable 50 to 5,100												■	■	■	■	■	■	
10,000																■	■	
variable 40 to 10,000																■	■	
15,000																	■	
variable 40 to 15,000																	■	
Max. measurement value																		
200 MΩ	■																	
400 MΩ								■										
1 GΩ			■	■														
2 GΩ					■	■	■											
5 GΩ		■																
20 GΩ									■									
4 TΩ										■	■							
10 TΩ												■	■	■	■			
25 TΩ																■		
30 TΩ																	■	
Continuity																		
■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Resistance																		
■	■																	
Capacitance																		
AC/DC current																		
								■										
Leakage current																		
													■	■	■	■	■	
Chronometer																		
							■			■	■	■	■	■	■	■	■	
Test duration programming																		
										■	■	■	■	■	■	■	■	
Quality ratios																		
PI										■	■	■	■	■	■	■	■	
DAR										■	■	■	■	■	■	■	■	
DD													■	■	■	■	■	
Graphics																		
R(t)										■	■		■	■	■	■	■	
u(t) + i(t)																■	■	
i(u)																■	■	
Ramp																		
Ramp by voltage steps																		
															■	■	■	
R. calculation (Tref)																		
															■	■	■	
I limit																		
															■	■	■	
Early break / Burn-in																		
															■	■	■	
Storage																		
															■	■	■	
RS232																		
										■	■				■	■	■	
USB																		
																■	■	
Display																		
Analogue	■	■	■	■														
LCD + bargraph					■	■	■	■	■	■	■	■	■	■				
Graphical																■	■	
Power supply																		
Magneto																		
■	■																	
Batteries																		
		■	■	■	■	■	■	■	■	■								
Rechargeable battery																		
											■	■	■	■	■	■	■	
Page																		
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Hand-cranked analogue insulation testers



C.A 6501 & C.A 6503

- > **C.A 6501 & C.A 6503: on-site version**
- Rugged plastic casing ideal for all-terrain use

	■ C.A 6501	■ C.A 6503
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Specifications

		■ C.A 6501	■ C.A 6503
Insulation	(calibre MΩ)		
	Test voltage (DC)	500 V	250 V / 500 V / 1,000 V
	Range	0.5 to 200 MΩ	1 to 5,000 MΩ
Accuracy		2.5 % of end-of-scale	2.5 % of end-of-scale
Resistance	Range	45 to 500 kΩ	-
	Accuracy	2.5 % of end-of-scale	-
Continuity	Range	0 to 100 Ω	-
	Accuracy	2 % of end-of-scale	-
Voltage	Range	0 ... 600 V _{AC}	
	Frequency	45 to 450 Hz	
	Accuracy	3 % of end-of-scale	
Display		Analogue	
Dimensions / weight		120 x 120 x 130 mm / 1.06 kg	
Power supply		Magneto allowing a stable test voltage	
Protection		IP 54 with cover IP 52 without cover	
Electrical safety		IEC 61010 - 600 V CAT II / 300 V CAT III	

300 V CAT III

IP
54

State at delivery

- > **C.A 6501** delivered in carrying bag with 1 operating manual, 2 elbowed/straight PVC leads 1.5 m long (black/red), 2 crocodile clips (black/red), 1 black test probe
- > **C.A 6503** delivered in carrying bag with 1 operating manual, 3 elbowed/straight PVC leads 1.5 m long (black/red/blue), 3 crocodile clips (black/red/blue), 1 black test probe

References to order

- > **C.A 6501** >P01132503
- > **C.A 6503** >P01132504

Accessories / Replacement parts

- Bag no. 2 > P01298006
- C.A 846 thermo-hygrometer > P01156301Z
- C.A 861 K thermocouple > P01650101Z
- 0.2 A / HRC fuse for C.A 6501 > P01297095
- 2 crocodile clips (red/black) > P01102052Z
- 2 test probes > P01295458Z
- 2 leads 1.5 m long (red/black) > P01295289Z
- 3 crocodile clips (red, black, blue) > P01101849
- 3 safety leads 1.5 m long (red, blue, black) > P01295171

Analogue insulation testers

C.A 6511 & C.A 6513

> C.A 6511

- Simple to use
- Rugged shockproof sheath
- Insulation 500 V, continuity 200 mA

> C.A 6513

- Simple to use
- Rugged shockproof sheath
- Insulation 1,000 V, continuity 200 mA & resistance

600 V CAT III



Specifications

		C.A 6511	C.A 6513
Insulation	Test voltage (DC)	500 V	500 V / 1,000 V
	Range	0.1 to 1,000 MΩ	
	Accuracy	± 5 % of end-of-scale	
Resistance	Range	-	0 to 1,000 Ω
	Accuracy	-	± 3 % of end-of-scale
Continuity	Range	-10 Ω to +10 Ω	
	Accuracy	± 3 % of end-of-scale	
	Test current	≥ 200 mA	
	Current reversal	Yes	
Voltage	Range	0... 600 V _{AC}	
	Frequency	45 to 400 Hz	
	Accuracy	3 % of end-of-scale	
Display	Analogue		
Dimensions / weight	167 x 106 x 55 mm / 500 g (excluding sheath)		
Power supply	4 x 1.5 V batteries		
Electrical safety	IEC 61010 - 600 V CAT III		



Accessories / Replacement parts

C.A 861 thermometer + K thermocouple	> P01650101Z
C.A 846 thermo-hygrometer	> P01156301Z
2 crocodile clamps (red/black)	> P01295457Z
2 test probes (red/black)	> P01295454Z
2 leads 1.5 m long (red/black)	> P01295288Z
1.5 V ALC LR6 battery	> P01296033
1.5 V ALC LR6 battery (x 12)	> P01296033A
1.5 V ALC LR6 battery (x 24)	> P01296033B
1.6 A fuse	> P01297022
Shockproof sheath no.13	> P01298016

State at delivery

- > **C.A 6511 and C.A 6513** delivered mounted in their shockproof sheath with 2 elbowed/straight PVC leads 1.5 m long (black/red), 1 black test probe, 1 red crocodile clip, 1 operating manual, 4 x 1.5 V LR6 batteries, 1 spare fuse

References to order

- | | |
|-------------------|-------------|
| > C.A 6511 | > P01140201 |
| > C.A 6513 | > P01140301 |

Digital insulation testers



300 V CAT III

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C.A 6521, C.A 6523, C.A 6525

- > **C.A 6521, 2 in 1**
 - Dual analogue and digital display
- > **C.A 6523, 3 in 1**
 - Dual analogue and digital display
 - Programmable alarm thresholds
- > **C.A 6525, 3 in 1**
 - Programmable alarm thresholds
 - Chronometer to test insulation quality

Specifications

Insulation	Test voltage	
	250 V	
	500 V	
	1,000 V	
Accuracy	200 kΩ to 2 GΩ	
Voltage test / Safety		
Voltage alert indicator		
Test inhibition		
Continuity	Range	
	Current measurement	
	Current reversal	
	Cable compensation	
	Buzzer	
Resistance	Range	
Alarms		
Chronometer		
Display		
Backlighting		
Power supply		
Dimensions / weight		
Electrical safety		

C.A 6521 C.A 6523 C.A 6525

	C.A 6521	C.A 6523	C.A 6525
Insulation	50 kΩ to 2 GΩ	-	50 kΩ to 2 GΩ
	100 kΩ to 2 GΩ	100 kΩ to 2 GΩ	100 kΩ to 2 GΩ
	-	200 kΩ to 2 GΩ	200 kΩ to 2 GΩ
Accuracy	±3 % R ±2 cts		
Voltage test / Safety	0 to 600 V _{AC/DC}		
Voltage alert indicator	Yes > 25 V		
Test inhibition	Yes > 25 V		
Continuity	0.0 to 19.99 Ω		
	≥ 200 mA up to 20 Ω		
Continuity	Yes	Yes	Yes
Cable compensation	-	Yes	Yes
Buzzer	Yes	Yes	Yes
Resistance	-	0 to 400 kΩ	0 to 400 kΩ
Alarms	-	Yes	Yes
Chronometer	-	-	0 to 15 min.
Display	LCD + Bargraph		
Backlighting	-	Yes	Yes
Power supply	6 x LR6 batteries		
Dimensions / weight	211 x 108 x 60 mm / 830 g		
Electrical safety	CEI 61010 300 V CAT III – CEI 61557		

State at delivery

- > The **C.A 6521, C.A 6523 and C.A 6525** are delivered with a "hands-free" bag containing 1 set of 2 leads 1.5 m long, 1 crocodile clamp, 1 black test probe, 6 x 1.5 V LR6 and 1 operating manual

Accessories / Replacement parts

- | | |
|---|--------------|
| Remote-control probe | > P01101935 |
| C.A 861 thermometer + K thermocouple | > P01650101Z |
| C.A 846 thermo-hygrometer | > P01156301Z |
| Carrying bag for "hands-free" use | > P01298049 |
| 0.63 A fuse (x 5) | > P01297078 |
| 1.5 V LR6 alkaline battery | > P01296033 |
| Test probes (red/black) | > P01295454Z |
| 2 crocodile clips (red/black) | > P01102052Z |
| 2 x 1.5 m elbowed-straight safety leads (red/black) | > P01295289Z |

References to order

- | | |
|-------------------|--------------|
| > C.A 6521 | > P01140801D |
| > C.A 6523 | > P01140802D |
| > C.A 6525 | > P01140803D |

Digital insulation testers

C.A 6531 & C.A 6533

> C.A 6531 & C.A 6533

- Specially designed for Telecoms & Electronics
- Dedicated to equipment or installations using low currents



Specifications

		C.A 6531	C.A 6533
Insulation	Test voltage		
	50 V	10 kΩ to 400 MΩ	10 kΩ to 2 GΩ
	100 V	20 kΩ to 400 MΩ	20 kΩ to 2 GΩ
	250 V	-	50 kΩ to 20 GΩ
	500 V	-	100 kΩ to 20 GΩ
Accuracy	200 kΩ to 2 GΩ	±3 % R ±2 cts	
Voltage test / Safety		0 to 600 V _{AC/DC}	
Voltage alert indicator		Yes > 25 V	
Test inhibition		Yes > 25 V	
Capacitance		0 to 4,000 nF*	-
AC/DC current measurement		0 to 400 mA	-
Resistance	Range	0 to 40 kΩ	0 to 400 kΩ
Alarms		Yes	Yes
Display		LCD + Bargraph	
Backlighting		Yes	
Power supply		6 x LR6 batteries	
Dimensions / weight		211 x 108 x 60 mm / 835 g	
Electrical safety		IEC 61010 600 V CAT III – IEC 61557	

*also calculates the line length on the basis of the capacitance per unit length

600 V CAT III

**IP
54**

Accessories / Replacement parts

Remote-control probe
 C.A 861 thermometer + K thermocouple
 C.A 846 thermo-hygrometer
 Carrying bag for "hands-free" use
 0.63 A fuse (x 5)
 1.5 V LR6 alkaline battery
 Test probes (red+ black)
 Crocodile clips (red+ black)
 1.5 m elbowed-straight safety leads

> P01101935
 > P01650101Z
 > P01156301Z
 > P01298049
 > P01297078
 > P01296033
 > P01295454Z
 > P01295457Z
 > P01295453Z

State at delivery

- > **C.A 6531** delivered with a carrying bag for "hands-free" use containing a set of 2 leads 1.5 m long, 1 crocodile clip, 1 black test probe, 2 wire grips, 6 x 1.5 V LR6 batteries and 1 operating manual
- > **C.A 6533** delivered with a carrying bag for "hands-free" use containing a set of 2 leads 1.5 m long, 1 guarded safety lead 1.5 m long, 1 crocodile clip, 1 blue crocodile clip, 1 black test probe, 2 wire grips, 6 x 1.5 V LR6 batteries and 1 operating manual

References to order

- > **C.A 6531** > P01140804B
- > **C.A 6533** > P01140805

Digital insulation tester

C.A 6541 & C.A 6543

> Special on-site 1,000 V insulation tester

- Extensive measurement range, up to 4 TΩ
- Automatic calculation of DAR / PI quality ratios
- Ultra-rugged site-proof case



600 V CAT III

IP
53

Specifications

Insulation	Test voltage
	50 V
	100 V
	250 V
	500 V
	1,000 V
Accuracy	2 kΩ to 40 GΩ
	40 GΩ to 4 TΩ
Programmable test duration	
DAR (1 min. / 30 sec.)	
PI (10 min. / 1 min.)	
Customizable PI	
Voltage test / Safety	
Voltage alert indicator	
Test inhibition	
Smooth function	
Continuity	Range
	Current measurement
Resistance	Range
Capacitance	Range
Memory - Communication	
	Storage of R(t)
	Measurement storage
	Direct report printing
	Communication output
	PC software
Display	
Power supply	
Dimensions / weight	
Electrical safety	

C.A 6541

C.A 6543

	2 kΩ to 200 GΩ
	4 kΩ to 400 GΩ
	10 kΩ to 1 TΩ
	20 kΩ to 2 TΩ
	40 kΩ to 4 TΩ
	±5 % R ± 3 cts
	±15 % R ± 10 cts
	1 to 59 min.
	0.000 to 9.999
	0.000 to 9.999
	Times programmable from 30 s to 59 min.
	0 to 1,000 V _{AC/DC}
	Yes > 25 V
	Yes > 25 V
	Yes
	0.01 to 39.99 Ω
	≥ 200 mA up to 20 Ω
	0.01 to 400 kΩ
	0.005 to 4.999 μF
	20 kB
	128 kB
	20 measurement results
	Up to 1,500 measurement results
	-
	On local printer, fixed format
	No
	RS-232
	No
	DataView® (option)
	Giant LCD + bargraph
	Giant LCD + bargraph
	8 x LR14 batteries
	NiMH battery
	240 x 185 x 110 mm / 3.4 kg
	240 x 185 x 110 mm / 3.4 kg
	IEC 61010 600 V CAT III - IEC 61557
	IEC 61010 600 V CAT III - IEC 61557

Accessories / Replacement parts

Remote-control probe	> P01101935
C.A 861 thermometer + K thermocouple	> P01650101Z
C.A 846 thermo-hygrometer	> P01156301Z
AN1 artificial neutral box	> P01197201
Carrying bag no. 6 for accessories	> P01298051
1.5 V LR14 battery	> P01296034
F fuse 2.5 A - 1,200 V - 8 x 50 mm - 15 kA (x 5)	> P01297071
F fuse 0.1 A - 660 V - 6.3 x 32 mm - 20 kA (x 10)	> P01297072
C.A 6543	
No. 5 serial printer	> P01102903
Serial-parallel adapter	> P01101941
MegohmView software	> P01101938A
DataView® software	> P01102095
Safety leads 1.5 m long (red, blue, black)	> P01295171
RS232 PC cable DB 9F - DB 25F x 2	> P01295172

State at delivery and reference

- > **C.A 6541** delivered with a carrying bag for accessories containing: a set of 2 leads 1.5 m long (red/black), 1 black guarded lead 1.5 m long, 3 crocodile clips (red/blue/black), 1 test probe (black), 1 simplified operating manual, 1 operating manual in 5 languages, 8 LR14 batteries > P01138901
- > **C.A 6543** delivered with a carrying bag for accessories containing a set of 2 leads 1.5 m long (red/black), 1 black guarded lead 1.5 m long, 3 crocodile clips (red/blue/black), 1 test probe (black), 1 simplified operating manual, 1 operating manual in 5 languages, 1 mains power cable 2 m long, 1 communication cable > P01138902

Accessories / Replacement parts

RS232 printer cable DB 9F - DB 9M no. 01	> P01295173
2P EUR mains lead	> P01295174
GB mains power cable	> P01295253
Battery pack	> P01296021

Digital insulation tester

C.A 6505

- > Insulation at 5 kV
- > Wide measurement range from 10 kΩ to 10 TΩ
- > Large backlit LCD screen with digital display and bargraph
- > Fixed test voltages and programmable test voltages from 40 V to 5,100 V
- > Automatic calculation of the DAR / PI quality ratios
- > Testing and maintenance of industrial equipment
- > Voltage, capacitance and leakage current
- > Site-proof case with shockproof lid

1,000 V CAT III

IP 53



Specifications

		C.A 6505	
Insulation	Test voltage		
	500 V		10 kΩ to 2 TΩ
	1,000 V		100 kΩ to 4 TΩ
	2,500 V		100 kΩ to 10 TΩ
	5,000 V		300 kΩ to 10 TΩ
Programmable voltage		40 V to 1,000 V: 10 V increments	
		1,000 V to 5100 V: 100 V increments	
Accuracy	1 kΩ to 400 GΩ		±5 % R ± 3 cts
	400 GΩ to 10 TΩ		±15 % R ± 10 cts
Programmable test duration			1 to 59 min.
DAR (1 min. / 30 sec.)			0.02 to 50.00
PI (10 min. / 1 min.)			0.02 to 50.00
Customizable PI			Times programmable from 30 s to 59 min.
Voltage test / Safety			0 to 1,000 V _{AC/DC}
Voltage alert indicator			Yes > 25 V
Test inhibition			Yes > 25 V
Capacitance			0.001 to 49.99 μF
Leakage current measurement			0.001 nA to 3 mA
Display			Giant LCD + bargraph
Power supply			NiMH battery
Dimensions / weight			270 x 250 x 180 mm / 4.3 kg
Electrical safety			IEC 61010 1,000 V CAT III – IEC 61557

State at delivery

- > **C.A 6505** delivered with a carrying bag containing: 2 simplified measurement leads 2 m long, each equipped with an HV plug at each end, 1 guarded safety lead de 2 m with an HV plug at one end and an HV plug with rear connection at the other end, 1 guarded safety lead 0.35 m long with HV plug / HV plug with rear connection, 3 crocodile clips (red, blue and black), 1 mains power cable 1.80 m long and 1 operating manual in 5 languages

Accessories / Replacement parts

See C.A 6545

References to order

- > **C.A 6505 Megohmmeter** >P01139704



Digital insulation testers

- > The insulation experts at 5 kV: measurement, testing and diagnosis
- Extensive measurement range
- Fixed and programmable test voltages
- Quantitative and qualitative insulation analysis: automatic calculation of the DAR / PI / DD quality ratios
- Storage and communication (C.A 6547)



1,000 V CAT III

IP 53

C.A 6545 & C.A 6547

Specifications

	C.A 6545	C.A 6547
Insulation	Test voltage	
	500 V	30 kΩ to 2 TΩ
	1,000 V	100 kΩ to 4 TΩ
	2,500 V	100 kΩ to 10 TΩ
	5,000 V	300 kΩ to 10 TΩ
Programmable voltage		40 V to 1,000 V: 10 V increments 1,000 V to 5100 V: 100 V increments
Accuracy	30 kΩ to 40 GΩ 40 GΩ to 10 TΩ	±5 % R ± 3 cts ±15 % R ± 10 cts
Programmable test duration		1 to 59 min.
DAR (1 min. / 30 sec.)		0.02 to 50.00
PI (10 min. / 1 min.)		0.02 to 50.00
Customizable PI		Times programmable from 30 s to 59 min.
DD		0.02 to 50.00
Voltage test / Safety		0 to 1,000 V _{AC/DC}
Voltage alert indicator		Yes > 25 V
Test inhibition		Yes – Adjustable according to test voltage
Smooth function		Configurable – Digital filtering to stabilize the measurements
Capacitance		0.005 to 49.99 μF
Leakage current measurement		0.001 nA to 3 mA
Memory – Communication		
	R(time)	4 kb 128 kb
	Measurement storage	20 measurement values Up to 1,500 measurement values
	Direct report printing	No On local printer, fixed format
	Communication output	No RS232
	PC software	No DataView® (option)
Display		Giant LCD + bargraph
Power supply		NiMH battery
Dimensions / weight		270 x 250 x 180 mm / 4.3 kg
Electrical safety		IEC 61010 1,000 V CAT III – IEC 61557

Accessories / Replacement parts

C.A 846 thermo-hygrometer
Measurement leads
C.A 861 thermometer + K thermocouple
AN1 artificial neutral box
Standard carrying bag for accessories
FF fuse, 0.1 A - 380 V - 5 x 20 mm - 10 kA (x 10)
2P EUR mains power cable

> For C.A 6547:

No. 5 serial printer
Serial-parallel adapter
MegohmView software
DataView® software
RS232 PC cable DB 9F - DB 25F x 2
RS 232 printer cable DB 9F - DB 9M no. 01

> P01156301Z
See page B-2-14
> P01650101Z
> P01197201
> P01298066
> P03297514
> P01295174

> P01102903
> P01101941
> P01101938A
> P01102095
> P01295172
> P01295173

State at delivery

- > **C.A 6545** delivered with a carrying bag containing 2 safety leads 3 m long with HV plug and HV crocodile clip (red/blue), 1 guarded safety lead 3 m long with HV plug with rear connector and HV crocodile clip (black), 1 rear-connector lead (blue) 0.35 m long, 1 mains power cable 2 m long, 1 simplified operating manual, 1 operating manual in 5 languages
- > **C.A 6547** delivered with a carrying bag containing 2 safety leads 3 m long with HV plug and HV crocodile clip (red/blue), 1 guarded safety lead 3 m long with HV plug with rear connector and HV crocodile clip (black), 1 rear-connector lead (blue) 0.35 m long, 1 mains power cable 2 m long, 1 communication cable, 1 simplified operating manual, 1 operating manual in 5 languages

References to order

- > **C.A 6545** >P01139701
- > **C.A 6547** >P01139702

Digital insulation tester

C.A 6549

Specifications

Insulation	Test voltage
	500 V
	1,000 V
	2,500 V
	5,000 V
Programmable voltage	
Automatic voltage steps	
Accuracy	30 kΩ to 40 GΩ
	40 GΩ to 10 TΩ
Programmable test duration	
DAR (1 min. / 30 sec.)	
PI (10 min. / 1 min.)	
Customizable PI	
DD	
Voltage test / Safety	
Voltage alert indicator	
Test inhibition	
Smooth function	
Capacitance	
Leakage current measurement	
Memory – Communication	
	Storage of R(t)
	Measurement storage
	Direct report printing
	Communication output
	PC software
Display	
Power supply	
Dimensions / weight	
Electrical safety	

C.A 6549

	30 kΩ to 2 TΩ
	100 kΩ to 4 TΩ
	100 kΩ to 10 TΩ
	300 kΩ to 10 TΩ
	40 V to 1,000 V: 10 V increments
	1,000 V to 5,100 V: 100 V increments
	Value and duration programmable for up to 5 steps, three profiles stored
	±5 % R ± 3 cts
	±15 % R ± 10 cts
	1 to 59 min.
	0.02 to 50.00
	0.02 to 50.00
	Times programmable from 30 s to 59 min.
	0.02 to 50.00
	0 to 1,000 V _{AC/DC}
	Yes > 25 V
	Yes – Adjustable according to test voltage
	Configurable – Digital filtering to stabilize the measurements
	0.005 to 49.99 μF
	0.001 nA to 3 mA
	Viewing on the display + storage of samples
	Up to 1,500 measurements
	On local printer, fixed format
	RS232
	DataView® (option)
	Large LCD screen
	Rechargeable NiMH battery
	270 x 250 x 180 mm / 4.3 kg
	IEC 61010 1,000 V CAT III – IEC 61557

- > C.A 6549, The "Pro" for preventive maintenance
- Storage
- Wide graphic screen
- Calculation of the resistance at a reference temperature
- Step voltage testing



1,000 V CAT III

IP 53

State at delivery

- > C.A 6549 delivered with a carrying bag containing 2 safety leads 3 m long with HV plug and HV crocodile clip (red/blue), 1 guarded safety lead 3 m long with HV plug with rear connector and HV crocodile clip (black), 1 rear-connector lead (blue) 0.35 m long, 1 mains power cable 2 m long, 1 communication cable, 1 simplified operating manual, 1 operating manual in 5 languages

Reference to order

> C.A 6549

>P01139703

Accessories / Replacement parts

Measurement leads	See page B-2-14
C.A 846 thermo-hygrometer	> P01156301Z
C.A 861 thermometer + K thermocouple	> P01650101Z
AN1 artificial neutral box	> P01197201
Standard carrying bag for accessories	> P01298066
FF fuse 0.1 A - 380 V - 5 x 20 mm - 10 kA (x 10)	> P03297514
2P EUR mains power cable	> P01295174
No. 5 serial printer	> P01102903
Serial-parallel adapter	> P01101941
MegohmView software	> P01101938A
DataView® software	> P01102095
RS232 PC cable DB 9F - DB 25F x 2	> P01295172
RS 232 printer cable DB 9F - DB 9M no. 01	> P01295173

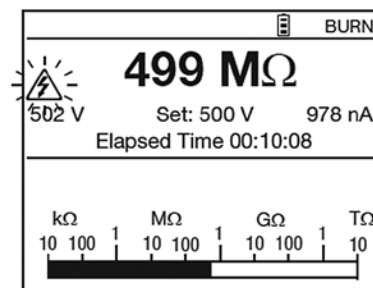
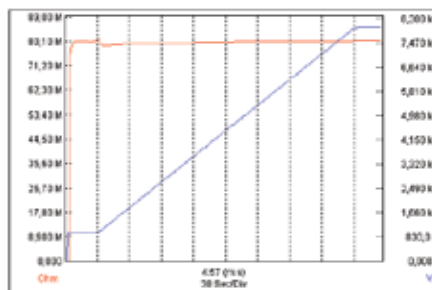
Digital insulation testers



1,000 V CAT IV

IP 54

Example of results displayed on the large 320 x 240-pixel screen, and example of graphic mode



C.A 6550 & C.A 6555

- Wide measurement range from 10 kΩ to 30 TΩ
- Fixed or programmable test voltage from 40 V to 10/15 kV
- 5 mA charging current
- Large backlit LCD screen with digital display, bargraph and R(t)+u(t), i(t), i(u) graphs
- Automatic calculation of DAR / PI / DD / ΔR (ppm/V) ratios
- Multiple voltage ramp and step test modes with:
 - - Burn mode: test without programmed current limit
 - - "Early break" mode: non-destructive test
 - - "I-limit" mode: test with predefined current
- 3 filters to optimize measurement stability
- Calculation of the resistance at a temperature of reference
- 80,000-measurement storage capacity and real-time clock
- Optically-isolated USB communication for transferring the recorded data onto a PC and generating reports with the DataView® software

> Effective, with 2 levels of diagnostics available:

- "Go/No Go" test
- Qualitative measurement for preventive maintenance

State at delivery

- > **C.A 6550 and C.A 6555** delivered with a carrying bag containing 2 safety leads 3 m long with HV plugs (red/blue) at each end, 1 guarded safety cable 3 m long equipped with an HV plug at one end and an HV plug with rear connection at the other end (black), 3 crocodile clips (red, blue, black), 2 CAT IV 1,000 V test probes (red/black) for voltage measurements, 1 rear-connector lead (blue), 1 mains power cable 2 m long, DataView® software, 1 optical / USB communication lead, 1 operating manual in 5 languages on CD-ROM

Reference to order

- > **C.A 6550** >P01139705
- > **C.A 6555** >P01139706

Digital insulation testers

Specifications

		C.A 6550	C.A 6555
Test voltages		10 kV	15 kV
Insulation measurement	Ranges	500 V: 10 kΩ to 2 TΩ 1,000 V: 10 kΩ to 4 TΩ 2,500 V: 10 kΩ to 10 TΩ 5,000 V: 10 kΩ to 15 TΩ 10,000 V: 10 kΩ to 25 TΩ	15,000 V: 10 kΩ to 30 TΩ
	Fixed test voltages	500 / 1,000 / 2,500 / 5,000 / 10,000 V	500 / 1,000 / 2,500 / 5,000 / 10,000 / 15,000 V
	Variable test voltages	40 V - 10,000 V 3 presettable voltage values	40 V - 15,000 V 3 presettable voltage values
	Variable voltage settings	Variable: 40-10 kV Increment: 40 V - 1 kV: 10 V 1 kV - 10 kV: 100 V	Variable: 40-15 kV Increment: 40 V - 1 kV: 10 V 1 kV - 15 kV: 100 V
	Ramp mode	3 presettable ramps: start voltage / end voltage / duration	
	Ramp configuration range	40-1100 V / 500-10000 V	40-1100 V / 500-15000 V
	Step mode	Up to 10 steps (value and duration configurable for each step)	
Voltage measurement after test		AC: 0 - 2,500 V DC: 0 - 4,000 V	
Capacitance measurement (> 500 V)		0.001-9.999 μF / 10.00-49.99 μF	
Leakage current measurement		0 - 8 mA	
Discharge after test		Yes / automatic	
Additional test stop modes	I-limit	Programmable 0.2 - 5 mA	
	Early-break	di/dt	
	Timer	Up to 99 minutes 59 seconds	
Debug mode	Burning	Continuous testing	
Ratio calculation		PI, DAR, DD, SV, ΔR (ppm/V)	
Calculation of R at ref. T°		Yes	
Measurement display filter		3 filters with 3 time constants	
Graphs on display		R(t)+u(t); i(t); i(u)	
Storage		256 recordings, 80,000 points, R, U, I and date	
Communication		Optically-isolated port for USB and RS232 links	
PC software		DataView®	
Power supply		NiMH rechargeable batteries, 8 x 1.2 V / 4,000 mAh Charging by external voltage: 90-260 V 50/60 Hz	
Electrical safety		1,000 V CAT IV - IEC 61010-1 and IEC 61557	
Dimensions / weight		L x W x H: 406 x 330 x 174 mm, 6 kg approx.	



**10 kV / 15 kV
INSULATION**



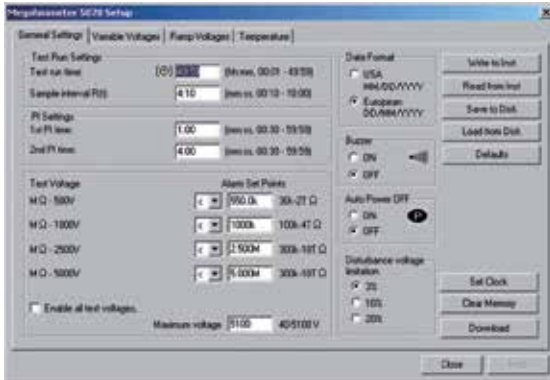
Accessories / Replacement parts

Measurement leads
2 test probes (red/black)
3 crocodile clips (red/blue/black)
Optical USB cable
Carrying bag
C.A 861 thermometer - thermocouple
C.A 846 thermo-hygrometer
2P mains power cable

See page B-2-14
> P01295454Z
> P01103062
> HX0056-Z
> P01298066
> P01650101Z
> P01156301Z
> P01295174

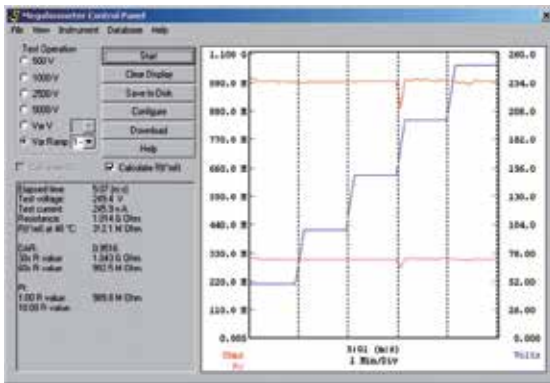
Software for digital insulation testers

DataView® for the C.A 6543, C.A 6547, C.A 6549, C.A 6550 & C.A 6555

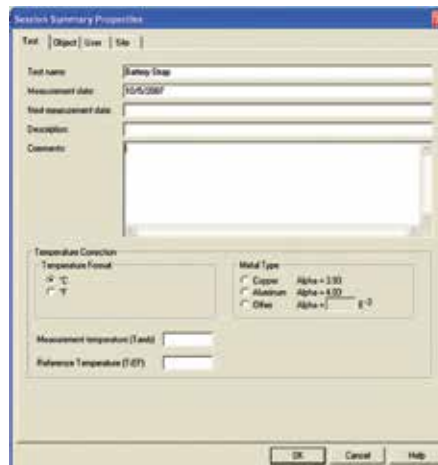


> The essential tool for configuring the instruments, triggering the measurements, viewing the data in real time, recovering the recorded data and creating standard or customized measurement reports

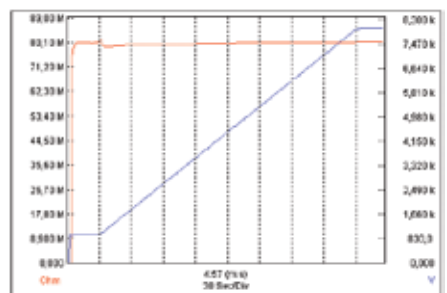
- Configuration of all the functions
- Remote activation of tests by simply pressing a button
- Real-time data capture and display
- Recovery of the data recorded in the instruments
- Display of the DAR, PI and DD ratios
- Graphical plotting of programmed-time tests and step voltage tests in real time
- Possibility of creating a library of configurations suitable for specific applications
- Possibility of inserting user comments directly into the measurement report
- Printing of measurement reports



Item	Value	Unit
Speed time	5.27	Sec
Test voltage	205.4	V
Test current	205.3	µA
Resistance	1.014	G Ohm
PI ratio at 50°C	37.11	M Ohm
PI
1000 R value	985.8	M Ohm
1000 R value



Channel Name	Rating (Ohm)
Measurement Date	10/05/2007
Measurement Time	8:57:47 AM
Account Model	6543
Test Number	1
Measurement Type	Resistance
Wave Type	42 mV Ohm
Measurement Range	42 mV Ohm
Wave Coefficient	1.00
High	2.00 V
Current	1.00 µA
Test	...
Resistance @ 50°C	1.00 M Ohm
Resistance @ 20°C	...



Insulation test

Reference to order

> **DataView®**

> P01102095

Multimeter clamps for leakage current

F62 & F65

- > Quick leakage-current testing
- > Insulation-fault detection on live installations

Specifications

			F62	F65	
Display	10,000 counts - 2 measurements / s				
Acquisition	AVG TRMS				
Function	Calibre	Resolution	Accuracy		
Current	mA AC	60 mA	10 μ A	with filter 50-60 Hz	with filter 50-60 Hz
		600 mA	100 μ A	1.2 % \pm 5 counts	2.5 % \pm 5 counts
	A AC	10 A	1 mA	1.2 % \pm 5 counts	2.5 % \pm 5 counts
		80 A	10 mA	1.2 % \pm 5 counts	2.5 % \pm 5 counts
		100 A		5 % \pm 5 counts	5 % \pm 5 counts
Voltage	V AC	600 V	0,1 V	1.0 % \pm 5 counts (50-60 Hz)	1.0 % \pm 5 counts (50-60 Hz)
	V DC	600 V	0,1 V	1.2 % \pm 5 counts (60-500 Hz)	1.2 % \pm 5 counts (60-500 Hz)
Resistance	Ω	1 k Ω	0,1 Ω	5 % \pm 5 counts (50-60 Hz)	5 % \pm 5 counts (50-60 Hz)
Audible continuity	Buzzer < 35 Ω				
Frequency	A	100 Hz	0,1 Hz	1.0 % \pm 5 counts (50-60 Hz)	1.2 % \pm 5 counts (60-500 Hz)
	V	1 kHz	1 Hz	1.2 % \pm 5 counts (60-500 Hz)	2.5 % \pm 5 counts (500-3 kHz)
Max. value	1 % \pm 2 counts				
Backlighting	1 % \pm 3 counts (max measurement voltage 3.3 V _{DC})				
Deactivatable automatic shutdown	0.5 % \pm 2 counts (I > 10 mA)				
Clamping diameter	0.5 % \pm 2 counts (V > 5 V _{AC})				
Dimensions / weight	100 ms				
Standards	Yes				
Installation category	Yes				
Enclosure protection	28 mm				
	218 x 64 x 30 mm / 280 g (with batteries)				
	IEC 61010-1 / IEC 61010-2-032				
	CAT III 300 V				
	IP 30 as per EN 60529				



State at delivery

- > **F62 & F65** delivered with 1 carrying bag, 1 set of straight/ elbowed banana leads, 1 set of safety test probes, 2 x 1.5 V AAA batteries and 1 operating manual



Accessories / Replacement parts

- Red+black crocodile clips in blister (set of 2)
 - Elbowed test-probe leads, 1.5 m, (1 red/1 black)
 - Soft case 200 x 100 x 40 mm with belt clip
 - Current measurement lead CMI214S
 - C.A 1871 IR probe for multimeter
 - C.A 801 single-channel temperature adapter
 - C.A 803 two-channel temperature adapter with differential measurement for multimeter
 - Bag no. 21 (250 x 165 x 60 mm) with strap
- > P01295457Z
 - > P01295456Z
 - > P01298065Z
 - > P03295509
 - > P01651610Z
 - > P01652401Z
 - > P01652411Z
 - > P06239502

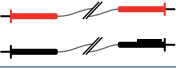


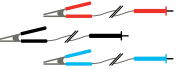





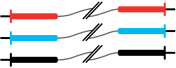
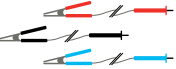







References to order

- > **F62** > P01120760
- > **F65** > P01120761

Other accessories: test, transport and protection accessories, etc. > See pages J-1-0 to J-4-0



Measurement leads for 5 kV and 10/15 kV insulation testers

	Article code	Description	Length	C.A 6505	C.A 6545	C.A 6547	C.A 6549	C.A 6550	C.A 6555
5 kV range	 P01295231	Simplified red HV safety lead with black rear connector	3 m	■	□	□	□		
	 P01295232	Simplified blue HV safety lead + blue crocodile clip	3 m	■	□	□	□		
	 P01295221	Guarded blue HV safety lead with rear connection	0,35 m	■	■	■	■		
	 P01295220	Set of 3 safety leads with red/blue/black HV crocodile clips	3 m	□	■	■	■		
	 P01295214	Safety lead with blue HV crocodile clip	8 m	□	□	□	□		
	 P01295215	Safety lead with red HV crocodile clip	8 m	□	□	□	□		
	 P01295216	Safety lead with rear connector and black HV crocodile clip	8 m	□	□	□	□		
	 P01295217	Safety lead with blue HV crocodile clip	15 m	□	□	□	□		
	 P01295218	Safety lead with red HV crocodile clip	15 m	□	□	□	□		
	 P01295219	Safety lead with rear connector and black HV crocodile clip	15 m	□	□	□	□		
10/15 kV range	 P01295465	Set of 3 simplified red/blue/black HV safety leads	3 m					■	■
	 P01295466	Set of 3 safety leads with red/blue/black HV crocodile clips	3 m					□	□
	 P011295467	Guarded blue safety lead with rear connection	0,5 m					■	■
	 P01295468	Safety lead with blue HV crocodile clip	8 m					□	□
	 P01295469	Safety lead with red HV crocodile clip	8 m					□	□
	 P01295470	Safety lead with rear connector and black HV crocodile clip	8 m					□	□
	 P01295471	Safety lead with blue HV crocodile clip	15 m					□	□
	 P01295472	Safety lead with red HV crocodile clip	15 m					□	□
	 P01295473	Safety lead with rear connector and black HV crocodile clip	15 m					□	□

□ Replacement part ■ Included in the initial delivery



Technical overview

EARTH MEASUREMENT

For residential or industrial installations, the presence of an earth connection is one of the basic rules to ensure that the electrical installation is safe.

The absence of an earth connection may endanger people's lives and damage electrical installations and property.

However, the presence of an earth connection does not guarantee safety and, even if the earth is correctly sized, only regular testing can ensure that it functions correctly.

The standards for electrical installations, such as IEC 60364, NF C 15-100, etc., stipulate the general installation conditions to be applied in order to guarantee the safety of people, pets, farm animals and property by protecting them against the hazards and damage which may result from use of the electrical installations.

When there is a large enough area available to set up stakes, earth measurement should be carried out with the traditional 3-pole method, also known as the 62 % method.

There are a large number of different methods for earth measurements, however, and the right choice depends on the type of neutral system, the type of installation (residential, industrial, urban, rural, etc.), the possibility of switching off the power supply, the area available for setting up stakes, etc.

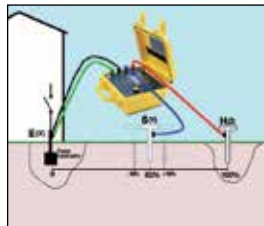
LIST OF THE DIFFERENT EARTH MEASUREMENT METHODS

	Rural building with possibility of setting up stakes	Urban building with no possibility of setting up stakes
Single earth connection		
3-pole method alias 62 % method	■	
Triangle method (2 stakes)	■	
4-pole method	■	
Variant 62 % method (1 stake)	■	
Line-PE loop measurement	■	■ (only with TT system)
Network of multiple parallel earths		
Selective 4-pole method	■	
Earth clamp	■	■
Earth loop measurement with 2 clamps	■	■

Here is an overview of the most frequently-used measurement methods:

1) The 62 % in-line measurement method (two stakes)

This method requires the use of two auxiliary electrodes (or "stakes") to allow current injection and provide the 0 V reference potential. The positioning of the two auxiliary electrodes in relation to the earth connection to be tested $E(X)$, is crucial. For correct measurements, the "auxiliary connection" providing the reference potential (S) must not be positioned in the areas influenced by earths E & H due to the flow of the current (i).



Statistics from the field have shown that the ideal method for guaranteeing the highest possible measurement accuracy involves placing the stake S at a point 62 % of the distance from E on the line EH.

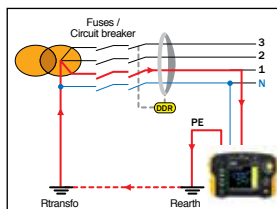
You must then make sure that the measurement does not vary significantly when moving the stake S by $\pm 10\%$ (S' and S'') on either side of its initial position, while remaining on the line EH.

If the measurement varies, it means that (S) is in an influence area, so the procedure should be repeated after increasing the distances.

For a correct measurement, the stake H should be at least 25 metres away from the earth to be tested. For more accurate measurements, it is possible to use a 4-pole measurement method (adding a connection between the earth to be tested and the ES terminal of the measurement instruments) to minimize the resistance of the measurement leads, thus improving accuracy. This method is strongly recommended for low resistance values as the influence of measurement-lead resistance will then be considerable.

2) Line-PE loop measurement (only on TT system)

In urban environments, it often proves difficult to measure earth resistances using auxiliary stakes because it is not possible to set up the stakes for reasons of space, concreting, etc. Loop measurement can then be used to test earths in urban environments without using stakes simply by hooking up to the mains power supply (mains socket). In addition to the earth to be measured, the loop resistance measured in this way includes the earth and internal resistance of the transformer and the resistance of the cables. As all these resistances are very low, the value measured is an overall earth resistance value.



The actual earth resistance is therefore lower: $R_{measured} > R_{earth}$. The (overall) measurement error introduced by this method actually contributes to greater safety. The standards concerning electrical installations consider that the loop resistance (overall earth resistance) may be taken into account instead of the earth resistance to comply with the rules on protection against the risk of indirect contacts.

Note: on TN or IT (impedant) systems, the loop impedance measurement can be used to calculate the short-circuit current and thus to size the protective devices correctly.

3) Selective earth measurements

For interconnected earths, selective earth measurement can be used for quick, safe testing. In this case, it is not necessary to isolate the installation (no need to open the earth bar) and, for loop measurements with 2 clamps or with an earth clamp, it is not necessary to set up stakes.

For the earth clamp and for the 2-clamp method, all you have to do to find out the earth value and the value of the currents flowing in it is clamp the cable connected to the earth.

An earth clamp comprises two windings: a generator winding and a receiver winding:

- The clamp's "generator" winding develops an AC voltage at the constant level E around the clamped conductor; a current $I = E / R_{loop}$ then flows through the resistive loop.

- The "receiver" winding measures this current.

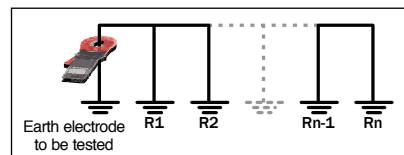
- As E and I are known values, the loop resistance can be deduced from them.

This case involves a network of parallel earths. Knowing that "n" resistances in parallel are equivalent to a resistance R_{aux} with a negligible value, we can measure the local earth value R_x :

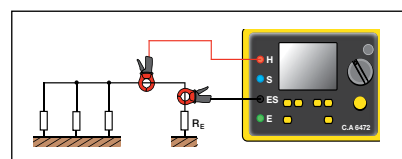
$R_{loop} = R_x + R_{aux}$ (where R_{aux} = resistance equivalent to $R_1 \dots R_n$ in parallel)

As $R_x \gg R_{aux}$, we obtain the result $R_{loop} \# R_x$

The 2-clamp method is an equivalent method. One clamp acts as the generator, while the second acts as the receiver. This method may be more practical in places where access is difficult or when a larger clamping diameter is required.












Schematic diagram: earth clamp



Schematic diagram: 2-clamp method

It is also possible to use the 4-pole + clamp method, which requires auxiliary stakes but allows precise measurement of the earth resistance.

Earth and resistivity testers election guide

									
	C-A 6421	C-A 6423	C-A 6460	C-A 6462	C-A 6470N TERCA 3	C-A 6471	C-A 6472	C-A 6416	C-A 6417
Earth									
3P method	■	■	■	■	■	■	■		
4P method			■	■	■	■	■		
Automatic coupling					■	■	■		
Selective earth									
4P + clamp method						■	■		
4P + 2-clamp method						■	■		
Earth clamp								■	■
Pylon earth measurement									
Resistivity									
Manual			■	■					
Automatic					■	■	■		
Contact voltage measurement									
Potential measurement									
Continuity									
Earth potential									
Measurement frequency									
Single frequency: 128 Hz	■	■	■	■					
Single frequency: 2,083 Hz								■	■
41 to 512 Hz					■	■			
41 to 5,078 Hz							■		
Rs, Rh measurement									
Udisturbance measurement									
Display									
Analogue	■								
LCD		■	■	■					
3-display LCD					■	■	■		
OLED								■	■
Storage / Communication									
Storage			■	■	■	■	■	■	■
Communication					■	■	■		■
Optical USB interface					■	■	■		
Bluetooth®									■
Power supply									
Batteries	■	■	■	■				■	■
Rechargeable batteries				■	■	■	■		
PC / tablet software									
GTT/ DataView®					■	■	■		
GTC									■
Tablet application									■
Page	B-3-2	B-3-2	B-3-3	B-3-3	B-3-4	B-3-5	B-3-6	B-3-8	B-3-8

Earth testers



C.A 6421 & C.A 6423

- 2-pole and 3-pole methods
- Easy to use
- Confirmation of the measurement by self-diagnosis
- Designed for use in the field with leakproof on-site casing and clearly-readable display

Specifications

Measurement	Earth
Type	2P & 3P
Resistivity	No
Measurement range	0.5 to 1,000 Ω
Resolution	-
Accuracy	± (5 % + 0.1 % at full scale)
No-load voltage	≤ 24 V
Frequency	128 Hz
Alarms	3 fault-indicator LEDs to validate the measurement
Power supply	8 x 1.5 V batteries
Display	Analogue
Electrical safety	IEC 61010 & IEC 61557
Dimensions / weight	238 x 136 x 150 mm / 1.3 kg

■ C.A 6421

■ C.A 6423

	■ C.A 6421	■ C.A 6423
Measurement	Earth	
Type	2P & 3P	
Resistivity	No	
Measurement range	0.5 to 1,000 Ω	0.01 to 2,000 Ω (3 automatic calibres)
Resolution	-	10 mΩ / 100 mΩ / 1 Ω (depending on calibre)
Accuracy	± (5 % + 0.1 % at full scale)	± (2 % + 1 ct)
No-load voltage	≤ 24 V	≤ 48 V
Frequency	128 Hz	
Alarms	3 fault-indicator LEDs to validate the measurement	
Power supply	8 x 1.5 V batteries	
Display	Analogue	2,000-count digital LCD screen
Electrical safety	IEC 61010 & IEC 61557	
Dimensions / weight	238 x 136 x 150 mm / 1.3 kg	

State at delivery

- > **C.A 6421 and C.A 6423** delivered with 1 carrying strap, 8 x LR6 1.5 V batteries, 1 operating manual in 5 languages

References to order

- > **C.A 6421** > P01123011
- > **C.A 6423** > P01127013

Accessories / Replacement parts

> For C.A 6421 and C.A 6423

- | | |
|-----------------------------------|------------------|
| Carrying strap | > P01298005 |
| 0.1 A -250 V HRC fuse (x 10) | > P01297012 |
| 1.5 V LR6 alkaline battery | > P01296033 |
| 1.5 V LR6 alkaline battery (x 12) | > P01296033A |
| 1.5 V LR6 alkaline battery (x 24) | > P01296033B |
| Bag no. 2 | > P01298006 |
| Earth and resistivity kits | > see page B-3-9 |

Earth and resistivity testers

C.A 6460 & C.A 6462

> 3 in 1: resistivity, earth and coupling

- Confirmation of the measurement by self-diagnosis: 3 LEDs indicating the presence of faults liable to invalidate the measurement result
- Highly resistant site-proof casing with cover for use in severe conditions
- Large LCD screen with backlighting

Specifications

	C.A 6460	C.A 6462
Measurement	Earth / resistivity / coupling	
Type	3P & 4P	
Measurement range	0.01 to 2,000 Ω (3 automatic calibres)	
Resolution	10 mΩ / 100 mΩ / 1 Ω (depending on calibre)	
Accuracy	± (2 % + 1 ct)	
No-load voltage	≤ 42 V peak	
Frequency	128 Hz	
Alarms	3 fault-indicator LEDs to validate the measurement	
Power supply	8 x 1.5 V batteries	Rechargeable NiMH battery
Display	2,000-count digital LCD screen	
Electrical safety	IEC 61010 & IEC 61557	
Dimensions	273 x 247 x 127 mm (handle folded away)	
Weight	2.8 kg	3.3 kg



Accessories / Replacement parts

> For C.A 6460 and C.A 6462:

- 2P EUR mains lead
- 0.1 A -250 V HRC fuse (x 10)
- Battery pack
- 1.5 V LR6 alkaline battery
- 1.5 V LR6 alkaline battery (x 12)
- 1.5 V LR6 alkaline battery (x 24)
- Standard carrying bag
- Earth and resistivity kits

- > P01295174
- > P01297012
- > P01296021
- > P01296033
- > P01296033A
- > P01296033B
- > P 01298060
- > see page B-3-9

State at delivery

- > **C.A 6460** delivered with 8 x LR6 1.5 V batteries and 1 operating manual in 5 languages
- > **C.A 6462** delivered with 1 mains lead for recharging and 1 operating manual in 5 languages

References to order

- > **C.A 6460** >P01126501
- > **C.A 6462** >P01126502

Earth and resistivity tester

C.A 6470N - TERCA 3

- > 4 in 1: Earth / Resistivity / Coupling and Continuity
- > Suitable for industrial and residential environments



IP
53

C.A 6470N

C.A 6470N

Specifications		
3P method	Range (<i>automatic selection</i>)	0.01 Ω to 99.99 kΩ
	Resolution	0.01 to 100 Ω
	Test voltage	16 or 32 V, selectable
	Measurement frequency	41 to 513 Hz, automatic or manual
	Test current	Up to 250 mA
	Accuracy	± 2 % of value ± 1 ct
4P method	Range	0.001 Ω to 99.99 kΩ
	Resolution	0.001 to 10 Ω
	Test voltage	16 V or 32 V
	Measurement frequency	41 to 513 Hz, automatic or manual
	Test current	Up to 250 mA
	Accuracy	± 2 % of value ± 1 ct
Soil resistivity measurement		
4P method	Measurement method	Wenner or Schlumberger method with automatic calculation of results and display in Ω-meters
	Range (<i>automatic selection</i>)	0.01 Ω to 99.99 kΩ
	Resolution	0.01 Ω to 100 Ω
	Test voltage	16 or 32 V, selectable
	Measurement frequency	41 to 128 Hz
External voltage measurement		
	Range (<i>automatic selection</i>)	0.1 to 65.0 V _{AC/DC} - DC to 450 Hz
	Accuracy	± 2 % of reading + 1 ct
Resistance measurement / Continuity (<i>earth connection test</i>)		
	Type of measurement	2P or 4P method, selectable by user
	Range (<i>automatic selection</i>)	2P: 0.01 Ω to 99.9 kΩ; 4P: 0.001 Ω to 99.99 kΩ
	Accuracy	± 2 % of reading + 3 cts
	Test voltage	16 V _{DC} (polarity +, - or auto)
	Test current	> 200 mA for R < 20 Ω
Data storage	Storage capacity	512 test results
	Communication	Optically-isolated USB
Power supply		Rechargeable battery
Battery-charger power supply		External power supply with 18 V _{DC} / 1.5 A output or 12 V _{DC} vehicle power supply
Dimensions / weight		272 x 250 x 128 mm / 3 kg
Electrical safety		50 V CAT IV

State at delivery

- > **C.A 6470N:** delivered with 1 mains adapter + 2-pole mains power lead for recharging the battery, data export software + optical/USB communication cable, 5 operating manuals (1 per language) on CD-ROM, 5 simplified operating manuals each in a different language, 5 specifications labels, each in a different language.



Accessories / Replacement parts

DataView® report generation software	> P01102095
Adapter for recharging on vehicle cigarette lighter	> P01102036
Optical/RS communication cable	> P01295252
GB mains power cable	> P01295253
F 0.63 A - 250 V - 5 x 20 mm - 1.5 kA fuse (x 10)	> AT0094
Adapter for charging battery from the mains	> P01102035
Battery pack	> P01296021
Optical/USB communication cable	> HX0056-Z
Earth and resistivity kits	> see page B-3-9

Reference to order

- > **C.A 6470N** > P01126506

Earth and resistivity tester

C.A 6471

Specifications

Measurements with 2 clamps	
Range	0.01 to 500 Ω
Resolution	0.01 to 1 Ω
Measurement frequency	Auto: 1.611 Hz
3P method	
Range (automatic selection)	Manual: 128 Hz - 1,367 Hz - 1,611 Hz - 1,758 Hz
Resolution	0.01 Ω to 99.99 kΩ
Test voltage	0.01 Ω to 100 Ω
Measurement frequency	16 V or 32 VRMS rated voltage, selectable
Test current	41 to 513 Hz, automatic or manual
Accuracy	Up to 250 mA
4P method / 4P measurements with clamps	
Range	± 2 % of reading + 1 ct at 128 Hz
Resolution	0.001 Ω to 99.99 kΩ
Test voltage	0.001 to 100 Ω
Measurement frequency	16 V or 32 V selectable
Test current	41 to 513 Hz, automatic or manual
Accuracy	Up to 250 mA
Soil resistivity measurement	
Measurement method	± 2 % of reading ± 1 ct
Range (automatic selection)	Wenner or Schlumberger method with automatic calculation of results and display in Ω-meter
Resolution	0.01 to 99.99 kΩ; ρ max. 999 kΩm
Test voltage	0.01 Ω to 100 Ω
Measurement frequency	16 or 32 V, selectable
External voltage measurement	
Range (automatic selection)	41 to 128 Hz, selectable
Accuracy	0.1 to 65.0 V _{AC/DC} - DC to 440 Hz
Resistance measurement / Continuity (connection test)	
Type of measurement	± 2 % of reading + 1 ct
Range (automatic selection)	2P or 4P selectable by user
Accuracy	2P: 0.01 Ω to 99.9 kΩ; 4P: 0.001 Ω to 99.99 kΩ
Test voltage	± 2 % of reading + 2 cts
Test current	16 V _{DC} (polarity +, - or auto)
Data storage	
Storage capacity	> 200 mA for R < 20 Ω
Communication	512 test results
Power supply	
Battery-charger power supply	Optically-isolated USB
	Rechargeable battery
Dimensions / weight	
External power supply with 18 V _{DC} / 1.9 A output or 12 V _{DC} vehicle power supply	
Electrical safety	
	272 x 250 x 128 mm / 3.2 kg
	50 V CAT IV

C.A 6471

- > 5-in-1 tester: Earth / Selective Earth / Resistivity / Coupling / Continuity
- > Ideal for industry



Accessories / Replacement parts



DataView® report generation software	> P01102095
Adapter for recharging on vehicle cigarette lighter	> P01102036
Optical/RS communication cable	> P01295252
GB mains power cable	> P01295253
F 0.63 A - 250 V - 5 x 20 mm - 1.5 kA fuse (x 10)	> AT0094
Adapter for charging battery from the mains	> P01102035
Battery pack	> P01296021
Optical/USB communication cable	> HX0056-Z
MN82 clamp (diam. 20 mm) delivered with 2 m cable for ES terminal connection	> P01120452
C182 clamp (diam. 20 mm) delivered with 2 m cable for ES terminal connection	> P01120333
Standard carrying bag	> P01298066
Earth and resistivity kits	> see page B-3-9

State at delivery

- > C.A 6471 delivered with 1 mains adapter + 2-pole mains power lead for recharging the battery, data export software + optical/USB communication cable, 2 x C182 clamps with 2 safety leads, 5 operating manuals (1 per language) on CD-ROM, 5 simplified operating manuals each in a different language, 5 specifications labels, each in a different language, 1 carrying bag

Reference to order

- > C.A 6471 > P01126505

Earth and resistivity tester

C.A 6472

- All types of earth resistance measurement and pylon earth measurement (C.A 6474 option)
- Resistivity (Wenner + Schlumberger methods)
- Earth coupling
- Soil potential measurement
- Continuity / Resistance



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C.A 6472

Specifications

3P measurements

Range (automatic selection)	0.01 Ω to 99.9 kΩ
Resolution	0.01 Ω to 100 Ω
Test voltage	16 V or 32 Vrms rated voltage, selectable
Measurement frequency	41 to 5,078 Hz, automatic or manual
Test current	Up to 250 mA
Accuracy	± 2 % R +1 ct at 128 Hz

Measurements with 2 clamps

Range	0.01 to 500 Ω
Resolution	0.01 to 1 Ω
Measurement frequency	Auto: 1367 Hz Manual: 128 Hz – 1,367 Hz – 1,611 Hz – 1,758 Hz

4P method /

4P measurements with clamps

Range	0.001 Ω to 99.99 kΩ
Resolution	0.001 to 10 Ω
Test voltage	16 V or 32 V selectable
Measurement frequency	41 to 5,078 Hz, automatic or manual
Test current	Up to 250 mA
Accuracy	± 2 % of reading ± 1 ct

Soil resistivity measurement

4P method

Measurement method

Range (automatic selection)	0.01 to 99.99 kΩ; ρ max. 999 kΩm
Resolution	0.01 Ω to 100 Ω
Test voltage	16 or 32 V, selectable
Measurement frequency	41 to 512 Hz, selectable

Wenner or Schlumberger method with automatic calculation of results and display in Ω-meter

Earth potential measurement

Range (automatic selection)	0.00 to 65.00 V
Resolution	0.01 mV to 10 mV
Measurement frequency	41 to 5,078 Hz
Accuracy	+/- 5% + 1 ct at 128 Hz

External voltage measurement

Range (automatic selection)	0.1 to 65.0 V _{AC/DC} and 15 to 450 Hz
Accuracy	± 2 % of reading + 1 ct

Resistance measurement /

Continuity

Type of measurement

Range (automatic selection)	2P: 0.01 Ω to 99.9 kΩ; 4P: 0.001 Ω to 99.99 kΩ
Accuracy	± 2 % of reading + 2 cts
Test voltage	16 V _{DC} (polarity +, - or auto)
Test current	> 200 mA for R < 20 Ω

2P or 4P selectable by user

Storage

Storage capacity

Communication

Power supply

Battery-charger power supply

Dimensions / weight

Electrical safety

Storage capacity	512 test results
Communication	Optically-isolated USB
Power supply	Rechargeable battery
Battery-charger power supply	External power supply with 18 V _{DC} /1.9 A output or 12 V _{DC} vehicle power supply
Dimensions / weight	272 x 250 x 128 mm / 3.2 kg
Electrical safety	50 V CAT IV

State at delivery

- > **C.A 6472** delivered with 1 mains adapter + 2-pole mains power lead for recharging the battery, data export software + optical/USB communication cable, 2 x C182 clamps with 2 safety leads, 5 operating manuals (1 per language) on CD-ROM, 5 simplified operating manuals each in a different language, 5 specifications labels each in a different language, 1 carrying bag

Reference to order

> **C.A 6472**

> P01126504

Accessories / Replacement parts

- | | |
|---|------------------|
| Adapter for battery charging on vehicle cigarette lighter | > P01102036 |
| Optical / RS communication cable | > P01295252 |
| GB mains power cable | > P01295253 |
| Set of 10 fuses F 0.63 A – 250 V – 5 x 20 mm – 1.5 kA | > AT0094 |
| Adapter for battery charging from the mains | > P01102035 |
| Battery pack | > P01296021 |
| Optical / USB communication cable | > HX0056-Z |
| MN82 clamp (diam. 20 mm) delivered with 2 m cable for connection to ES terminal | > P01120452 |
| C182 clamp (diam. 20 mm) delivered with 2 m cable for connection to ES terminal | > P01120333 |
| Standard carrying bag | > P01298066 |
| Earth and resistivity kits | > see page B-3-9 |
| Pylon Box with its accessories | > see page B-3-7 |

Earth and resistivity tester

C.A 6474

> The essential accessory for measurements on pylons

- Measurement of the overall line impedance
- Measurement of the pylon's overall earth resistance
- Measurement of the earth resistance of each pylon footing
- Quality of overhead earth wire connection



Specifications

Measurement

Type of measurement	Overall pylon earth resistance Earth resistance of each pylon footing Overall line impedance Quality of overhead earth wire connection. Active measurement (injection by the C.A 6472) Passive measurement (use of disturbance currents)
Measurement range	0.067 Ω to 99.99 kΩ
Accuracy	± (5 % + 1 ct)
Frequency	41 to 5,078 Hz
Frequency sweep	Yes
Dimensions	272 x 250 x 128 mm
Weight	2.3 kg
Power supply / Storage / Display	Provided by the C.A 6472



■ C.A 6474 / PYLON BOX

DataView®

For C.A 6470N, C.A 6471, C.A 6472 & C.A 6474

The essential tool for configuring the instruments, triggering the measurements, viewing the data in real time, recovering the recorded data and creating standard or customized measurement reports

- > Configuration of all the functions
- > Remote activation of tests by simply pressing a button
- > Real-time data capture and display
- > Recovery of the data recorded in the instruments
- > Possibility of inserting user comments directly into the measurement report
- > Possibility of creating customized report templates
- > Display of result curves, e.g. the measurement of impedance as a function of frequency
- > Printing of measurement reports

Accessories / Replacement parts

Connection cable	> P01295271
15 m BNC/BNC cable	> P01295272
5 m AmpFLEX™ flexible current sensor	> P01120550
8 m AmpFLEX™ flexible current sensor	> P01120551
AmpFLEX™ identification ring (x 12)	> P01102045
Adjustable clamp (x 3)	> P01102046
5 m green cable (E terminal connection)	> P01295291
5 m black cable (ES terminal connection)	> P01295292
Spade lug/banana plug adapters	> P01102028
Calibration loop	> P01295294
Prestige carrying bag	> P01298067
AmpFLEX™ flexible current sensors: other lengths available on request	

State at delivery

- > **C.A 6474** delivered with 1 carrying bag for accessories containing 1 connection lead, 6 BNC/BNC cables 15 m long, 4 AmpFLEX™ flexible current sensors 5 m long, 1 set of 12 AmpFLEX™ identification rings, 2 cables (5 m green, 5 m black) with safety connectors on winder, 5 spade lug/banana plug converters Ø 4 mm, 3 adjustable clamps, 1 calibration loop, 5 operating manuals and 5 specifications labels, each in a different language

References to order

- > **C.A 6474** - AmpFlex™ 5 m > P01126510
- > **C.A 6474** - AmpFlex™ 8 m > P01126511

Earth clamps

C.A 6416 & C.A 6417

- > Quick earth-loop testing
- > Easy to use thanks to the OLED screen and the force compensation system
- > Simultaneous display of Ω and A
- > Automatic hold of measurement display when clamp is opened
- > Leakage current and Storage
- > Bluetooth communication (C.A 6417)
- > Contact voltage alarm



600 V CAT IV

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Accessories / Replacement parts

- | | |
|----------------------|-------------|
| DataView | > P01102095 |
| Bluetooth USB modem | > P01102112 |
| Hard case | > P01298080 |
| CL1 calibration loop | > P01122301 |



Specifications

Loop ohmmeter
1,500-count display

Frequency

Loop inductance measurement

4,000-count display

Ammeter
4,000-count display

Setup

Modes

Alarms

Buzzer

HOLD

Automatic power-off

General specifications

Display

Max. clamping diam.

Storage

Communication

Power supply

Battery life

Calibration

Electrical safety

Protection

Dimensions / weight

C.A 6416

C.A 6417

Measurement ranges (Ω) / Resolution (Ω) / Accuracy
0.010 to 0.099 / 0.001 / $\pm 1.5\% \pm 0.01$

0.10 to 0.99 / 0.01 / $\pm 1.5\% \pm 2r$ (r = resolution)

1.0 to 49.9 / 0.1 / $\pm 1.5\% \pm r$

50.0 to 99.5 / 0.5 / $\pm 2\% \pm r$

100 to 199 / 1 / $\pm 3\% \pm r$

200 to 395 / 5 / $\pm 5\% \pm r$

400 to 590 / 10 / $\pm 10\% \pm r$

600 to 1,150 / 50 / Envir. 20 %

1,200 to 1,500 / 50 / Envir. 25 %

Measurement frequency 2,083 Hz /
Translation frequency 50, 60, 128 or 2,083 Hz

Measurement ranges (μH) / Resolution (μH) / Accuracy

10 to 100 / 1 / $\pm 5\% \pm r$

100 to 500 / 1 / $\pm 3\% \pm r$

Measurement ranges (V) / Resolution (V) / Accuracy

0.1 to 4.9 / 0.1 / $\pm 5\% \pm r$

5.0 to 49.5 / 0.5 / $\pm 5\% \pm r$

50.0 to 75.0 / 1 / $\pm 10\% \pm r$

Measurement ranges (A) / Resolution (A) / Accuracy

0.200 to 0.999 mA / 1 μA / $\pm 2\% \pm 50 \mu\text{A}$

1.000 to 2.990 mA - 3.00 to 9.99 mA / 10 μA / $\pm 2\% \pm 50 \mu\text{A}$

10.00 to 29.90 mA - 30.0 to 99.9 mA / 100 μA / $\pm 2\% \pm r$

100.0 to 299.0 mA - 0.300 to 0.990 A / 1 mA / $\pm 2\% \pm r$

1.000 to 2.990 A - 3.00 to 39.99 A / 10 mA / $\pm 2\% \pm r$

Standard or advanced

Configurable on Z, V and A

Active / Inactive

Manual or automatic PRE-HOLD

Active / Inactive

152-segment OLED. Active area 48 x 39 mm

\varnothing 35 mm

300 time/date-stamped

measurements

2,000 time/date-stamped

measurements

Bluetooth class 2

4 x 1.5 V, LR6 (AA) alkaline batteries or 4 Ni-MH batteries

1,440 measurements of 30 seconds

Automatic at startup

IEC 61010 600 V CAT IV

IP40

55 x 95 x 262 mm / Approx. 935 g with batteries

State at delivery and references

- > **C.A 6416** >P01122015
1 clamp delivered in a carrying case with 4 x 1.5 V batteries, 1 CD Rom containing the operating manual in 5 languages, 1 quick startup guide, 1 safety datasheet in 20 languages and a verification certificate

- > **C.A 6417** >P01122016
1 clamp delivered in a carrying case with 4 x 1.5 V batteries, 1 CD Rom containing the operating manual in 5 languages and the GTC software with simplified driver, 1 quick startup guide, 1 safety datasheet in 20 languages and a verification certificate

Composition of the earth and resistivity kits

	Article code	Description	Reels and winders				Other accessories			Installation testers			3P	3/4P+p	Expert		Pylon	
			Green	Red	Blue	Black	Stake(s) / Mallet	Spade-lug / banana adapter	Carrying bag	C.A 6030	C.A 6113	C.A 6116N / C.A 6117	C.A 6421 / C.A 6423	C.A 6460 / C.A 6462	C.A 6470N TERCA 3	C.A 6471	C.A 6472	C.A 6474
1P Kit	P01102018	30 m 1P earth kit				33 m	1 / -											
	P01102020	(black)	33 m				1 / -											
3P Kit	P01102017	33 m 1P earth kit	5 m	15 m	10 m		2 / -											
	P01102021	15 m 3P earth kit	10 m	50 m	50 m		2 / 1	5	Standard									
	P01102022	(red/green/blue)	10 m	100 m	100 m		2 / 1	5	Standard									
	P01102023	50 m earth kit for 3P method	10 m	166 m	166 m		2 / 1	5	Prestige									
4P Kit	P01102040	100 m earth kit for 3P method	33 m	50 m	50 m	33 m	4 / 1	5	Standard									
	P01102024	166 m earth kit for 3P method	100 m 10 m	100 m	100 m	33 m	4 / 1	5	Prestige									
	P01102025	50 m 4P resistivity kit	100 m 10 m	166 m	166 m	33 m	4 / 1	5	Prestige									
Additional	P01102030	100 m earth & resistivity kit	100 m			33 m	2 / -		Standard									

	Article code	Description	Reels and winders			
			Verte	Rouge	Bleue	Noire
Other accessories for earth kit	P01102026	Green cable winder	10 m			
	P01102028	Set of 5 adapters				
	P01102029	for terminals				
	P01102031	Set of 4 reel handles				
	P01102046	Earth T-stake				
	P01102047	Set of 3 adjustable clamps				10 m
	P01120310	10 m black cable H-winder				
	P01295260	C172 clamp		166 m		
	P01295261	166 m reel of red cable		100 m		
	P01295262	100 m reel of red cable		50 m		
	P01295263	50 m reel of red cable			166 m	
	P01295264	166 m reel of blue cable			100 m	
	P01295265	100 m reel of blue cable			50 m	
	P01295266	50 m reel of blue cable	100 m			
	P01295267	100 m reel of green cable				33 m
	P01295268	33 m reel of black cable	33 m			
	P01295270	33 m reel of green cable				2 m
	P01295291	2 m black cable winder (2 m cable for clamps)	5 m			
P01295292	5 m green cable winder				5 m	
		5 m black cable H-winder				

Additional	P01102037	C.A 647x continuity kit (4 red, black, blue & yellow croc. clips), (2 red/black test probes), (4 x 1.5m red, black, blue & yellow cables)																
	P01120550	5m AmpFlex™ flexible current sensors																
Special	P01120551	8m AmpFlex™ flexible current sensors																
	P01102046	Set of 3 adjustable clamps																
	P01120310	C172 clamp																
	P01120335	C177 clamp																
	P01120336	C177A clamp																
P01120333	C182 clamp																	

High-quality accessories for your earth resistance and soil resistivity measurements

- > **Ergonomic**
 - Simple, error-free connections thanks to colour coding
 - Easy to handle
- > **Universal**
 - Ø 4 mm banana plug / spade lug adapters
- > **Compact**
 - All the accessories in a single carrying bag divided into compartments



Earth and resistivity kit: for earth resistance and soil resistivity measurements using any method

P01298066	Standard carrying bag
P01298067	Prestige carrying bag

Technical overview

CHECKING THE SAFETY OF MACHINES, SWITCHBOARDS AND PORTABLE ELECTRICAL APPLIANCES

MACHINE SAFETY

The IEC 60204 / EN 60204 standard defines a **machine** as a **set of parts** or systems linked together, **at least one of which is mobile**. The fields of application are particularly diverse: machines for working metal, wood, textiles, printing, compressors, leather, tanneries, agricultural machinery, building sites and quarries, etc. **Part 1** of this reference standard defines the general requirements regarding electrical machine safety to ensure the protection of people who may be exposed to hazardous phenomena due to failure of the electrical equipment or the command circuits, disturbances in the power sources or power circuits, loss of continuity in the circuits, electromagnetic disturbances, release of accumulated energy, excessive audible noise or excessive surface temperatures.

To ensure electrical safety on the machines, you have to carry out a number of checks and tests after initial implementation, installation, renovation or modification and during periodic testing:

- Checking of the **protective automatic cut-off systems** on the power supply in particular (the types of tests and checks depend on the earthing system):
 - Checking of **PE continuity** on each circuit in the machine with a measurement current ≥ 200 mA which may be as high as 10 A,
 - Verification of the **loop impedance** as per IEC 61557-3 and correct coordination of the protection against overcurrents
 - **Visual** check of the protection against overcurrents
 - **RCD** testing as per IEC 61557-6, tripping-time test (recommended)
 - Verification of the current at the first insulation fault by measurement or calculation

Note: this test may be simplified depending on the condition of the machine as established by a questionnaire included in the standard.

- **Insulation resistance** measurement at 500 V_{DC}, $R > 1$ MΩ
 - Test of dielectric strength with 50 or 60 Hz **AC voltage**, at 2 x UN or 1,000 V, duration 1 sec (without disruptive discharge)
 - **Residual overvoltage** test by measuring the **discharge time** < 1 sec or 5 sec.
 - Operating test of the machine and the circuits involved in electrical safety
- The tests are usually performed in the order of decreasing failure in order to intercept electrical safety problems on the machine tested as quickly as possible.

Other aspects of the machine may be checked, such as the conformity of the documentation, the temperature reached, the correct order of the phase sequence and the phase drop between the power supply and the load.

SWITCHBOARD SAFETY

The IEC 61439 / EN 61439 standard defines a **set of low-voltage equipment** as a **combination** of one or more low-voltage connection devices.

A recent upgrade of this standard precisely defines the limits of liability between the **original manufacturer**, who should perform the **design checks**, and the **assembler (switchboard operator)** who should perform **individual series testing**. These checks include construction and performance tests. The **switchboard operator** is considered to become the **original manufacturer** if modifications are made to the low-voltage switchboard. A declaration of conformity based on simple comparison with a similar switchboard will not be accepted, so a new check is necessary. This new context means that additional test equipment is needed to ensure compliance with the requirements of this reference standard.

The **tests required** for low-voltage switchboards are:

- Physical measurement of the **insulation gap or leakage distance**
- **PE continuity check** with a measurement current ≥ 200 mA which may be up to 10 A ($R \leq 0.1 \Omega$)
- **Short-circuit withstand** by creating a bolted short-circuit
- Checking of the **dielectric properties** by a test at 50 / 60 Hz with the application of a voltage between the different groups of terminals rising slowly and then held for 5 sec or 1 sec
- **Insulation test** (variant)

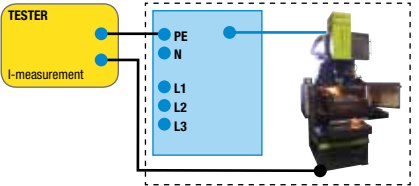
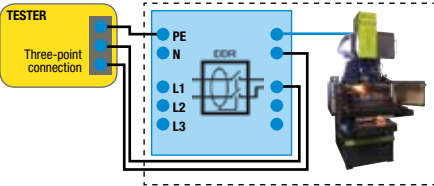
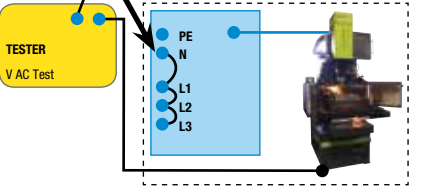
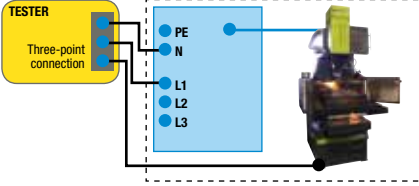
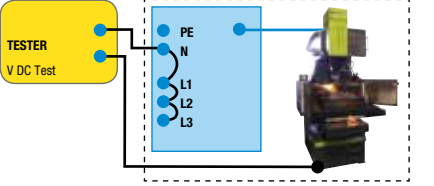
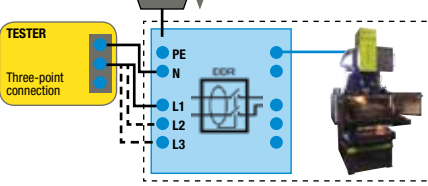
Other aspects can also be checked, such as the discharge time, the IP protection rating, the electrical circuits and connections (by random testing), identification of the external terminals, mechanical operation, la shock voltage withstand, heating, etc.

SAFETY OF PORTABLE ELECTRICAL APPLIANCES

The VDE 701 and VDE 702 standards define the inspections to be performed after repair or modification of the electrical appliances and the periodic inspections necessary, as well as general guidelines for electrical safety. This reference standard describes the automatic sequencing of the tests to be performed.

Many of the tests and checks to be performed are identical to those described in the Machines and Switchboards section, plus certain tests "**with probes**" when the equipment does not have double insulation or reinforced insulation (Class I). Furthermore, the leakage current measurements must include leakage measurements by different methods (**substitution method, differential leakage method, contact leakage method**, etc.). The polarity of the mains leads must also be checked to ensure that it complies.

PRMAIN TESTS & CHECKS

PE CONTINUITY TEST	RCD AND PRCD TEST	HV DIELECTRIC TEST
<p>(CEI 61557-4)</p> 	<p>RCD test (Uc, Ti, I) (IEC 61557-6)</p> 	<p>AC dielectric strength</p> 
<p>Can be used to check whether the resistance measured corresponds to the cross-section and length of the PE conductor.</p>	<p>The RCD test can be used to check operation of the RCDs.</p>	<p>The AC dielectric test can be used to confirm the device's ability to function at its operating voltage. These tests are performed at a higher voltage than the normal operating voltage.</p>
LOOP IMPEDANCE MEASUREMENT	INSULATION RESISTANCE MEASUREMENT	DISCHARGE TIME
<p>Loop & PFC measurement (IEC 61557-3)</p> 	<p>Measurement of Rin insulation in MΩ (IEC 61557-2)</p> 	
<p>By measuring the loop impedance and calculating the protective fault current (PFC), you can check that the automatic cut-off systems or fuses are appropriately sized.</p>	<p>By measuring the insulation resistance, it is possible to detect faults due to deterioration or pollution and mould.</p>	<p>When the machines are disconnected, high-value capacitors may supply a hazardous voltage. This test measures whether the time taken by the discharge voltage to reach a non-hazardous value complies with the requirements ($< 5s / < 1s$).</p>

Machine and switchboard testers selection guide


C.A. 6121

C.A. 6155

C.A. 6160

	C.A. 6121	C.A. 6155	C.A. 6160
Insulation			
250 V _{DC}		■	■
500 V _{DC}	■	■	■
1,000 V _{DC}	■		■
Dielectric tests			
1,000 / 1,250 / 1,500 V _{AC}	■		
1,000 / 1,890 / 2,500 V _{AC}		■	
100 to 5,000 V _{AC}			■
Continuity			
I test > 10A	■	■	■
I test 0.2A		■	■
I test 0.1A			■
I test 25A			■
Voltage drop			
I test 10A	■		■
Via Zi		■	
Discharge time			
Discharge time to 60 V	■	■	■
Leakage current			
Via socket		■	■
Substitution (residual) method		■	■
Contact leakage		■	■
Direct method via clamp		■	
Functional test			
Apparent power S, V		■	■
Active power, current, frequency and & cos phi			■
Loop impedance & resistance			
Zs-loop (L-PE) (Trip), Ik calculation (PFC)		■	
Zs-loop (L-PE) (No Trip), Ik calculation (PFC)		■	
Zi-loop (L- or LL), Ip-p (PSCC)		■	
RCD & PRCD test			
PRCD x0.5 / x1 / x5x IΔn		■	
RCD x0.5 / x1 / x2 / x5x IΔn		■	
Other functions			
Alarms	■	■	■
Phase sequence		■	
Storage / Communication			
Storage	■ (999)	■ (6,000)	■ (1,600)
RS232 / USB Communication	■ / -	■ / ■	■ / -
Transmission of results to printer	■	■	■
Interface for pedal (START/STOP, SAVE) and lamps	■		■
Interface for barcode		■	■
DOOR OPEN interface			■
PC software			
	MachineLink	CALink	CELink
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Electrical equipment tester



600 V CAT III

IP
40



C.A 6121

> "Industrial machine" tester as per IEC 60204: insulation / dielectric test / continuity / voltage drop / discharge time

C.A 6121

Specifications

Insulation	Test voltage	500 / 1,000 V _{DC}
	Measurement range	1 kΩ to 500 MΩ
	Accuracy 0 to 200 MΩ	± (2 % R + 2 cts)
Dielectric testing	Test voltage	1,000 / 1,250 / 1,500 V _{AC} (50 Hz) for U _{mains} = 230 V at 500 VA
	Measurement range	0 to 500 mA
	Accuracy	± (2 % R + 0.3 mA) For trigger current set to 1, 3, 5, 10 or 20 mA ± (2 % R + 0.5 mA)
Continuity	Range	For trigger current set to 30, 40, 50, 60, 70, 80, 90 or 100 mA
	Current measurement	± (2 % R + 2 mA)
	Accuracy 0 to 1 Ω	For trigger current set to 150, 200, 250, 300, 330, 350, 400, 450 or 500 mA
Voltage drop	Test current	0 to 2 Ω
	Measurement range	I > 10 A
	Accuracy	± (2 % R + 2 mΩ)
Discharge time	Range	10 A
	Accuracy	0 to 10 V
		± (2 % R + 0.02 V)
Memorization		External (2 counts) or internal (4 counts)
Communication output		0 - 10 s
Power supply		± (2 % R + 0.2 s)
Dimensions / weight		999 measurements
Electrical safety		RS232
		230 V / 50 Hz mains supply
		400 x 260 x 250 mm / 11 kg
		IEC 61010-1 - CAT III - 600 V

Accessories / Replacement parts

MACHINE LINK Windows processing software
(supplied with communication cable)

Serial printer no. 5

DB9F-DB25M adapter

Remote-control pedal

Indicator lamps (green/red)

Roll of paper for serial printer (x 5)

2 crocodile clips (red/black)

2 test probes (red/black)

2 dielectric test guns with 6 m cable

2 dielectric test guns with 2 m cable

Key (x 2)

2 safety leads, 3 m (red/black)

Black continuity test lead, 2.5 m

Red continuity test lead, 2.5 m

Discharge time cable (EURO)

- > P01101915
- > P01102903
- > P01101841
- > P01101916
- > P01101917
- > P01101842
- > P01295457Z
- > P01295458Z
- > P01101918
- > P01101919
- > P01101932
- > P01295097
- > P01295137
- > P01295140
- > P01295141

State at delivery and reference

> **C.A 6121** is delivered with an accessories bag, 2 dielectric test guns with 2 m cable, 2 continuity test leads 2.5 m long (1 red, 1 black), 2 insulation test leads 3 m long (1 red, 1 black), 2 crocodile clips (1 red, 1 black), 1 red test probe, 1 discharge-time cable, 1 power supply lead, 1 operating manual in 5 languages

> P01145601

Accessories / Replacement parts

DB9F-25F cable (x 2)

DB9F-DB9M cable no. 01

20 A-600 V 10.3 x 38F fuse (x 10)

Rigid bag no.3

> P01295172

> P01295173

> P01297030

> P01298031

Electrical equipment tester

C.A 6160

C.A 6160

Specifications

Insulation	
Test voltage	250 / 500 / 1,000 V _{DC}
Measurement range	0.000 MΩ to 999 MΩ
Accuracy	0.000 to 1,999 MΩ: ±(5 % R + 10 cts) 2,000 to 199,9 MΩ: ±(3 % R + 3 cts) 200 to 999 MΩ: ±(10 % R + 10 cts)
Dielectric testing	
Test voltage	100 to 5,000 V _{AC} - 50 Hz/60 Hz for U _{mains} = 230 V at 500 VA
Trigger current	0.5 to 500 mA up to 500 VA
Continuity	
Test current	0.1 / 0.2 / 10 / 25 A
Measurement range	0.000 to 9,999 Ω for I = 10 A or 25 A 0.00 to 100.0 Ω for I = 0.1 A
Accuracy at 10 / 25 A	(3 % R + 3 cts)
Voltage drop	0.00 to 99.99 V at 10 A
Discharge time	External (mains socket) Internal (components)
Leakage current	
Measurement range	0.00 to 20.0 mA
Accuracy	±(5 % R + 3 cts)
Residual leakage current	
Measurement range	0.00 to 20.0 mA
Accuracy	±(5 % R + 3 cts)
Contact leakage current	
Measurement range	0.00 to 2.00 mA
Accuracy	±(5 % R + 3 cts)
Functional testing	Active and apparent power, current, voltage, frequency, cos φ
Memorization	1,600 measurements
Communication output	RS232
Power supply	230 V / 50-60 Hz mains supply
Dimensions / weight	410 x 175 x 370 mm / 13.5 kg
Protection	IP 50: closed product
Electrical safety	IEC 61010-1 - 600 V CAT II

- All the measurements and tests required by the standards
- Multiple functions
- AUTOTEST function for automatic execution of a measurement sequence
- Storage of up to 600 measurements in memory
- Testing and certification according to the European standards

300 V CAT III

IP
50



State at delivery & reference

- > **C.A 6160** delivered with a carrying bag containing 2 dielectric test guns with cable 2 m long, 2 insulation test leads 3 m long, 4 crocodile clips, 2 test probes, 4 continuity test leads 2.5 m long, 1 discharge-time cable, 1 power supply lead and 1 operating manual in 5 languages
>P01145801

CE Link software (option) for C.A 6160

- download the recorded data
- create measurement sequences and load them into the instrument
- perform remote tests and retrieve the data directly in the software
- create and print measurement reports

Accessories / Replacement parts

- | | |
|---------------------------------------|--------------|
| CE Link processing software | > P01101996 |
| DB9F-DB25M adapter | > P01101841 |
| Remote-control pedal | > P01101916 |
| Indicator lamps (green/red) | > P01101917 |
| 2 dielectric test guns with 6 m cable | > P01101918 |
| 2 dielectric test guns with 2 m cable | > P01101919 |
| 2 safety leads, 3 m (red/black) | > P01295097 |
| Power cable (Euro) | > P01295234 |
| RS232 DB9F-DB9F communication cable | > P01295172 |
| 2.5 A-250 V 5 x 20 T fuse (x 10) | > P01297085 |
| 16 A-250 V 6 x 32 T fuse (x 10) | > P01297086 |
| Standard carrying bag | > P01298066 |
| Discharge-time cable | > P01295141 |
| 2 crocodile clips (red/black) | > P01295457Z |
| 2 test probes (red/black) | > P01295458Z |

Multi-function machine tester

C.A 6155

Check the safety of all your electrical instruments and equipment according to the applicable standards:

- > Integration of all the measurements required by the latest editions of the IEC 60204 (edition 5), VDE0701/0702 and IEC 61439 (formerly IEC 60439) standards
- Electrical safety testing on portable electrical equipment, machines and switchgear
- Preprogrammed test sequences adapted to the standards or to custom requirements
- Extensive storage capacity: up to 6,000 measurements
- Delivered with data processing and report generation software as standard
- Large backlit graphic screen with an intuitive user interface and contextual help for each function
- Built-in keyboard for quick and easy customization of the measurements recorded

300 V CAT II

IP 50



State at delivery and reference

- > C.A 6155 delivered with an accessories bag containing 1 high-voltage test probe, 1 mains-socket test cable, 1 test cable with separate wires, 1 red lead 1.5 m long, 1 black lead 1.5 m long, 1 green lead 1.5 m long, 1 red lead 4 m long, 4 test probes, 3 crocodile clips, 1 operating manual in 5 languages, 1 USB communication cable, 1 RS232 communication cable and data transfer software

>P01146001



C.A 6155

Specifications

Dielectric testing	Test voltage	1,000 V / 1,890 V / 2,500 V
	I limit	0.1 to 100 mA (1,890 V / 2,500 V) 0.1 to 200 mA (1,000 V)
	Timer	2, 3, 5, 10, 30 s
Insulation resistance measurement	Timer	2, 3, 5, 10, 30 s
	U test	250 / 500 V _{DC}
	Range	Up to 200 MΩ
Continuity testing	Timer	5, 10, 30, 60, 120 s
	Range	0.01 to 1.99 Ω Indication range: 2.00 Ω to 19.9 Ω
	I test	0.20 / 10 A
Leakage current measurement	U test	< 9 V
	Timer	5, 10, 30, 60, 120, 180 s
	Substitution method	0.00 to 20.0 mA
Contact leakage current measurement	Differential method	0.00 to 9.99 mA
	Accuracy	± (5 % R + 5 cts)
	Measurement range	0.00 to 2.50 mA
60 V discharge time measurement	Accuracy	± (10 % R + 5 cts)
	Voltage range (peak value)	10 % R
	Time range	0 to 550 V 0 to 10 s
Functional test	Apparent power	0.00 to 4.00 kVA
	Power-lead polarity test	Yes
Current measurement with clamp		0.00 mA to 24.9 A
PRCD testing	Calibre	10, 15, 30 mA
	Test current	0.5 x IΔn, IΔn, 5 x IΔn
	Other	Automatic PRCD test
RCD testing	Calibre	10, 30, 100, 300, 500, 1,000 mA
	Test current	0.5 x IΔn, IΔn, 2 x IΔn, 5 x IΔn
	Current type	AC / AC (pulse)
	RCD type	General / Selective
	Test type	Step / Pulse
Uc contact voltage measurement		Yes
	Other	Automatic RCD test
High-current Zs loop measurement	Test current	6.5 A
	Range	0.00 to 1,999 Ω
	Accuracy	±(5 % R + 5 cts)
	Ik calculation	0.00 to 23.0 kA
Zs loop measurement (without RCD tripping)	Range	0.00 to 1,999 Ω
	Accuracy	±(5 % R + 10 cts)
	Ik calculation	0.00 to 23.0 kA
Zi loop measurement	Test current	6.5 A
	Range	0.00 to 1,999 Ω
	Accuracy	±(5 % R + 5 cts)
Voltage, frequency	Ik calculation	0.00 to 199 kA
		0 to 550 V / 14.0 to 499.9 Hz
Phase rotations	Voltage	100 to 550 V AC
	Frequency	14 to 500 Hz
Communication	RS 232	1 connection for barcode / RFID reader + 1 connection for printer / PC
	USB	1 printer / PC connection
Alarms		Yes for all functions
Storage		6,000 memory locations
Software		Yes, delivered as standard, Pro version as option
Power supply		230 V / 50-60 Hz
Dimensions / weight		33.5 cm x 16.0 cm x 33.5 cm / 8.4 kg
Functional standards		VDE 701 702 / IEC 60204 Ed. 5 / IEC 60439 / IEC 61439
Electrical safety		IEC 61010-1 / IEC 61557 (parts 1, 2, 3, 4, 6, 7, 10) CAT II / 300 V
Protection		IP 50: closed product

Accessories for machine and switchboard testers

	Article code	Description	Length	C.A 6121	C.A 6155	C.A 6160
Test & measurement leads						
	P01295097	4 mm banana cable- red + black	3 m	■		■
	P01295137	Double croc. cable - black	2,5 m	■		
	P01295140	Double croc. cable - red	2,5 m	■		
	P01295141	Discharge cable (EURO)	2 m	■		■
	P01295236	Double continuity cable	2,5 m			■
	P01295234	Power cable (EURO)	2 m			■
	P01102139	Test lead - red	4 m		■	
	P01102136	Plug-in test cable	1,5 m		■	
	P01102137	Test cable with separate wires	3 m		■	
	P01102138	Red + black test lead	1,5 m		■	
	P01102140	Green test lead	1,5 m		■	
	P01102141	Black test probe for C.A 6155			■	
	P01102142	Red test probe for C.A 6155			■	
	P01102143	Green test probe for C.A 6155			■	
	P01102144	Blue test probe for C.A 6155			■	
	P01102145	Set of 3 black croc. cables			■	
HV test guns and probes						
	P01101919	HV test gun	2 m	■		■
	P01102135	HV test probe for C.A 6155			■	
	P01101918	HV test gun	6 m	□		□
Remote control, indication and communication						
	P01101916	Remote control pedals		□		□
	P01101917	Red / green indicator lamps		□		□
	P01101841	DB9F-DB25M adapter		□		□
	P01295172	DB9F-25F cable x2		□		□
	P01295173	DB9F-DB9M no.1 cable		□		
	P01101915	MachineLink software with communication cables		□		
		CALink software			■	
	P01101996	CELink software with communication cables				□

□ Optional accessories ■ Included in the initial delivery

Technical overview (other testers)

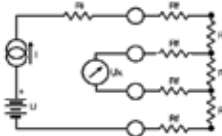
MEASUREMENT OF LOW RESISTANCES

The measurement of low resistances is widely used in preventive maintenance to check the continuity of the chassis-earths, surface condition and metallization, the quality of the contacts in the switches and relays, the resistance of the cables and windings, to assess motor and transformer heating and, in general, to check the mechanical joints. A wide variety of fields are involved, including the automotive sector, telecommunications, transport, motor and transformer manufacturers, etc. as well as the repair and maintenance companies working in these different sectors

Measurement principle

The basic principle for measuring resistance involves applying Ohm's Law: $U = R \times I$. When measuring very low resistances, a measurement current is injected and the resulting voltage is measured on the terminals of the resistance to be checked. The connections are the same as for 4-wire measurements, often called a Kelvin assembly, which limits the influence of the measurement leads when measuring low resistances.

The connection diagram is shown below:



Where:

- Ri = internal resistance of the instrument.
- Rf = resistance of the measurement wires.
- Rc = contact resistance.
- Rx = resistance to be measured.

From a DC voltage source U, a generator supplies a current with the value I.

A voltmeter measures the voltage drop Ux at the terminals of the resistor Rx to be measured and displays $R_x = U_x / I$. The result is independent of the other resistances encountered in the current loop (Ri, Rf, Rc), as long as the total voltage drop which they cause with Rx remains lower than the voltage which the current source can supply.

In practice, double retractable test probes, pivoting or otherwise, or Kelvin clamps are used for better contact with the object to be tested. Lastly, when measuring on a rivet, the two contacts of a given test probe must be capable of retracting by different amounts.

The micro-ohmmeters must offer a resolution of 1 $\mu\Omega$ or even 0.1 $\mu\Omega$, a wide measurement range and compensation of the thermocouple effects by inversion of the measurement current. To ensure operator safety, the equipment must be protected against accidental overvoltages, prevent measurement in the presence of a disturbance voltage and trigger automatic discharging after measurements on inductive objects.

Lastly, as the resistance of metals changes significantly according to the temperature, it is a good idea to present the result at a given reference temperature. The instruments with the best performance automatically perform this calculation according to the type of metal, its temperature coefficient (approximately 0.4 %/°C for copper or aluminium), the ambient temperature and the reference temperature.

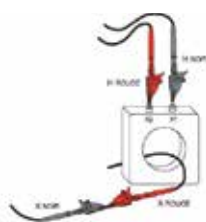
MEASUREMENT OF TRANSFORMER RATIO AND EXCITATION CURRENT

Strict compliance with the primary / secondary ratio values of the voltage, power and current transformer is crucial because any variation of these values over time is a sign of problems in the transformer, such as internal damage, possible deterioration of the insulants due to mechanical damage or contamination or short-circuits between loops. In addition, accurate measurement of the excitation current can identify problems in the magnetic core of the transformer, such as type and thickness of the material, mechanical stresses and air-gap and assembly variations.

By checking the winding polarity and the presence of open circuits or groups of terminals in open circuit, it is possible to detect rewiring errors after maintenance operations.

Transformer ratio measurements performed using the method described in the IEEE C57.12-90™-2006 reference document ensure standard, repeatable measurements. As such measurements are often performed in environments where a lot of noise is present, it is important for the operator to be able to choose different filters in order to obtain more reliable results in such environments. Operator safety is ensured by a technique involving primary excitation, thus guaranteeing that no hazardous signal can occur at the secondary terminals of the transformer being tested. Storage of different "boilerplates" (specifications) in the instrument and direct display of the ratio value and its percentage deviation from the rated value help to speed up interpretation of the measurements performed.

Their long battery life and their storage capacity for the results make digital ratiometers particularly useful for producing and analysing measurements.



MOTOR DIRECTION AND PHASE ROTATION TESTS

Interconnection of several sections of the electrical network or several buildings on the same site in a three-phase system requires the phase sequence to follow the normal direction. This is particularly crucial for the power supplies of rotating machines as the rotation order of the phases connected determines the direction of the rotating field and therefore the rotation direction of the rotor.

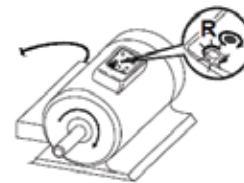
Phase rotation direction

The phase rotation direction can be determined by connecting the three phases of the electrical network to be tested to the tester, in accordance with the markings. The tester then indicates the phase rotation direction: clockwise or anticlockwise. In this case, the tester is self-powered via the measurement inputs.

To cover a wide range of applications, the equipment must be capable of operating at frequencies from 15 to 400 Hz.

Rotating field direction or rotation direction without connection

For some phase sequence detectors, the possibility of testing without connection, simply by positioning the tester on the casing of the motor, allows you to obtain a quick indication of the rotating field direction. In this mode, the tester must be set up in parallel to the rotor and in the prescribed direction. This principle is not valid when controlling a motor by means of a frequency converter.



Determination of the phase connection direction on a motor

If you connect the motor's power supply phases to the tester and turn the rotor half a turn to the right by hand, the tester indicates whether or not the phase wires are connected in the right order.

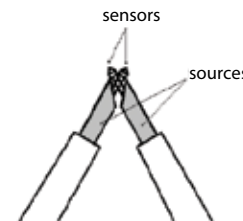
Indication of solenoid valve activation without connection

On testers capable of testing without connection, the activation of a solenoid valve can be detected by placing the tester close to the valve. The clockwise or anticlockwise LED then indicates the direction of the field generated.

BATTERY CAPACITY MEASUREMENT

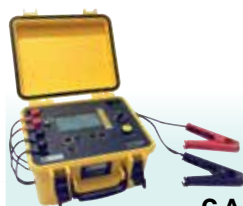
Research carried out by battery manufacturers has shown that the internal impedance of a rechargeable battery increases with its age and the number of discharges which it has undergone. By analysing the internal impedance, you can therefore assess the condition of the elements inside and determine whether the battery needs to be replaced or not. Instead of the absolute value of the battery's internal resistance, it is the variation of the value which is important. Indeed, a 25% increase causes performance to fall by approximately 80%. These values may vary according to the battery technology involved. These values are compared with the instantaneous measurements made and noted when the batteries were installed.

Preventive maintenance equipment should simultaneously measure and display the internal resistance by means of a 4-wire method for AC at a frequency close to 1 kHz, as well as the open-circuit voltage. As the internal resistance values measured may be low, you have to compensate the resistance of the measurement leads and retractable test probes. A large number of alarm comparison systems are used to quickly detect battery deterioration. On the basis of this comparison, the result is assessed and one of the LEDs (PASS, WARNING, FAIL) is then activated accordingly.



Selection guide

Other testers


C.A 6240

C.A 6250

Micro-ohmmeters

4-wire measurement method (Kelvin)	■	■
Measurement range	■	■
Resolution	■	0.1 $\mu\Omega$
Measurement current	■	■
Inductive mode / non-inductive / Auto non-inductive	■	■
Alarms	■	■
Temperature compensation	■	■
USB / RS232 communication	■	■
Storage (number of measurements)	■	■
Automatic recording	■	■
NiMH rechargeable batteries	■	■

Page


DTR 8510

Ratiometer

Range of VT/PT ratios	0.8000 to 8,000 / 1
Range of CT ratios	0.8000 to 1,000 / 1
Battery life	Up to 10 hours
Storage	10,000 tests
Communication	Optical USB

DTR 8510

Page

B-5-4


C.A 6608

C.A 6609

Phase and/or motor rotation testers

Operating mode	With connection	With and without connection
Operating voltage with connection	40 to 850 V _{AC} between phases	40 to 600 V _{AC} between phases
Operating voltage without connection		120 to 400 V _{AC} between phases
Power supply	By measurement	9 V battery

Page

B-5-5

B-5-5


C.A 6681 E/R

Cable and metal-conductor locator

Operation with / without power	■ / ■
Location of a short-circuit / circuit interruption	■ / ■
Location of cables, conductors or metal ducts	■

C.A 6681 E/R

Page

B-5-6


C.A 6630

Battery capacity testers

Min / max measurement range	■
Min / max resolution	■
Measurement frequency	■
Comparison function	99 sets of settings
Manual storage (no. of memory locations)	■
Automatic storage (no. of memory locations)	■

C.A 6630

Page

B-5-7

Micro-ohmmeter



COMPATIBLE
DataView®

50 V CAT III

IP 53

Accessories / Replacement parts

Double 1 A test probe (x 2)	> P01102056
Mini Kelvin clamp (x 2)	> P01101783
GB mains lead	> P01295253
C.A. 846 thermo-hygrometer	> P01156301Z
2P EUR mains lead	> P01295174
6.3 x 32 / 12.5 A / 500 V fuse (x 10)	> P01297091
Standard carrying bag	> P01298066
Optical/USB communication cable	> HX0056-Z
10 A-P clamp (x 2)	> P01101794
DataView®	> P01102095
Straight probe with 10 A double pivoting retractable test probe (x 2)	> P01103063
Pistol with 10 A double retractable test probe (x 2)	> P01103065

C.A. 6240

- > Rugged, leakproof on-site instrument
- > Suitable for use in the field, the workshop or the laboratory
- > Wide measurement range and excellent accuracy due to:
 - The 4-wire measurement method
 - Automatic current reversal
 - Test current up to 10 A
 - 1 $\mu\Omega$ resolution
 - Automatic "on-the-fly" or manual measurement modes

C.A. 6240

Specifications

Measurement method	4-wire method					
	Range	4000 μ	40 m	400 m	4000 m	40
Accuracy	0.25 % ± 2 cts	0.25 % ± 2 cts	0.25 % ± 2 cts	0.25 % ± 2 cts	0.25 % ± 2 cts	0.25 % ± 2 cts
Resolution	1 μ	10 μ	0,1 m	1 m	10 m	100 m
Current measurement	10 A	1 A	1 A	100 mA	10 mA	10 mA
Memory	100 measurements					
Communication output	Optical / USB link					
Power supply	Rechargeable NiMH battery					
Dimensions / weight	273 x 247 x 180 mm / 5 kg					
Electrical safety	IEC 61010 - CAT III 50 V					

10 A retractable

> "Pistol" test probes

- Handle dimensions 108 x 40 mm, test probe 154 x 30 mm, thickness 28 mm
- Test probes \varnothing 2 mm
- Test probe spacing 3.5 mm
- Cable length 3.15 m
- Spade lugs for \varnothing 4 to 6 mm
- Safety connectors \varnothing 4 mm
- Approx. weight 2 x 420 g
- Resistance 2 x 50 mW max.



Pistol with 10 A double retractable test probe

Reference > P01103065

State at delivery and reference

- > **C.A. 6240** delivered with a carrying bag, 1 set of 2 x 10 A Kelvin clamps with 3 m cable, 2P EURO mains power supply cable, 1 operating manual + 1 simplified operating manual in 5 languages, data export software + 1 optical / USB communication cable
- > P01143200

IP 40

Micro-ohmmeter

C.A 6250

- > Rugged, leakproof on-site instrument
- > Suitable for use in the field, the workshop or the laboratory
- > Wide measurement range and excellent accuracy due to:
 - The 4-wire measurement method
 - Automatic compensation of eddy currents
 - Test current up to 10 A
 - Resolution of 0.1 $\mu\Omega$
 - Temperature compensation function for comparative results
 - Extended memory



C.A 6250

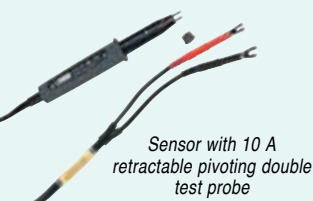
Specifications

Measurement method	4-wire method						
Range	5.000 m Ω	25.000 m Ω	250.00 m Ω	2,500.0 m Ω	25.000 Ω	250.00 Ω	2,500.0 Ω
Accuracy	0.05 % +1.0 $\mu\Omega$	0.05 % +3 $\mu\Omega$	0.05 % +30 $\mu\Omega$	0.05 % +0.3 m Ω	0.05 % +3 m Ω	0.05 % +30 m Ω	0.05 % +300 m Ω
Resolution	0.1 $\mu\Omega$	1 $\mu\Omega$	10 $\mu\Omega$	0.1 m Ω	1 m Ω	10 m Ω	100 m Ω
Current measurement	10 A	10 A	10 A	1 A	100 mA	10 mA	1 mA
Measurement modes	Inductive, non-inductive, non-inductive with automatic triggering						
Temperature compensation	By temperature probe or manual						
Memory	1,500 measurements						
Communication output	RS232						
Power supply	Rechargeable NiMH battery						
Dimensions / weight	270 x 250 x 180 mm / 4 kg						
Electrical safety	IEC 61010 - CAT III 50 V						

50 V CAT III

IP 53

KELVIN test probes



- > Kelvin probe with rotation
 - Dimensions (L x W x H) 207 x 34 x 30 mm
 - Test probes \varnothing 3 mm
 - Test probe spacing 8 mm
 - Test probe extension/retraction 10 mm
 - Cable length 3.15 m
 - Spade lugs for \varnothing 4 to 6 mm
 - Safety connectors \varnothing 4 mm
 - Approx. weight 2 x 400 g
 - Resistance 2 x 50 m Ω max.
- Reference >P01103063

IP 40

State at delivery and reference

- > C.A 6250 delivered in carrying bag with 1 power supply cable 2 m long, 2 x 3 m cables terminated by 10 A Kelvin clamps, 1 operating manual in 5 languages, 5 simplified operating manuals, data transfer software and RS232 communication cable
- >P01143201

Accessories / Replacement parts

- Double test probe (x 2) > P01102056
- Mini Kelvin clamp (x 2) > P01101783
- C.A 846 thermo-hygrometer > P01156301Z
- 2P EUR mains lead > P01295174
- Standard carrying bag > P01298066
- 10 A-P clamp (x 2) > P01101794
- GB mains power cable > P01295253
- Pt 100 temperature probe > P01102013
- 2 m cable for remote Pt 100 > P01102014
- Serial printer no. 5 > P01102903
- DataView® > P01102095
- RS232 PC cable DB 9F – DB 25F x 2 > P01295172
- 6.3 x 32 / 16 A / 250 V fuse (x 10) > P01297089
- 5.0 x 20 / 2 A / 250 V fuse (x 10) > P01297090
- Straight probe with 10 A double pivoting retractable test probe (x 2) > P01103063
- Pistol with 10 A double retractable test probe (x 2) > P01103066

Electrical equipment tester

DTR 8510

- > **Digital ratiometer for transformers**
- Storage of up to 10,000 test results in internal memory
- Measures transformation ratios on power transformers, voltage transformers and current transformers
- Direct Turns Ratio readings from 0.8000:1 to 8000.0:1
- Tests performed by exciting the primary and measuring the secondary for greater operator safety
- Displays the transformation ratio, excitation current, winding polarity and % deviation from the nameplate values
- Internal NiMH battery packs provide up to 10 hours of continuous operation



Specifications

Ratio range (VT/PT)

Accuracy (VT/PT)

Ratio range (CT)

Accuracy (CT)

Excitation signal

Excitation current display

Excitation frequency

Display

Languages supported

Measurement method

Power supply

Battery life

Battery charger

Charging time

Data storage

Date / time

Communication

Software

Dimensions / weight

Connection

Leads

Casing

Vibrations

Shocks

Falls

Protection

Safety ratings

DTR 8510

Auto-ranging: 0.8000 to 8000:1

Ratio	Accuracy (% R)
0.8000 to 9.9999	± 0.2 %
10.000 to 999.99	± 0.1 %
1,000.0 to 4999.9	± 0.2 %
5,000.0 to 8000.0	± 0.25 %

Auto-ranging: 0.8000 to 1.000.0

± 0.5 % R

PT/VT mode: 32 Vrms max

CT mode: automatic level 0 to 1 A, 0.1 to 4.5 Vrms

Range: 0 to 1,000 mA; Accuracy: ± (2 % R + 2 mA)

70 Hz

Dual-line alphanumeric LCD, 16 x 2 characters with contrast adjustment and backlight control. Day/night visible.

English, Spanish, French, Italian, German, Portuguese

In accordance with IEEE Std C57, 12.90™

Two 12 V, 1,650 mAh NiMH rechargeable battery packs

Up to 10 hrs of continuous operation. Low battery indication.

Universal input (90 to 264 Vrms input), smart recharger

< 4 hours to full charge

10,000 tests

Powered by dedicated battery, real-time clock

USB. 2.0 compliant, optically isolated, 115.2 kB

DataView® analysis software included

272 x 248 x 130 mm / 3.7 kg

XLR connectors

15 ft (4.6m) H & X shielded cables with colour-coded crocodile clips

Heavy-duty polypropylene case, UL 90 V0

IEC 68-2-6 (1.5 mm at 55 Hz)

IEC 68-2-27 (30 G)

IEC 68-2-32 (1 m)

IP 40 (Instrument lid open) as per EN 60529

IP 53 (Instrument lid closed) as per EN 60529

EN 61010-1, 50 V CAT IV; pollution degree 2

State at delivery

- > **DTR 8510** delivered with 1 carrying bag containing 1 set of leads 4.6 m long with crocodile clips, 1 external battery charger with mains lead, 1 USB cable, 1 NiMH battery datasheet, 1 operating manual and DataView® software on CD-ROM

Accessories / Replacement parts

- Set of 2 spare leads 4.6 m long
- USB cable
- Carrying bag

- > P01295143A
- > P01295293
- > P01298066

50 V CAT IV

IP
40

Reference to order

> **DTR 8510**

> P01157702

Phase rotation and/or motor testers

C.A 6608 & C.A 6609

- > Indication of phase presence or absence
- > Determination of a motor's rotation direction with or without contact (C.A 6609 only)
- > Automatic tests as soon as the instrument is connected
- > Terminals and cables identified by colour coding to simplify connection

Specifications

	C.A 6608	C.A 6609
Operating voltage for phase rotation function	40 to 850 V _{AC} between phases	With connections: 40 to 600 V _{AC} between phases Without connections: 120 to 400 V _{AC} between phases
Frequency range	15 to 400 Hz	
Power supply	Self-powered via the measurement inputs	9 V battery
Dimensions	130 x 69 x 32 mm	
Weight	130 g	170 g
Electrical safety	IEC 61010-1 600 V CAT III IEC 61557-7	



600 V CAT III

IP
40

State at delivery

- > **C.A 6608 Phase rotation tester**
Delivered in a carrying bag containing 3 test leads, 3 crocodile clips, 1 operating manual in 5 languages
- > **C.A 6609 Phase rotation and motor tester**
Delivered in a carrying bag containing 3 test leads, 3 crocodile clips, 1 operating manual in 5 languages



References to order

- > **C.A 6608** >P01191304
- > **C.A 6609** >P01191305

Cable and metal-conductor locator



C.A 6681 LOCAT-N

- Ideal for all configurations (current-carrying or non-current-carrying)
- Digital technology for reliable detection and maximum immunity to disturbances
- Large LCD screen displaying the transmission power, the numeric identification code and the voltage present on the circuit tested.
- Digital, visual and audible indication for intuitive monitoring of the trace.
- Automatic or manual adjustment (more accurate detection) of the reception sensitivity
- Deactivatable audible indication
- Indication of transmitter and receiver battery status on the receiver screen
- Automatic shutdown of receiver
- Transmitter and receiver equipped with an additional lighting system (torch) for use in dark conditions.

Specifications

Transmitted signal frequency	125 kHz
External voltage measurement	12-300 V DC/AC (50-60 Hz)
Dimensions	190 x 89 x 42.5 mm
Weight	Approx. 420 g with battery

C.A 6681 E

Specifications

Detection depth	Single-pole application: 0 to 2 m approx. Two-pole application: 0 to 0.5 m approx. Simple looping line: up to 2.5 m
Identification of network voltage	0-0.4 m approx.
Dimensions	241.5 x 78 x 38.5 mm
Weight	Approx. 360 g with battery

C.A 6681 R

Reference to order

> **C.A 6681 LOCAT-N**

> P01141626

State at delivery

> Delivered in a hard case containing 1 x **C.A 6681E** transmitter, 1 x **C.A 6681R** receiver, set of 2 red/black isolated banana leads 1.5 m long (Ø4mm straight male / Ø4mm elbowed male), set of 2 red/black crocodile clips, 1 earthing stake, 1 adapter for mains socket, 1 male plug adapter for B22 bayonet socket, 1 male plug adapter for E27 screw socket, 1 x 9V 6LR61 alkaline battery, 6 x 1.5 V LR03 (or AAA) alkaline batteries, operating manual in 5 languages

Accessories / Replacement parts

33 m reel of green wire, battery clip/4 mm male banana on winder with handle > P01295268
 15 m reel of green wire, battery clip/4 mm male banana on H winder with 1 stake > P01102019
 10 m reel of green wire, battery clip/4 mm male banana on H winder > P01102026
 Kit of 3 measurement adapters for residential work (B22, E27, mains socket) > P01102114Z

Battery capacity tester

C.A 6630

- > **Test batteries simply, quickly and safely**
- Zero adjustment function for compensation of the voltage circuit displayed
- 2-display LCD screen with numerous symbols
- Power supply by 6 x 1.5 V batteries. Battery life in continuous use: 7 hours
- Max. power consumption: 1 VA
- Dimensions: 250 x 100 x 45 mm
- Weight: 500 g including batteries
- Resistance measurement:
- temperature coeff.: $\pm (0.1 \% R + 0.5 \text{ digit}) / ^\circ\text{C}$
- measurement voltage: 1.5 mV_{AC}
- measurement frequency: 1 kHz $\pm 10 \%$



C.A 6630

Specifications

Range	40 mΩ	400 mΩ	4 Ω	40 Ω
Resolution	10 μΩ	100 μΩ	1 mΩ	10 mΩ
Current measurement	37.5 mA	3.75 mA	37.5 μA	3.75 μA
Accuracy	$\pm (1 \% R + 8 \text{ cts}) - \text{Temp. coeff.: } \pm (0.1 \% R + 0.5 \text{ digit}) / ^\circ\text{C}$			
Voltage measurement				
Range	4 V			40 V
Resolution	1 mV			10 mV
Accuracy	$\pm (0.1\%R + 6 \text{ digits})$			

Accessories / Replacement parts

Set of 2 leads for C.A 6630 with retractable test probes

> P01102103



Reference to order






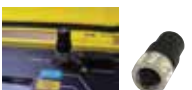



> **C.A 6630**

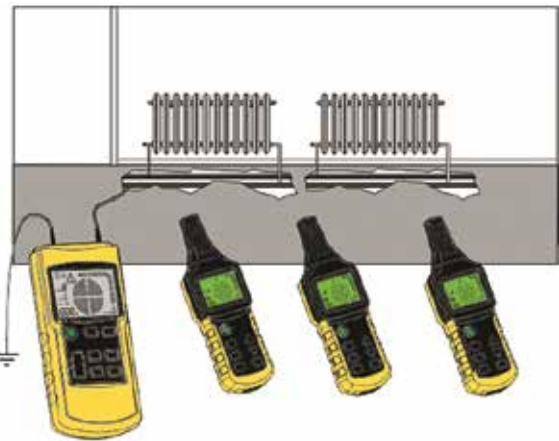
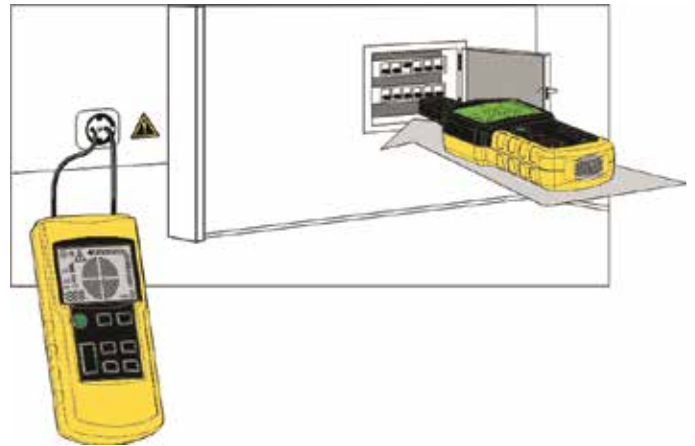
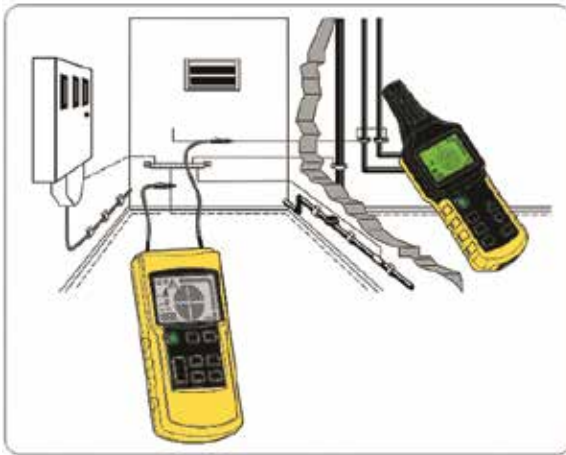
> P01191303

State at delivery

- > **C.A 6630** delivered in a hard case with a set of 2 measurement leads 1 m long terminated by retractable test probes, PC transfer software for exporting and processing the stored data, one C.A 6630 / PC connection cable and an operating manual in 5 languages

Accessories for other testers

	Code article	Description	Connectique	C.A 6240	C.A 6250	DTR 8510	C.A 6681	C.A 6630
Double test probes and Kelvin clamps for micro-ohmmeters								
	P01101794	10 A Kelvin clamps (x 2), L=3 m	Spade lug	■	■			
	P01101783	1 A mini Kelvin clamps (x 2)	Spade lug	■	■			
	P01103065	10 A double pistol-type test probe (x 2) L= 3.15 m	Spade lug and 4 mm banana	■	■			
	P01103063	10 A double pivoting test probe (x 2) L= 3.15 m	Spade lug and 4 mm banana	■	■			
	P01102056	1 A double test probe (x 2) L=2.85m	Spade lug and 4 mm banana	■	■			
Other accessory for micro-ohmmeters								
	P01102013	Pt 100 probe			■			
Measurement lead for Ratiometer								
	P01295143A	Set of 2 spare leads, H primary, X secondary L= 4.6 m, compatible with DTR 8500 / DTR 8510	4 mm banana			■		
Adapters for C.A 6681 LOCAT-N								
	P01102114Z	Kit of 3 measurement adapters for residential work (B22, E27, mains socket)	B22 bayonet E27 screw socket 2P mains socket				■	
Measurement lead for battery capacity tester								
	P01102103	Set of 2 double-contact current / voltage measurement leads for C.A 6630 battery capacity tester. L=1 m	Jack					■



DataView®

Software platform for data processing



DTR

> Ratiometer
DTR 8510

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

DataView®

- ✓ Configuration of instruments connected to a PC or via Bluetooth
- ✓ Recovery of the measurement data recorded in the instrument
- ✓ Saving of measurement files
- ✓ Opening of saved files
- ✓ Processing and creation of reports
- ✓ Export into Excel spreadsheets
- ✓ Export in .pdf format
- ✓ Database management

MOT

> Micro-ohmmeters
C.A 6240
and C.A 6250

Field	Value
Micro-ohmmeter C.A.	6200
N° serie	19420044-8328 6
Numero	
Valid. da base	22/11/2007 - 07/03/08
Valid. prova base test	22/11/2008 - 07/03/09
Classe	Modello 6240
Test	Resist. a temperatura
Descrizione da base 104/04/06	
Numero di materiali	104/04/06
Tipologia di materiale	Industria
Tipologia di controllo	Calore
Coefficiente di errore	0,5%
Temperatura di misura	23,0°C
Temperatura di riferimento	23,0°C





GTC

- > C.A 6417 earth clamp
- Instantaneous acquisition

GTT

- > C.A 6470N, C.A 6471, C.A 6472 & C.A 6474 earth and resistivity testers

- Remote testing
- Instantaneous acquisition



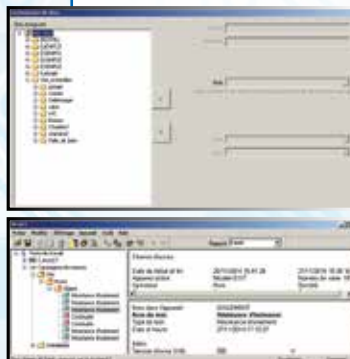
The measurements made can also be processed by the **DataView®** multi-product expert processing software, which automatically recognizes the instrument when it is connected to the PC and opens the corresponding menu. This menu, in the form of a tree structure, offers users direct access to the data recorded in the instrument, its configuration, etc.

DataView® includes multiple predefined report templates for quick printing in accordance with the applicable standards. Users can also create their own templates, as required.

ICT

- > C.A 6116, C.A 6116N and C.A 6117 electrical installation tester

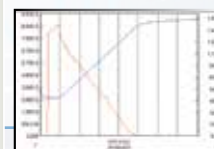
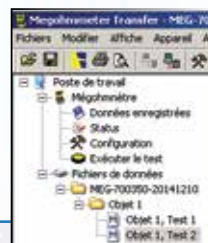
- Customization of measurement campaigns with transfer in the instrument
- Preparation of installation test reports



MEG

- > C.A 6543, C.A 6547, C.A 6549, C.A 6550 and C.A 6555 megohmmeters

- Remote test activation
- Real-time display
- DAR, PI and DD ratios
- Graphical trace of the tests

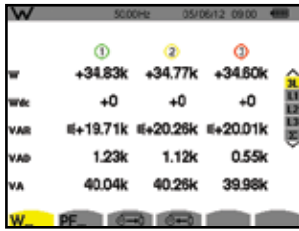


A phase of analysis is essential to precisely identify the behaviour of the installations and determine which solutions to implement.

The measurements made help to ensure that the solutions are pertinent and that the gains achieved are maintained over the long term in the context of an energy optimization programme.

So measurement provides the foundation for optimizing your installations' energy efficiency, supervising your electrical networks and fairly allocating the costs.

POWER MEASUREMENTS



Power measurement is a key element for the definition, success and long-term effects of an energy optimization programme. Reducing electricity consumption is also a simple, painless way of saving money. Electricity is a clean energy source which is less harmful for the environment, but it

does affect it nevertheless.

The various parameters of the installation are measured regularly, including the different power values used to size the electrical network and the phase shift data, as well as the voltage, current and frequency measurements.

For private customers, reactive power is neither measured nor billed separately. Instead it is included at a flat rate in the active power price. Things are very different for industrial customers, however. Electricity suppliers penalize consumers whose displacement power factor (cos phi or DPF) is lower than 0.93 (in France) or whose tan phi is higher than 0.4 (in France).

This set of measurements will help the installation manager to size the capacitor banks correctly.

RECHERCHE DE PERTURBATIONS



With the spread of systems incorporating electronics using switching power supplies, the electrical network is becoming increasingly polluted. A further complication is the fact that electricity market deregulation could lead to an increase in the frequency of general network blackouts.

The quality requirements have become much more demanding and stringent than in the past. All the equipment in factories and buildings now includes digital electronics which are known to be sensitive to micro-outages, peaks and dips, harmonics and disturbances in general.

The complexity of industrial equipment makes it vulnerable to the voltage disturbances that occur on the electrical network. The arrival of new quick-switching components is leading to a large number of low-order harmonic currents (3, 5, 7, 9, 11, ...).

Electrical network analysers capable of recording disturbances for industrial companies and professionals in the electricity sector (producers, transmission companies, electricity users) are essential tools for satisfactory supervision and timely maintenance of installations.

They have to provide direct measurements, allow as much parameterization as possible for recording and facilitate subsequent analysis.

Some faults are encountered very frequently. In general, most disturbances are caused by:

1/ Slow and transient voltage variations.

The voltage amplitude is a crucial parameter for electricity quality.

The voltage amplitude varies abnormally and may even drop to a level close to zero.

The causes mainly lie in the installation itself. The connection of heavy loads may lead to voltage variations if the short-circuit power at a point of supply is undersized.

Several types of faults are then defined: overvoltage, voltage dip, outage, etc. The rated network voltage variation range is set by the power distributor.

2/ Flicker: rapid voltage fluctuations.

When variable loads such as arc furnaces, laser printers, microwave ovens or air-conditioning systems are started up, they cause rapid voltage variations. This phenomenon is called flicker. In reality, the flicker value is the result of a statistical calculation based on measurements of the rapid voltage variations.














A 10-minute interval is considered an acceptable compromise for evaluation of the short-term flicker (Pst).

If the combined effect of several disturbance-generating loads operating in a random way (e.g. welding units or motors) has to be taken into account or when flicker sources with long or variable operating cycles are involved (electric arc furnace), the resulting disturbance must be assessed over a longer time. The measurement duration defined is then 2 hours, a time considered appropriate for the load operating cycle or the time during which an observer may be sensitive to long-term flicker (Plt).

3/ Harmonics and interharmonics.

The waveform of the current consumed by loads connected to the electrical network is often no longer purely sinusoidal. This current distortion implies distortion of the voltage also depending on the impedance of the source. The disturbances called harmonics are caused by connecting non-linear loads, such as equipment incorporating power electronics, to the network. This may have instant consequences on certain electronic equipment: operating problems (synchronization, switching), untimely tripping, measurement errors on energy meters, etc. In the medium term, the extra heating caused by this may reduce the life span of rotating machines, capacitors, power transformers and neutral conductors. Today's measuring instruments have to be capable of performing this harmonic analysis order by order, as well as measuring the Total Harmonic Distortion (THD) for more detailed diagnosis of the installation.

Selection guide for power and/or energy analysers

													
	C-A 404	C-A 405	F205	F405	F605	F407	F607	C-A 8220	C-A 8230	C-A 8331	C-A 8333	C-A 8336	C-A 8435
Number of U/I input channels	1	1	1	1	1	1	1	1	1	3	3	4	4
Current													
(A)	1	5	600	1000	2000	1000	2000	□	□	□	□	□	□
Display													
Analogue	■	■											
Digital			■	■	■	■	■	■	■	■	■	■	■
Scope mode									■	■	■	■	■
Electrical network													
Single-phase	■	■	■	■	■	■	■	■	■	■	■	■	■
Balanced 3-phase		■	■	■	■	■	■	■	■	■	■	■	■
3-phase										■	■	■	■
Measurements													
DC voltage			■	■	■	■	■	■	■	■	■	■	■
AC voltage			■	■	■	■	■	■	■	■	■	■	■
DC current			■	■	■	■	■	■	■	■	■	■	■
AC current			■	■	■	■	■	■	■	■	■	■	■
Frequency			■	■	■	■	■	■	■	■	■	■	■
Power													
VA			■	■	■	■	■	■	■	■	■	■	■
W	■	■	■	■	■	■	■	■	■	■	■	■	■
var			■	■	■	■	■	■	■	■	■	■	■
Cos φ / DPF						■	■	■	■	■	■	■	■
PF			■	■	■	■	■	■	■	■	■	■	■
Tan φ									■	■	■	■	■
Energy													
VAh, Wh, varh							■	■	■	■	■	■	■
Harmonics													
THD			■	■	■	■	■	■	■	■	■	■	■
FD						■	■	■	■	■	■	■	■
Decomposition						■	■	■	■	■	■	■	■
Other													
PST flicker									■	■	■	■	■
PLT flicker												■	■
Sliding PLT flicker												■	■
Unbalance											■	■	■
Temperature								■					
Resistance			■	■	■	■	■	■					
Rotation speed								■					
Monitoring													
Recording						■	■		■	■	■	■	■
Transients											■	■	■
Alarms									■	■	■	■	■
PC software													
						■	■	■	■	■	■	■	■
Pages	H-1-4	H-1-4	A-4-3	A-4-4	A-4-5	A-4-4 C-1-2	A-4-5 C-1-3	C-1-4	C-1-5	C-1-6	C-1-7	C-1-8	C-1-10

□ Depending on sensors

Power and harmonics multimeter clamp



1,000 V CAT IV

IP 54

Bluetooth



F407

- Measurements up to 1,000 A_{AC} or 1,500 A_{DC} or A_{AC+DC}
- Clamping diameter: 48 mm
- Analysis of harmonic orders
- TrueInrush function
- Bluetooth communication

F407

Specifications

Current (RMS)	AC	100 mA to 1,000 A
	DC and AC+DC	100 mA to 1,500 A
	Best accuracy	1% R + 3 cts
Voltage	(RMS) AC	100 mV to 1,000 V
	DC and AC+DC	100 mV to 1,000 V
	Best accuracy	1% R + 3 cts
Auto AC/DC		Yes (V and A)
Resistance		100 kΩ
Continuity/buzzer		Yes (< 40 Ω)
Power W, var, VA		Yes, single-phase and total three-phase
Crest factor (CF)		Yes
PF and DPF (cos φ)		Yes / Yes
Automatic power Off		Yes
Hold function		Yes
Display backlighting		Yes
Min Max button		Yes
100 ms Peak +/- function		Yes / Yes
True-Inrush function		Yes
THD-f / THD-r harmonics function		Yes / Yes
Decomposition into harmonic orders		25 th
REC recording function		Yes
Recordings (with Min, Max)		Up to 3,000 measurements
Bluetooth communication function		Yes
Frequency		15 Hz to 20 kHz
Clamping diameter		48 mm
Protection		IP 54
Electrical safety		IEC 61010 – 1,000 V CAT IV
Warranty		3 years

State at delivery

- > **F407** delivered in bag pre-equipped for MultiFix with 1 set of banana/banana leads (red/black), 1 set of test probes (red/black), 1 set of crocodile clips (red/black), 4 x 1.5 V AA alkaline batteries, 1 safety datasheet and 1 CD-Rom containing 1 operating manual and the PC data recovery software (Power Analyser Transfer)

Accessories / Replacement parts

- | | |
|--|--------------|
| Set of banana/banana leads (red/black) | > P01637301 |
| Set of crocodile clips (red/black) | > P01295457Z |
| MultiFix magnetic mounting kit | > P01102100Z |
| Bluetooth kit | > P01637301 |
| Bag | > P01298076 |
| DataView® software | > P01102095 |

Reference to order

- > **F407** Harmonics clamp > P01120947

Power and harmonics multimeter clamp

F607

- Measurements up to 2,000 A_{AC} or 3,000 A_{DC} or A_{AC+DC}
- Clamping diameter: 60 mm
- Analysis of harmonic orders
- TrueInrush function
- Bluetooth communication

Specifications

Current (RMS)	AC	100 mA to 2,000 A
	DC and AC+DC	100 mA to 3,000 A
	Best accuracy	1% R + 3 cts
Voltage (RMS)	AC	100 mV to 1,000 V
	DC and AC+DC	100 mV to 1,000 V
	Best accuracy	1% R + 3 cts
Auto AC/DC		Yes (V and A)
Resistance		100 kΩ
Continuity/buzzer		Yes (< 40 Ω)
Power W, var, VA		Yes, single-phase and total three-phase
Crest factor (CF)		Yes
PF and DPF (cos j)		Yes / Yes
Automatic power-off		Yes
Hold function		Yes
Display backlighting		Yes
Min Max button		Yes
100 ms Peak +/- function		Yes / Yes
True-Inrush function		Yes
THD-f / THD-r harmonics function		Yes / Yes
Decomposition into harmonic orders		25 th
REC recording function		Yes
Recordings (with Min, Max)		Up to 3,000 measurements
Bluetooth communication function		Yes
Frequency		15 Hz to 20 kHz
Clamping diameter		60 mm
Protection		IP 54
Electrical safety		IEC 61010 – 1,000 V CAT IV
Warranty		3 years

F607



1,000 V CAT IV

Bluetooth

IP 54



Accessories / Replacement parts

Set of banana/banana leads (red/black)	> P01637301
Set of crocodile clips (red/black)	> P01295457Z
MultiFix magnetic mounting kit	> P01102100Z
Bluetooth kit	> P01637301
Carrying bag	> P01298076
DataView® software	> P01102095

State at delivery

- > **F607** delivered in bag pre-equipped for MultiFix with 1 set of banana/banana leads (red/black), 1 set of test probes (red/black), 1 set of crocodile clips (red/black), 4 x 1.5 V AA alkaline batteries, 1 safety datasheet and 1 CD-Rom containing 1 operating manual and the PC data recovery software (Power Analyser Transfer)

Reference to order

- > **F607** Harmonics clamp

> P01120967

Power and energy quality analyser

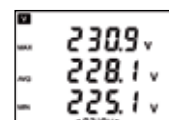
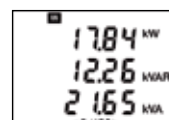
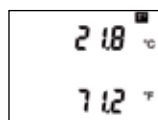


C.A 8220

> Ideal for motor maintenance

- Access to all measurements simultaneously
- Measurement of low resistances and high currents
- Voltage calculation per half-period
- Motor rotation speed

IP
54



600 V CAT III

Specifications

Voltage (TRMS)		Phase/Phase: 660 V _{AC+DC} Phase/Neutral: 600 V _{AC+DC}
Current (TRMS)	MN clamp	MN93: 2 to 240 A _{AC} ; MN93A: 0.005 A _{AC} to 5 A _{AC} / 0.1 A _{AC} to 120 A _{AC}
	C clamp	3 A to 1,200 A _{AC}
	AmpFLEX™ or MiniFLEX® clamp	30 A to 6,500 A _{AC}
	PAC clamp	10 A to 1,000 A _{AC} / 10 A to 1,400 A _{DC}
	E3N clamp	50 mA to 10 A _{AC+DC} ; 100 mA to 100 A _{AC+DC}
Frequency		40 Hz to 70 Hz
Other measurements		W, var, PF, DPF, VA, temperature, phase rotation, RPM, resistance, continuity, diode test, wh, VAh, varh
Harmonics		1st to 50th order
Sampling frequency		256 samples/cycle
Data storage		99 complete sets of voltage, current, power and harmonics measurement data
Power supply		6 x 1.5 V AA batteries, optional mains power supply
Battery life		≥ 8 hours with display on
Communication		Optically-isolated USB
Display		3-line backlit digital display with custom icons
Dimensions / weight		211 x 108 x 60 mm / 0.88 kg
Electrical safety		IEC 61010 600 V CAT III, IP 54, pollution degree 2

C.A 8220

State at delivery

- > The **C.A 8220** analyser is always delivered complete with 2 banana leads, 2 x 4 mm test probes, 2 crocodile clips, 6 x 1.5 V AA batteries, 1 USB optical cable, Power Analyser Transfer processing software, 1 operating manual on CD in 5 languages



References to order

> C.A 8220

- | | |
|-----------------------------------|-------------|
| C.A 8220 analyser (without clamp) | > P01160620 |
| C.A 8220 analyser MN93A | > P01160621 |
| C.A 8220 analyser AmpFLEX™ | > P01160622 |

Accessories / Replacement parts

- | | |
|----------------------------|--------------|
| C.A 1711 tachometer sensor | > P01102082 |
| Pt100 adapter, 2 wires | > HX0091 |
| > For C.A 8220 / C.A 8230 | |
| E3N clamp | > P01120043A |
| E3N clamp adapter | > P01120081 |
| E3N clamp + mains adapter | > P01120047 |

Power and energy quality analyser

C.A 8230

> Ideal for electrical network maintenance

- All measurements accessible simultaneously
- INRUSH function up to 18 s
- Excellent quality/price ratio
- Recording and alarms



600 V CAT III

IP 54



Specifications

		C.A 8230
Voltage (TRMS)		Phase/Phase: 660 V Phase/Neutral: 600 V
Current (TRMS)	MN clamp	MN93: 2 to 240 A _{AC} MN93A: 0.005 A _{AC} to 5 A _{AC} / 0.1 A _{AC} to 120 A _{AC}
	C clamp	3 A to 1,200 A _{AC}
	AmpFLEX™ or MiniFLEX® clamp	30 A to 6,500 A _{AC}
	PAC clamp	10 A to 1,000 A _{AC} / 10 A to 1,400 A _{DC}
	E3N clamp	50 mA to 10 A _{AC+DC} / 100 mA to 100 mA _{AC+DC}
Frequency		40 to 70 Hz
Other measurements		VA, W, var, PF, DPF, Wh, varh, VAh, K-factor, flicker, harmonics phase shift, phase rotation
Harmonics		THD-R, THD-F, V, A, VA 1st to 50th order: direction, sequence
Sampling frequency		256 samples/cycle
Data storage		1.5 MB partitioned for waveforms, alarms and trend recording
Power supply		6 NiMH rechargeable batteries (included) AC power supply: 120/230 V _{AC} (50/60 Hz)
Battery life		≥ 8 hours with display on ≥ 40 hours with display off (recording mode)
Communication		Optically isolated USB
Display		¼ VGA (320 x 240) colour LCD
Dimensions / weight		211 x 108 x 60 mm (8.3 x 4.3 x 2.4") 0.88 kg (1.9 lbs)
Electrical safety		EN 61010 - 600 V - CAT III, pollution degree 2

Accessories / Replacement parts

> For C.A 8220 / C.A 8230

- MN93A BK clamp
- MN93 BK clamp
- AmpFLEX™ A193 450 mm BK
- AmpFLEX™ A193 800 mm BK
- MiniFlex® MA193-250
- MiniFlex® MA193-350
- PAC93 BK clamp
- C193 BK clamp
- 5 A adapter box
- Optical cable
- Carrying bag no. 5
- 2 crocodile clips (red/black)
- 2 banana/banana leads(red/black)
- 2 test probes (red/black)
- Pack 6 NiMH rechargeable batteries
- C.A 82X0 EUR mains power supply
- MA193 Mini-AmpFLEX™
- Optical/USB cable
- DataView® software
- Current measurement lead

- > P01120434B
- > P01120425B
- > P01120526B
- > P01120531B
- > P01120580
- > P01120567
- > P01120079B
- > P01120323B
- > P01101959
- > P01295252
- > P01298049
- > P01102057Z
- > P01295288Z
- > P01295454Z
- > P01296037
- > P01160640
- > P01120580
- > HX0056Z
- > P01102095
- > P03295509

State at delivery

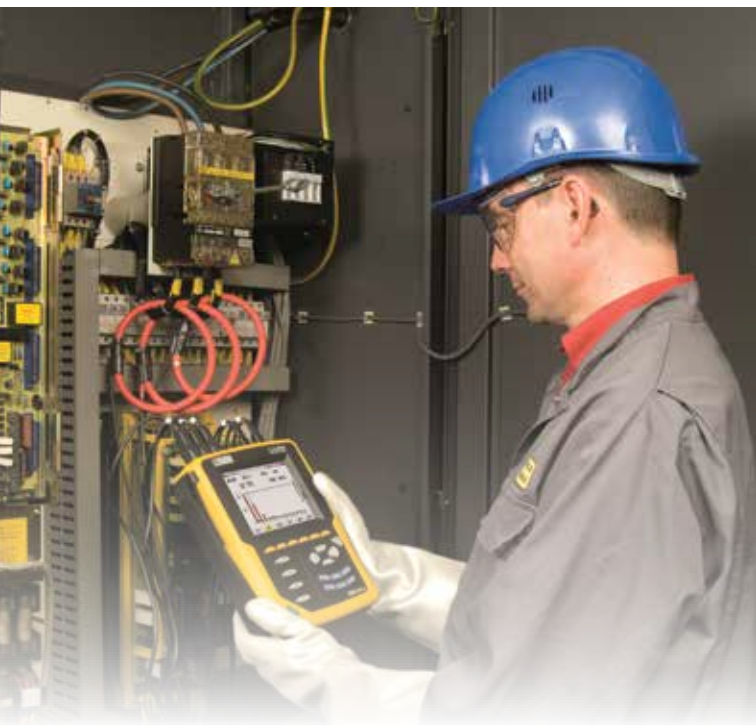
- > The **C.A 8230** analyser is always delivered complete with 2 banana leads, x 4 mm test probes, 2 crocodile clips, 6 x 1.2 V rechargeable batteries, 1 x 230 V mains adapter, 1 USB optical cable, Power Analyser Transfer processing software, 1 operating manual on CD in 5 languages, 1 bag no. 5



References to order

- > **C.A 8230**
- AC.A 8230 analyser (without clamp) > P01160630
- C.A 8230 analyser with MN93A > P01160631
- C.A 8230 analyser with AmpFLEX™ > P01160632

Three-phase network and power analyser



1,000 V CAT III
600 V CAT IV

IP
53

3 YEARS
WARRANTY



State at delivery

- > With the Qualistar **C.A 8331**: bag no. 22, USB cable, mains adapter, 4 x 4 mm banana voltage leads 3 m long, 4 crocodile clips, one safety datasheet, 1 operating manual, PC data recovery software and the set of current sensors selected

Reference to order

- > **C.A 8331** > P01160511
power analyser without sensor

QualiSTAR+ C.A 8331

- > Designed for inspection and maintenance teams in industrial or administrative buildings, the Qualistar+ C.A 8331 can be used to obtain a snapshot of the main electrical network quality parameters.
- > Easy to handle and particularly compact, this instrument also offers a large number of calculated values and several processing functions. The C.A 8331 offers 3 Voltage measurements and 3 Current measurements.
- > When they are connected, the current sensors are recognized automatically by the C.A 8331. It allows you to mix different current sensors and direct readings of the measurements are possible if you configure the ratios appropriately.
 - TRMS AC+DC voltage and current, frequency
 - Power values: W, VA, var, VAD, PF, DPF, $\cos \varphi$, $\tan \varphi$
 - Energy values: Wh, varh, VAh, VADh, BTU, toe, Joule
 - Harmonics from 0 to the 50th order, phase
 - Recording of a selection of parameters with a maximum sampling interval from 4 hrs to 2 weeks
 - Vectorial representation



Measurement inputs

Accessories / Replacement parts

- | | |
|--|--------------|
| CA833X-F 5 A adapter unit | > P01101959 |
| PAC93 BK clamp | > P01120079B |
| C193 BK clamp | > P01120323B |
| MN93 BK clamp | > P01120425B |
| MN93A BK clamp | > P01120434B |
| AmpFlex® A193 450 mm BK | > P01120526B |
| AmpFlex® A193 800 mm BK | > P01120531B |
| MiniFlex® MA193-250 | > P01120580 |
| MiniFlex® MA193-350 | > P01120567 |
| Belt bag no. 21 | > P01298055 |
| Qualistar bag no. 22 | > P01298056 |
| Qualistar screen film | > P01102059 |
| Qualistar bag no. 06 | > P01298051 |
| DataView® software | > P01102095 |
| In-vehicle charger | > HX0061 |
| E3N clamp | > P01120043A |
| E3N adapter | > P01102081 |
| E3N mains power pack | > P01120047 |
| Battery pack | > P01296024 |
| ESSAILEC casing | > P01102131 |
| Set of inserts and rings | > P01102080 |
| USB-A USB-B cable | > P01295293 |
| Mains power pack (C.A 8331-33-35-36) | > P01102057 |
| Kit of banana leads (x 5), crocodile clips (x 5),
1 set of colour-coded rings | > P01295483 |
| Kit of banana leads (x 4), crocodile clips (x 4),
1 set of colour-coded rings | > P01295476 |
| J93 clamp | > P01120110 |
| PAC93 mains adapter | > P01101967 |

Three-phase network and power analyser

QualiSTAR+ C.A 8333

- > The functions offered by this analyser make it the ideal instrument for maintenance, whether preventive or corrective. It can also be used to perform a comprehensive energy survey of an installation.
- > The C.A 8333 offers 3 Voltage measurements and 3 Current measurements. It can simultaneously capture and record all the parameters, transients, alarms and waveforms.
- TRMS AC+DC voltage up to 1,000 V
- TRMS AC+DC current: from 5 mA to 10 kA depending on the sensors
- Power values: W, VA, var, VAD, PF, DPF, $\cos \varphi$, $\tan \varphi$
- Energy values: Wh, varh, VAh, VADh, , BTU, toe, Joule
- Harmonics from 0 to the 50th order, phase
- Recording of a selection of parameters with a maximum sampling interval of 4 h to 2 weeks
- Several thousand programmable alarms
- Capture of transients lasting just a few μ s

1,000 V CAT III
600 V CAT IV



3 YEARS
WARRANTY



IEC 61000-4-30

EN 50160



Measurement inputs

State at delivery

- > With the Qualistar **C.A 8333**: bag no. 22, USB cable, mains adapter, 4 x 4 mm banana voltage leads 3 m long, 4 crocodile clips, safety datasheet, operating manual, PC data recovery software and the set of current sensors selected.

Reference to order

- > **C.A 8333** > P01160541
- Power analyser without sensor



Accessories / Replacement parts

- | | |
|--|--------------|
| CA833X-F 5 A adapter unit | > P01101959 |
| PAC93 BK clamp | > P01120079B |
| C193 BK clamp | > P01120323B |
| MN93 BK clamp | > P01120425B |
| MN93A BK clamp | > P01120434B |
| AmpFlex® A193 450 mm BK | > P01120526B |
| AmpFlex® A193 800 mm BK | > P01120531B |
| MiniFlex® MA193-250 | > P01120580 |
| MiniFlex® MA193-350 | > P01120567 |
| Belt bag no. 21 | > P01298055 |
| Qualistar bag no. 22 | > P01298056 |
| Qualistar screen film | > P01102059 |
| Site case | > P01298062 |
| Qualistar bag no. 06 | > P01298051 |
| DataView® software | > P01102095 |
| In-vehicle charger | > HX0061 |
| E3N clamp | > P01120043A |
| E3N adapter | > P01102081 |
| E3N mains power pack | > P01120047 |
| Battery pack | > P01296024 |
| ESSAILEC casing | > P01102131 |
| Set of inserts and rings | > P01102080 |
| USB-A USB-B cable | > P01295293 |
| Mains power pack (C.A 8331-33-35-36) | > P01102057 |
| Kit of banana leads (x 5), crocodile clips (x 5),
1 set of colour-coded rings | > P01295483 |
| Kit of banana leads (x 4), crocodile clips (x 4),
1 set of colour-coded rings | > P01295476 |
| J93 clamp | > P01120110 |
| PAC93 mains adapter | > P01101967 |

Three-phase network and power analyser



QualiSTAR+ C.A 8336

- > Designed for inspection and maintenance teams in industrial or administrative buildings, the QualiSTAR+ C.A 8336 can be used to obtain a snapshot of the main electrical network quality parameters
- > Easy to handle and particularly compact, this instrument also offers a large number of calculated values and several processing functions. The C.A 8336 is equipped with 5 Voltage inputs and 4 Current inputs.
- > When they are connected, the current sensors are recognized automatically by the C.A 8336. It allows you to mix different current sensors and direct readings of the measurements are possible if you configure the ratios appropriately.
 - TRMS AC+DC voltage and current, frequency
 - Power values: W, VA, var, VAD, PF, DPF, $\cos \varphi$, $\tan \varphi$
 - Energy values: Wh, varh, VAh, VADh, BTU, toe, Joule
 - 10-minute Inrush
 - Harmonics from 0 to the 50th order, phase
 - Recording of a selection of parameters with a maximum sampling interval of 4 h to 2 weeks
 - Vectorial representation

EN 50160



Measurement inputs

1,000 V CAT III
600 V CAT IV

IP
53



3 YEARS
WARRANTY

IEC 61000-4-30

State at delivery

- > With the QualiSTAR **C.A 8336**: bag no. 22, USB cable, mains adapter, 5 x 4 mm banana voltage leads 3 m long, 5 crocodile clips, safety datasheet, operating manual, PC data recovery software and the set of current sensors selected

Reference to order

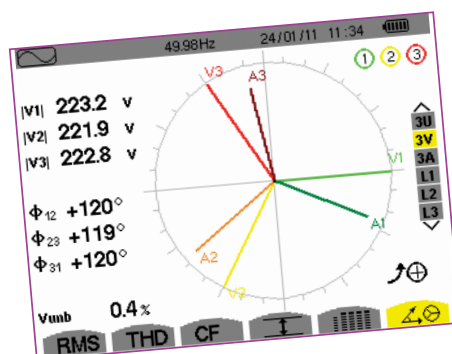
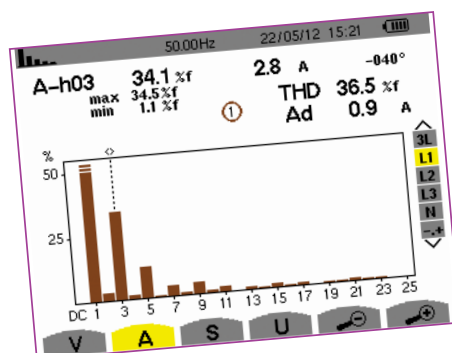
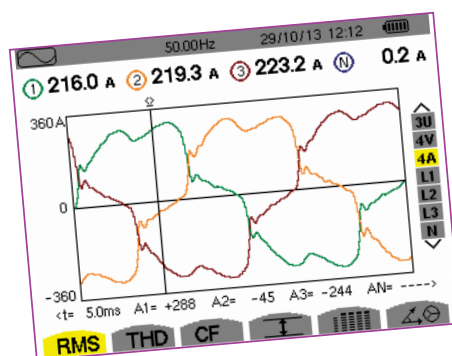
- > **C.A 8336** > P01160591
- Power analyser without sensor > P01160591

Accessories / Replacement parts

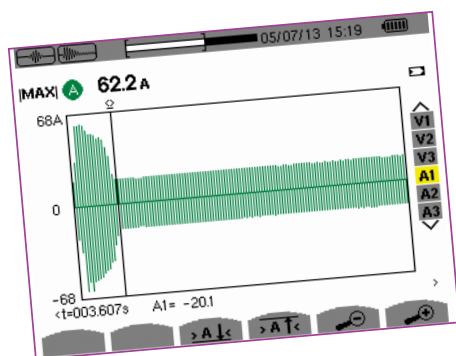
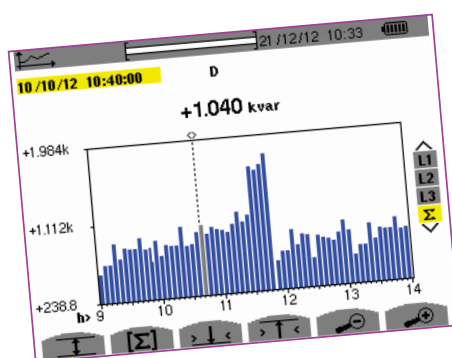
- | | |
|--|--------------|
| CA833X-F 5 A adapter unit | > P01101959 |
| PAC93 BK clamp | > P01120079B |
| C193 BK clamp | > P01120323B |
| MN93 BK clamp | > P01120425B |
| MN93A BK clamp | > P01120434B |
| AmpFlex® A193 450 mm BK | > P01120526B |
| AmpFlex® A193 800 mm BK | > P01120531B |
| MiniFlex® MA193-250 | > P01120580 |
| MiniFlex® MA193-350 | > P01120567 |
| J93 clamp | > P01120110 |
| Belt bag no. 21 | > P01298055 |
| Qualistar bag no. 22 | > P01298056 |
| Qualistar screen film | > P01102059 |
| Qualistar bag no. 06 | > P01298051 |
| DataView® software | > P01102095 |
| In-vehicle charger | > HX0061 |
| E3N clamp | > P01120043A |
| E3N adapter | > P01102081 |
| E3N mains power pack | > P01120047 |
| Battery pack | > P01296024 |
| ESSAILEC casing | > P01102131 |
| Set of inserts and rings | > P01102080 |
| USB-A USB-B cable | > P01295293 |
| Mains power pack (C.A 8331-33-35-36) | > P01102057 |
| Kit of banana leads (x 5), crocodile clips (x 5),
1 set of colour-coded rings | > P01295483 |
| Kit of banana leads (x 4), crocodile clips (x 4),
1 set of colour-coded rings | > P01295476 |
| PAC93 mains adapter | > P01101967 |

Functions

- Real-time display of waveforms (5 voltage inputs and 4 current inputs)
- Half-period RMS voltage and current measurements
- Intuitive use
- Automatic recognition of the different types of current sensors
- All DC components taken into account
- Voltage and current ratios
- Mixed current sensors
- Measurement, calculation and display of harmonics up to the 50th order, accompanied by their phase data
- Calculation of Total Harmonic Distortion (THD)
- Capture of transients per sample (1/256th of a period)
- Display of phasor diagram
- Measurement of power values: VA, W, VAD, total var and var per phase
- Measurement of energy values: VAh, Wh, VADh, total varh and var per phase
- Calculation of K factor & FHL (harmonic loss factor)
- Calculation of displacement power factor $\cos \varphi$ (DPF) and PF power factor
- Capture of up to 210 transients
- Calculation of PST & PLT Flicker
- Calculation of unbalance (current and voltage)
- Electrical network monitoring with setting of alarms
- Backup and recording of screenshots (image and data)
- Recording and export on PC
- PC data recovery and real-time communication software
- EN 50160 reports



Date	Time	Phase	Parameter	Value	Duration
20/04/12	15:43	L2	Vrms	213V	46min32s
16:30	L1	Arms	4010mA	2s36ms	
15:43	L3	Vrms	215V	46min46s	
16:30	L3	Vrms	0V	43ms	
	L2	Vthd	34.3% _f	1s	2d1 4h
15:43	L1	Vrms	218V	2d1 3h	
16:30	L3	Vrms	218V	12h5min	
23/04/12	05:49	L2	Vrms	213V	



Phase	1	2	3
P (W)	+34.83k	+34.77k	+34.60k
Pdc (W)	+0	+0	+0
Q ₁ (var)	±19.71k	±20.26k	±20.01k
D (var)	1.23k	1.12k	0.55k
S (VA)	40.04k	40.26k	39.98k

Power and energy analyser



3 YEARS WARRANTY

**1,000 V CAT III
600 V CAT IV**



Measurement inputs

**IP
67**

C.A 8435

> For all conditions and all seasons!

- Indoor and outdoor use, even in the rain
- 5 voltage inputs, 4 current inputs
- Continuous recording of all the parameters simultaneously
- Monitoring with alarms
- All types of installations
- Inrush over more than 10 minutes

Specifications

Sampling frequency
Voltage (TRMS AC+DC)
Current (TRMS AC+DC)
MN clamp
C clamp
AmpFLEX™ or MiniFLEX clamp
PAC clamp
E3N clamp
Frequency
Other measurements
Harmonics
Power supply
Battery life
Storage
Memory depth
Screen and curve
Recording (quantity)
Alarms
Transients
Inrush
Mechanical specifications
Communication
Display
Dimensions / weight
Electrical safety

Mechanical specifications

C.A 8435

256 samples/period
10 V to 1,000 V
MN93: 2 to 240 A _{AC} ; MN93A: 0.005 A _{AC} to 5 A _{AC} / 0.1 A _{AC} to 120 A _{AC}
3 A to 1,200 A _{AC}
30 A to 6,500 A _{AC}
1 A to 1,000 A _{AC} / 1 A to 1,400 A _{DC}
50 mA to 10 A _{AC/DC} , 100 mA to 100 A _{AC/DC}
40 Hz to 69 Hz
kW, kvar, kVA, kVAD, PF, DPF, kWh, kvarh, kVAh, Flicker, Unbalance, K factor K
THD, rang de 0 to 50, phase
9.6 V NiMH rechargeable battery or 90 to 260 V mains power pack
≥ 10 hours; ≥ 30 hours in standby mode
≥ 2 GB
50
From 29 days to several years
10,000 alarms of 40 different types
210
≥ 10 minutes on all 3 phases
USB
¼ VGA colour screen, diagonal 148 mm
270 x 250 x 180 mm / 3.7 kg
IEC 61010, 600 V CAT IV / 1,000 V CAT III, pollution 2

State at delivery

- > **C.A 8435** delivered with 1 USB cable, IP65 mains power cable, 5 x 4 mm banana voltage leads 3 m long, 5 crocodile clips, 1 x 12-colour identification kit for the leads and inputs, 1 screen-protection film (mounted), 1 safety datasheet, 1 bag for accessories, 1 CD containing a multilingual operating manual and 1 CD containing the PC data recovery software (Power Analyser Transfer)

References to order

- > **C.A 8435 analyser** > P01160585
- > **C.A 8435 analyser with 4 x IP65 AmpFLEX™ 450 A196 current sensors, 5 x IP65 BB196 black banana leads 3 m long and 5 lockable crocodile clips** > P01160587

Accessories / Replacement parts

- | | |
|---------------------------------------|--------------|
| MiniFlex® MA193-250 | > P01120580 |
| MiniFlex® MA193-350 | > P01120567 |
| AmpFlex® A196 450 IP65 | > P01120552 |
| AmpFlex® A193 450 mm | > P01120526B |
| AmpFlex® A193 800 mm | > P01120531B |
| Set of 5 x IP65 banana leads 3 m long | > P01295476 |
| Set of 5 lockable crocodile clips | > P01102099 |
| IP65 mains power cable | > P01295477 |
| Set of rubber caps | > P01102117 |
| ESSAILEC casing | > P01102131 |
| CA833X-F 5 A adapter unit | > P01101959 |
| Qualistar bag no. 22 | > P01298056 |
| MN93 clamp | > P01120425B |
| MN93A clamp | > P01120434B |
| PAC93 clamp | > P01120079B |
| C193 clamp | > P01120323B |
| DataView® software | > P01102095 |
| Screen-protection film | > P01102059 |
| Set of rings and inserts | > P01102080 |
| USB-A USB-B cable | > P01295293 |
| E3N clamp | > P01120043A |
| E3N clamp adapter | > P01102081 |
| E3N + mains adapter | > P01120047 |
| J93 clamp | > P01120110 |
| PAC93 mains adapter | > P01101967 |

Software platform for processing the data

DataView®

DataView® automatically recognizes the instrument when it is connected to the PC and opens the corresponding menu. This menu, in the form of a tree structure, offers users direct access to the data recorded in the instrument, its configuration, etc. DataView® includes multiple predefined report templates for quick printing in accordance with the applicable standards. Users can also create their own templates, as required.

> DataView® can be used to process the data from the following instruments:

- Qualistar+ C.A 8331, C.A 8333, C.A 8335, C.A 8336 & C.A 8435 power analysers
- Qualistar C.A 8332B & C.A 8334B power analysers
- C.A 8230 & C.A 8220 power analysers
- F407 & F607 power and harmonics clamp
- PEL100 loggers or Simple Logger II models

> DataView® offers the following functions for all these instruments:

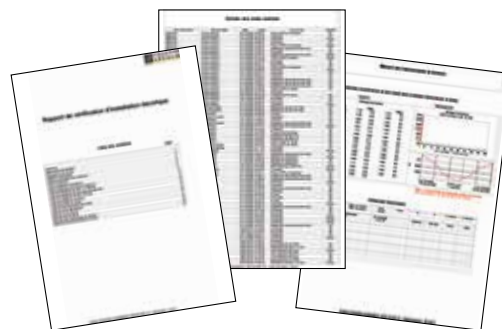
- Configuration of instruments connected to a PC or via Bluetooth
- Recovery of the measurement data recorded in the instrument
- Saving of measurement files
- Opening of saved files
- Processing and creation of reports (EN 50160)
- Export into Excel spreadsheets
- Export in .pdf format
- Database management



> DataView® is divided into sub-modules for measuring instruments. Depending on the instrument, it may also offer additional functions

> Power Analyser Transfer 2 for Qualistar+

- Configuration of alarms
- Configuration of transients
- Configuration of trends
- Real-time display
- Recovery, back-up and export of data
- After proposing automatic configuration of your instrument, it can be used to start the measurement campaign



> DataView® is specified for:

- Windows® XP
- Windows Vista®
- Windows 7®
- Windows 8/8.1®

*Windows is a registered trade mark of Microsoft Corporation



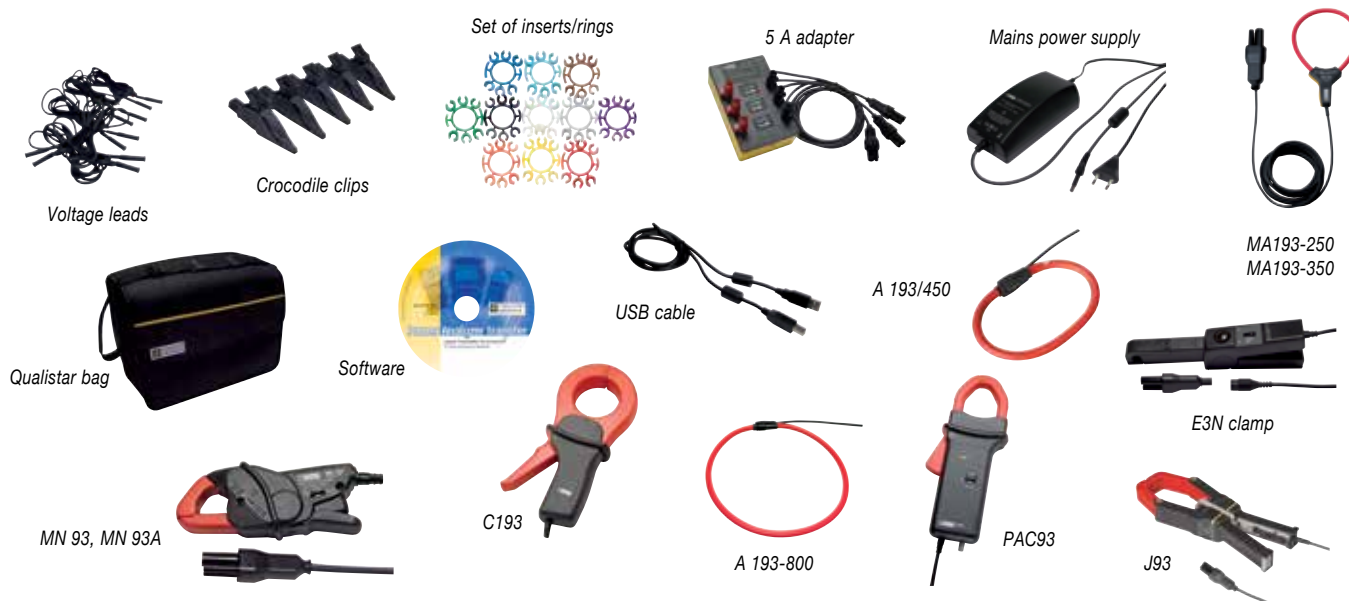
Reference to order

> **DataView®** software

> P01102095

Accessories

> Unique connection technology for automatic recognition of the sensors and more accurate measurements.



Model	Measurement range	Clamping diam. / Length	IEC 61010
MN93	500 mA to 200 A _{ac}	Ø 20 mm	600 V CAT III / 300 V CAT IV
MN 93A	0.005 A to 100 A _{ac}	Ø 20 mm	600 V CAT III / 300 V CAT IV
MA193-250 MA193-350	100 mA to 10 kA _{ac}	Ø 70 mm / 250 mm Ø 100 mm / 350 mm	1,000 V CAT III / 600 V CAT IV
PAC93	1 A to 1,000 A _{ac} / 1 A to 1,300 A _{dc}	1 x Ø 39 mm ou 2 x Ø 25 mm	600 V CAT III / 300 V CAT IV
J93/J193	50 A to 3,500 A _{ac} / 50 A to 5,000 A _{dc}	Ø 72 mm	600 V CAT III / 1,000 V CAT IV
A193-450 A196-450	100 mA to 10 kA _{ac}	Ø 140 mm / 450 mm	1,000 V CAT III / 600 V CAT IV
A193-800	100 mA to 10 kA _{ac}	Ø 250 mm / 800 mm	1,000 V CAT III / 600 V CAT IV
C193	3 A to 1000 A _{ac}	Ø 52 mm	600 V CAT IV
E3N	50 mA to 10 A _{ac/dc} 100 mA to 100 A _{ac/dc}	Ø 11,8 mm	600 V CAT III / 300 V CAT IV

Essailec accessory for all the Qualistar models

A lead with an ESSAILEC plug can be used to perform tests without disturbance or interruption of the power supply on meters or protection relays installed in the secondary circuits of current or voltage transformers. . The main advantage is quick, simple measurement with maximum user safety.

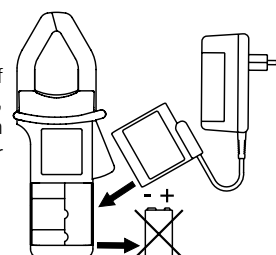


Adapter for...

> PAC clamp

> P01101967

For continuous use of your current clamps, replace the battery with the mains adapter



Solar power analysers selection guide

		
	FTV 100	FTV 200
Solar power installation tester	■	
Solar panel tester		■
DC voltage measurement	■	■
DC current measurement	■	■
AC voltage measurement	■	■
AC current measurement	■	■
Temperature measurement	■	■
Insolation measurement	■	■
Calculation of the installation's overall efficiency	■	
Calculation of inverter efficiency	■	
I / V curve in Standard Test Conditions (STC)		■
Library of panels		■
Report software	■	■
Page	C-2-2	C-2-3

Solar power installation analyser



FTV 100

> Verification of energy efficiency on solar power installations:

- Electrical power survey
- Calculation of solar panel efficiency
- Calculation of DC/AC inverter efficiency

> Easy to read even in direct sunlight thanks to anti-reflective treatment!

> Simultaneous measurements on 1, 2 or 3 rows of panels installed in parallel

Display

Inputs

Pyranometer
Ambient temperature
Solar panel temperature
DC voltage
DC current
AC voltage
AC current

Functions

Calculation functions

Data logger

Specifications

Communication
Internal power supply
External power supply
Protection
Dimensions / weight
Electrical safety

FTV 100

Large 5.7" extra-bright colour digital LCD screen (320 x 240) with anti-reflective treatment

Functions	Range	Accuracy
Solar irradiance measurement	0 to 2,000 W/m ²	± 2 %
Measurement with Pt 100 probe	-30°C to +80°C	± 1 % ± 1 °C
Measurement with Pt 100 probe	-30°C to +120°C	± 1 % ± 1 °C
1 to 3 inputs	1,000 V _{DC}	± 1 %
1 to 3 inputs	1,400 A _{DC}	± 1 %
1 to 3 inputs	600 V _{AC}	± 1 %
1 to 3 inputs	3,000 A _{AC}	± 1 %

Efficiency of solar panels with compensation of the modules' temperature coefficient

Efficiency of DC/AC conversion by the inverter

Up to 10 instrument configurations can be pre-recorded (measurements and results)

RS232 (remote unit) + USB (PC)

Built-in Li-Ion rechargeable battery (4.5 Ah) / Battery life 8 hours

Via 220 V_{AC} - 50 Hz external power supply

IP67 closed / IP54 open

360 x 304 x 194 mm / 3 kg (with battery)

IEC 61010-1 - 600 V CAT IV / 1,000 V CAT III

Ambient temperature probe

Bluetooth kit

REMOTE unit

Pyranometer

Panel temperature probe

D-type current clamp

PAC-type current clamp

MN-type current clamp

C-type current clamp

Accessories / Replacement parts

Installation measurement kit with 3 DC inputs:

2 PAC current clamps (PAC10-FTV) with 3 m cable, 2 sets of leads with test probes (3 m)

> P01160710

GREENTEST FTV100 REMOTE unit: 4 x 1.5 V batteries, 2 x RS232 M/M connectors for soldering, 1 fastening strap

> P01160736

"Wired" communication kit: 1 serial cable 15 m long, 9-pin RS232 M/M connectors

> P01160737

"Bluetooth" communication kit: 2 Bluetooth adapters (transmitter/receiver), 2 x RS232 M/F and M/M cables 20 cm long, software for programming the adapters

> P01160738

PAC10-FTV DC PAC clamp (200 A_{DC})

> P01160734

PAC20-FTV DC PAC clamp (1,400 A_{DC})

> P01120092

MN13-FTV AC MN clamp (200 A_{AC})

> P01160733

C107-FTV AC type-C clamp (1,000 A_{AC})

> P01120337

D43-FTV AC type-D clamp (3,000 A_{AC})

> P01120100

2 crocodile clips Ø 4 mm (red/black)

> P01102052Z

FTV100 battery

> P01160735

State at delivery and reference

> **TV100 with 1 DC input and PAC10-FTV DC current clamp + 3 MN-FTV AC clamps:** delivered with IP67 site-proof case, 1 pyranometer for irradiance measurement with 5 m cable, 1 Pt100 probe for ambient temperature with 3 m cable, 1 Pt100 probe for panel temperature with 3 m cable, 3 AC current clamps (MN-FTV) with 3 m cable, 1 DC current clamp (PAC10-FTV) with 3 m cable, 4 x 3 m leads with test probes, 1 rechargeable battery with mains adapter, data processing software, 1 carrying bag, 1 certificate of conformity, 1 SIT calibration certificate for the pyranometer > P01160700

> P01160700

> **GREENTEST FTV100 with 3 DC inputs and 3 PAC10-FTV DC current clamps + 3 MN-FTV AC current clamps:** same as for 1-DC-input version plus the 3-DC-input installation measurement kit > P01160720

> P01160720

Solar panel testers

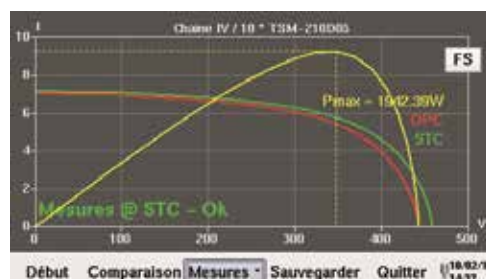
FTV 200

Specifications

Display	4.3" colour graphic LCD touch screen
Casing	Site-proof case
Library	10,000 curves (with reference values of panels / manufacturer)
Functions	
DC voltage	10 to 1,000 V
DC current	0.1 to 10 A
Power	10 W to 10 kW
Radiation	By pyranometer / 0 to 2,000 W/m ²
Temperature	By Pt 100 probe, -20 °C to +100 °C
I-V graph	Display of voltage/current measurement graph per panel or string
MPP graph	Display of Maximum Power Point (MPP) graph
General Specifications	
Communication	USB 2.0
Power supply / battery life	Mains or Li-ion rechargeable battery pack / 12-hour battery life
Safety	IEC 61010, CAT III 600 V
Operating temperature	-5 °C to +40 °C
Dimensions / weight	270 x 250 x 130 mm / 2.5 kg

FTV 200

- Specifications of thousands of panels referenced in an integrated library
- Excellent display resolution with 500 measurement points per curve with zoom
- Temperature and solar radiation measurements
- I-V graphs of all types of solar panels
- Measurement of peak power, Voc, Isc, etc.
- Complies with the IEC /EN 60891 standard



State at delivery

- > Carrying bag, set of 3 m cables, set of MC4 adapters (red/black), MC4/ Ø 4 mm banana adapter, magnetic stylus for touch screen, USB key, 1 mains adapter, set of flexible test probes, operating manual, PC software and certificate of conformity.

Accessories / Replacement parts

Pyranometer	> P01160730
Pt100 ambient temperature probe	> P01160731
Pt100 contact temperature probe	> P01160732
FTV remote unit	> P01160736
FTV200 Bluetooth communication kit	> P01160739
Carrying bag	> P01298066
USB/RS232 adapter	> HX0055
Inclinometer	> P01102115
Flexible test probes	> P01102116

References to order

- > **FTV200 I-V TRACER** >P01160745
 - > **FTV200 I-V TRACER** >P01160740
- with pyranometer and Pt100 probe

Data logging made simple...

The Simple Logger® II data logger family is a cost-effective, advanced-design product line incorporating features and functions not found in data loggers costing 2 to 3 times their price.

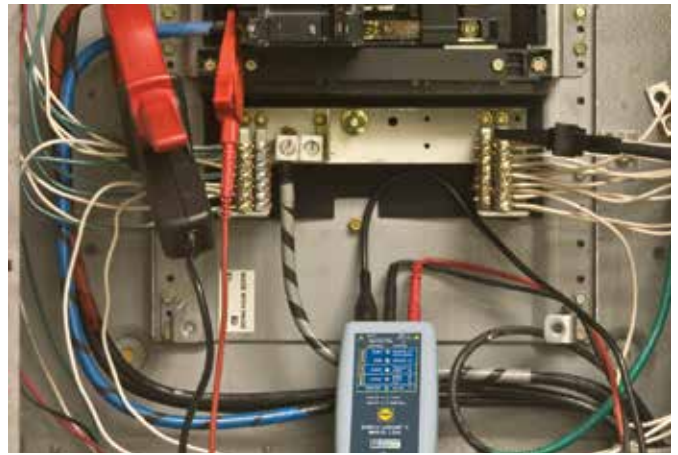
The choice of data storage modes and storage rates allows the operator to effortlessly configure these loggers to optimize memory usage for the application required.

Extended Recording Mode (XRM™) and delayed start time are just two of the many application-friendly features in these loggers. An internal memory of 512 kB allows storage of over 240,000 measurements, more than enough for most data collection needs. All AC measurement loggers are True RMS (TRMS) and all DC measurement loggers allow the user to program both scale and engineering units.

A full set of alarm programming tools allows programming of alarm set points and triggering on high, low, inside or outside trigger points.

Their battery operation and compact size allow installation in tight locations without the need for external power. A series of front-panel LEDs provides a quick overview of the logger's state and memory usage.

DataView® application software is included, providing real-time viewing of measurement data even while recording. Instrument configuration, data storage and report generation from predefined templates or operator custom-designed templates are also standard features. In addition, several data loggers can be synchronized to record at the same time intervals using DataView®.



Main features

- True RMS measurements provide an accurate representation of measured signals for AC models
- Choice of data storage modes to assist in matching the data collection to the application needs
- Stores over 240,000 measurements, ensuring that no valuable data is missed (more than 8 hours at 8 samples per second; approximately 1 week at one sample every 2 seconds)
- Compact size and battery operation
- Display and analyse real-time data through your PC

Applications

- DataView® helps electricians or engineers to detect problems occurring randomly in fault/intermittent current detection
- Neutral current monitoring to detect unwanted leakage currents
- Harmonic real-time current monitoring to locate unwanted energy which causes equipment failure
- Load profiling which sizes loads for proper transformer and meter selection
- Split-phase load monitoring for residential voltage and current
- Machine load monitoring detects overload conditions causing premature equipment failure due to overheating
- Process loop monitoring - finds troubled sensors and controls
- HV_{AC} and general temperature profiling (refrigeration and air-conditioning systems)

Loggers selection guide

Electrical measurements

	PEL103	PEL102	L562	CL601	L101	L102	L111	ML912	ML914	AL834	L261	L481
With display	■	■	■	■	■	■	■	■	■	■	■	■
Without display	■	■	■	■	■	■	■	■	■	■	■	■
Power												
Power values	■	■	■									
Energy values	■	■										
Current												
Clamp format				■								
Voltage input (format)	Qualistar	Qualistar	BNC		BNC	BNC						
Current input (format)							Banana					
Number of inputs	3	3	1	1	1	2	1	2	4	4	0	0
Type of sensors	See acc.	See acc.	See acc.		See acc.	See acc.	See acc.	MiniFlex®	MiniFlex®	AmpFlex®		
Voltage												
RMS	■	■	■							■		■
DC	■	■	■							■	■	■
Number of inputs	3	3	1	0	0	0	0	0	0	0	1	1
Page	D-1-2/3	D-1-2/3	D-1-4	D-1-5	D-1-6	D-1-6	D-1-7	D-1-8	D-1-10	D-1-10	D-1-9	D-1-9

Physical measurements

	L322	L432	L642
Number of inputs	2	2	2
Process			
4-20 mA	■		
0-10 V		■	
Temperature			■
Page	D-1-11	D-1-12	D-1-13

Power and Energy Loggers

Power and Energy Loggers

> Management of energy spending & control of consumption

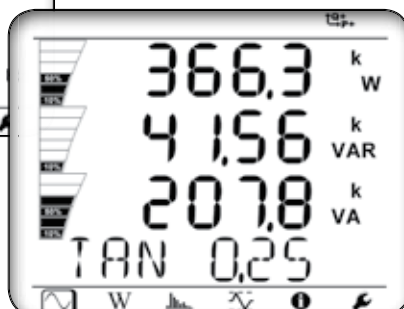
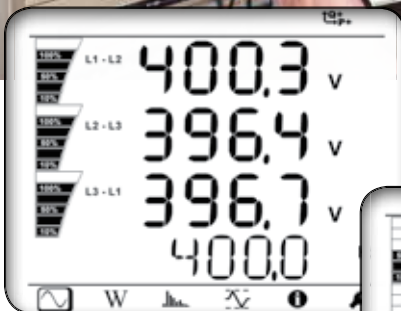
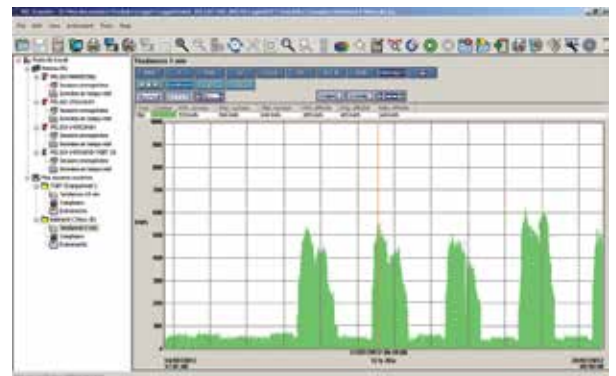
- Meters compatible with all electrical networks
- Installation without switching off the electrical network
- Data recording on integrated SD card
- Remote viewing of measurements
- Compact and magnetized for installation in closed cabinets
- Data viewable remotely via Bluetooth and Ethernet

600 V CAT IV
1,000 V CAT III

IP
54

> PEL102 ,
logger
without display

> PEL103,
logger with triple
digital display



> PEL Transfer, the analytical software for PEL100 loggers

- Configuration of PEL100 loggers
- Verification of the connections before starting to record
- Downloading of the measurements recorded in the PEL100 loggers
- Display of the various measurement and analysis results

Enregistreurs

	■ PEL 102	■ PEL 103
Specifications		
Display	Without	With triple digital display
Installation types	Single-phase, split-phase, three-phase with or without neutral and many other specific configurations	
Number of channels	3 voltage inputs / 3 current inputs	
Electrical Specifications		
Network frequency	DC, 50 Hz, 60 Hz & 400 Hz	
Voltage (Measurement range / Best accuracy)	10.00 to 1,000 V _{AC/DC} / ± 0.2% + 0,5 V	
Current	MN93	2.000 to 240.0 A _{AC} / ± 1.2% + 1 A
	MN93A	0.005 A _{AC} to 5.000 A _{AC} / ± 1.2% + 2 mA 0.100 A _{AC} to 120.0 A _{AC} / ± 1.2% + 2 mA
	C193	3.000 A to 1200 A _{AC} / ± 0.5%
	A193 & MA193	200.0 mA to 10.00 kA _{AC} / ± 1.2% + 70 mA
	PAC93	10.00 A to 1000 A _{AC} / ± 1.7% + 1 A 10.00 A to 1400 A _{DC} / ± 1.7% + 1 A
	E3N	50.00 mA to 10.00 A _{AC/DC} / ± 3.2% + 70 mA 100.0 mA to 100.0 A _{AC/DC} / ± 3.2% + 70 mA
J93/J193	50 A to 3,500 A _{AC} / 50 A to 5,000 A _{DC}	
Calculated measurements		
Ratios	Up to 650,000 V / up to 25,000 A	
Power	10 W to 10 GW / 10 var to 10 Gvar / 10 VA to 10 GVA	
Energy	Up to 4 EWh / 4 EVAh / 4 Evarh (E = 10 ¹⁸)	
Phase	cos φ, tan φ, PF	
Harmonics	Up to the 50th order	
Complementary functions		
Phase order	Yes	
Min / Max	Yes	
Mounting	Magnet, hook	
Recording		
Sampling / Acquisition rate / Aggregation	128 S/period - 1 measurement per second - from 1 min to 60 min	
Memory	SD card (SD-HC up to 32 GB)	
Communication	Bluetooth (Class 2), Ethernet, USB	
Power supply	110 V - 250 V (+ 10%, - 15 %) @ 50-60 Hz & 400Hz	
Safety	IEC 61010 600 V CAT IV - 1,000 V CAT III	
Mechanical Specifications		
Dimensions	256 x 125 x 37 mm without sensor	
Weight	950 g	950 gr
Casing	IP54, ETL	



Accessories

DataView® software	> P01102095
Bag No 23	> P01298078
Leads/clamps kit	> P01295476
Set of id. rings/inserts	> P01102080
5 A adapter	> P01101959
MN93 clamp	> P01120425B
MN93A clamp	> P01120434B
C193 clamp	> P01120323B
PAC93 clamp	> P01120079B
AmpFLEX™ A193-450 mm clamp	> P01120526B
AmpFLEX™ A193-800 mm clamp	> P01120531B
MiniFlex® MA193-250	> P01120580
MiniFlex® MA193-350	> P01120567
E3N clamp	> P01120043A
E3N adapter	> P01102081
MultiFIX	> P01102100Z
Mains power cable	> P01295174
J93 clamp	> P01120110
J193 clamp	> P01120111
Mains adapter	> P01102134

State at delivery

- > One **PEL 102 or PEL 103** power and energy logger delivered with 4 measurement leads, 4 crocodile clips (black), 1 SD card (2 GB), 1 set of rings and inserts (for ends of leads and current sensors), 1 mains cable, 1 USB cable (Type A / Type B), 1 Multifix mounting system, 1 operating manual (on CD), 1 bag, 1 safety datasheet, PEL Transfer PC software, 1 quick start-up guide and 1 SD USB adapter

References to order

- > **PEL102** Logger without current sensors > P01157152
- > **PEL103** Logger without current sensors > P01157153

TRMS voltage/current logger

> The lightweight, compact Simple Logger® II L562 detects dips and surges. Ideal for diagnostics on industrial, commercial or residential networks, the L562 can be used to monitor power consumption on single-phase systems and to supervise energy consumption.

- 2 input channels
- 64 samples/cycle
- Programmable storage rates from 8 per second to 1 per day
- 4 user-selectable storage modes
- Stores up to 240,000 measurements in non-volatile memory
- 300 V CAT IV / 600 V CAT III with a safety-rated current probe connected



**600 V CAT III
300 V CAT IV**



L562

Electrical specifications

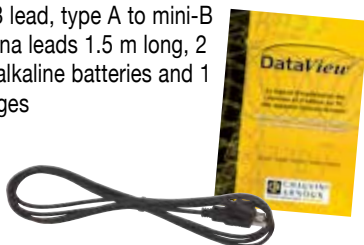
No. of channels	2
Connection	Current channel: BNC; Voltage channel: Banana connector
Input connection	0 to 1 V _{AC}
Input range	0 to 1 V _{AC}
Resolution	0.1 mV
Accuracy (50/60 Hz)	0 to 10 mV: unspecified 10 to 50 mV: ±(0.5 % R + 1 mV) 50 to 1,000 mV: ±(0.5 % R + 0.5 mV)
Sampling rate	64 samples per cycle
Storage interval	Programmable from 125 ms to 1 day
Recording modes	Stop when full, FIFO, Extended Recording Mode (XRM™) and recording according to alarms
Recording duration	15 minutes to 8 weeks, programmable with DataView®
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed
Communication	Optically-isolated USB 2.0
Power supply	2 x 1.5 V AA alkaline batteries
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)
Mechanical specifications	
Dimensions	136 x 70 x 32 mm (5.38 x 2.75 x 1.28")
Max conductor size	Depends on current probe
Weight (with battery)	181 g (6.4 oz)
Casing	UL94-V0
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)
Shocks	IEC 60068-2-27 (30 G)
Falls	IEC 60068-2-32 (1 m)
Environmental specifications	
Operating temperature	-10 to +50 °C (14 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to +140 °F)

L562

2	
Current channel	Voltage channel
BNC	Banana connector
0 to 1 V _{AC}	0 to 600 V _{AC}
0.1 mV	0.1 V
0 to 10 mV: unspecified 10 to 50 mV: ±(0.5 % R + 1 mV) 50 to 1,000 mV: ±(0.5 % R + 0.5 mV)	0 to 5 V: unspecified 5 to 50 V: ±(0.5 % R + 1 V) 50 to 600 V: ±(0.5 % R + 0.5 V)
64 samples per cycle	
Programmable from 125 ms to 1 day	
Stop when full, FIFO, Extended Recording Mode (XRM™) and recording according to alarms	
15 minutes to 8 weeks, programmable with DataView®	
240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed	
Optically-isolated USB 2.0	
2 x 1.5 V AA alkaline batteries	
100 hours to > 45 days (depends on storage interval/recording duration)	
Mechanical specifications	
136 x 70 x 32 mm (5.38 x 2.75 x 1.28")	
Depends on current probe	
181 g (6.4 oz)	
UL94-V0	
IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)	
IEC 60068-2-27 (30 G)	
IEC 60068-2-32 (1 m)	
Environmental specifications	
-10 to +50 °C (14 to 122 °F)	
-20 to +60 °C (-4 to +140 °F)	

State at delivery

> L562 delivered with 2 m USB lead, type A to mini-B - 5 pins, PC software, 2 banana leads 1.5 m long, 2 crocodile clips, 2 x 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Accessories / Replacement parts

Standard PVC leads with 4 mm straight male connectors
32 A crocodile clips
Bag with shoulder strap
2 m USB lead, type A to mini-B, 5 pins
Banana plug/female BNC adapter

- > P01295288Z
- > P01102052Z
- > P01298076
- > Contact us
- > P01101846

References to order

> Simple Logger® II L562

> P01157060

TRMS clamp-on current logger

CL601

CL601

Electrical specifications

No. of channels	1
Input connection	Split CT – AC Current
Current range	0 to 600 A _{AC}
Resolution	0.1 A
Accuracy (50/60 Hz)	0 to 5 A: unspecified 5 to 50 A: ±(1 % R + 1 A) 50 to 400 A: ±(1 % R + 0.5 A) 400 to 600 A: ±(3 % R + 1 A)
Sampling rate	64 samples/cycle
Storage interval	Programmable from 125 ms to 1 day
Recording modes	Start/Stop, FIFO and Extended Recording Mode (XRM™)
Recording duration	15 minutes to 8 weeks, programmable with DataView®
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed
Communication	Optically-isolated USB 2.0
Power supply	2 x 1.5 V AA alkaline batteries
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)

Mechanical specifications

Dimensions	235 x 102 x 41 mm (9.25 x 4.0 x 1.63")
Max conductor size	1 conductor Ø 42 mm (1.65"), 2 conductors Ø 25.4 mm (1.00") each
Weight (with battery)	485 g (17.1 oz)
Electrical safety	IEC 61010, 300 V CAT IV / 600 V CAT III
Casing	UL94-V0
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)
Shocks	IEC 60068-2-27 (30 G)
Falls	IEC 60068-2-32 (1 m)

Environmental specifications

Operating temperature	-10 to +50 °C (14 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to +140 °F)

> The CL601 is particularly suitable for monitoring machine loads, electrical maintenance, etc.

- Self-contained with secure connections
- Alarm function
- Overload indication



State at delivery

> **CL601** delivered with type A to 5-pin mini-B USB cable 2 m long, PC communication software, 2 x 1.5 V AA alkaline batteries and 1 operating manual in 5 languages

Reference to order

> **Simple Logger® II CL601**

> P01157010

TRMS current loggers

> The lightweight, compact Simple Logger® II L101 and L102 detect fault currents and intermittent problems.

- 64 samples/cycle
- Storage rates from 8 per second to 1 per day
- 4 user-selectable storage modes
- Store up to 240,000 measurements in non-volatile memory
- L101: records on demand and can be used to monitor the neutral current
- L102: with its two independent channels, it can be used to monitor the neutral current in relation to the earth, as well as split-phase loads



L101 and L102

Electrical specifications

No. of channels	1	2
Input connection	BNC	One BNC connector per channel
Current-probe output-voltage range	0 to 1 V _{AC} (depending on probe)	
Resolution	0.1 mV	
Accuracy (50/60 Hz)	0 to 10 mV: unspecified	
10 to 50 mV: ± (0.5 % R + 1 mV)	64 samples per cycle	
50 to 1,000 mV: ± (0.5 % R + 0.5 mV)	Programmable de 125 ms to 1 jour	
Sampling rate	64 samples per cycle	
Storage interval	Programmable from 125 ms to 1 day	
Recording modes	Start/Stop, FIFO, Extended Recording Mode (XRM™) and recording according to alarms	
Recording duration	15 minutes to 8 weeks, programmable with DataView®	
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed	
Communication	Optically-isolated USB 2.0	
Power supply	2 x 1.5 V AA alkaline batteries	
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)	
Max conductor size	Depends on current probe	
Weight (with battery)	180 g (6.4 oz)	
Electrical safety	IEC 61010, 50 V CAT III	
Casing	UL94-V0	
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)	
Shocks	IEC 60068-2-27 (30 G)	
Falls	IEC 60068-2-32 (1 m)	
Environmental specifications		
Operating temperature	-10 to +50 °C (14 to 122 °F)	
Storage temperature	-20 to +60 °C (-4 to +140 °F)	

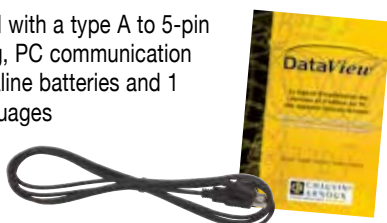
L101

L102

No. of channels	1	2
Input connection	BNC	One BNC connector per channel
Current-probe output-voltage range	0 to 1 V _{AC} (depending on probe)	
Resolution	0.1 mV	
Accuracy (50/60 Hz)	0 to 10 mV: unspecified	
10 to 50 mV: ± (0.5 % R + 1 mV)	64 samples per cycle	
50 to 1,000 mV: ± (0.5 % R + 0.5 mV)	Programmable de 125 ms to 1 jour	
Sampling rate	64 samples per cycle	
Storage interval	Programmable from 125 ms to 1 day	
Recording modes	Start/Stop, FIFO, Extended Recording Mode (XRM™) and recording according to alarms	
Recording duration	15 minutes to 8 weeks, programmable with DataView®	
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed	
Communication	Optically-isolated USB 2.0	
Power supply	2 x 1.5 V AA alkaline batteries	
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)	
Max conductor size	Depends on current probe	
Weight (with battery)	180 g (6.4 oz)	
Electrical safety	IEC 61010, 50 V CAT III	
Casing	UL94-V0	
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)	
Shocks	IEC 60068-2-27 (30 G)	
Falls	IEC 60068-2-32 (1 m)	
Environmental specifications		
Operating temperature	-10 to +50 °C (14 to 122 °F)	
Storage temperature	-20 to +60 °C (-4 to +140 °F)	

State at delivery

> L101 and L102, delivered with a type A to 5-pin mini-B USB cable 2 m long, PC communication software, 2 x 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Accessories / Replacement parts

- | | |
|--|--------------|
| E3N AC current probe | > P01120043A |
| MN60 AC current probe | > P01120409 |
| PAC12 AC current probe | > P01120072 |
| PAC22 AC current probe | > P01120073 |
| C160 AC current probe | > P01120308 |
| D38N AC current probe | > P01120057A |
| 32 A crocodile clips | > P01102052Z |
| Bag with shoulder strap | > P01298076 |
| 2 m USB lead, type A to mini-B, 5 pins | > Contact us |
| Mains adapter for E3N clamp | > P01101965 |

References to order

- | | |
|--------------------------|-------------|
| > Simple Logger® II L101 | > P01157020 |
| > Simple Logger® II L102 | > P01157030 |

TRMS current logger

L111

L111

Electrical specifications

No. of channels	1
Input connection	Two recessed banana jacks
Current-probe output-voltage range	0 to 1 V _{AC} (depending on probe)
Resolution	0.1 mA
Accuracy (50/60 Hz)	0 to 10 mA: unspecified 10 to 50 mA: ± (0.5 % R + 1 mA) 50 to 1,000 mA: ± (0.5 % R + 0.5 mA)
Sampling rate	64 samples per cycle
Storage interval	Programmable from 125 ms to 1 day
Recording modes	Start/Stop, FIFO, Extended Recording Mode (XRM™) and recording according to alarms
Recording duration	15 minutes to 8 weeks, programmable with DataView®
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed
Communication	Optically-isolated USB 2.0
Power supply	2 x 1.5 V AA alkaline batteries
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)
Mechanical specifications	
Dimensions	132 x 70 x 32 mm (5.18 x 2.75 x 1.28")
Max conductor size	Depends on current probe
Weight (with battery)	180 g (6.4 oz)
Electrical safety	IEC 61010, 50 V CAT III
Casing	UL94-V0
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)
Shocks	IEC 60068-2-27 (30 G)
Falls	IEC 60068-2-32 (1 m)
Environmental specifications	
Operating temperature	-10 to +50 °C (14 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to +140 °F)

> The lightweight, compact Simple Logger® II L111 detects fault currents and intermittent problems. The L111 records on demand and can be used to monitor the neutral current in relation to the earth, as well as split-phase loads.

- Fused inputs
- 64 samples/cycle
- Programmable storage rates from 8 per second to 1 per day
- 4 user-selectable storage modes
- Stores up to 240,000 measurements in non-volatile memory



Accessories / Replacement parts

MN11 current probe	> P01120404
C103 current probe	> P01120303
Standard PVC leads with 4 mm straight male plugs	> P01295288Z
32 A crocodile clips	> P01102052Z
Bag with shoulder strap	> P01298076
2 m USB lead, type A to mini-B, 5 pins	> Contact us
Mains adapter for E3N clamp	> P01101965
Banana plug/female BNC adapter	> P01101846

State at delivery

- > L111 delivered with 1 type A to 5-pin mini-B USB 2 m, PC software, 2 x 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



References to order

- > Simple Logger® II L111

> P01157080

Current logger

- Two MiniFlex™ flexible current sensors for measuring currents from 0.5 A to 1,000 A
- Two ranges: 100 / 1,000 A_{ac}
- Phase load monitoring
- Detection of intermittent faults
- Harmonic current monitoring



**600 V CAT III
300 V CAT IV**



ML912

Electrical specifications

Channels	2	
Input connection	Built-in MiniFlex™ flexible AC current sensors	
Range	0,5 to 100 A _{ac}	5 to 1,000 A _{ac}
Resolution	0,1 mA	0,1 V
Accuracy	0 to 1 A: unspecified 1 to 100 A: ±(1 % L + 0,5 A)	0 to 5 A: unspecified 5 to 1,000 A: ±(1 % L + 1 A)
Sampling rate	64 samples/cycle	
Storage interval	Programmable from 125 ms to 1 day	
Recording modes	Start/Stop, FIFO, Extended Recording Mode (XRM™) and recording according to alarms	
Recording duration	15 minutes to 8 weeks, programmable with DataView®	
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed	
Communication	Optically-isolated USB 2.0	
Power supply	2 x 1.5 V AA alkaline batteries	
Battery life	100 hours to > 45 days (depends on storage interval/ recording duration)	
Mechanical specifications		
Dimensions	136 x 70 x 32 mm without sensor (5.38 x 2.75 x 1.28")	
Weight (with batteries)	245 g (8.67 oz)	
Electrical safety	IEC 61010-1; 600 V CAT III; 300 V CAT IV; pollution degree 2	
Casing	UL94-V0	
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)	
Shocks	IEC 60068-2-27 (30 G)	
Falls	IEC 60068-2-32 (1 m)	
Environmental specifications		
Operating temperature	-10 to +50 °C (14 to 122 °F)	
Storage temperature	-20 to +60 °C (-4 to +140 °F)	
Safety - Electro-magnetic compatibility		
Safety	IEC 61010-1; 600 V CAT IV; pollution degree 2	
Protection	IP40	

State at delivery

- > **ML912** delivered with 2 m USB lead, type A to mini-B, 5 pins, PC communication software, 2 x 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Accessories / Replacement parts

- Bag with shoulder strap > P01298076
- 2 m USB lead, type A to mini-B, 5 pins > Contact us

Reference to order

- > Simple Logger® II ML912 > P01157130

Voltage loggers

L261 and L481

Electrical specifications

	L261	L481
No. of channels	1	
Input connection	2 recessed safety banana jacks	
Voltage range	0 to 600 V _{AC/DC}	-850 V _{DC} to + V _{DC}
Accuracy (50/60 Hz)	0 to 5 V: unspecified 5 to 50 V: ± (0,5 % L + 1 V) 50 to 600 V: ± (0,5 % L + 0,5 V)	0 to 5 V: unspecified 5 to 50 V: ± (0,5 % L + 1 V) 50 to 850 V: ± (0,5 % L + 0,5 V)
Resolution	0,1 V	
Sampling rate	64 samples per cycle	8 samples per second
Storage interval	Programmable from 125 ms to 1 day	
Recording modes	Start/Stop, FIFO, Extended Recording Mode (XRM™) and recording according to alarms	
Recording duration	15 minutes to 8 weeks, programmable with DataView®	
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed	
Communication	Optically-isolated USB 2.0	
Power supply	2 x 1.5 V AA alkaline batteries	
Battery life	100 hours to > 45 days (depends on storage interval/ recording duration)	
Mechanical specifications		
Dimensions	125 x 70 x 32 mm (4.94 x 2.75 x 1.28")	
Weight (with batteries)	180 g (6.4 oz)	
Electrical safety	IEC 61010-1; 600 V CAT III; 300 V CAT IV; pollution degree 2	
Casing	UL94-V0	
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)	
Shocks	IEC 60068-2-27 (30 G)	
Falls	IEC 60068-2-32 (1 m)	
Environmental specifications		
Operating temperature	-10 to +50 °C (14 to 122 °F)	
Storage temperature	-20 to +60 °C (-4 to +140 °F)	

> L261

- 600 V_{AC/DC} TRMS
- Suitable for industrial, commercial or residential monitoring,
- Logging of voltage drops and surges

> L481

- 850 V_{DC}
- Voltage monitoring on machines, wind turbines, railway applications, etc.
- Detection of intermittent voltage faults



**600 V CAT III
300 V CAT IV**



Accessories / Replacement parts

Standard PVC leads with 4 mm straight male plugs	> P01295288Z
32 A crocodile clips	> P01102052Z
Bag with shoulder strap	> P01298076
2 m USB lead, type A to mini-B, 5 pins	> Contact us
Banana plug/female BNC adapter	> P01101846

State at delivery

- > **L261 and L481** delivered with 2 m USB lead, type A to mini-B, 5 pins, PC communication software, 2 banana leads, 2 voltage leads 1.5 m long, 2 crocodile clips, 2 x 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Reference to order

- | | |
|--------------------------|-------------|
| > Simple Logger® II L261 | > P01157040 |
| > Simple Logger® II L481 | > P01157110 |

Current logger

- Current loggers with compact flexible sensors
- TRMS measurements up to 1,000 A_{AC} (ML914) or 3,000 A_{AC} (AL 834)
- Safety and risk-free access to measurements with Bluetooth™ communication
- DataView® processing software for effective analysis of the measurements



**600 V CAT IV
1,000 V CAT III**



**600 V CAT IV
1,000 V CAT III**



Electrical specifications

Number of channels
Type of sensor
Range
Accuracy (50 / 60 Hz)

Resolution
Sampling
Acquisition interval
Storage mode
Recording duration
Memory
Communication
Power supply
Battery life
Safety

Mechanical specifications

Dimensions
Max. electrical conductor size
Weight
Casing

ML914 and AL 834

ML914

AL 834

Built-in MiniFLEX®		Built-in, flexible	
100 A	1,000 A	300 A	3,000 A
0 to 1 A: not specified 1 to 100 A: ± (1% R + 0.5 A)	0 to 5 A: not specified 5 to 1,000 A: ± (1% L + 1 A)	0 to 5 A: not specified 1 to 300 A: ± (1% L + 0.5 A)	0 to 15 A: not specified 15 to 3,000 A: ± (1% L + 1 A)
0.1 A			
64 samples per period			
Programmable from 125 ms to 1 day			
Start/Stop, FIFO, XRM™ extended mode and on alarm			
from 15 minutes to 8 weeks, programmable with DataView®			
1,000,000 measurements (2 MB)			
Bluetooth (Class 2)			
4 x 1.5 V type-C alkaline batteries			
Up to 180 days			
IEC 61010 600 V CAT IV and 1000 V CAT III			
150 x 150 x 90 mm without sensor		150 x 150 x 91 mm without sensor	
45 mm		203 mm	
1.1 kg		1.77 kg	
IP50 according to IEC 60529		IP65 according to IEC 60529	

State at delivery

- > **ML 914** logger delivered with PC software, 4 type-C alkaline batteries, multilingual operating manual on CD Rom and safety datasheet.
- > **AL 834** logger delivered with PC software, 4 x type-C alkaline batteries, multilingual operating manual on CD-Rom and safety data-

Reference to order

- > **Simple Logger® II ML 914** > P01157135
- > **Simple Logger® II AL 834** > P01157140

Accessories / Replacement parts

- DataView® software > P01102095
- Bag > P01298078



Current logger (4 to 20 mA_{DC})

L322

L322

Electrical specifications

Channels	2
Input connection	One 4-position removable screw-type terminal block
Measurement range	-20 to +20 mA _{DC}
Resolution	0.01 mA
Accuracy	0.25 % R + 0.05 mA
Sampling rate	64 samples per cycle
Storage interval	Maximum of 8 samples taken at storage interval
Recording modes	Start/Stop, FIFO and Extended Recording Mode (XRM™) and recording according to alarms
Recording duration	From 15 minutes to 8 weeks, programmable with DataView®
Storage	240,000 measurements (512 kB) The recorded data is stored in non-volatile memory & retained even if the battery is low or removed
Communication	Optically-isolated USB 2.0
Power supply	2 x 1.5 V AA alkaline batteries
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)
Mechanical specifications	
Dimensions	136 x 70 x 32 mm (5.38 x 2.75 x 1.28")
Weight (with battery)	181 g (6.4 oz)
Casing	UL94-V0
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)
Shocks	IEC 60068-2-27 (30 G)
Falls	IEC 60068-2-32 (1 m)
Environmental specifications	
Operating temperature	-10 to +50 °C (14 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to +140 °F)

> The compact Simple Logger® II L322 can be used for monitoring and diagnostics in process control. It also offers the possibility of directly establishing the temperature, pressure and flow profiles, etc.

- 2 independent input channels
- -20 to +20 mA_{DC}
- Programmable storage rates from 8 per second to 1 per day
- 4 user-selectable storage modes
- Stores up to 240,000 measurements in non-volatile memory
- Scaling and engineering units entered via software prior to saving



Accessories / Replacement parts

- | | |
|--|--------------|
| Bag with shoulder strap | > P01298076 |
| 2 m USB lead, type A to mini-B, 5 pins | > Contact us |

State at delivery

- > **L322** delivered with 2 m USB lead, type A to mini-B, 5 pins, PC software, two 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Reference to order

- > **Simple Logger® II L322** > P01157090

DC voltage logger

> The compact Simple Logger® II L432 is ideal for diagnostics during circuit design. It can be used to establish the power supply profile, monitor the sensors and even test batteries.

- 2 independent input channels
- Ranges of ± 100 mV, ± 1 V and ± 10 V_{DC}
- Programmable storage rates from 8 per second to 1 per day
- 4 user-selectable storage modes
- Stores up to 240,000 measurements in non-volatile memory
- 50 V CAT III



L432

Electrical specifications

L432	
Channels	2
Input connection	One 4-position removable screw-type terminal block
Measurement level(3 ranges/channel)	Range no. 1: -100 mV to +100 mV _{DC} Range no. 2: -1 V to +1 V _{DC} Range no. 3: -10 V to +10 V _{DC}
Resolution	Range no. 1: 0.1 mV Range no. 2: 1 mV Range no. 3: 10 mV
Accuracy (50/60 Hz)	Range no. 1: $\pm (0.5 \% R + 1 \text{ mV})$ Range no. 2: $\pm (0.5 \% R + 1 \text{ mV})$ Range no. 3: $\pm (0.5 \% R + 10 \text{ mV})$
Sampling rate	Maximum of 8 samples taken at storage interval
Storage interval	Programmable from 125 ms to 1 day
Recording modes	Start/Stop, FIFO and Extended Recording Mode (XRM™) and recording according to alarms
Recording duration	From 15 minutes to 8 weeks, programmable using DataView®
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed
Communication	USB 2.0 to isolation optique
Power supply	2 x 1.5 V AA alkaline batteries
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)
Mechanical specifications	
Dimensions	136 x 70 x 32 mm without sensor (5.38 x 2.75 x 1.8")
Weight (with battery)	181 g (6.4 oz)
Casing	UL94-V0
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)
Shocks	IEC 60068-2-27 (30 G)
Falls	IEC 60068-2-32 (1 m)
Environmental specifications	
Operating temperature	-10 to +50 °C (14 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to +140 °F)

State at delivery

> L432 delivered with 2 m USB lead, type A to mini-B, 5 pins, PC software, two 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Accessories / Replacement parts

Bag with shoulder strap > P01298076
2 m USB lead, type A to mini-B, 5 pins > Contact us

Reference to order

> Simple Logger® II L432 > P01157070

Temperature logger

L642

Electrical specifications

■ L642	
No. of channels	2
Input connection	2 miniature thermocouple connectors
Measurement range	°C (°F)
J	-210 TO +1,200 (-346 TO +2192)
K	-200 TO +1,372 (-328 TO +2501)
T	-250 TO +400 (-418 TO +752)
N	-200 TO +1,300 (-328 TO +2372)
E	-150 TO +950 (-238 TO +1742)
R	0 TO 1,767 (32 TO 3212)
S	0 TO 1,767 (32 TO 3212)
Resolution	0.1 °C/F < 1,000 °C/F; 1 ° ≥ 1,000 °C/F
Accuracy (50/60 Hz)	0.1 % to 0.2 % + 0.6 ° to 1 ° depending on the range and T/C type
Sampling rate	8 samples taken at storage interval
Storage interval	Programmable from 5 s to 1 day
Recording modes	Start/Stop, FIFO, Extended Recording Mode (XRM™) and recording according to alarms
Recording duration	From 15 minutes to 8 weeks, programmable using DataView®
Storage	240,000 measurements (512 kB). The recorded data are stored in non-volatile memory and are kept even if the battery is low or removed
Communication	Optically-isolated USB 2.0
Power supply	2 x 1.5 V AA alkaline batteries
Battery life	100 hours to > 45 days (depends on storage interval/recording duration)
Mechanical specifications	
Dimensions	125 x 70 x 32 mm (4.94 x 2.75 x 1.28")
Weight (with batteries)	200 g (7 oz)
Casing	UL94-V0
Vibrations	IEC 60068-2-6 (1.5 mm, 10 to 55 Hz)
Shocks	IEC 60068-2-27 (30 G)
Falls	IEC 60068-2-32 (1 m)
Environmental specifications	
Operating temperature	-10 to +50 °C (14 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to +140 °F)

> The compact Simple Logger® II L642 can be used to monitor industrial processes, heating systems and air-conditioning.

- 2 independent input channels for selectable thermocouple types J, K, T, N, E, R, S
- Programmable storage rates from 1 per seconds to 1 per day
- 4 user-selectable storage modes
- Stores up to 240,000 measurements in non-volatile memory
- 50 V CAT III

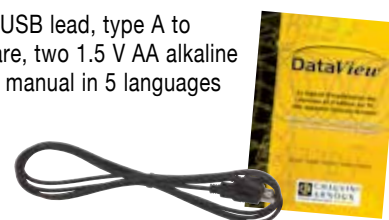


Accessories / Replacement parts

- | | |
|--|--------------|
| SK6 K thermocouple | > P03652906 |
| Bag with shoulder strap | > P01298076 |
| 2 m USB lead, type A to mini-B, 5 pins | > Contact us |

State at delivery

- > L642 delivered with 2 m USB lead, type A to mini-B, 5 pins, PC software, two 1.5 V AA alkaline batteries and 1 operating manual in 5 languages



Reference to order

- > Simple Logger® II L642

> P01157050

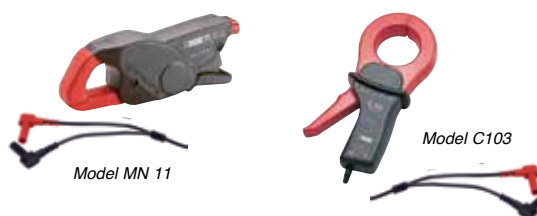
Accessories for the Simple Logger® II



Current probes with VOLTAGE output



Current probes with CURRENT output



References to order

Current probe E3N	> P01120043A
Current probe MN60	> P01120409
Current probe PAC12	> P01120072
Current probe PAC22	> P01120073
Current probe C160	> P01120308
Current probe D38N	> P01120057A
Current probe MN11	> P01120404
Current probe C103	> P01120303

	Model	Measurement range AC	Output signal Voltage	Phase shift**	Maximum conductor size		Output connection	Compatibility
					Ø Câble	Barre		
VOLTAGE OUTPUT	E3N	100 mA to 10 A 1 to 100 A	100 mV/A _{AC} 10 mV/A _{AC}	< 1.5°	11,8 mm (0.46")	–	Lead w/BNC	L101 L102 L562
	MN 60	0.1 to 24 A 0.5 to 240 A	100 mV/A _{AC} 10 mV/A _{AC}	< 2.5°	19,8 mm (0.78")	–	Lead w/BNC	
	PAC 12	0.2 to 40 A 0.5 to 400 A	10 mV/A _{AC} 1 mV/A _{AC}	< 1.5°	One cable: 30 mm (1.18") Two: 24 mm (0.95")	Two 31.5 x 10 mm (1.2 x 0.4")	Lead w/BNC	
	PAC 22	0.2 to 100 A 0.5 to 1,000 A	10 mV/A _{AC} 1 mV/A _{AC}	< 1.5°	One cable: 39 mm (1.5") Two: 25 mm (0.98")	One 50 x 12, mm (1.96 x 0.49") Two 50 x 5 mm (1.96 x 0.19")	Lead w/BNC	
	C160	0.1 to 10 A 0.1 to 100 A 1 to 1,000 A	100 mV/A _{AC} 10 mV/A _{AC} 1 mV/A _{AC}	< 1°	52 mm (2.05")	50 x 5 mm (1.96 x 0.19")	Lead w/BNC	
	D38N	1 to 30 A 1 to 300 A 1 to 3,000 A	10 mV/A _{AC} 1 mV/A _{AC} 0,1 mV/A _{AC}	< 1°	64 mm (2.52") 64 x 100 mm (2.52 x 3.94")	50 x 135 mm (1.97 x 5.31")	Lead w/BNC	
CURRENT OUTPUT	MN11	0.5 to 240 A	1 mA/A _{AC}	< 2.5°	19,8 mm (0.78")	–	Wire cable with reinforced or double insulation, length 1.5 m, terminated by 2 elbowed male banana safety plugs, Ø 4 mm	L111
	C103	0.1 to 1,200 A	1 mA/A _{AC}	< 0.5°	52 mm (2.05")	50 x 5 mm (1.96 x 0.19")	Wire cable with reinforced or double insulation, length 1.5 m, terminated by 2 elbowed male banana safety plugs, Ø 4 mm	

* For the AC measurements **Phase shift indicated at maximum rating

Calibrators selection guide



C.A. 1621



C.A. 1623



C.A. 1631

Measurement / Simulation	C.A. 1621	C.A. 1623	C.A. 1631
J, K, T, E, R, S, B and N thermocouples	■		
Pt10, Pt50, Pt100, Pt200, Pt500 and Pt1000 probes		■	
4-20 mA			■
0-10V			■
Voltage			
Up to 100 mV	■		■
Up to 20 V			■
Current			
Up to 24 mA			■
Resistance			
0.00 to 3200.0 Ω		■	
Page	E-1-2	E-1-2	E-1-3

Calibrators

> C.A 1621, thermocouple temperature calibrator

The C.A 1621 is capable of measuring and simulating:

- up to 8 types of thermocouple: J, K, T, E, R, S, B and N
- a voltage in mV

> C.A 1623, resistive-probe temperature calibrator

The C.A 1623 is capable of measuring and simulating:

- up to 7 different types probes: Pt 10, Pt 50, Pt 100, Pt 200, Pt 500, Pt 1000, Pt 100 (JIS)
- a resistor



C.A 1621, C.A 1623 & C.A 1631

- > Instrument calibration without dismantling the sensors
- > Simulation and generation of all low-level signals encountered in industry
- > Measurement of signal during calibration
- > Comfortable handling for use in the field
- > Powered by battery or mains

C.A 1621

Specifications for measurement (input) /simulation (output)

Input/output range	Resolution	Accuracy
-10 mV ... 100 mV	0.01 mV	± 0.025 % + 2 counts

Function	Range	Resolution	Accuracy	Reference junction error
Type J	-200 ... +1,200°C	0.1°C	± (0,3°C + 10 µV)	± 0.3°C
Type K	-200 ... +1,370°C	0.1°C	± (0,3°C + 10 µV)	± 0.3°C
Type T	-200 ... +400°C	0.1°C	± (0,3°C + 10 µV)	± 0.3°C
Type E	-200 ... +950°C	0.1°C	± (0,3°C + 10 µV)	± 0.3°C
Type R	-20 ... +1,750°C	1°C	± (1 °C + 10 µV)	± 0.3°C
Type S	-20 ... +1,750°C	1°C	± (1 °C + 10 µV)	± 0.3°C
Type B	600 ... +1,800°C	1°C	± (1 °C + 10 µV)	± 0.3°C
Type N	-250 ... +1,300°C	0.1°C	± (0,3°C + 10 µV)	± 0.3°C

C.A 1623

Specifications for measurement (input) /simulation (output)

Range	4-wire measurement accuracy ± Ω	Simulation accuracy ± Ω	Acceptable excitation in mA
0,00 Ω ... 400,0 Ω	0.1	0.15	0.1 ... 0,5
		0.1	0.5 ... 3,0
400,0 Ω ... 1500,0 Ω	0.5	0.5	0.05 ... 0,8
1500,0 Ω ... 3200,0 Ω	1	1	0.05 ... 0.4
	2		

Mode	Range	Accuracy in °C			Acceptable excitation in mA
		4-wire input	2-wire / 3-wire input	Output	
Pt10 385	-200 ... +800°C				0.1 ... 3.0
Pt50 385	-200 ... +800°C	0.7	1.0	0.7	0.1 ... 3.0
Pt100 385	-200 ... +800°C	0.33	0.5	0.33	0.1 ... 3.0
Pt200 385	-200 ... +250°C	0.2	0.3	0.2	0.1 ... 3.0
	+250 ... +630°C	0.8	1.6	0.8	
Pt500 385	-200 ... +500°C	0.3	0.6	0.3	0.05 ... 3.0
	+500 ... +630°C	0.4	0.9	0.4	
Pt1000 385	-200 ... +100°C	0.2	0.4	0.2	0.1 ... 3.0
	+100 ... +630°C	0.2	0.5	0.2	
Pt100 JIS	+200 ... +630°C	0.2	0.5	0.3	0.1 ... 3.0

Calibrators

C.A 1621, C.A 1623 & C.A 1631

■ C.A 1631

Specifications for measurement (input) / simulation (output)

Calibre	Resolution	Accuracy ± (% of reading + counts)
100 mV	0.01 mV	0.02 % + 3
20 V	0.001 V	0.02 % + 3

Input Impedance: 2 MΩ (rated value), < 100 pF
 Protection against overvoltages: 30 V
 Current delivered at 20 V: 1 mA

Calibre	Resolution	Accuracy ± (% of reading + counts)
24 mA	0,001 mA	0,015 % + 3

Protection against overloads: 125 mA 250 V quick-response fuse
 Percentage display: 0 % = 4 mA 100 % = 20 mA
 Source mode: 1,000 Ω load at 20 mA for a battery voltage ≥ 6.8 V (700 Ω at 20 mA for a battery voltage between 5.8 and 6.8 V)
 Simulation mode: external loop voltage condition: 24 V (rated value), 30 V maximum, 12 V minimum.

Loop voltage power supply: 24 V ± 10 %

> C.A 1631, voltage/current process signal calibrator

■ The C.A 1631 can be used for measurements or to deliver a DC current loop between 0 and 24 mA and a DC voltage between 0 and 20 V



■ C.A 1621 ■ C.A 1623 ■ C.A 1631

Specifications communes

Unit	C.A 1621 and C.A 1623: °C or °F
Power supply	6 x 1,5 V
Dimension / Weight	205 x 97 X 45 mm / 472 g
Mains power supply	Input: 100 V – 240 V _{AC} , 50 – 60 Hz 1.8 A Output: 12 V _{DC} , 2 A MAX

Mains power supply (option)



Accessories / Replacement parts

Mains power supply
 MF carrying bag 120 x 245 x 60 mm
 2 crocodile clips (red/black)
 2 moulded PVC leads
 2 moulded test probes, Ø 4 mm

> P01103057
 > P01298075
 > P01295457Z
 > P01295451Z
 > P01295458Z

State at delivery

- > **C.A 1621** delivered with 1 soft case, 2 thermocouple adapters, 6 x 1.5 V AAA batteries and 1 operating manual in 5 languages
- > **C.A 1623** delivered with 1 soft case, 2 test leads, 2 crocodile clips, 6 x 1.5 V AAA batteries and 1 operating manual in 5 languages
- > **C.A 1631** delivered with 1 soft case, 2 test leads, 2 crocodile clips, 2 test probes, 6 x 1.5 V AAA batteries and 1 operating manual in 5 languages



References to order

- > **C.A 1621** >P01654621
- > **C.A 1623** >P01654623
- > **C.A 1631** >P01654402

Technical overview

INFRARED THERMOGRAPHY

Infrared thermography detection technology has become irreplaceable for ensuring safe conditions for industrial production. Infrared thermal imaging is a no-contact, real-time inspection method for production equipment subject to high voltages, powerful electric currents or high operating speeds.

For this detection method, there is no need to cut off the current, shut down the machines or stop production. It can be used to troubleshoot any latent malfunctions in advance and thus prevent failures and avoid production incidents. Thermal imaging is an innovative technique for safe, reliable and quick "no-contact" assessment.

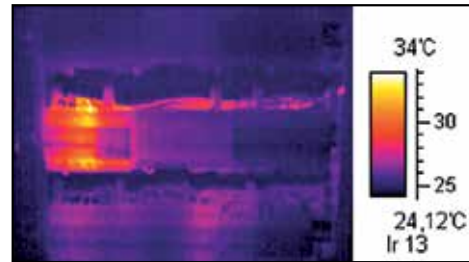
A thermal camera does not measure temperatures but radiation fluxes. Once the operator has adjusted certain parameters, the camera calculates the temperatures of the target. It then provides the user with a map of the temperatures which is called a thermogram: each temperature is represented by a different colour.

APPLICATIONS

1) Electrical maintenance

The purpose of this sort of inspection is to detect any overheating in working electrical systems due to various causes: poor connections, overloads, phase unbalance, faulty contacts, etc. This helps to prevent and avoid costly equipment damage, production shutdowns, operating losses, fires, etc.

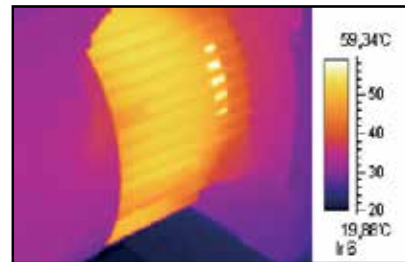
The aim is to help with decision-making for corrective action, to prevent incidents, to anticipate any works which might be necessary and to facilitate electrical installation maintenance (time saving and safety).



2) Mechanical maintenance

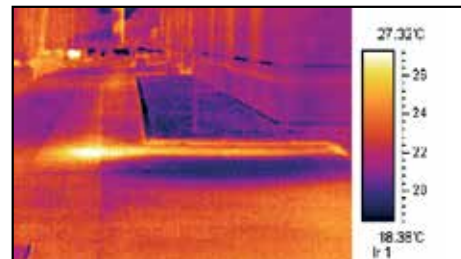
Moving mechanical parts heat up quite normally due to friction. Infrared thermography reveals abnormal overheating due to wear, misalignment, lubrication problems, etc. It is used to complement vibratory analysis, which is much more time-consuming to set up.

A single image gives a full health report on the electric motor, its power supply (cables), the bearings and, if necessary, the alignment.



3) Building thermics

These applications of infrared thermography concern architects, heating and sanitary installers, heating operators, electricians, property companies, property experts, owners and insurers. With an infrared camera, it is easy to view the distribution of heat on the front of a building and it also possible to precisely locate heat losses due to faulty insulation. This helps to produce a thermal survey of the building.



Infrared camera selection guide



C.A 1877



C.A 1878



C.A 1882



C.A 1886



C.A 1888

	C.A 1877	C.A 1878	C.A 1882	C.A 1886	C.A 1888
Detectors					
80 x 60	■				
100 x 80		■			
160 x 120			■	■	
384 x 288					■
Thermal sensitivity (N.E.T.D)					
0,08°C @ 30°C	■	■	■	■	
0,05°C @ 30°C					■
Temperature range					
-20°C to +250°C	■	■	■		
-20°C to +600°C				■	■
1,000°C / 1,500°C (option)				■	■
Display mode					
Thermal image	■	■	■	■	■
Real image and merge			■	■	■
Display	2.5 inches	2.5 inches	3 inches	3.5 inches	3.5 inches
Analytical functions					
Manual cursor	1	1	1	3	3
Min / Max on area	■	■	■	■	■
Average on area				■	■
Isotherm				■	■
Temperature profile				■	■
Temperature differential			■	■	■
Alarms	■	■		■	■
Correction parameters					
Emissivity, environmental temperature, RH, distance	■	■	■	■	■
Others					
CNPP Approval				■	■
Wide-angle or telephoto lenses				■	■
Analysis and report creation software	■	■	■	■	■
Page	E-2-2/3	E-2-2/3	E-2-2/3	E-2-4	E-2-5

Thermography



C.A 1877, C.A 1878, C.A 1882

DiaCam thermal cameras for affordable thermographic diagnostics

- Ergonomics designed for effortless handling
- Manual cursor and automatic search for hot/cold point
- Alarms
- Thermal sensitivity of 0.08 °C
- Wide dynamic range for measurement from -20°C to +250°C
- Recording of up to 1,000 thermograms on SD card

> C.A 1882

- Wide-angle lens
- MixVision function
- Docking station delivered as standard with video output

> Applications

- Building diagnostics (insulation faults, thermal bridges, air infiltration)
- Electrical maintenance (abnormal heating, faulty contacts, overloads, etc.)
- Mechanical maintenance (motor wear, incorrect alignment, etc.)
- Suitable for educational purposes in combination with the C.A 1875 Training Bench



Thermography

	■ C.A 1877	■ C.A 1878	■ C.A 1882
Detector specifications			
Detector	80 x 60	100 x 80	160 x 120
Type	UFPA microbolometer, 8-14 µm		
Frequency	9 Hz		50 Hz*
Sensitivity (N.E.T.D)	0,08°C @ 30°C		
Temperature measurement			
Temperature range	-20°C to +250°C		
Accuracy	±2°C or ±2% of reading		
Image performance			
Thermal image			
Field of view	10° x 8°	12° x 10°	38° x 28°
Spatial resolution	2,2 mrad		4,4 mrad
Min. focal distance	10 cm		
Focusing	Manual		
Real image			
	No		Yes
"MixVision" mode	-		Merge function with adjustment of percentage of thermal image in real image from 0 to 100%
Image size	-		640 x 480 pixels
Functions			
Emissivity correction	Yes		
Parameter settings	Emissivity, environmental temperature, distance, relative humidity		
Measurement tools	1 manual cursor + automatic Min/Max detection on adjustable area + adjustable alarm (C.A 1877 & C.A 1878)		
Laser pointer	Yes		
Storage	1,000 thermal images as standard		
Storage type	2 GB removable SD card (as standard), up to 16 GB possible		
Screen	2.5 inches, multi-directional		3 inches
General specifications			
General specifications			
Battery	Rechargeable Lithium-Ion battery / Battery life: 3 hours		
Battery recharging	Recharging with external charger		
Protection	IP54		

* 9 Hz outside the European Union



State at delivery

- > **C.A 1877 ou C.A 1878:** delivered in blank cardboard box for transport, 1 battery charger, 1 battery, 2 GB SD card, SD card reader, RayCAM Report software on CD-ROM, operating manuals.
- > **C.A 1882:** delivered in blank cardboard box for transport, 1 battery charger, 1 docking station, 1 battery, 2 GB mini-SD card, SD card reader, video cable, RayCAM Report software on CD-ROM, operating manuals.

References to order

- > **C.A 1877 IR thermographic camera** > P01651277
- > **C.A 1878 IR thermographic camera** > P01651278
- > **C.A 1882 IR thermographic camera** > P01651215
- > **C.A 1882-9 Hz IR thermographic camera** > P01651215E

Accessories / Replacement parts

- Battery > P01296045
- Battery charger > P01296046
- Bag > P01298075
- Docking station > P01651528
- Mains power supply > P01651527
- Sun-shade > P01651532
- In-vehicle charger adapter > HX0061
- Basic thermography training > Contact us

Thermography



Certification granted on the basis of a single test Available at www.cnpp.com
N° 2010-0020 - N° 2010-0021

C.A 1886, thermal camera

- Large 3.5" multidirectional screen for easier reading
- Temperature up to 600 °C as standard
- Voice comments (option)
- MixVision mode
- RayCAM Report software for zone analysis (polygons or polylines) and temperature distribution studies on histograms.

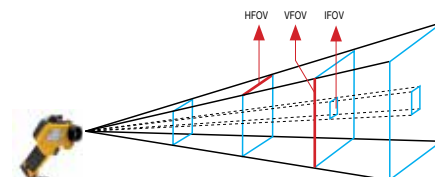
C.A 1886

Specifications

Detector	160 x 120, refresh rate: 50 Hz
Type	UFPA microbolometer, 8-14 microns
Sensitivity (NETD)	0,08 °C @ 30°C
Temperature	-20 °C to +600 °C (standard), up to 1,500 °C (option)
Accuracy	±2 °C or ±2 %
Optics	Field of view: 20° x 15°, IFOV: 2.2 mrad Min. focusing distance: 10 cm
MixVision function	Complete IR-Merge functions IR image in real image from 0 to 100 %
Image size	640 x 480 pixels
Adjustment	Emissivity, environment temperature, distance, humidity
Measurement tools	3 manual cursors + Auto-detection of Max/Min/Avg on area, isotherm, temperature differential, temperature profile
Storage	1,000 radiometric images in 250 folders + 2 GB on mini-SD card
Power supply	Battery life: 3 hrs (continuous use) External battery charger

Lenses for RayCAM C.A 1886

Lens	IFOV spatial resolution	Distance (m)									
		0.1 m	0.3 m	0.5 m	1 m	2 m	10 m	30 m	100 m		
6.4° x 4.8° 3 x Telephoto lens	0.7 mrad	HFOV	0.01	0.03	0.05	0.11	0.22	1.11	3.35	11.18	
		VFOV	0.008	0.024	0.04	0.08	0.16	0.83	2.51	8.38	
		IFOV	0.07	0.21	0.34	0.69	1.39	6.98	20.96	69.88	
20° x 15° Standard lens	2.2 mrad	HFOV	0.03	0.10	0.17	0.35	0.70	3.52	10.57	35.26	
		VFOV	0.02	0.07	0.13	0.26	0.52	2.63	7.89	26.33	
		IFOV	0.22	0.66	1.10	2.20	4.40	22.04	66.12	220.40	
38° x 28.5° 0.5 x Wide-angle lens	4.4 mrad	HFOV	0.06	0.20	0.34	0.68	1.37	6.88	20.65	68.86	
		VFOV	0.05	0.15	0.25	0.50	1.01	5.07	15.23	50.79	
		IFOV	0.43	1.29	2.15	4.30	8.60	43.04	129.12	430.40	



HFOV: horizontal field of view (metres)
VFOV: vertical field of view (metres)
IFOV: spatial resolution (millimetres)

State at delivery

- Delivered in a case with 1 battery charger, 2 batteries, a 2 GB mini-SD card, 1 SD card reader, 1 video cable, RayCAM Report software and 1 measurement report



Accessories / Replacement parts

- | | |
|---|--------------|
| Sun shade | > P01651531 |
| Photo tripod adapter | > P01651526 |
| Lens cap | > P01651522 |
| USB cable | > P01295274 |
| Battery | > P01296041 |
| Battery charger | > P01296043 |
| Mains power supply | > P01651527 |
| In-vehicle adapter (cigarette-lighter socket) | > HX0061 |
| Thermography training | > Contact us |

References to order

- | | |
|---|--------------|
| > C.A 1886 | > P01651260 |
| > C.A 1886 high-temperature option 1,000 °C | > P01651261 |
| > C.A 1886 high-temperature option 1,500 °C | > P01651262 |
| > C.A 1886 Bluetooth | > P01651263 |
| Other configurations | > Contact us |

Thermography

C.A 1888, thermal camera

- Large 3.5" multidirectional screen for easier reading
- Temperature up to 600 °C as standard
- Matrix 384 x 288
- Voice comments (option)

Specifications

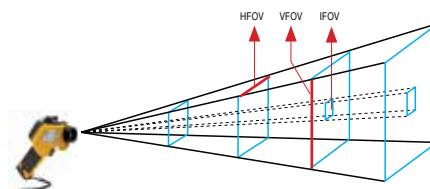
C.A 1888	
Detector	384 x 288, refresh rate: 50 Hz
Type	UFPA microbolometer, 8-14 microns
Sensitivity (NETD)	0.05 °C at 30 °C
Temperature	-20 °C to +600 °C (standard)
Accuracy	up to 1,500 °C (option)
Optics	±2 °C or ±2 %
MixVision function	Merge function with adjustment of IR image percentage on real image from 0 to 100 %
Image size	640 x 480 pixels
Adjustment	Emissivity, environmental temperature, distance, humidity
Measurement tools	3 manual cursors + Auto-detection of Max/Min/Avg on area, isotherm, temperature differential, temperature profile
Storage	1,000 radiometric images in 250 folders + 2 GB on mini-SD card
Power supply	Battery life: 3 hours (continuous use) External battery charger



Certification granted on the basis of a single test Available at www.cnpap.com
N° 2010-0020 - N° 2010-0021

Lenses for C.A 1888

Lens	IFOV spatial resolution		0.1 m	0.3 m	0.5 m	1 m	2 m	6 m	10 m	30 m	100 m
12° x 9° Telephoto lens	0,55 mrad	HFOV	0.01	0.03	0.05	0.11	0.22	1.11	1.11	3.35	11.18
		VFOV	0.008	0.024	0.04	0.08	0.16	0.83	0.83	2.51	8.38
		IFOV	0.07	0.21	0.34	0.69	1.39	6.98	6.98	20.96	69.88
24° x 18° Standard lens	1,1 mrad	HFOV	0.03	0.10	0.17	0.35	0.70	3.52	3.52	10.57	35.26
		VFOV	0.02	0.07	0.13	0.26	0.52	2.63	2.63	7.89	26.33
		IFOV	0.22	0.66	1.10	2.20	4.40	22.04	22.04	66.12	220.40
48° x 36° Wide-angle lens	2,2 mrad	HFOV	0.06	0.20	0.34	0.68	1.37	6.88	6.88	20.65	68.86
		VFOV	0.05	0.15	0.25	0.50	1.01	5.07	5.07	15.23	50.79
		IFOV	0.43	1.29	2.15	4.30	8.60	43.04	43.04	129.12	430.40



HFOV: horizontal field of view (metres)
VFOV: vertical field of view (metres)
IFOV: spatial resolution (millimetres)

State at delivery

- Delivered in a case with 1 battery charger, 2 batteries, a 2 GB mini-SD card, 1 SD card reader, 1 video cable, RayCAM Report software and a measurement report



References to order

- > **C.A 1888** > P01651270
- > **C.A 1888** high-temperature option 1,000 °C > P01651271
- > **C.A 1888** high-temperature option 1,500 °C > P01651272
- > **C.A 1888** Bluetooth > P01651273
- Other configurations > Contact us

Accessories / Replacement parts

- Sun shade > P01651531
- Photo tripod adapter > P01651526
- Lens cap > P01651522
- USB cable > P01295274
- Battery > P01296041
- Battery charger > P01296043
- Mains power supply > P01651527
- In-vehicle adapter > HX0061
- Thermography training > Contact us

Thermography

RayCAM Report software

Delivered as standard with all our thermal cameras

With its very simple user interface, RayCAM Report is the ideal tool for analysing your results and creating customized reports.

Mode analyse

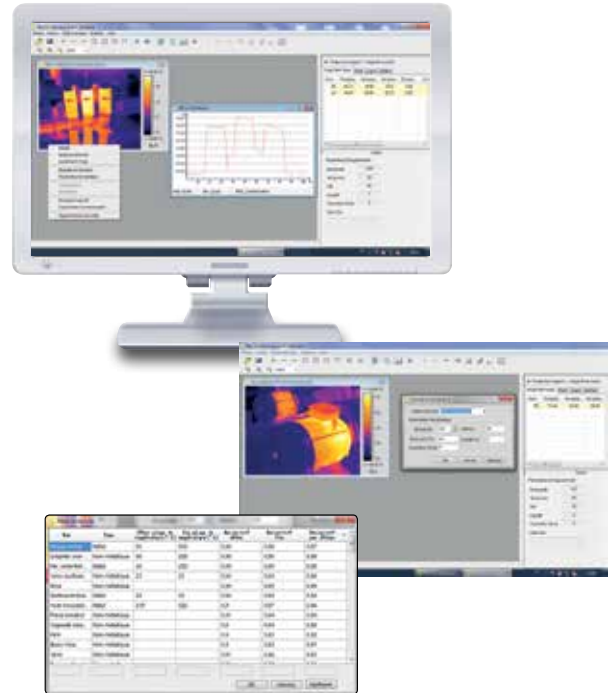
- This new mode can be used to open one or more images, add various analytical tools and obtain a summarized view of all the results in a table.
- This mode is useful for first-level analysis if you only want an idea of the temperature values without saving the analyses.

Precise, realistic analysis

If a parameter is modified on the radiometric image, the other values are automatically recalculated.

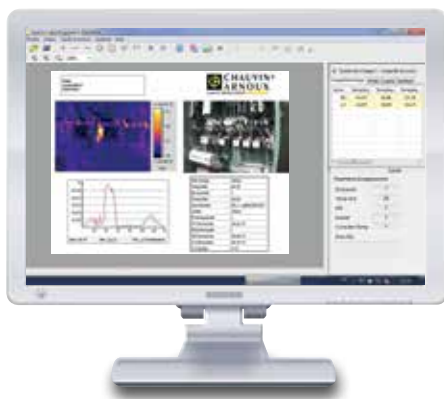
RayCAM Report Standard is a crucial tool when the thermogram contains different materials as it can be used to set the emissivity of each point in the thermogram.

- > Define different configurations for each of the analytical tools inserted in your thermogram.
- > Wide-ranging possibilities:
 - Cursors (automatic display of the temperature at the selected point)
 - Set a different emissivity from the value in the rest of the thermogram
 - Display a value label next to your tool
 - Display the Max/Min temperature inside an area being analysed



Report mode

- RayCAM Report Standard is the ideal tool for analysis and customized report creation.



- > Its simple interface means anyone can learn to use it very quickly.
- > >For analysis, all the functions are accessible via the toolbar.
- > >Depending on their requirements, users can position various elements:
 - Cursors (automatic display of the temperature at the selected point)
 - Thermal profile (automatic display of the Min/Max/Avg temperature on the line).
 - A square or circle for area analysis (ideal for comparison of Min/Max/Avg temperatures, e.g. between terminals).
 - Result tables quickly and automatically show all the information/analytical tools linked to the thermogram.
 - The "Max" function automatically indicates the hottest spot in the full thermogram or in a predefined area.
 - Polygons and polylines are available for more detailed analysis of certain areas in the thermogram.
 - A histogram can be used to study the temperature distribution according to several intervals.

Thermography

C.A 1875, training bench

- > **Highlighting of the various types of error possible in thermography: problems involving emissivity, spatial resolution, measurement angle, transmission or reflection**
- > **Simple use and simple measurements**
- > **Delivered with a guide presenting experiments and the corresponding theoretical framework**



■ C.A 1875

Emissivity of materials	The influence of emissivity on temperature measurement is demonstrated using sheets of different materials
Positioning	Visual demonstration of the influence on temperature measurement of camera positioning in relation to the target
Reflection and transmission	Visual demonstration of reflection and transmission phenomena and their influence
Spatial resolution	Detection of minimum areas for temperature measurement according to the distance from the target



State at delivery

- > **C.A 1875** delivered in carrying bag with 1 power supply lead, test sheets, 1 operating manual with booklet presenting the theoretical principles and practical exercises.

Reference to order

- > **C.A 1875**, training bench

> P01651620

Air-conditioning, ventilation, noise and lighting, humidity and pollution are all part of today's environment. To limit nuisance, these aspects are subject to regulations which change regularly.

To comply with these rules, physical quantities have to be measured on the corresponding systems.

In addition to operating the measuring instruments and interpreting the results (curves, diagrams, etc.), measurement of the environment is now an integral part of the job for electricians, heating specialists, environmental engineers, etc. These professionals all have to work on these systems.

When new buildings are built, all the necessary measurements for maintenance of the installations or verification of the environmental parameters can be performed simply and quickly with the comprehensive range of Chauvin Arnoux® measuring instruments, whatever the applications involved.

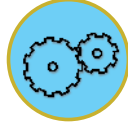
To ensure good indoor air quality, you need an appropriately-sized ventilation system capable of diluting the pollutants emitted in the premises until they reach a level considered acceptable. For this reason, the CO₂ level is an excellent indicator of air renewal efficiency.



Immediate, mandatory temperature measurement at each step in the cold chain



Checking the operation of your air-conditioning and ventilation systems



Preventive maintenance of all types of installations (industry, hospitals, etc.)



For industry, all measurements enabling work environment testing (noise pollution, CO detection, lighting, etc)



Testing of air quality and atmospheric humidity, which are regulated for improved conservation of exhibits in museums



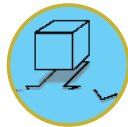
Testing the preservation of food products (superstores, etc.)



Testing all parameters to optimize storage (temperature, hygrometry, etc.)



Optimizing the quality of transport (vehicles, loads, etc.)



Testing comfort parameters in a restaurant

Thermometers selection guide

											
	C.A 1871	C.A 871	C.A 876	C.A 879	C.A 1864	C.A 1866	C.A 861	C.A 863	C.A 865	TK 2000	TK 2002
Infrared measurement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Distance/spot ratio											
8/1	<input type="checkbox"/>	<input type="checkbox"/>									
10/1			<input type="checkbox"/>								
12/1				<input type="checkbox"/>							
30/1					<input type="checkbox"/>						
50/1						<input type="checkbox"/>					
Emissivity											
Fixed: 0.95	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>							
Variable: 0.1 to 1			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>					
Laser sight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Contact measurement											
1-input K sensor			<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
2-input K sensor								<input type="checkbox"/>			<input type="checkbox"/>
Pt100 sensor									<input type="checkbox"/>		
General functions											
Hold	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Max			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Min			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>					
Avg					<input type="checkbox"/>	<input type="checkbox"/>					
Alarm			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>					
Choice of units	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Backlighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Page	E-3-4	E-3-2	E-3-4	E-3-2	E-3-3	E-3-3	E-3-5	E-3-5	E-3-5	E-3-6	E-3-6

Non-contact thermometers



C.A 871

- > Small and easy to handle
- > Simple to use
- > Ideal for all users

C.A 879

- > Specially designed for comfortable handling
- > Laser sight for precise targeting of the measurement area

	C.A 871	C.A 879
Specifications		
D/S targeting ratio	8/1	12/1
Emissivity	Fixed: 0.95	
Measurement range	-40 °C to +538 °C	-50 °C to +550 °C
Resolution	0.1 °C to 100 °C 1 °C for other temperatures	
Accuracy*	±2.5% ±2 °C	±1.5% ±2 °C
Functions		
Laser sight	Yes	
Continuous measurement	Yes (continuous press on trigger)	
Hold	Yes	
Continuous measurement	°C / °F	
Display	2,000 counts with	
Dimensions / weight	160 x 82 x 41,5 mm / 180 g	230 x 100 x 56 mm / 290 g

* Depending on measurement range. See operating manual for details.

State at delivery

- > C.A 871 delivered with carrying bag and 9 V battery
- > C.A 879 delivered with carrying bag and 9 V battery

Accessories / Replacement parts

- | | |
|--------------------|-------------|
| Pile 9 V | > P01100620 |
| Soft carrying case | > P01298033 |

References to order

- | | |
|-----------|--------------|
| > C.A 871 | > P01651302Z |
| > C.A 879 | > P01651805Z |

Non-contact thermometers

C.A 1864 and C.A 1866

- > Extensive temperature range: measure up to 1,000 °C
- > Variable emissivity ensuring inspections in line with reality
- > High distance/spot targeting ratio for greater accuracy
- > Set your alarm thresholds so that you are warned about any abnormal temperatures

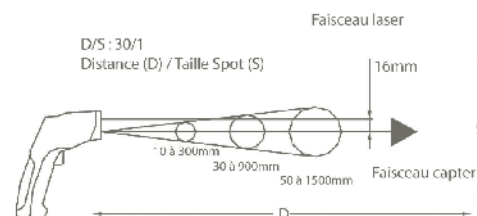


Specifications

	C.A 1864	C.A 1866
D/S targeting ratio	30/1	50/1
Emissivity	0.1 to 1	
Measurement range	-50 °C to +1,000 °C	
Resolution	0.1 °C	
Accuracy	-50 °C to -20 °C: ± 5 °C -20 °C to +200 °C: ±1.5 % L + 2 °C +200 °C to +538 °C: ±2.0 % L + 2 °C +538 °C to +1,000 °C: ±3.5 % L ± 5 °C	
Functions	Max, Min, Avg, DIFF, HOLD	
Alarms	High and low	
Measurement unit	°C, °F	
Laser sight	Yes, class II laser	
Display	20,000 counts, backlighting	
Dimensions / weight	230 x 100 x 56 mm / 290 g	

Diagram illustrating the D/S targeting ratio

C.A 1864



Accessories / Replacement parts

9 V battery
Soft carrying case

> P01100620
> P01298033



State at delivery

- > C.A 1864 delivered in carrying case with operating manual and 9 V battery
- > C.A 1866 delivered in carrying case with operating manual and 9 V battery

References to order

- > C.A 1864 >P01651813
- > C.A 1866 >P01651814

Non-contact thermometers



C.A 1871 and C.A 876

> C.A 1871

- Infrared probe adaptable to all multimeters
- When the probe is pointed at the surface of an object, the sensor delivers a voltage proportional to the temperature measured (1 mV / °C)

> C.A 876

- Measure temperatures from a distance or by contact
- Accurate analysis due to its variable emissivity
- Surface measurement, measurement of medium, measurement of liquids

Specifications

D/S targeting ratio	8/1
Emissivity	Fixed 0.95
Measurement range	- 30 °C to + 550 °C
Accuracy	± 2 % R
Functions	-
Dimensions / weight	164 x 50 x 40 mm / 182 g

■ C.A 1871

■ C.A 876

	IR measurements	Contact measurements
D/S targeting ratio	10/1	
Emissivity	0.1 to 1	
Measurement range	- 20 °C to + 550 °C	- 40 °C to + 1,350 °C
Accuracy	± 2% R or ± 3 °C	± 0.1 % R +1 °C
Functions	Max, Min, Avg, Hold, Alarms	
Dimensions / weight	173 x 60.5 x 38 mm / 255 g	

State at delivery

- > **C.A 876** delivered with 1 flexible K thermocouple sensor, 1 operating manual and 1 shockproof sheath
- > **C.A 1871** delivered with 1 operating manual and 9 V battery



References to order

- > **C.A 876** >P01651403Z
- > **C.A 1871** >P01651610Z

Accessories / Replacement parts

- > **For C.A 876** Large choice of K thermocouple sensors > See page E-3-7

Contact thermometers

C.A 861 and C.A 863

- > Rugged instruments due to their shockproof sheaths
- > Particularly simple measurement of temperatures up to 1,300 °C
- > Temperature differential included on the C.A 863



C.A 865

- > Accurate measurements
- > Stability of the sensor over time
- > Rugged due to its protective sheath



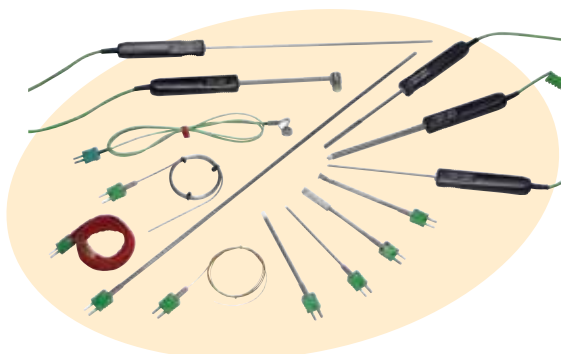
	C.A 861	C.A 863	C.A 865
Specifications			
Sensor	K couple	K couple	Pt 100
No. of inputs	1	2	1
Range	-40 °C to +1,350 °C	-50 °C to +1,300 °C	-50 °C to +200 °C
Accuracy	±0.1% +1 °C	±0.3% +1 °C	±0.5 °C
Functions	Max., HOLD, °C ou °F		
Dimensions	173 x 60.5 x 38 mm		
Weight	185 g		175 g

Accessories / Replacement parts

- > For C.A 861, C.A 863 and C.A 865

Pt 100 probes
K thermocouples
CK extensions

> See pages E-3-7 & E-3-8



State at delivery

- > **C.A 861** delivered with 1 flexible K thermocouple sensor, 1 shockproof sheath, 1 operating manual and 1 battery
- > **C.A 863** delivered with 2 flexible K thermocouple sensors, 1 shockproof sheath, 1 operating manual and 1 battery
- > **C.A 865** delivered with 1 Pt 100 sensor, 1 shockproof sheath, 1 operating manual and 1 battery

References to order

- > **C.A 861** >P01650101Z
- > **C.A 863** >P01650201Z
- > **C.A 865** >P01650301Z

Contact thermometers



TK 2000 and TK 2002

- > Compact, accurate thermometers which are easy to use: simply hook up the probe and start measuring!
- > IP 65 protection means they can be used in any type of environment
- > Measure the temperature difference with the TK 2002's two thermocouple inputs

Specifications

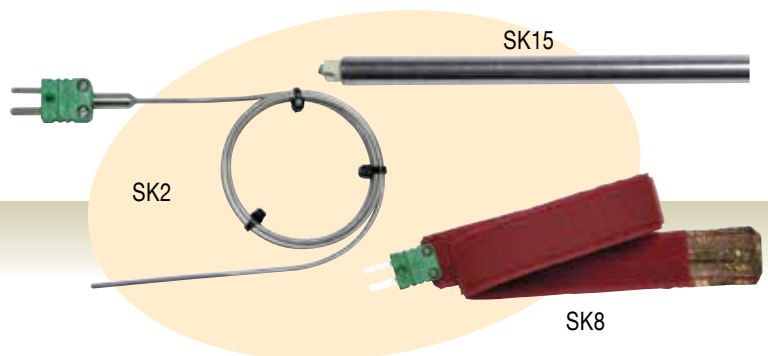
	TK 2000	TK 2002
No. of inputs	1	2
Range	-50 °C to +1,000 °C	
Accuracy	±1.5% +0.5 °C	
Functions	HOLD, °C	
Dimensions / weight	163 x 63 x 37,5 mm / 200 g	

State at delivery

- > **TK 2000** delivered with 1 flexible K thermocouple sensor, 1 operating manual and 1 battery
- > **TK 2002** delivered with 2 flexible K thermocouple sensors, 1 operating manual and 1 battery

References to order

- > **TK 2000** > P01653100
- > **TK 2002** > P01653110



Accessories / Replacement parts

- > **TK 2000 and TK 2002**
- K thermocouple assembly > See page E-3-7
- CK extension > See page E-3-8

Sensors and probes

K thermocouple sensors



■ SK 1 ■ SK 2 ■ SK 3 ■ SK 4 ■ SK 5 ■ SK 6 ■ SK 7 ■ SK 8 ■ SK 11 ■ SK 13 ■ SK 14 ■ SK 15 ■ SK 17 ■ SK 19

Series	Type	Description	Measurement range	Response time	Ø	Length
SK 1	Needle sensor	Penetration (20 mm minimum) in pasty, viscous or liquid media	-50 °C to +800 °C	1 s	3 mm	15 cm
SK 2	Bendable sensor	Bendable as required. Curve radius > 4 mm	-50 °C to +1,000 °C	2 s	2 mm	1 m
SK 3	Semi-rigid sensor	Slightly bendable	-50 °C to +1,000 °C	6 s	4 mm	50 cm
SK 4	Surface sensor	For small flat surfaces Use of silicone grease improves contact quality	0 to 250 °C	1 s	5 mm	15 cm
SK 5	Surface sensor with spring	For flat surfaces The spring ensures optimum contact, even if the sensor is not set up perpendicularly Use of silicone grease improves contact quality	-50 °C to +500 °C	1 s	5 mm	15 cm
SK 6	Flexible sensor	Sensor specially designed for measurements in places where access is difficult. Not to be used in liquids (tip not leakproof).	-50 °C to +285 °C	1 s in contact use 3 s in ambient-air use	1 mm	1 m
SK 7	Air sensor	Suitable for all ambient air measurements (moving air) If the air is stationary, agitate the sensor	-50 °C to +250 °C	5 s	5 mm	15 cm
SK 8	Pipe sensor	For measurements on pipes The pipe is cleaned and dried before applying the copper sheet The Velcro ribbon is then wound round it to ensure contact	-50 °C to +140 °C	10 sur tuyau inox	90 mm	32 cm
SK 11	Needle sensor (stainless steel)	For penetration in pasty or viscous products	-50 °C to +600 °C	12 s	3 mm	13 cm
SK 13	General purpose sensor	Spiral lead: 45 cm to 1 m	-50 °C to +1,100 °C	12 s	3 mm	30 cm
SK 14	Elbowed surface sensor	For measuring surface temperatures when access is difficult	-50 °C to +450 °C	8 s	6 mm	13 cm
SK 15	Surface sensor with spring	For flat surfaces The spring ensures optimum contact, even if the sensor is not set up perpendicularly	-50 °C to +900 °C	2 s	8 mm	13 cm
SK 17	Air sensor	Suitable for all ambient air measurements (moving air) If the air is stationary, agitate the sensor	-50 °C to +600 °C	3 s	6 mm	13 cm
SK 19	Magnetic sensor	Sensor with magnet for flat metal surfaces	-50 °C to +200 °C	7 s	4 mm	1 m


















Class-II thermocouple accuracy: -40 °C to +333 °C: ±2.5 °C / +333 °C to +1,200 °C: ±0.0075 x t °C x t °C

References to order

- > SK 1 > P03652901
- > SK 2 > P03652902
- > SK 3 > P03652903
- > SK 4 > P03652904
- > SK 5 > P03652905
- > SK 6 > P03652906

- > SK 7 > P03652907
- > SK 8 > P03652908
- > SK 11 > P03652917
- > SK 13 > P03652918
- > SK 14 > P03652919
- > SK 15 > P03652920
- > SK 17 > P03652921
- > SK 19 > P03652922

Selection guide for environmental measurements

											
	C-A 846	C-A 847	C-A 1244	C-A 822	C-A 1224	C-A 1226	C-A 850	C-A 852	C-A 895	C-A 1510	C-A 1052
Temperature measurement											
CMO3											
Pt 100 probe	■		■	■	■	■					
2-input K probe											■
Relative humidity measurement											
RH of air	■		■							■	■
Dew-point measurement			■								■
RH of materials		■									
Air speed measurement											
Rotating-vane sensor				■	■						■
Hot-wire sensor						■					■
Flow-rate measurement					■	■					■
Air pressure measurement											
Differential pressure							■	■			■
High pressure (>= 10 bar)							■				
Low pressure (>= 100 mbar)								■			■
Gas measurement											
CO gas measurement									■		
CO2 gas measurement										■	
General functions											
Hold	■		■	■	■	■	■	■	■	■	■
Max	■		■	■	■	■	■	■	■	■	■
Min			■	■	■	■	■	■	■	■	■
Avg				■	■	■	■	■	■	■	■
Choice of units	■		■	■	■	■	■	■	■	■	■
Backlighting	■		■	■	■	■	■	■		■	■
Alarm									■	■	■
Recording										■	■
Software										■	■
Page	E-4-2	E-4-2	E-4-2	E-4-3	E-4-3	E-4-3	E-4-6	E-4-6	E-4-12	E-4-11	E-4-4/5
											
				C-A 811	C-A 813	C-A 832	C-A 834	C-A 1725	C-A 1727		
Lighting measurement											
< 20,000 lux				■							
< 200,000 lux					■						
Spectral correction				■	■						
Incidence correction				■	■						
Noise measurement											
A and C frequency weighting						■	■				
Slow / fast time weighting						■	■				
Analogue output						■	■				
Speed measurement											
With and without contact								■			■
Rotation speed								■			■
Linear speed								■			■
Frequency, period								■			■
Duty cycle								■			■
Counting											■
General functions											
Hold				■	■		■	■		■	■
Max				■	■	■	■	■		■	■
Min				■	■	■	■	■		■	■
Choice of units				■	■		■	■	■	■	■
Backlighting				■	■	■	■	■			■
Alarm											■
Recording								■		■	■
Software								■		■	■
Page				E-4-7	E-4-7	E-4-8	E-4-8	E-4-9		E-4-9	

Thermo-hygrometers



C.A 846

- > 2 in 1: hygrometry and environmental temperature measurement
- > Easy to use

C.A 1244

- > 3 in 1: hygrometry, ambient temperature and dew point measurement
- > Remote probe for greater accessibility
- > Particularly easy to read with its dual backlit display

C.A 847

- > Measure the humidity of your materials quickly and simply: prick the material and note the value corresponding to the LED lit

Specifications

	C.A 846	C.A 1244	C.A 847
RH range	0 to 100 % HR	5 to 95% HR	6 to 100% HR
RH accuracy	2.5 % from 10 % to 90 %	±1,8% HR	±1 led
Temperature range	-20°C to +60 °C	-20°C to +70 °C	-
Temperature accuracy	±0.5 °C	±0.4% L +0,3 °C	-
Dew point	-	Yes	-
Functions	Max, HOLD		-
	-	Min, Avg	-
Dimensions / weight	173 x 60,5 x 38 mm / 185 g	147,7 x 70,6 x 34,7 mm / 190 g	173 x 60,5 x 38 mm / 160 g

State at delivery

- > The **C.A 846**, **C.A 1244** and **C.A 847** are delivered with 1 battery and 1 user guide in 5 languages.

Accessories / Replacement parts



- > **For C.A 846 and C.A 1244**
33 % salt cartridge > P01156401
75 % salt cartridge > P01156401
- > **For C.A 1244**
Telescopic extension > P01102012

> P01156402

> P01102012

References to order

- > **C.A 846** > P01156301Z
- > **C.A 847** > P01156302Z
- > **C.A 1244** > P01156310

Thermo-anemometers

C.A 822, C.A 1224 and C.A 1226

- > Simple to use
- > Dual display
- > Rotating-vane or hot-wire sensor depending on your application

Specifications

	C.A 822	C.A 1224	C.A 1226
Air-speed sensor	Rotating vane	Rotating vane	Hot wire
Air-speed range	0.4 to 30 m/s	0.25 to 35 m/s	0.15 to 30 m/s
Air-speed accuracy	± 3 % full scale	± 3 % R + 0.1 m/s or ± 1 % R + 0.2 m/s*	± 3 % R + 0.05 m/s or ± 1 % R + 0.2 m/s*
Temperature range	- 20 °C to + 60 °C	-20 °C to +80 °C	
Temperature accuracy	± 0.5 °C	± 0.3 % R + 0.25 °C	
Flow rate	-	0 to 99,999 m3/h	
Functions	Max, HOLD, Min, Avg		
Dimensions / weight	173 x 60.5 x 38 mm / 330 g	147.7 x 70.6 x 34.7 mm / 190 g	

* from 3.1 m/s



Accessories / Replacement parts

> For C.A 1224

C.A 825 flow measurement cones
Telescopic extension

> P01173105
> P01102012

> For C.A 1226

C.A 828 flow measurement cones > P01173107
Straight extension > P01102010
Elbowed extension > P01102011

State at delivery

- > **C.A 822** delivered with 1 shockproof sheath, 1 rotating-vane sensor, 1 operating manual in 5 languages and 1 battery
- > **C.A 1224** delivered with 1 remote probe, 1 operating manual in 5 languages and 9 V battery
- > **C.A 1226** delivered with 1 remote probe, 1 operating manual in 5 languages and 9 V battery

References to order

- > **C.A 822** > P01173102
- > **C.A 1224** > P01173113
- > **C.A 1226** > P01173114

Multi-function instrument



C.A 1052

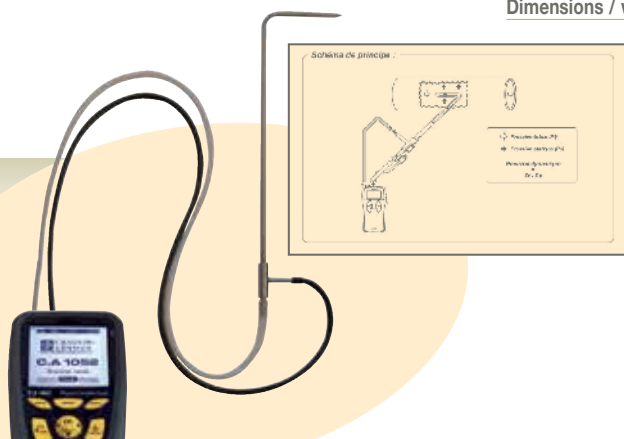
- > Can be used for comprehensive analysis of your air-conditioning, heating and ventilation installations.
- > Accurate 5-in-1 instrument: air-speed measurement, flow rate, relative humidity, pressure and temperature
- > Complete: the instrument is delivered as standard with its probes in a hard case
- > Very easy to use: simply connect the probe (recognized automatically) and start measuring!
- > Data storage

Specifications

Hot-wire speed
Ø 100 mm rotating-vane speed
Ambient temperature
Flow rate
Relative humidity
Dew point
Pressure
Temperature (two K thermocouple inputs)
Function
Recording
Dimensions / weight

C.A 1052

Measurement range	Accuracy
0.15 to 3 m/s	± 3 % R + 0.03 m/s
3.1 to 35 m/s	± 3 % R + 0.1 m/s
0.25 to 3 m/s	± 3 % R + 0.1 m/s
3.1 to 35 m/s	± 1 % R + 0.3 m/s
-20 °C to +80 °C	± 0.4 % R + 0.3 °C
0 to 99,999 m ³ /h	3 % R
3 to 98 % RH	± 1 % R + 1.5 % RH
-20 °C to +70 °C	± 0.8 % R + 0.6 °C
0 to 1,000 mm H ₂ O	± 0.2 % R + 1
-200 °C to +1,300 °C	±0.4 % R or 1.1 °C
-100 °C to +750 °C	±0.4 % R or 0.8 °C
-200 °C to +400 °C	±0.4 % R or 0.5 °C
HOLD, Min, Max, Avg	
8,000 counts	
161.9 x 80.8 x 57.4 mm / 380 g	



Accessories / Replacement parts

Straight extension	> P01102010
Elbowed extension	> P01102011
Telescopic extension	> P01102012
C.A 825 rotating-vane flow cone	> P01173105
C.A 828 hot-wire flow cone	> P01173107
Pitot tube	> P01102048
Hard case	> P01298072

State at delivery and reference

- > **C.A 1052** delivered in a case with all its probes, 1 operating manual in 5 languages, 4 x 1.5 V batteries and PhysicsLog software > P01175020



Physics-Log software

- > Recovery of the data from the C.A 1052: rotating-vane and hot-wire speed, flow rate, relative humidity, temperature, pressure
- > Downloaded campaigns labelled with operator and customer details
- > Customized report printing

Physics-Log software

- Choice of campaigns for download
- Campaigns labelled with operator and customer details
- C.A 1052 memory dump
- Display of curves corresponding to the data downloaded
- Customization of graphs
- Saving in PDF format for customer distribution



Manometers



C.A 850 and C.A 852

- > Accurate and simple to use
- > Time/date-stamped monitoring
- > Differential measurements

Specifications

Measurement range

-6.89 to +6.89 bar

-138 to +138 mbar

Accuracy

0.3 % full scale

Units

kbar, cmH₂O, FtH₂O, mmHg,
OZin², kg/cm²

-

Functions

Differential measurements, Min, Max, HOLD

Dimensions / weight

182 x 72 x 30 mm / 220 g

C.A 850

C.A 852

State at delivery

- > **C.A 850** delivered in carrying case with 2 connection tubes, 1 operating manual in 5 languages and battery
- > **C.A 852** delivered in carrying case with 2 connection tubes, 1 operating manual in 5 languages and battery

References to order

- > **C.A 850** >P01184101
- > **C.A 852** >P01184102



Lightmeters



C.A 811 & C.A 813

- > Check your lighting in compliance with the standards and in all directions
- > Measurement up to 20,000 or 200,000 lux depending on your requirements

Specifications

Measurement range

20 to 20,000 lux

20 to 200,000 lux

Accuracy

Incandescent lamp:

± 3 % + 10 counts

Other sources:

± 18 % + 2 counts

± 11 % + 2 counts

Correction

Spectral and incidence

Functions

Max, HOLD

Dimensions

173 x 60.5 x 38 mm

Weight

214 g

223 g

C.A 811

C.A 813

State at delivery

- > **C.A 811** delivered with 1 shockproof protective sheath, 1 battery and 1 operating manual in 5 languages
- > **C.A 813** delivered with 1 shockproof protective sheath, 1 battery and 1 operating manual in 5 languages

References to order

- > **C.A 811** >P01172201Z
- > **C.A 813** >P01172401Z



Sound-level meters



C.A. 832

- > Testing of sound levels
- > Simple to use

C.A. 834

- > Monitoring of noise exposure levels: recording of up to 32,000 values!
- > Process the data on a PC using the standard software supplied

Specifications

	C.A. 832	C.A. 834
Measurement range	35 to 130 dB	30 to 130 dB
Calibres	3 calibres: 35 to 80 dB 50 to 100 dB 80 to 130 dB	4 calibres: 30 to 80 dB 50 to 100 dB 80 to 130 dB Auto 30 to 130 dB
Accuracy	±2 dB	±1,5 dB
Frequency range	31.5 Hz to 8,000 Hz	
Functions	A and C frequency weighting curves Fast and slow time weighting	
Analogue output	-	Min., HOLD
Memory	-	32 000 valeurs
Software	-	Yes
Dimensions / weight	237 x 60.5 x 38 mm / 230 g	275 x 64 x 30 mm / 285 g

State at delivery

- > **C.A. 832** delivered with 1 shockproof sheath, 1 jack socket for analogue output and 1 universal adapter for fixing on tripod, 1 operating manual and 9 V battery
- > **C.A. 834** delivered in hard case with data processing software, 1 jack/USB cable and 1 jack socket for analogue output, 1 operating manual and 9 V battery



References to order

- > **C.A. 832** > P01185501Z
- > **C.A. 834** > P01185502

Accessories / Replacement parts

- > **For C.A. 832 and C.A. 834**
- C.A. 833 - 94 dB or 114 dB sound-level meter calibrator > P01185301
- Microphone extension for C.A. 834 > P01102085
- Wind shield > P01102083
- Jack/USB cable for C.A. 834 > P01295478

Tachometers

C.A 1725 and C.A 1727

- > Measurements up to 100,000 RPM
- > Measurement with or without contact
- > Large number of functions available: rotation speed, linear speed, counting, frequency, period
- > Possibility of programming and storage capacity on the C.A 1727
- > USB link for processing the recorded data on a PC with the C.A 1727

Specifications		C.A 1725	C.A 1727
RPM function	Range	6 to 100,000 RPM	
	Accuracy	10-4 R ± 6 counts	
m/min function	Range	0.6 to 60,000 m/min.	
	Accuracy	10-4 R ± 1 increment	
Hz function	Range	0.1 to 10,000 Hz	
	Accuracy	4 x 10-5 R ± 4 counts	
ms function	Range	0.1 to 1,000 ms	
	Accuracy	10-4 R ± 5 counts	
Duty cycle function	Range	10 to 10,000 %	
	Accuracy	0.1 % to 1 %	
Counting function	Range	0 to 99,999 events	
	Accuracy	± 1 event	
Functions		Min, Max, HOLD, Smooth	
		High and low alarm	
Memory		4,000 counts	
Dimensions / weight		21 x 72 x 47 mm / 250 g	



Accessories / Replacement parts

Mechanical accessories kit	> P01174902
End-fittings (set of 3)	> P01174903
Reflective tape (15 strips of 0.1 m)	> P01101797
FRB F socket	> P01101785
TACHOGRAPH software on CD-Rom	> P01174835
USB-A to USB-B lead	> P01295293

State at delivery

- > **C.A 1725 tachometer** delivered in a hard case with FRB F connector, a 9 V battery, 1 set of 15 reflective strips (length 0.1 m), 1 operating manual on CD and 1 quick start-up guide on paper.
- > **C.A 1727 tachometer** delivered in a hard case with FRB F connector, a 9 V battery, 1 set of 15 reflective strips (length 0.1 m), 1 operating manual and the TACHOGRAPH software on CD-Rom and 1 quick start-up guide on paper.

References to order

- | | |
|-----------------------|-------------|
| > C.A 1725 tachometer | > P01174810 |
| > C.A 1727 tachometer | > P01174830 |

Technical overview

INDOOR AIR QUALITY

Whether in places open to the public (transport, government offices, schools or hospitals), workplaces or private areas, our lifestyles mean we spend most of our time indoors. Human activities and products used in construction, decoration and furniture (paint, floor and wall coverings, varnishes, etc.) are all sources of contamination emitting substances into the air. The issue of air quality has only come into the spotlight recently, but it represents a major concern because it affects everybody.



Carbon dioxide (CO₂)

Carbon dioxide is a colourless, odourless gas produced by the combustion of carbon-based materials such as wood, oil, coal and their derivatives. It is also produced by humans' and animals' respiration. Plants, however, actually extract CO₂ from the air during photosynthesis, thus contributing to the natural balance.

Nevertheless, the level of CO₂ in outdoor air is increasing. This gradual increase began with the industrial revolution and the growing use of fossil fuels.

Why measure it?

Indoors, CO₂ is representative of a level of confinement indicating an accumulation of pollutants in the premises and insufficient air renewal. Links have been found between poor ventilation, leading to high levels of CO₂, and reduced performance by children in tests involving logic, reading and calculations.

Concentrations above 1,000 ppm already cause sleepiness, difficulty in concentrating and even headaches.

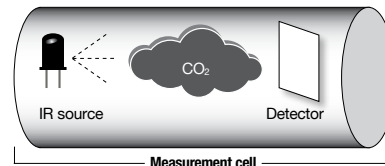
Threshold values

In volume terms, the proportion of CO₂ in the air is 0.0375%, or 375 ppmv (parts per million by volume). In urban environments, it may be as high as 500 ppm.

- 500 to 1,000 ppm - Indoor air quality: Good
- 1,000 ppm - Certain studies have shown an increase in asthma-related symptoms among children on average over a school day
- 1,500 to 2,500 ppm - Indoor air quality: Poor (1,500 ppm is the regulatory limit usually specified, particularly for educational premises in the United Kingdom, Germany and Austria)
- 2,500 to 5,000 ppm - Symptom: headache, fatigue and loss of concentration
- 5,000 ppm* - Average concentration over 8 hours - Occupational Exposure Limit in France and elsewhere

Measurement principle

The method used by the C.A 1510 to measure CO₂ levels is an NDIR (Non-Dispersive InfraRed) method.



CO₂ and other gases absorb IR radiation in a "specific" way.

- 1 source emits an IR signal in a predefined cavity
- The CO₂ absorbs part of the light in the near-IR spectrum, thus reducing the intensity of the signal
- The IR detector measures the intensity of the signal received at the absorption wavelength of carbon dioxide. The Beer-Lambert Law establishes the relationship between the signal intensity and the gas concentration.

Sensor positioning and recommendations

The measuring instrument should preferably be positioned between 50 cm and 2 m from the ground. In practice, it should be set up in a safe place with access to a power socket if necessary. The instrument should be kept at least 50 cm away from any intense heat sources (heating) and should be kept out of direct sunlight. The instrument must not be placed in the direct flow of air from outside (windows) or close to the entrance. The CO₂ level varies during the day, depending on how many people are present, the activities involved and the efficiency of the air renewal system; for these reasons, functions for recording and for indicating any threshold overruns are crucial.

CO₂, temperature & humidity logger

C.A 1510

- > CO₂, temperature and humidity logger (up to 1 million points)
- > Compact: for fixed or portable use
- > User-friendly: thanks to the comfort-level indicators based on the level of CO₂ and hygrothermal criteria
- > Accurate: complies with the latest regulations on air-quality monitoring
- > Low gas consumption thanks to its in-situ calibration kit



C.A 1510	
Specifications CO₂	
Measurement range	0 to 5,000 ppm
Accuracy	± 50 ppm ± 3 % of value measured
Resolution	1 ppm
Temperature measurement	
Measurement range	-10 °C to +60 °C
Accuracy	± 0.5 °C
Resolution	0.1 °C
Humidity measurement	
Measurement range	5 to 95 % HR
Accuracy	± 2% HR
Resolution	0,1% HR
Possibilities of the product	
Portable measurements	Quick measurement and display of the CO ₂ , temperature and relative humidity values
Indicator	<p>1D mode: indication of CO₂ confinement Visual (two-colour backlighting & pictograms) and/or audible indication of high when the CO₂ concentration is between 1,000 ppm and a 1,700 ppm threshold.</p> <p>3D mode: Indication of optimum comfort zone on the basis of the hygrothermal criteria and the CO₂ concentration.</p>
Energy-saving (ECO)	For fixed use on battery power, the product performs measurements every 10 minutes over a programmable time range for a battery life of up to one year.
Logger	<p>Activation of programmed recording (P_REC) The start date, recording rate and end date can be customized with the PC software or the Android application. Possibility of locking the display in this mode (no values displayed).</p> <p>Manual start and stop controls on the product. Recording is performed at the rate of the mode currently selected.</p>
Specifications	
Recording interval	Customizable from 1 minute to 2 hours
Storage	More than 1 million points
Buzzer and units	Yes / °C or °F
Backlighting/Hold/Min Max	Yes
Dimensions / weight	125 x 65,5 x 32 mm / 190 g with batteries
Protection	IP40
Power supply	<ul style="list-style-type: none"> - Alkaline batteries: 2 x 1,5 V AA / LR6 or rechargeable battery - Connection to mains possible with mains / micro USB adapter supplied as standard
Interfaces	2 communication modes possible: Bluetooth wireless communication and USB link; the product is then recognized as a USB key for easy file transfer
Mounting	C.A 1510 casing equipped with a magnet, a wall-suspension system and a slit for hanging the product. A wall support for use with a padlock (padlock not supplied) is available as an accessory, as is a desktop stand (supplied as standard with the C.A 1510W).
AQR (Air Quality Report) software supplied as standard	<p>Graphic representation or as table of values – Data export – Real-time mode</p> <p>Calculation of the confinement index with selection of presence periods – Report generation</p>



Accessories / Replacement parts

In-situ calibration kit	>P01651022
Hard case	>P01298071
Desk stand	>P01651021
Wall support	>P01651020
USB mains adapter	>P01651023
USB-Bluetooth adapter	>P01102112

State at delivery

- > **C.A 1510** >P01651010
Delivered in small-format metal case with 2 x LR6 batteries, USB mains adapter, USB-micro USB cable, Quick Startup Guide (5 languages), AQR software, operating manuals (5 languages) on CD-ROM, 1 verification certificate
- > **C.A 1510 White** >P01651011
Delivered in cardboard box with 2 x LR6 batteries, USB mains adapter, desk stand, USB-micro USB cable, Quick Startup Guide (5 languages), AQR software, operating manuals (5 languages) on CD-ROM, 1 verification certificate

References to order

- > **C.A 1510** >P01651010
- > **C.A 1510 White** >P01651011

CO detector

C.A 895

- > Measures the level of carbon monoxide present in a room
- > Checks the operation of combustion equipment
- > Warning buzzer to indicate when there is a risk

Specifications

	C.A 895
Measurement range	0 to 1,000 ppm
Accuracy	± 5 % + 5 ppm
Measurement mode	Normal or Avg
Functions	Alarm, Max, HOLD
Dimensions / weight	237 x 60.5 x 38 mm / 190 g



Accessories / Replacement parts

Aspiration kit with pump and extension >P01651101

State at delivery

- > **C.A 895** delivered with 1 shockproof protective sheath, 1 operating manual in 5 languages and 9 V battery

Reference to order

- > **C.A 895** >P01651001Z

Computer network and telecom testing

The wiring of a physical infrastructure may be defined as a set of specific elements through which it is possible to transfer information. Usually linked to computer networks, the performance requirements of wiring systems are rapidly evolving and they must now be capable of conveying other types of information, such as voice and video.

COPPER NETWORK WIRING

A category-5 or higher network cable comprises an external sheath, 8 copper wires organized in 4 pairs and an earth wire. There are different levels of cable shielding, with shielding per pair, global shielding or both.

THE DIFFERENT TYPES OF CABLES

The ISO/IEC 11801 standard defines official naming conventions for copper cables. The names describe the global protection of the cable, on the one hand, and the protection of the pairs of copper conductors, on the other.

Copper cables are named as follows: X / Y TP

X: Global protection of the cable

Y: Protection of the pairs

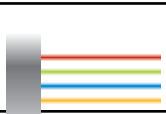

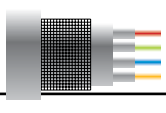
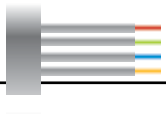
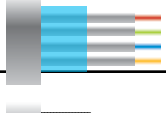
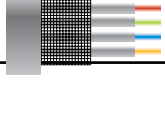
TP: Twisted Pairs

The following values are possible for X and Y:

U = Unshielded, no protection

S = Shielded with a tin-plated braid

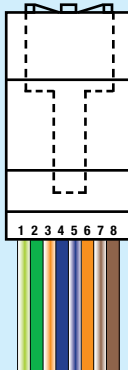
F = Foiled, shielded with aluminium foil

		Shielding efficiency
U/UTP Global shielding: None (U) Shielding per pair: None (U)		☹☹☹
F/UTP Global shielding: Aluminium foil (F) Shielding per pair: None (U)		☹☹
SF/UTP Global shielding: Tin-plated braid and Aluminium foil Shielding per pair: None (U)		☹
U/FTP Global shielding: None (U) Shielding per pair: Aluminium foil (F)		😊
F/FTP Global shielding: Aluminium foil (U) Shielding per pair: Aluminium foil (U)		😊😊
S/FTP Global shielding: global tin-plated braid Shielding per pair: Aluminium foil per pair		😊😊😊

RJ45 CONNECTOR

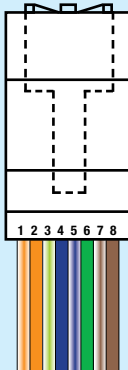
This connector with 8 positions and 8 electrical contacts is very widely used to terminate cables with twisted pairs:

MODULAR MALE RJ45 JACK SOCKET



T568A
(clip below)

EIA/TIA 568A standard		
Name	N°	Colour
TD+	1	White/Green
TD-	2	Green
RD+	3	White/Orange
Not used	4	Blue
Not used	5	White/Blue
RD-	6	Orange
Not used	7	White/Brown
Not used	8	Brown



T568B
(clip below)

Norme EIA/TIA 568B		
Name	N°	Colour
RD+	1	White/Orange
RD-	2	Orange
TD+	3	White/Green
Not used	4	Blue
Not used	5	White/Blue
TD-	6	Green
Not used	7	White/Brown
Not used	8	Brown

LAN tester



C.A 7028

- > Graphical screen
- > Detects, identifies and locates faults from up to 150 m away
- > Designed for use on UTP, STP, FTP, & SSTP cables equipped with RJ45 connectors and wired in compliance with the TIA 568A/B, USOC or ISDN specifications

C.A 7028

Specifications

Connector	RJ 45
Type of cable	UTP, STP, FTP & SSTP
Faults indicated	Short-circuited pair, Wire in open circuit, Short-circuit between pairs, Crossed pairs, Reversed pairs, Shielding continuity
Remote modules	Identifiers nos. 1 to 9
Dimensions / weight	165 x 90 x 37 mm / 350 g



State at delivery

- > **C.A 7028** delivered with 2 x RJ45 leads, 1 identifier No. 1 and soft case, 1 battery and 1 operating manual in 5 languages

Accessories / Replacement parts

> For C.A 7028

- Set of 4 identifiers nos. 2 to 5 > P01101994
- Set of 4 identifiers nos. 6 to 9 > P01101995
- Carrying bag > P01298532

Reference to order

- > **C.A 7028** > P01129501



Measurement of electromagnetic fields

Any system using electricity as an energy source generates electromagnetic radiation when it is in operation. Depending on the design of the system, the electromagnetic fields which it produces may be propagated in the space around it, extending significantly further than the external limits defined by its enclosure (casing) or the site where it is installed. This is the case for electrical machinery, motors, welding units, induction furnaces, high-voltage power lines, transformer stations, household electrical appliances and electronic instruments used for data processing, transmission, monitoring or measurement. These electromagnetic fields interact with matter, both inanimate (interference with nearby electrical devices) and animate (plants, animals, etc.). It is therefore important to be able to measure the values of the radiated magnetic and electric fields propagated around any electrical or electronic device:

- to overcome the purely technical problems linked to the electromagnetic compatibility of instruments and machines,
- but also to make sure that the people living and working near these electrical systems are not exposed to fields liable to cause lasting or even temporary negative effects on them.

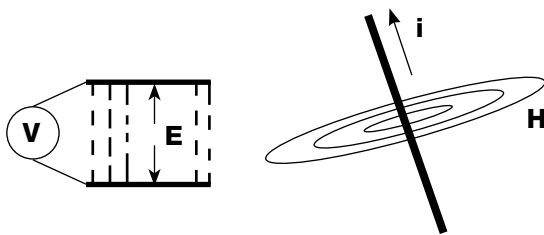
1. THE ELECTROMAGNETIC WAVE

The electromagnetic wave is the radiated energy produced by an electrical load. It is characterized by oscillation of the electrical and magnetic fields. Each system generating or absorbing electrical energy is the source of electromagnetic waves in the form of variable electric fields and magnetic fields which are propagated in the air at the speed of light.

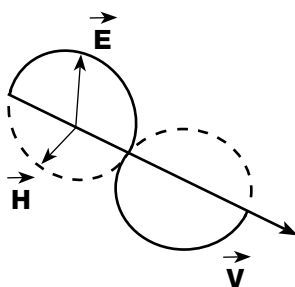
Roughly speaking, an electromagnetic wave comprises:

The electric field (E): generated by the difference in potential between two conductors subjected to an electrical voltage, this field depends on the voltage V.

The magnetic field (H): as this field is generated by a current in a conductor, it depends on the current i.



In the case of a sinusoidal alternating wave, the electric field E and the magnetic field H are sinusoidal and in phase. Their directions are perpendicular to one another and perpendicular to the direction of propagation.



Representation of the three components of an electromagnetic wave

This wave is characterized by its frequency F in Hertz (Hz) or its wavelength in metres; these two quantities are linked by the following relation:

$$\lambda = C_0 / F$$

where C_0 = the speed of light in m/s, i.e. 300,000 km/s = 3×10^8 m/s

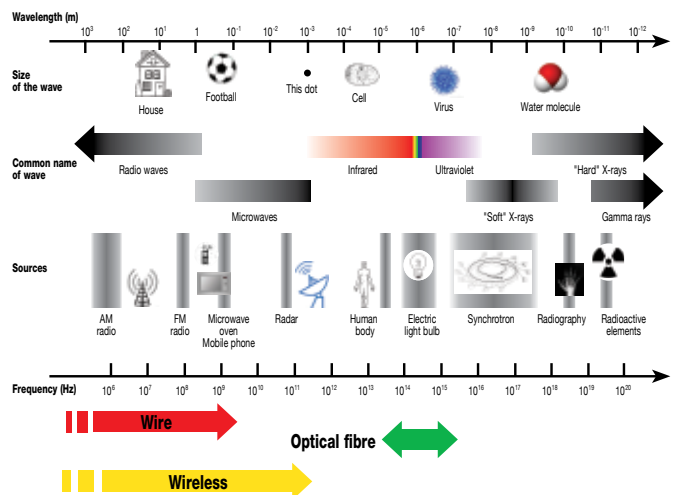
F = frequency in Hz

λ = wavelength in m

Example: for a wave at 300 MHz, the wavelength is 1 metre.

2. THE ELECTROMAGNETIC SPECTRUM

The electromagnetic spectrum is the decomposition of the electromagnetic radiation into its different components in terms of wavelength. Some waves can be detected with the human eye, while others have much lower frequencies detectable using radio devices.



3. INTERACTIONS WITH MATTER

The effects of electric and magnetic fields on matter and tissues vary according to their frequency and their intensity. Low-frequency fields are liable to induce electric currents in matter and biological tissues.

Effects described as "thermal" may follow. These thermal effects are the basis for the action of higher-frequency fields used in certain applications (cooking and drying with microwaves).

4. OBLIGATIONS

The International Commission on Non-ionizing Radiation Protection (ICNIRP) has defined exposure limits adopted in many countries. The exposure limits adopted by the European Community are based on a recommendation issued by the ICNIRP, including those in Directive 1999 / 519 / CE (public) and the recent directive 2013/35/UE of 26th June 2013 concerning workers' exposure to electromagnetic fields, which must be transposed into law in the member states by 1st July 2016. For the latter directive, the employer's role will be to assess the hazards and determine the exposure which can be measured in order to find out objectively whether the standard recommended thresholds have been exceeded or not.

Fieldmeters



C.A 40

- > Measurement of low-frequency magnetic fields
- > Quick evaluation of the radiation from instruments and installations
- > Easy-to-handle unidirectional probe

C.A 41 and C.A 43

- > Electrical field measurement and detection of radiation sources across a wide frequency band
- > Isotropic probe: measures the field in all directions
- > Storage of measurement points with the C.A 43

Specifications

	C.A 40	C.A 41	C.A 43
Magnetic field measurement	20 μ T 200 μ T 2,000 μ T	-	-
Electrical field measurement	-	0.1 to 1 1 to 10	10 to 100 100 to 200
Accuracy	\pm (4%+3 pts) \pm (5%+3 pts) \pm (10%+5 pts)	0.7 V/m 0.5 V/m	1 dB 2 dB
Frequency range	30 to 300 Hz	100 kHz to 2.5 GHz	
Field intensity	-	-	0.1 to 2 mW/cm ²
Output	-	Analogue	Digital on optical fibre
Probe	Unidirectional	Isotropic	
Alarm	-	Configurable high and low thresholds	
Memory	-	-	1,920 points
Dimensions / weight	163 x 68 x 24 mm / 285 g	216 x 72 x 37 mm / 350 g	

State at delivery

- > **C.A 40** delivered with 1 probe, 1 battery and 1 operating manual in 5 languages
- > **C.A 41** delivered in hard case with 1 EF2A probe, 1 battery and 1 operating manual in 5 languages
- > **C.A 43** delivered in hard case with 1 EF2A probe, optical fibre, 1 PC adapter, software, 1 battery and 1 operating manual in 5 languages

References to order

- > **C.A 40** >P01167501
- > **C.A 41** >P01167001B
- > **C.A 43** >P01167002A

Accessories / Replacement parts

- > **For C.A 41 and C.A 43**
 - EF2A isotropic probe > P01167202B
 - Shockproof sheath > P01298009B
- > **For C.A 40**
 - Soft carrying case for C.A 40 > P01298036



LF fieldmeter

C.A 42

> Measurement of the fields and comparison with the international standards

- Measurement of Low-Frequency magnetic and electric fields
- Oscilloscope and frequency analysis functions
- Isotropic probes

Specifications

	C.A 42
Magnetic field measurement	MF 400 – MF 400H – MF 05 isotropic probes: 10 nT to 1 T*
Electrical field measurement	EF 400 isotropic probe: 1 V/m to 30 kV/m
Frequency range	DC to 400 kHz*
Evaluation standards stored	6 as standard including ICNIRP
Probes	1 internal isotropic probe and 4 external isotropic probes as an option
Output	RS232 and analogue output
Function	Option: oscilloscope, frequency analysis
Dimensions / weight	266 x 144 x 60 mm / 950 g

* depending on the isotropic probe used



Accessories / Replacement parts

- | | |
|----------------------------------|-------------|
| MF 400 probe | > P01167302 |
| MF 400H probe | > P01167303 |
| MF 05 probe | > P01167304 |
| EF 400 probe | > P01167305 |
| Aluminium tripod for MFxxx probe | > P01167310 |
| Voltage output lead | > P01167314 |
| Large-size storage case | > P01167308 |
| Small-size storage case | > P01167307 |
| Carrying bag | > P01167309 |

Options:

- | | |
|-------------------------|--------------|
| - Oscilloscope function | > Contact us |
| - Frequency analysis | > Contact us |

State at delivery

- > delivered in a carrying bag with a protective sheath, RS232 and Trigger leads, mains charger and 1 operating manual in 5 languages



Reference to order

> **C.A 42**

> Contact us

Training benches: guided propagation

Education

Made up of a set of components which are rugged and very easy to set up, the ORITEL BDH R100 bench can be used to perform many basic microwave experiments.

- > Microwave teaching aids - 8.5 to 9.6 GHz
- > WR90/R100 waveguide fitted with "EASYFIX" quick fastening system

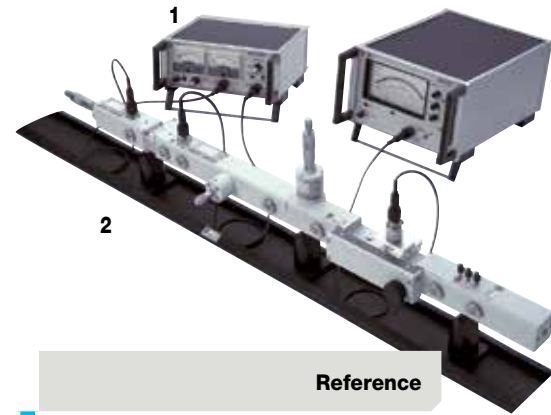


- > 1 : GUNN ORITEL CF 204 power supply
- > 2: ORITEL BDH R100 training bench

Can be used for a number of different experiments:

- Study of the GUNN oscillator
- Wavelength measurement
- Standing wave ratio measurement
- Impedance measurement
- Frequency measurement
- Reading the quadratic law of a detector, etc.

Detailed course, teaching and lab work material and aids come with this educational microwave bench.



Accessories / Replacement parts*

	Reference
ORITEL OSG 100 GUNN diode oscillator	Voltage: 10 V _{DC} Power: +17 dBm > P01275307
ORITEL MOD 100 PIN diode modulator	Modulation depth: > 50 % when I = +10 mA > P01275309
ORITEL OND 100 cavity wavemeter with curve	Reading accuracy: 5 MHz > P01275311
ORITEL LAF 100 measuring line	Residual SWR: < 1.05 > P01275312
ORITEL DEN 100 coaxial detector	SWR: < 1.3 Max. power: +19 dBm > P01275315
ORITEL ISO 100 ferrite isolator	Isolation: > 20 dB > P01275308
ORITEL ATM 100 micrometer - adjustable attenuator	Attenuation: > 20 dB Max. power: 1 W avg > P01275310
ORITEL ADZ 100/3 impedance adaptor	Number of screws: 3 > P01275313
ORITEL TGN 100 waveguide-to-coax transition element	SWR: < 1.25 > P01275314
ORITEL CHG 100 adapted load	SWR: < 1.05 > P01275316
ORITEL CGX 100/20 dB cross coupler	Coupling: 20 dB Directivity: 15 dB typ. > P01275305
IRIS 100 coupling iris (for CGX 100)	Coupling: 20 and 30 dB > P01275306
ORITEL ANC 100/15 dB horn antenna	Gain: 15 dB Flange: UBR 100/UG 39 > P01275304
ORITEL AFR 100	Compatible with UBR 100/UG 39 standard flanges > P01275301
ORITEL RD 100 displacement copy	for ORITEL LAF 100 measuring line > P01275302

* You are advised to use the GUNN CF204 power supply to power GUNN diode oscillators safely/oscillateurs to diode GUNN

State at delivery

> Delivered with the 11 components listed below and a user's manual grouped together in a hard case:

- 1 ORITEL ISO 100 ferrite isolator
- 1 ORITEL MOD 100 PIN diode modulator
- 1 ORITEL ATM variable attenuator
- 1 ORITEL OND 100 cavity wavemeter with curve
- 1 ORITEL LAF 100 measuring line
- 1 ORITEL ADZ 100/3 impedance adaptor
- 1 ORITEL TGN 100 waveguide-to-coax transition element
- 1 ORITEL DEN 100 coaxial detector
- 1 ORITEL CHG 100 adapted load
- 1 ORITEL CC 100 short circuit platelet
- 3 ORITEL SUP 100 guide support

Reference to order

> ORITEL BDH R100 bench

>P01275101

Training benches



Additional components

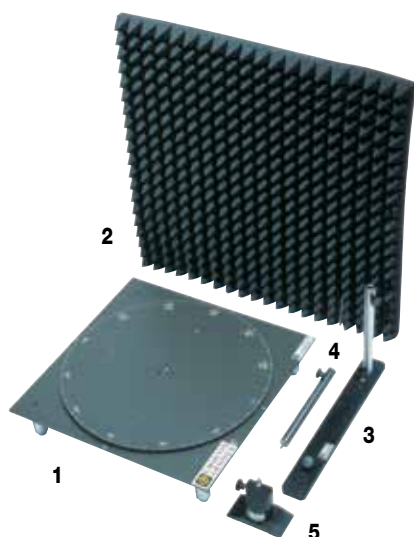
Reference

1	ORITEL RD 100 displacement copy (for ORITEL LAF 100 measurement line)	> P01275302
2	Micrometer phase shifter – DPH100	> P01275340
3	Rotating joint – JTG100	> P01275338
4	Ferrite circulator – CIR100	> P01275344
5	Parallel detector on guide –DEG100	> P01275345
6	E-H positioner – PEH100	> P01275358
7	180 mm straight waveguide – GD100/180	> P01275350
8	High plane E bend – COE100/H	> P01275346
	Low plane E bend – COE100/B	> P01275347
	Plane H bend– COH100	> P01275348
9	Micrometer short-circuit – CCM100	> P01275351
10	Calibrated attenuator	> P01275339
11	Movable impedance adapter – LAZ100	> P01275352
12	Dielectrics kit – KED100	> P01275353
13	Multi-hole directional coupler – CDT100	> P01275341
	30 dB iris for multi-hole coupler	> P01275343
14	1 m coaxial cable – CAB100	> P01275357

Elements for free-space propagation

Reference

1	20 dB ANC 100/20 horn antenna	> P01275326
2	15 dB ANC 100/15 dB horn antenna	> P01275304
3	20 dB ANC 100/10 horn antenna	> P01275325
4	Passive radar responder – RRL100	> P01275333
5	Reflector disk – DR100	> P01275334
6	Dielectric antenna - AND100	> P01275329
7	Patch antenna - ASP100	> P01275328
8	Adjustable slot antenna – ANF100	> P01275332
	Fixed slot antenna – ANF100F	> P01275331
	Iris for adjustable slot antenna – IANF100	> P01275330
	Adjustable parabolic reflector – ANP100	> P01275327
9	Fixed parabolic reflector – ANP100F	> P01275335



Accessoires

Reference

1	Manual rotating platform – PTM100	> P01275359
2	Set of 2 absorbent panels –ABS100	> P01275362
3	Antenna support – SAN100	> P01275360
4	Antenna support rod	> P01275349
5	Waveguide support – SUP100	> P01275318
	Experiment frame	> P01275361

Wattmeters / reflectometers

RW 511, RW 5012, RW 501 and RW 521



> Wattmeters developed for military and civilian applications:

- Simple installation testing
- Testing of the assembly comprising the transmitter, cable and antenna
- 1 product for each market:
 - Single side-band transmission (RW 511)
 - VHF networks, police, emergency services (RW 5012)
 - Radio, FM and TV networks (RW 501)
 - Rural VHF – HF networks (RW 521)



Models	Frequency	Incident power	Reflected power	Accuracy
■ RW 521	1,3 ... 2,7 GHz	+10 ... +40 dBm	+5 ... +35 dBm	± 6%
■ RW 511	2 ... 30 MHz	30 ... 1,000 W	10 ... 300 W	± 7.5%
■ RW 5012	25 ... 500 MHz	1 ... 300 W	0.3 ... 100 W	± 6%
■ RW 501	25 ... 1,300 MHz	1 ... 300 W	0.3 ... 100 W	± 6%

State at delivery

- > RW 511 - delivered with 9 V battery and 1 operating manual in 5 languages
- > RW 5012, RW 501 and RW 521 - delivered with 2 x 1.5 V batteries and 1 operating manual in 5 languages

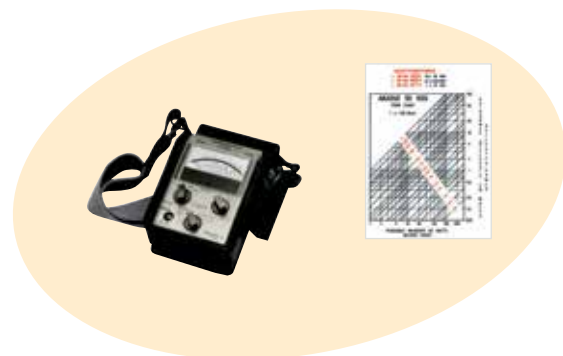
Accessories / Replacement parts

> For RW 511, RW 5012, RW 501 and RW 521

- Carrying bag > P01298046
- SWR chart for RW 501, 511 & 5012 > P01255901
- SWR chart for RW 521 > P01255902

References to order

- > RW 511 >P01255102
- > RW 5012 >P01255104
- > RW 501 >P01255101
- > RW 521 >P01255103

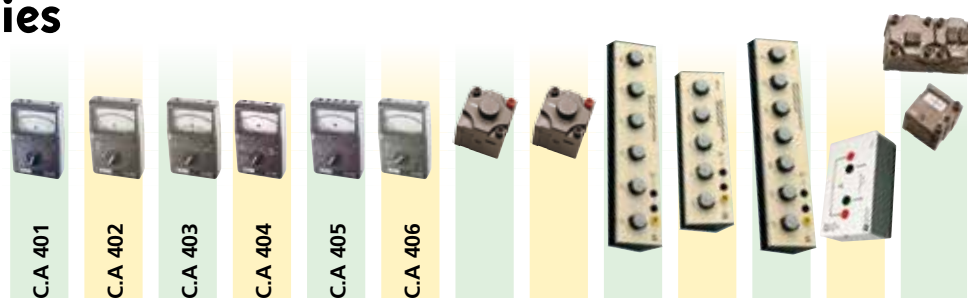


Training and simulation cases



Electrical installation testing and safety		
Earth	■	
Ground resistivity	■	
Loop	■	
Insulation	■	
RCDs	■	
Leakage current	■	
Power and harmonics		
Single and three-phase currents		■
Single and three-phase voltages		■
Single and three-phase active, reactive & apparent power, $\cos \varphi$, PF, etc.		■
Voltage variation		■
Current variation		■
Current phase-shift variation		■
Variation of harmonic distortion on voltage and current		■
Page	H-1-2	H-1-3

Instruments and accessories for simulating and measuring electrical quantities



Specifications	C.A 401	C.A 402	C.A 403	C.A 404	C.A 405	C.A 406							
AC / DC ammeter	■												
AC / DC voltmeter		■											
Null galvanometer			■										
Single / three-phase wattmeter				■/-	■/■								
Multimeter						■							
1-decade resistance box							■						
1-decade capacitance box								■					
Multi-decade resistance boxes									■				
Multi-decade capacitance boxes										■			
Multi-decade inductance boxes											■		
Shunts												■	
Wheatstone bridge (sub-assembly for)													■
Page	H-1-4	H-1-4	H-1-4	H-1-4	H-1-4	H-1-4	H-1-5	H-1-6	H-1-5	H-1-6	H-1-6	H-1-6	H-1-5

Training case



C.A 6710

- > C.A 6710 electrical installations case
- > Simulation of measurements on electrical installations
- Ideal for learning about electrical safety measurements
- Depressurization valve for air transport

■ C.A 6710

Specifications

Standards illustrated	NF C 15-100, VDE 0100, IEE 16th, IEC 64-8, ÖVE EN-1, RBT MIE, NIN/NIV...
SLT simulations	T, TN and IT
Measurement simulations	Earth, resistivity, loops (earth and internal), insulation, RCD tests (30 mA / 300 mA), current / leakage current
Fault simulations	Phase/neutral or earth interruptions, neutral/earth reversal, leakage current
Electrical safety	Cat. II 230 V
Dimensions / weight	490 x 395 x 195 mm / 10 kg

State at delivery

- > C.A 6710 electrical installations training case. Delivered with a 2P+E FRA/GER Schuko-type mains power cable, 6 black safety leads 25 cm long with rear connector, universal adapter for mains socket, FRA/GER adapter for mains socket and 1 operating manual in 2 languages

Accessories / Replacement parts

- > Choice of current sensors: AmpFLEX®, MN clamps, etc. > Contact us
- > Contact us

Reference to order

- > C.A 6710 Electrical installations case > P01145901

Training case

Power and Harmonics case

- > Power and Harmonics case
- > Risk-free simulation of a network and a three-phase load
- Crible currents and voltages
- Variable phase shift
- Variable harmonic distortion



Power & Harmonics case

Specifications

Network simulations	SINGLE or THREE-phase (230 V mains power supply)
Measurement simulations	U, I, W, W/h, var, φ , THD, etc.
Voltage	Mains $\pm 15\%$
Current	1, 2, 5, 10, 20 A $\pm 10\%$
Voltage variation*	+8% ; -10%
Current phase shift*	30°, 45°, 60° $\pm 5^\circ$ inductive or capacitive
Harmonic distortion for current and voltage*	Network level, 15 %, 25 % and variable
Phase output	Yes
Power supply	230 V mains - 2 P + E socket
Electrical safety	IEC 61010 300 V Cat II pollution 2
Dimensions / weight	490 x 395 x 195 mm / 10 kg

* sur phase 1

Accessories / Replacement parts

- > Choice of current sensors: AmpFLEX®, MN clamps, etc.:
- > Contact us



State at delivery

- > Delivered with mains lead

Reference to order

- > Power and harmonics case > P01NC5003

Analogue testers



Serie C.A 400

> Economical and rugged for training applications

- Resistant casing with fold-away stand
- Single switch
- Safety sockets
- Double insulation



■ C.A 401 ■ C.A 402 ■ C.A 403 ■ C.A 404 ■ C.A 405 ■ C.A 406

Function	AC/DC ammeter	AC/DC voltmeter	Null galvanometer 2 black scales(0 to 30 and 0 to 100)	Single-phase AC/ DC wattmeter	Single-phase AC/DC wattmeter	Multimeter with 6 black, green and red scales
Switchgear	Magneto-electric rectifying		Magneto-electric	Ferrodynamic		Magneto-electric
Calibres	Voltage		1 cal. DC: 100 mV for shunts	4 cal.: 60 V to 480 V	6 single-phase cal.:60 V to 480 V 4 balanced three-phase cal.: 60 V/√3 to 240 V/√3	8 cal. DC: 100 mV to 1,000 V 6 cal. AC: 3 V to 1,000 V
	Current		2 DC cal.: 30 μA, 3 mA	2 cal.: 0.5 A; 1 A	1 cal. 5 A	4 DC cal.: 1 mA to 1 A + 1 cal. 50 μA 5 AC cal.: 0.3 mA to 3 A + 1 cal. 150 μA
	Resistance					3 cal.: 0.5 Ω - 1 kΩ to 1 MΩ
Basic accuracy	2 % DC 2.5 % AC		1.5 % DC	1 % AC	2.5 % DC, 1 % single- phase AC and 2 % three- phase AC	1.5 % DC
Operating frequency	45 to 400 Hz	20 to 400 Hz		0 to 500 Hz	15 to 500 Hz	20 to 400 Hz
Fuses	1 A HPC and 10 A HPC	Internal resistance: 20 kW/DC ; 6,32 kW/AC	315 mA HPC	1,25 A HPC	6,3 A HPC	3.15 A HRC AND 160 mA HRC int. res: 20 kW/V _{DC} ; 6.32 kW/V _{AC}
Electrical safety	600 V CAT III as per IEC/EN 61010-1 Edition 2					
Dimensions / weight	165 x 105 x 50 mm / 450 g					

State at delivery and references

- > **C.A 401** delivered with a 1.5 V battery (LR6) > P01170301
- > **C.A 402** delivered with a 1.5 V battery (LR6) > P01170302
- > **C.A 403** delivered with a 1.5 V battery (LR6) > P01170303
- > **C.A 404** delivered with a 1.5 V battery (LR6) > P01170304
- > **C.A 405** delivered with a 1.5 V battery (LR6) > P01170305
- > **C.A 406** delivered with test-probe leads
and a 1.5 V battery (LR6) > P01170501
- > **C.A 406** kit version > P01170701

Decade boxes and shunts

Resistance boxes

Specifications

0.1 to 1 Ω
1 to 10 Ω
10 to 100 Ω
100 to 1000 Ω
1 to 10 k Ω
10 to 100 k Ω
100 to 1000 k Ω
1 to 10 M Ω
BR 04 : 4 decades 1 Ω to 10 k Ω
BR 05 : 5 decades 1 Ω to 100 k Ω
BR 06 : 6 decades 1 Ω to 1 M Ω
BR 07 : 7 decades 1 Ω to 10 M Ω

References to order

P03197521A
P03197522A
P03197523A
P03197524A
P03197525A
P03197526A
P03197527A
P03197528A
P01197401
P01197402
P01197403
P01197404



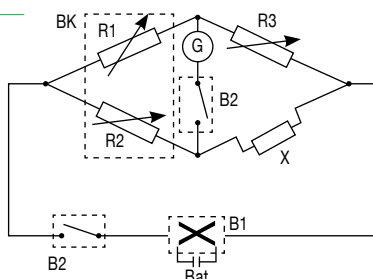
Wheatstone bridge assemblies

Specifications

7-ratio K box
Zero galvanometer
Dual switch box
Simple changeover-switch box

References to order

P03197531A
P03197611A
P03197529A
P03197530A



G = null galvanometer
 BK = K ratio box - with $K = R2/R1$
 R3 = resistance boxes
 X = resistance to be measured - with $X = K \times R3$
 B1 = simple changeover-switch box
 B2 = dual switch box
 Bat = battery

Decade boxes and shunts



Capacitance boxes

> Elements for mechanical and electrical assemblies

- Selection by rotary switch with contacts
- Typical accuracy: 2%

> 1-decade boxes

- 3 boxes with 11-position switch (including position 0)
- 2 x Ø 4mm safety terminals and 1 earth terminal
- Dimensions: 72x72x90 mm

> 5-decade box

- Polystyrene and polypropylene high-accuracy capacitors with a temperature coefficient of 125 ppm/°C and a very high insulation resistance
- Output: Ø 4mm safety sockets
- Metal front panel and casing connected to a safety earth socket with foolproofing

References to order

Specifications

0,01 to 0,1 μF
0,1 to 1 μF
1 to 10 μF
BC 05 : 5 decades 0,1 nF to 10 μF

P03199613A
P03199612A
P03199611A
P01197421

Inductance boxes



Reference to order

Specifications

BL 07: 7 decades, 1 μH to 10 H

P01197451

100 mV safety shunts in double-insulated box



> Red "current" terminals

> Black "voltage" terminals

References to order

Specifications

1 A	P01165221
5 A	P01165222
10 A	P01165223
20 A	P01165224
30 A	P01165225



Current sensors

Choose

Choosing your current clamp

There is a wide range of criteria for choosing a current clamp. The approach below is designed to help define your requirements and guide you naturally towards the model which best suits your application. The criteria selected are classified from 1 to 6.



To choose your clamp, we advise you to follow this logic:

- Measurement of direct or alternating current? (AC/DC clamps table or AC clamps table)
- High or low currents? (see the "Input" column to define the appropriate families of clamps)
- On small wires or large cables? (see the diagrams at the bottom of the next page and only choose families with the shapes and dimensions required)
- What instrument will it be connected to? (see "Output / Connection" column to choose a clamp with compatible signal and connection possibilities)
- What are your other criteria? (see "Specific features" column to check that the clamp chosen fulfils your requirements perfectly)

IEC 61010-2-032 clamps

The widest range of IEC 61010-2-032 clamps

Our innovation, technical expertise and determination to manufacture top-quality products that comply with standards have made Chauvin Arnoux the worldwide specialist in current clamps.

On the next pages, you will find a table presenting the clamps for measuring AC/DC current, followed by a diagram giving the clamp form with dimensions and then another table grouping a large number of models for AC current.

As a result of their specifications, certain clamps are specialized for specific applications.

- Clamps for oscilloscopes (BNC output): E3N, PAC12, PAC22, MN60, Y7N, C160, and D38N
- Clamps for leakage currents: MN73 and C173 and B102
- Process current clamps: K1 and K2
- Clamp for measurement on the secondary windings of current transformers: MN71



As well as these standard specialized and unspecialized models, "specific" versions can also be produced on request: please ask for details.

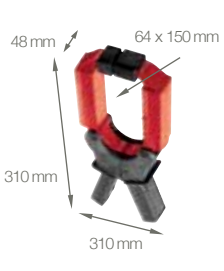
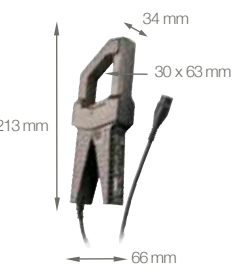
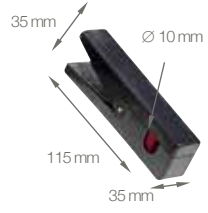


Current clamps selection guide



	MINI	MN	YN	C1XX	DN	BXX	MiniFlex® Serie MA100	MiniFlex® Serie MA200	AmpFlex® Serie A100	K	EN	PAC 1X	PAC 2X
For currents													
Clamping diameter (mm)	10	20	30	52	64	115	45 70 100	45 70 100	140 250 380	3,9	8	30	42
AC	■	■	■	■	■	■	■	■	■	■	■	■	■
DC										■	■	■	■
Min	5 mA	10 mA	1 A	1 mA	100 mA	500 µA	500 mA	500 mA	500 mA	100 µA	5 mA	200 mA	200 mA
MAX	150 A	240 A	600 A	1,200 A	3,600 A	400 A	3,000 A	3,000 A	10,000 A	4,5 A	150 A	600 A	1,000 A
Output													
in mA AC	■	■	■	■	■	■	■	■	■				
in mV AC	■	■	■	■	■	■	■	■	■				
in mV DC	■	■	■										
in mV AC+DC										■	■	■	■
Connection													
Insulated Ø 4 mm sockets		■		■	■								
Lead with insulated elbowed Ø 4 mm plugs	■	■	■	■	■	■					■	■	■
Insulated Ø 4 mm plug box with standard 19 mm spacing							■		■	■			
Coaxial cable with insulated male BNC		■	■	■	■		■	■			■	■	■
Single-calibre	■	■	■	■	■	■		■	■			■	■
Multi-calibre	■	■		■	■	■	■	■	■	■	■	■	■
For multimeter	■	■	■	■	■	■	■		■	■	■	■	■
For oscilloscope		■	■	■	■			■	■		■	■	■
For detecting leaks and insulation faults		■		■		■							
For measuring power values, harmonics, etc.	■	■		■	■		■		■		■	■	■
For the process and the 4-20/0-20 mA measurement loop										■			
Power supply													
Self-contained	■	■	■	■	■	■							
9 V battery							■	■	■	■	■	■	■
Mains adapter							■	■	■	■	■	■	■
Page	I-1-2	I-1-2	I-1-2	I-1-2	I-1-2	I-1-2	I-1-4	I-1-4	I-1-5	I-1-3	I-1-3	I-1-3	I-1-3

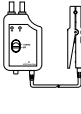
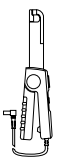


AC current measurement



Series	Model	Input						Output - Connections				Specific features				To order		
		Measurement range (1)						Voltage	Leads + safety plugs (± 1 mm (2))	Female sockets (± 4 mm)	BNC connectors (coaxial)	Transformation ratio (input/output)	Output protected against over-voltages	Automatic zero DC	Power measurement (low phase shift)		Bandwidth (frequency in Hz)	Typical accuracy
Very low current	Low current	Medium current	High current	AC	DC	Current												
MINI	MINI 01		2 to 150 A					0,15 A AC			1000/1					48 Hz... 500 Hz	≤ 2,5%	P01105101Z
	MINI 02		50 mA to 100 A					0,15 A AC			1000/1					48 Hz... 10 kHz	≤ 1%	P01105102Z
	MINI 03		1 to 100 A					0,1 V AC			1 A / 1 mV						≤ 2%	P01105103Z
	MINI 05		5 mA to 10 A	1 to 100 A				10 V AC	0,1 V AC		1 mA / 1 mV	1 A / 1 mV				48 Hz... 500 Hz	≤ 3%	P01105105Z
	MINI 09		1 to 150 A					15 V DC			1 A / 100 mV						≤ 4%	P01105109Z
MN	MN08		0,5 to 240 A					0,2 A AC			1000/1					40 Hz... 10 kHz	≤ 1%	P01120401
	MN09		0,5 to 240 A					0,2 A AC			1000/1						≤ 1%	P01120402
	MN10		0,5 to 240 A					0,2 A AC			1000/1						≤ 2%	P01120403
	MN11		0,5 to 240 A					0,2 A AC			1000/1						≤ 2%	P01120404
	MN12		0,5 to 240 A					2 V AC			1 A / 10 mV						≤ 1%	P01120405
	MN13		0,5 A to 240 A					2 V AC			1 A / 10 mV						≤ 1%	P01120406
	MN14		0,5 A to 240 A					0,2 V AC			1 A / 1 mV						≤ 1%	P01120416
	MN15		0,5 A to 240 A					0,2 V AC			1 A / 1 mV						≤ 1%	P01120417
	MN21		0,1 A to 240 A					0,2 V AC			1000/1						≤ 2%	P01120418
	MN23		0,1 A to 240 A					0,2 A AC			1000/1						≤ 1,5%	P01120419
	MN38		0,1 A to 24 A	0,5 A to 240 A				2 V AC	2 V AC		1 A / 100 mV	1 A / 10 mV					≤ 1%	P01120407
	MN39		0,1 A to 24 A	0,5 A to 240 A				2 V AC	2 V AC		1 A / 100 mV	1 A / 10 mV					≤ 1%	P01120408
	MN60		0,1 A to 60 A peak	0,5 A to 600 A peak				6 V peak	6 V peak		1 A / 100 mV	1 A / 10 mV				40 Hz... 40 kHz	≤ 2%	P01120409
MN71		10 mA to 12 A					1 V AC			1 A / 100 mV						≤ 1%	P01120420	
MN73		10 mA to 2,4 A	100 mA to 240 A				2 V AC	2 V AC		1 mA / 1 mV	1 A / 10 mV				40 Hz... 10 kHz	≤ 1%	P01120421	
MN88		0,5 A to 240 A					20 V DC (2)			1 A / 100 mV						≤ 2%	P01120410	
MN89		0,5 A to 240 A					20 V DC (2)			1 A / 100 mV						≤ 2%	P01120415	
Y	Y1N		4 A to 600 A					0,5 A AC			1000/1					48 Hz... 1 kHz	≤ 3%	P01120001A
	Y2N		4 A to 600 A					0,5 A AC			1000/1						≤ 1%	P01120028A
	Y3N		4 A to 600 A					5 A AC			100/1						≤ 3%	P01120029A
	Y4N		4 A to 600 A					0,5 V DC (2)			500 A / 0,5 V						≤ 1%	P01120005A
	Y7N		1 A to 1200 A peak					1,2 V peak			1 A / 1 mV					5 Hz... 10 kHz	≤ 2%	P01120075
	C	C100		0,1 A to 1200 A					1 A AC			1000/1					30 Hz... 10 kHz	≤ 0,5%
C102			0,1 A to 1200 A					1 A AC			1000/1						≤ 0,5%	P01120302
C103			0,1 A to 1200 A					1 A AC			1000/1						≤ 0,5%	P01120303
C106			0,1 A to 1200 A					1 V AC			1 A / 1 mV						≤ 0,5%	P01120304
C107			0,1 A to 1200 A					1 V AC			1 A / 1 mV						≤ 0,5%	P01120305
C112			1 mA to 1200 A					1 A AC			1000/1						≤ 0,3%	P01120314
C113			1 mA to 1200 A					1 A AC			1000/1						≤ 0,3%	P01120315
C116			1 mA to 1200 A					1 V AC			1 A / 1 mV						≤ 0,3%	P01120316
C117			1 mA to 1200 A					1 V AC			1 A / 1 mV						≤ 0,3%	P01120317
C122			1 A to 1200 A					5 A AC			1000/5						≤ 1%	P01120306
C148			1 A to 300 A	1 A to 600 A	1 A to 1200 A			5 A AC			250/5	500/5	1000/5			48 Hz... 1 kHz	≤ 2%	P01120307
C160			0,1 A to 30 A peak	0,01 A to 300 A peak	1 A to 2000 A peak			3 V peak	3 V peak	2 V peak	10 A / 1 V	100 A / 1 V	1000 A / 1 V			10 Hz... 100 kHz	≤ 3%	P01120308
C173		1 mA to 12 A	0,01 A to 12 A	0,1 A to 120 A	1 A to 1200 A			1 V AC		1 A / 1 V	10 A / 1 V	100 A / 1 V	1000 A / 1 V		10 Hz... 3 kHz	≤ 0,7%	P01120309	
B	B102		500 µA to 4 A	0,5 A to 400 A				4 V AC	0,4 V AC		1 mA / 1 mV	1 A / 1 mV				10 Hz... 1 kHz	≤ 0,5%	P01120083
D	D30N		1 A to 3600 A					1 A AC			3000/1					30 Hz... 5 kHz	≤ 0,5%	P01120049A
	D30CN		1 A to 3600 A					1 A AC			3000/1						≤ 0,5%	P01120064
	D31N		1 A to 600 A	1 A to 1200 A	1 A to 1800 A			1 A AC			500/1	1000/1	1500/1			30 Hz... 1,5 kHz	≤ 1%	P01120050A
	D32N		1 A to 1200 A	1 A to 2400 A	1 A to 3600 A			1 A AC			1000/1	2000/1	3000/1			30 Hz... 1 kHz	≤ 1%	P01120051A
	D33N		1 A to 3600 A					5 A AC			3000/5					30 Hz... 5 kHz	≤ 1%	P01120052A
	D34N		1 A to 600 A	1 A to 1200 A	1 A to 1800 A			5 A AC			500/5	1000/5	1500/5			30 Hz... 1,5 kHz	≤ 3%	P01120053A
	D35N		1 A to 1200 A	1 A to 2400 A	1 A to 3600 A			5 A AC			1000/5	2000/5	3000/5			30 Hz... 1,5 kHz	≤ 1%	P01120054A
	D36N		1 A to 3600 A					3 A AC			3000/3						≤ 0,5%	P01120055A
	D37N		0,1 A to 36 A	1 A to 360 A	1 A to 3600 A			3 V AC			30 A/3 V	300 A/3 V	3000 A/3 V			30 Hz... 5 kHz	≤ 2%	P01120056A
	D38N		1 A to 90 A peak	1 A to 900 A peak	1 A to 9000 A peak			0,9 V peak			1 A / 10 mV	1 A / 1 mV	1 A / 0,1 mV			30 Hz... 50 kHz	≤ 2%	P01120057A

(1) The upper value corresponds to 120% of the maximum rated value (2) Reshaping of AC signal by diodes.

AC/DC current measurement

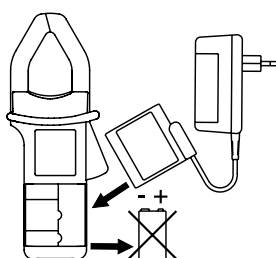
Series	Model	Input				Output - Connections				Specific features				To order	
		Very low current	Low current	Medium current	High current	Measurement range (1)	Voltage	Leads + safety plugs ± 4 mm (2)	Female sockets ± 4 mm	BNC connectors (coaxial)	Transformation ratio (input/output)	Output protector against over-voltages	Automatic zero DC		Power measurement (low phase shift)
	K1	1 mA to 4,5 A DC 1 mA to 3 A RMS 1 mA to 4,5 A peak				4,5 V AC 3 V RMS 4,5 Vpeak	●			1 mA / 1 mV			DC...2 kHz	≤ 1%	P01120067A
	K2	100 µA to 450 mA DC 100 µA to 300 mA RMS 100 µA to 450 mA peak				4,5 V AC 3 V RMS 4,5 Vpeak	●			1 mA / 10 mV			DC...1,5 kHz	≤ 1%	P01120074A
	E1N	0,05 A to 2 A DC 0,05 A to 1,5 A AC 0,5 A to 150 AAC/DC				2 V DC 1,5 V AC 150 mV AC/ DC	●			1 A / 1 V 1 A / 1 mV			DC... 2 kHz DC... 8 kHz	≤ 2% ≤ 1,5%	P01120030A
	E3N	0,05 A to 10 A peak 0,05 A to 10 ADC 1 A to 100 A peak 1 A to 100 A DC				1 Vpeak or DC	●	●		1 A / 100 mV 1 A / 10 mV			DC...100 kHz	≤ 3% ≤ 4%	P01120043A
	E6N	5 mA to 2 A DC 5 mA to 1,5 A AC 20 mA to 80 A AC/DC				2 V DC 1,5 V AC 0,8 V AC/ DC	●			1 A / 1 V 1 A / 10 mV			DC... 2 kHz DC... 8 kHz	≤ 2% ≤ 4%	P01120040A
	PAC10	0,5 A to 400 A AC 0,5 A to 600 A DC				600 mV AC/DC	●			1 A / 1 mV			DC...5 kHz	≤ 2%	P01120070
	PAC11	0,2 A to 40 A AC 0,4 A to 60 A DC 0,5 A to 400 A AC 0,5 A to 600 A DC				600 mV AC/DC	●			1 A / 10 mV 1 A / 1 mV	●		DC...10 kHz	≤ 1,5% ≤ 2%	P01120068
	PAC12	0,2 A to 60 A peak 0,4 A to 60 A DC 0,5 A to 600 A peak 0,5 A to 600 A DC				600 mV peak ou DC	●			1 A / 10 mV 1 A / 1 mV	●		DC...10 kHz	≤ 1,5% ≤ 2%	P01120072
	PAC20	0,5 A to 1000 A AC 0,5 A to 1400 A DC				1,4 V AC/DC	●			1 A / 1 mV			DC...5 kHz	≤ 2%	P01120071
	PAC21	0,2 A to 100 A AC 0,4 A to 150 A DC 0,5 A to 1000 A AC 0,5 A to 1400 A DC				1,4 V AC/DC	●			1 A / 10 mV 1 A / 1 mV	●		DC...10 kHz	≤ 1,5% ≤ 2,5%	P01120069
	PAC22	0,2 A to 150 A peak 0,4 A to 150 A DC 0,5 A to 1400 A peak 0,5 A to 1400 A DC				1,5 V peak ou DC 1,4 V peak ou DC	●			1 A / 10 mV 1 A / 1 mV	●		DC...10 kHz	≤ 1,5% ≤ 2,5%	P01120073

(1) The upper value corresponds to 120 % of the maximum rated value (2) AC rectification by diodes
(3) Lead + electronic unit with $\varnothing 4$ mm safety connectors, 19 mm spacing, for K series

Adapter for...

- > E clamp > P01101965
- > K clamp > P01101966
- > PAC clamp > P01101967
- > AmpFlex® clamp > P01101968
- > MA100 clamp > P01102086
- > MA200 clamp > P01102087

For unlimited use of your current clamps: replace the battery with the mains adapter plug.



MiniFlex®

Flexible current sensors and probes

- > Models for multimeters, loggers, oscilloscopes, etc.
- > 600 V CAT IV – 1,000 V CAT III





MiniFlex® MA100 series

The MA100 sensors are fitted with two types of outputs: insulated Ø 4 mm banana plugs with 19 mm spacing or BNC output. These compact sensors are easy to set up in domestic or industrial electrical cabinets.

MiniFlex® MA200 series

The MA200 insulated current probes are equipped with a BNC output and can be connected to all types of oscilloscopes. They offer **high bandwidth** and are particularly suitable for viewing transient signals. The MA200 models can notably be used to display the control signals, the thyristor trigger current or the output signal of a power electronics power supply.

Series	Model	Input						Output - Connections				Specific features			To order				
		Very low current	Low current	Medium current	High current	AC	DC	Current	Voltage	Leads + safety plugs \varnothing 4 mm (18)	Female sockets \varnothing 4 mm (18)	BNC connectors (coaxial)	Transformation ratio (input/output)	Output protected against overvoltages		Automatic zero DC	Power measurement (low phase shift)	Bandwidth (frequency in Hz)	Typical accuracy
	MA100 30-300/3 (17 cm / Ø 4,5 cm)	0,5 A...30 A 0,5 A...300 A				●			3 V AC	●		100 mV/A 10 mV/A		●			5 Hz ...20 kHz	≤ 1%	P01120560
	MA100 30-300 /3 (17 cm / Ø 4,5 cm)	0,5 A...30 A 0,5 A...300 A				●			3 V AC		●	100 mV/A 10 mV/A		●			5 Hz ...20 kHz	≤ 1%	P01120563
	MA100 300-3000/3 (25 cm / Ø 7 cm)	0,5 A...300 A 0,5 A...3000 A				●			3 V AC	●		10 mV/A 1 mV/A		●			5 Hz ...20 kHz	≤ 1%	P01120561
	MA100 300-3000/3 (25 cm / Ø 7 cm)	0,5 A...300 A 0,5 A...3000 A				●			3 V AC		●	10 mV/A 1 mV/A		●			5 Hz ...20 kHz	≤ 1%	P01120564
	MA100 300-3000 /3 (35 cm / Ø 10 cm)	0,5 A...300 A 0,5 A...3000 A				●			3 V AC	●		10 mV/A 1 mV/A		●			5 Hz ...20 kHz	≤ 1%	P01120562
	MA100 300-3000/3 (35 cm / Ø 10 cm)	0,5 A...300 A 0,5 A...3000 A				●			3 V AC		●	10 mV/A 1 mV/A		●			5 Hz ...20 kHz	≤ 1%	P01120565
	MA200 30-300/3 (17 cm / Ø 4,5 cm)	0,5 A...45 Apeak 0,5 A...450 Apeak				●			4,5 Vpeak		●	100 mV/A 10 mV/A				5 Hz...1 MHz	≤ 1% + 0,3 A	P01120570	
	MA200 30-300/3 (25 cm / 7 cm)	0,5 A...45 Apeak 0,5 A...450 Apeak				●			4,5 Vpeak		●	100 mV/A 10 mV/A				5 Hz...1 MHz	≤ 1% + 0,3 A	P01120571	
	MA200 3000 /3 (35 cm / Ø 10 cm)	5 A...4500 Apeak				●			4,5 Vpeak		●	1 mV/A				5 Hz...1 MHz	≤ 1% + 0,3 A	P01120572	

1) The upper value corresponds to 120 % of the maximum rated value

AmpFlex®

Flexible current sensors

AmpFlex® A100

Flexibility and easy handling for clamping any conductor

The range is composed of 9 standard models* dedicated to the measurement of AC currents from 0.5 A to 10 kA, at industrial frequencies. Each flexible core (48, 80 or 120 cm long depending on the model) is connected by a shielded cable to a small box containing the processing electronics and a standard 9 V battery.

The distance between the sockets (19 mm) facilitates direct connection to any type of multimeter, tester or recorder equipped with an AC voltage input (impedance $Z > 1 \text{ M}\Omega$).

The quick and simple system for opening/closing the core makes it easy to handle even with safety gloves. Other advantages: very lightweight (no magnetic circuit), no saturation effect, highly accurate and very little phase shift (for wattmeter measurements).



AmpFlex®



1 kA / 10 kA



20 A / 200 A

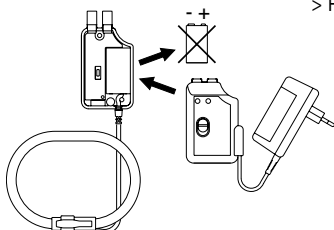
Series	Model	Input						Output - Connections				Specific features			To order			
		Very low current	Low current	Medium current	High current	AC	DC	Current	Voltage	Leads + safety plugs $\pm 4 \text{ mm}^{(2)}$	Female sockets $\pm 4 \text{ mm}$	BNC connectors (coaxial)	Transformation ratio (input/output)	Output protected against overvoltages		Automatic zero DC	Power in measurement (low phase shift)	Bandwidth (frequency in Hz)
	A100 20-200/2 (45 cm)	0.5 A...20 A	0.5 A...200 A					2 V AC				1 A / 100 mV				10 Hz...20 kHz	$\leq 1\%$	P01120503
	A100 2000/2 (45 cm)	0.5 A...2000 A						2 V AC				1 A / 1 mV				10 Hz...20 kHz	$\leq 1\%$	P01120501
	A100 2000/2 (80 cm)	0.5 A...2000 A						2 V AC				1 A / 1 mV				10 Hz...20 kHz	$\leq 1\%$	P01120502
	A100 0,2-2 k/2 (45 cm)	0.5 A...200 A	0.5 A...2000 A					2 V AC				1 A / 10 mV				10 Hz...20 kHz	$\leq 1\%$	P01120504
	A100 0,2-2 k/2 (80 cm)	0.5 A...200 A	0.5 A...2000 A					2 V AC				1 A / 10 mV				10 Hz...20 kHz	$\leq 1\%$	P01120505
	A100 0,3-3 k/3 (45 cm)	0.5 A...300 A	0.5 A...3000 A					3 V AC				1 A / 10 mV				10 Hz...20 kHz	$\leq 1\%$	P01120506
	A100 0,3-3 k/3 (80 cm)	0.5 A...300 A	0.5 A...3000 A					3 V AC				1 A / 10 mV				10 Hz...20 kHz	$\leq 1\%$	P01120507
	A100 0,3-3 k/3 (120 cm)	0.5 A...300 A	0.5 A...3000 A					3 V AC				1 A / 10 mV				10 Hz...20 kHz	$\leq 1\%$	P01120508
	A100 1-10 k/1 (120 cm)	0.5 A...1000 A	0.5 A...10000 A					1 V AC				1 A / 1 mV				10 Hz...20 kHz	$\leq 1\%$	P01120509

(1) The upper value corresponds to 120 % of the maximum rated value
(2) Lead + electronic unit with $\varnothing 4 \text{ mm}$ safety connectors, 19 mm spacing

Accessories / Replacement parts

> For unlimited use of your AmpFLEX™: replace the battery with the mains adapter plug

- Adapter for AmpFLEX™ > P01101968
- Adapter for MA100 > P01102086
- Adapter for MA200 > P01102087




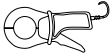

References to order

* Specific models on request: contact us concerning the possible sensitivities (mV/A) and lengths. We can also supply bare sensors for incorporation in assemblies including the signal processing electronics.

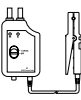
Specific sensors for dedicated applications

Series	Model	Input						Output - Connections				Specific features				To order
		Very low current	Low current	Medium current	High current	AC	DC	Current	Voltage	Leads + safety plugs \pm 4 mm ⁽¹⁾	Female sockets \pm 4 mm ⁽²⁾	BNC connectors (coaxial)	Transformation ratio (input/output)	Output protected against overvoltages	Automatic zero DC	


Leakage current measurement

	MN73	10 mA to 2,4 A 100 mA to 240 A	●			2 V AC 2 V AC	●			1 A / 1000 mV 1 A / 10 mV			40 Hz to 10 kHz	≤ 1% ≤ 2%	P01120421
	C173	1 mA to 1,2 A 0,01 A to 12 A 0,1 A to 120 A 1 A to 1200 A	●			1 V AC	●			1 A / 1 V 10 A / 1 V 100 A / 1 V 1000 A / 1 V			10 Hz to 3 kHz	≤ 0,7% ≤ 0,3% ≤ 0,5% ≤ 0,2%	P01120309
	B102	500 μ A to 4 A 0,5 A to 400 A	●			4 V AC 0,4 V AC	●			1 mA / 1 mV 1 A / 1 mV	●		10 Hz to 1 kHz	≤ 0,5% ≤ 0,35%	P01120083

Measurement of process current

	K1	1 mA to 4,5 A DC 1 mA to 3 A RMS 1 mA to 4,5 A peak	●	●		4,5 V DC 3 V RMS 4,5 V peak	●			1 mA / 1 mV			DC to 2 kHz	≤ 1%	P01120067A
	K2	100 μ A to 450 mA DC 100 μ A to 300 mA RMS 100 μ A to 450 mA peak	●	●		4,5 V DC 3 V RMS 4,5 V peak	●			1 mA / 10 mV			DC to 1,5 kHz	≤ 1%	P01120074A

Measurement on secondary winding of current transformers

	MN71	10 mA to 12 A	●			1 V AC	●			1 A / 100 mV			40 Hz to 10 kHz	≤ 1%	P01120420
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(1) The upper value corresponds to 120 % of the maximum rated value

(2) Lead + electronic unit with \varnothing 4 mm safety connectors, 19 mm spacing, for K and series



C173



B102



K1

Current sensors for oscilloscopes

> View the currents in total safety without opening the circuit !

- Voltage output via BNC connector
- Safety: IEC 61010-2-32 Cat. III, 600 V
- Acquisition of the signal simply by clamping the conductor



MN 60

Series	Model	Input						Output - Connections			Specific features			To order		
		Very low current	Low current	Medium current	High current	AC	DC	Current	Voltage	Leads + safety plugs ± 4 mm (a)	Female sockets ± 4 mm (a)	BNC connectors (coaxial)	Transformation ratio (input/output)		Output protected against overvoltages	Automatic zero DC

Measurement on oscilloscope

	MN60	0,1 A to 60 Apeak 0,5 A to 600 Apeak	●		6 V peak	●	1 A / 100 mV 1 A / 10 mV		40 Hz to 40 kHz	≤ 2% ≤ 1,5%	P01120409
	Y7N	1 A to 1200 Apeak	●		1,2 V peak	●	1 mA / 1 mV		5 Hz to 10 kHz	≤ 2%	P01120075
	C160	0,1 A to 30 Apeak 1 A to 300 Apeak 1 A to 2000 Apeak	●		3 Vpeak 3 Vpeak 2 Vpeak	●	10 A / 1 V 100 A / 1 V 1000 A / 1 V		10 Hz to 100 kHz	≤ 3% ≤ 2% ≤ 1%	P01120308
	D38N	1 A to 90 Apeak 1 A to 900 Apeak 1 A to 9000 Apeak	●		0,9 V peak	●	1 A / 10 V 1 A / 1 mV 1 A / 0,1 mV		30 Hz to 50 kHz	≤ 2%	P01120057A
	MA200 30-300/3 (17 cm)	0,5 A...45 Apeak 0,5 A...450 Apeak	●		4,5 Vpeak	●	100 mV/A 10 mV/A		5 Hz...1 MHz	≤ 1% + 0,3 A	P01120570
	MA200 30-300/3 (25 cm)	0,5 A...45 Apeak 0,5 A...450 Apeak	●		4,5 Vpeak	●	100 mV/A 10 mV/A			≤ 1% + 0,3 A	P01120571
	MA200 3000 /3 (35 cm)	5 A...4500 Apeak	●		4,5 Vpeak	●	1 mV/A			≤ 1% + 0,3 A	P01120572
	E3N	0,05 A to 10 Apeak 1 A to 100 Apeak	●	●	1 Vpeak	●	1 A / 10 mV 1 A / 1 mV		DC to 100 kHz	≤ 3% ≤ 4%	P01120043A*
	PAC12	0,2 A to 60 Apeak 0,4 A to 60 A DC 0,5 A to 600 Apeak 0,5 A to 600 A DC	●	●	600 mV peak ou DC	●	1 A / 10 mV 1 A / 1 mV	●	DC to 10 kHz	≤ 1,5% ≤ 2%	P01120072
	PAC22	0,2 A to 150 Apeak 0,4 A to 150 A DC 0,5 A to 1400 Apeak 0,5 A to 1400 A DC	●	●	1,5 V peak 1,4 V peak	●	1 A / 10 mV 1 A / 1 mV	●	DC to 10 kHz	≤ 1,5% ≤ 2,5%	P01120073

*Reference for E3N
+ mains power pack > P01120047



Y7N



C160



D38N



MA200



E3N



PAC12



PAC22

 F01	 E01	 E02	 E03
 E04	 E05	 E06	 E07
 E08	 S01	 S02	 S03
 S04	 S05	 S06	 S07
 S08	 S09	 S10	 S20
 S21	 S22	 S23	 M01-M02-M03
 M04-M05-M06	 M07	 B01	 B02

Protection and transport accessories

Accessories, soft cases, shoulder bags, bags, hard cases and leakproof casings

Photo	Base x Height x Thickness	Reference to order		
		Code	Type	Note
F01		P01102100Z	Mounting acc.	MultiFix mounting system
E01	110 x 220 x 45 mm	P01298065Z	Soft case	
E02	125 x 210 x 120 mm	P01298049	Soft case	(*)
E03	125 x 265 x 60 mm	P01298043Z	Soft case	
E04	180 x 75 x 45 mm	P01298012 P01298012Z	Soft case	
E05	185 x 135 x 85 mm	P01298046	Soft case	(*)
E06	190 x 250 x 60 mm	P01298055	Soft case	
E07	250 x 190 x 80 mm	P01298051	Soft case	
E08	70 x 185 x 30 mm	P01298007	Soft case	
S01	120 x 200 x 60 mm	P01298074	Shoulder bag	Compatible with MultiFix
S02	120 x 245 x 60 mm	P01298075	Shoulder bag	Compatible with MultiFix
S03	120 x 300 x 60 mm	P01298076	Shoulder bag	Compatible with MultiFix
S04	150 x 230 x (40+40) mm	P01298032	Shoulder bag	
S05	165 x 250 x 60 mm	P06239502	Shoulder bag	
S06	180 x 220 x 75 mm	P01298036	Shoulder bag	
S07	225 x 270 x 70 mm	P01298033	Shoulder bag	
S08	240 x 140 x 130 mm	P01298006	Shoulder bag	
S09	355 x 255 x 235 mm	P01298056	Shoulder bag	
S10	360 x 200 x 140 + 360 x 160 x 35 mm	P01298061A	Shoulder bag	
S20	330 x 240 x 240 mm	P01298078	Bag	
S21	380 x 280 x 200 mm	P01298066	Bag	All-terrain waterproof base. 2 compartments and storage space for documents. Supplied with shoulder strap
S22	575 x 320 x (200 + x +x) mm	P01298067	Bag	
S23		P01298031	Bag	
M01	270 x 195 x 65 mm	P01298071	Hard case	Equipped with foam inserts. Delivered with strap and
M02	285 x 210 x 80 mm	P01298037	Hard case	(*)
M03	285 x 210 x 80 mm	P01298037A	Hard case	(*)
M04	320 x 255 x 75 mm	P01298004	Hard case	Equipped with foam inserts. Delivered with strap and
M05	320 x 255 x 75 mm	P01298011	Hard case	(*)
M06	320 x 255 x 75 mm	P01298040	Hard case	(*)
M07	440 x 310 x 135 mm	P01298072	Hard case	Equipped with foam inserts. Delivered with strap and
B01	272 x 248 x 130 mm	P01298068	Leakproof casing	Equipped with foam inserts
B02	272 x 248 x 182 mm	P01298069	Leakproof casing	Equipped with foam inserts

(*): Specific to an instrument or product range

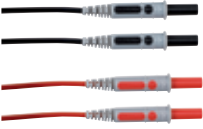

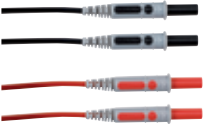

Protection and transport accessories

Photo n°	F01	E01	E02	E03	E04	E05	E06	E07	E08	S01	S02	S03	S04
Type	Mounting acc.	Soft case	Soft case	Soft case	Soft case	Soft case	Soft case	Soft case	Soft case	Shoulder bag	Shoulder bag	Shoulder bag	Shoulder bag
Code	P01102100Z	P01298065Z	P01298049	P01298043Z	P01298012 P01298012Z	P01298046	P01298055	P01298051	P01298007	P01298074	P01298075	P01298076	P01298032
Boîte neutre artificiel AN1													
C.A 1052													
C.A 1621, C.A 1623, C.A 1631											X		
C.A 1725, C.A 1727													
C.A 1864, C.A 1866											X		
C.A 1877, C.A 1878, C.A 1882													
C.A 40													
C.A 401, C.A 402, C.A 403, C.A 404, C.A 405, C.A 406, C.A 406 KIT													
C.A 41, C.A 43													
C.A 5001, C.A 5003, C.A 5005													
C.A 5005													
C.A 5011													
C.A 5030													
C.A 5110, C.A 5120													
C.A 5205G, C.A 5210 G, C.A 5220 G, C.A 5230G, C.A 5240G, C.A 5260G		X											
C.A 5231, C.A 5233	X									X			
C.A 5271, C.A 5273, C.A 5275, C.A 5277	X											X	
C.A 5287, C.A 5289	X										X		
C.A 6030			X										
C.A 61, C.A 65													
C.A 6113, C.A 6116, C.A 6116N, C.A 6117													
C.A 6115N													X
C.A 6121													
C.A 6160													
C.A 6240, C.A 6250													
C.A 6410, C.A 6411, C.A 6412, C.A 6413, C.A 6415													
C.A 6416, C.A 6417													
C.A 6421, C.A 6423													
C.A 6425													
C.A 6454, C.A 6456			X										
C.A 6460, C.A 6462													
C.A 6501, C.A 6503													
C.A 6505													
C.A 6511, C.A 6513													
C.A 6521, C.A 6523, C.A 6525			X										
C.A 6531, C.A 6533			X										
C.A 6541, C.A 6543								X					
C.A 6545, C.A 6547													
C.A 6550, C.A 6555													
C.A 702, C.A 703		X											
C.A 704					X								
C.A 730, C.A 735		X			X								
C.A 745		X			X				X				
C.A 740, C.A 760, C.A 740N, C.A 740N IP2X, C.A 760N, C.A 760N IP2X		X			X					X			
C.A 751		X											
C.A 8220, C.A 8230			X										
C.A 8331, C.A 8332, C.A 8333, C.A 8334, C.A 8335, C.A 8336							X	X					
C.A 8352													
C.A 8435													
C.A 871, C.A 879													
CADI 2					X								
CDA 104													
DTR 8510													
F01, F03, F05, F07, F09		X								X			
F11N, F13N, F15		X		X							X		
F201, F203, F205											X		
F21				X									
F3N				X					X				
F401, F403, F405, F407												X	
F601, F603, F605, F607												X	
F62, F65		X											
FTV200													
MA400D, MA4000D	X									X			
MAN'X 015, MAN'X 02S													
MAN'X TOP, MAN'X TOP PLUS													
MAX 2000, MAX 3000													
PAC10, PAC11, PAC12													
PAC20, PAC21, PAC22													
PEL102, PEL103	X												
RW501, RW511, RW521, RW5012						X							
SIMPLE LOGGER ML914, AL834													
TK 1000					X								
TP 850					X								




Banana measurement leads Ø 4 mm

Measurement leads



Moulded leads

Model	Description	Model	Description
	Set of 2 moulded red/black PVC leads Isolated straight male plug Ø 4 mm – Isolated straight male plug Ø 4 mm • 15 A • 1.5 m • 1,000 V CAT IV Reference: P01295450Z		Set of 2 red/black moulded PVC leads Isolated straight male plug Ø 4 mm – Isolated elbowed male plug Ø 4 mm • 15 A • 1.5 m • 1,000 V CAT IV Reference: P01295451Z
	Set of 2 red/black moulded silicone leads Isolated straight male plug Ø 4 mm – Isolated straight male plug Ø 4 mm • 15 A • 1.5 m • 1,000 V CAT IV Reference: P01295452Z		Set of 2 red/black moulded silicone leads Isolated straight male plug Ø 4 mm – Isolated elbowed male plug Ø 4 mm • 15 A • 1.5 m • 1,000 V CAT IV Reference: P01295453Z

Standard leads

Model	Description	Model	Description
	Set of 2 red/black PVC leads Isolated straight male plug Ø 4 mm – Isolated straight male plug Ø 4 mm • 15 A • 1.5 m • 600 V CAT IV / 1,000 V CAT III Reference: P01295288Z		Set of 2 red/black PVC leads Isolated straight male plug Ø 4 mm – Isolated elbowed male plug Ø 4 mm • 15 A • 1.5 m • 600 V CAT IV / 1,000 V CAT III Reference: P01295289Z
	Set of 2 red/black PVC leads Isolated straight male plug Ø 4 mm with rear connection Isolated straight male plug Ø 4 mm with rear connection • 20 A • 2 m • 600 V CAT III Reference: P01295290Z		


Leads with built-in test probes

Model	Description	Model	Description
	Set of 2 red/black PVC leads with test probes Isolated straight male plug Ø 4 mm • 15 A • 1.5 m • 600 V CAT IV / 1,000 V CAT III Reference: P01295455Z		Set of 2 red/black PVC leads with test probes Isolated elbowed male plug Ø 4 mm • 15 A • 1.5 m • 600 V CAT IV / 1,000 V CAT III Reference: P01295456Z



Banana connection accessories Ø 4 mm

Removable test probes




For CAT IV & CAT III installations

Model	Description
	<p>Set of 2 red/black moulded test probes</p> <ul style="list-style-type: none"> • Female plug Ø 4 mm • 15 A • CAT IV / CAT III 1000 V <p>Reference: P01295454Z</p>

For CAT II installations and lower

Model	Description	Model	Description
	<p>Set of 2 moulded test probes Ø 4 mm</p> <ul style="list-style-type: none"> • Female plug Ø 4 mm • 15 A • CAT II 300 V <p>Reference: P01295458Z</p>		<p>Set of 2 moulded test probes Ø 2 mm</p> <ul style="list-style-type: none"> • Female plug Ø 4 mm • 15 A • CAT II 300 V <p>Reference: P01295460Z</p>





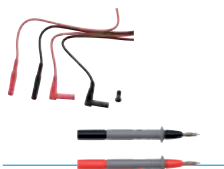



IP2X

Model	Description	Model	Description
	<p>Set of 2 IP2X PVC leads for multimeters</p> <p>Compliant with NF C 18-510 and IEC 61010-031+A1:2008</p> <ul style="list-style-type: none"> • IP2X test probe • Isolated elbowed male plug Ø 4 mm • 15 A • 1,5 m • 600 V CAT IV <p>Reference: P01295461Z</p>		<p>Set of 2 IP2X PVC leads for VATs (C.A 760 & C.A 704)</p> <p>Compliant with NF C 18-510 and IEC 61010-031+A1:2008</p> <ul style="list-style-type: none"> • IP2X test probe IP2X Ø 2 mm • Elbowed female Ø 4 mm • 15 A • 1,5 m • 600 V CAT IV <p>Reference: P01295463Z</p>
	<p>Set of 2 IP2X leads for VATs (C.A 740N and C.A 760N)</p> <ul style="list-style-type: none"> • IP2X test probe Ø 4 mm • Elbowed female plug Ø 4 mm • 15 A • NF C 18-510 / IEC 61243-3 1000 V • 1,5 m <p>Reference: P01295462Z</p> <ul style="list-style-type: none"> • 0,25 m & 0,85 m: <p>Reference: P01295285Z</p>		

Banana measurement leads Ø 4 mm

Other accessories

For CAT IV & CAT III installations

Model	Description	Model	Description
	Set of 2 red/black crocodile clips <ul style="list-style-type: none"> • 15 A • 1,000 V CAT IV Reference: P01295457Z		Set of 2 red/black crocodile wire grips <ul style="list-style-type: none"> • 20 A • 1,000 V CAT III Reference: P01102053Z
	Set of leads and measurement accessories for electricians <ul style="list-style-type: none"> • 2 moulded test probes, 1,000 V CAT IV • 2 red/black moulded PVC leads with straight male plug – elbowed male plug, 1,5 m, 1,000 V CAT IV • 2 red/black crocodile clips, 1,000 V CAT IV • 2 moulded test probes Ø 4 mm, 300 V CAT II Reference: P01295459Z		Set of 2 adapters: <ul style="list-style-type: none"> • Isolated female BNC – Isolated red/black male plugs, Ø 4 mm, • 600 V CAT III Reference: P01102101Z
	Kit of 2 PVC leads + 2 test probes Ø4 mm <ul style="list-style-type: none"> • Straight male plug Ø4 mm - • Elbowed male plug Ø4 mm • Probe Ø4 mm - Female plug Ø 4mm CAT II 300V P01295475Z		Kit of 2 PVC leads + 2 test probes Ø2 mm <ul style="list-style-type: none"> • Straight male plug Ø4 mm - • Elbowed male plug Ø4 mm • Probe Ø2 mm - Female plug Ø 4mm • CAT II 300V Reference: P01295474Z
	Set of 2 red/black magnetized test probes For voltage measurement only Test probe Ø: 6.6 mm – Elbowed female plug Ø 4 mm <ul style="list-style-type: none"> • 1,000 V CAT III / 600 V CAT IV Reference: P01103058Z		PVC lead Isolated male BNC – Straight male isolated banana plugs Ø 4 mm (red/black) with rear connection <ul style="list-style-type: none"> • 1 m • 500 V CAT III Reference: AG-1066Z






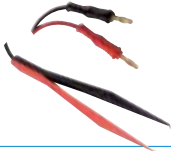


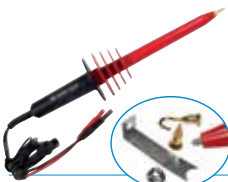
Product-specific

Model	Description	Model	Description
	Removable red test probe Ø 4 mm for tester or DMM "Hands-free" use as test probe <ul style="list-style-type: none"> • Male plug Ø 4 mm • 600 V CAT IV Reference: P01103060Z		Removable red test probe Ø 4 mm with locking pin For testers or remote-control probes <ul style="list-style-type: none"> • Male plug Ø 4 mm • 600 V CAT IV Reference: P01103061Z
For C.A 740N & C.A 760N 	Removable red test probe <ul style="list-style-type: none"> • Female plug Ø 4 mm • IEC 61243-3 Reference: P01102008Z	For C.A 740 & C.A 760 	Removable red test probe <ul style="list-style-type: none"> • Female plug Ø 4 mm • 600 V CAT IV Reference: P01103059Z
	Black test-probe lead Isolated elbowed female plug Ø 4 mm <ul style="list-style-type: none"> • Length 0.85 m • IEC 61243-3 Reference: P01102009Z		Black test-probe lead Isolated elbowed female plug Ø 4 mm <ul style="list-style-type: none"> • Length 0.85 m • 600 V CAT IV Reference: P01295464Z

Banana connection accessories Ø 4 mm




Other accessories

For CAT II installations and lower





Model	Description	Model	Description
	Set of 3 measurement adapters for housing 2 red/black isolated straight male plugs Ø4 mm <ul style="list-style-type: none"> • E27 screw socket • B22 bayonet socket • 2-pole mains socket (P/N) • CAT II 250V Reference: P01102114Z		C.A 753: Measurement adapter for 2P+E socket <ul style="list-style-type: none"> • Suitable for European and Schuko sockets • Can be used for measurements on the P (Phase), N (Neutral) and PE (Earth) conductors in total safety • Guarantees mechanical and electrical contact with all test probes (Ø2, Ø4, IP2x, etc.) • Shows the presence of a P-N voltage (> 200 V) and indicates the phase position • IEC 61010 230V CAT II Reference: P01191748Z
	Current lead equipped with a French 2P+E mains socket <ul style="list-style-type: none"> • For setting up an ammeter in series in total safety • For measuring the current with a current clamp without stripping off the external sheath of the power supply cable Reference: P03295509		Measurement lead for French and German 2P+E mains sockets For direct measurement from a mains socket Quick implementation and reliable connections Reference: P06239307
	Set of 2 red/black insulation-piercing clips <ul style="list-style-type: none"> • 30 V AC, 60 V DC Reference: P01102055Z		CMS clamp Gold-plated beryllium copper contacts Output via male plugs Ø 4 mm <ul style="list-style-type: none"> • 1.2 m • TBTS Reference: HX0064
	Set of 2 isolated red/black adapters: male BNC – female sockets, Ø 4 mm, spacing 19 mm <ul style="list-style-type: none"> • 500 V CAT I, 150 V CAT III Reference: P01101846		Set of 2 isolated red/black adapters: male BNC – male sockets, Ø 4 mm, spacing 19 mm <ul style="list-style-type: none"> • 500 V CAT I, 150 V CAT III Reference: P01101847
	SHT40KV high-voltage probe for multimeters Maximum rated voltage: 40 kV _{DC} , 28 kV _{rms} or 40 kV _{peak} (50/60 Hz) Division ratio (input/output): 1 kV / 1 V For multimeters with 10 MΩ input impedance Reference: P01102097		

Adapters and probes for multimeters

Adapters

Model	Description	Specifications	Reference
	Thermocouple safety adapter for multimeter (x 2)	Female thermocouple plug – Red/black insulated male plugs Ø 4 mm with 19 mm spacing	P01102106Z
	Pt100/Pt1000 probe adapter for multimeter	Female Pt100/Pt1000 plug – Red/black insulated male plugs Ø 4 mm	HX0091
	Safety adapter and K sensor temperature probe	For multimeters and multimeter clamps equipped with a temperature measurement range and banana inputs with 19 mm spacing - Measurement range from -50 °C to +350 °C - Sensor length: 100 cm approx	P01102107Z

Probes

Model	Description	Specifications	Reference
	> C.A 1711 Infrared tachometric probe	- Pulse output $1,1 \frac{V}{0}$ / tr - 2 insulated banana plugs Ø 4 mm - Measurement range: 6 to 120,000 RPM - IP 53	P01102082
	> C.A 1871 Infrared probe	Compatible with any multimeter with an mV range - Measurement range: -30 °C to +550 °C - Output: 1 mV/1 °C - Distance/diameter ratio: 8/1 - Accuracy: ± 2 %	P01651610Z
	> C.A 801 Temperature adapter for multimeters	- -40 °C to +1,000 °C - 1 mV _{DC} / °C (or /°F) Delivered with 1 K sensor and 1 battery	P01652401Z
	> C.A 803 Temperature adapter for multimeters	- 2 measurement channels - -40 °C to +1,000 °C - 1 mV _{DC} / °C (or /°F) - Ø1 - Ø2 differential measurement Delivered with 2 K sensors and 1 battery	P01652411Z

Fuses

Produit	Standardized dimensions (mm)	Amperage	Reference
C.A 10	6 x 32	8 A	P01297013
C.A 1621	5 x 20	125 mA	P01297099
C.A 1631	5 x 20	125 mA	P01297099
C.A 401	6 x 32	1 A	P03297507
C.A 401	6 x 32	10 A	P03297510
C.A 4010	6 x 32	0,315 A	P03297509
C.A 4010	6 x 32	16 A	P03297505
C.A 4020	6 x 32	0,315 A	P03297509
C.A 4020	6 x 32	16 A	P03297505
C.A 403	6 x 32	0,315 A	P03297509
C.A 404	6 x 32	1,25 A	P01297015
C.A 405	6 x 32	6,3 A	P01297016
C.A 406	5 x 20	0,16 A	P03297508
C.A 406	6 x 32	3,15 A	P01100726
C.A 4300	6 x 32	1 A	P03297507
C.A 4300	6 x 32	10 A	P03297510
C.A 47	5 x 20	1 A	P01297075
C.A 47	5 x 20	4 A	P01297076
C.A 47	5 x 20	0,315 A	P01297074
C.A 5000	6 x 32	5 A	P01297035
C.A 5000	6 x 32	0,5 A	P01297028
C.A 5003	6 x 32	1,6 A	P01297036
C.A 5003	10 x 38	16 A	P01297037
C.A 5005	6 x 32	1 A	P01297039
C.A 5005	6 x 32	10 A	P01297038
C.A 5011	6 x 32	1 A	P01297039
C.A 5011	6 x 32	10 A	P01297038
C.A 5110	6 x 32	1 A	P03297507
C.A 5120	6 x 32	1 A	P03297507
C.A 5120	6 x 32	10 A	P03297510
C.A 5210	10 x 38	12 A	P01297021
C.A 5210	6 x 32	0,4 A	P01297020
C.A 5210G	10 x 38	12 A	P01297021
C.A 5210G	6 x 32	0,4 A	P01297020
C.A 5220	10 x 38	12 A	P01297021
C.A 5220	6 x 32	0,4 A	P01297020
C.A 5220G	10 x 38	12 A	P01297021
C.A 5220G	6 x 32	0,4 A	P01297020
C.A 5230G	10 x 38	12 A	P01297021
C.A 5230G	6 x 32	0,5 A	P01297028
C.A 5240G	10 x 38	12 A	P01297021
C.A 5233	6 x 32	10 A	AT0070
C.A 5240G	6 x 32	0,5 A	P01297028
C.A 5260G	6 x 32	0,1 A	P01297012
C.A 5271	10 x 38	10 A	P01297096
C.A 5273	10 x 38	10 A	P01297096
C.A 5275	6 x 32	0,63 A	P01297098
C.A 5275	10 x 38	10 A	P01297096
C.A 5277	6 x 32	0,63 A	P01297098
C.A 5277	10 x 38	10 A	P01297096
C.A 5287	10 x 38	11 A	P01297092
C.A 5287	10 x 38	0,44 A	P01297094
C.A 5289	10 x 38	11 A	P01297092
C.A 5289	10 x 38	0,44 A	P01297094
C.A 6114 / 15N	6 x 32	3,15 A	P01297080
C.A 6115N	5 x 20	2 A	P01297026
C.A 6115N	6 x 32	3,15 A	P01297080
C.A 6121	5 x 20	1 A	P01297031
C.A 6121	5 x 20	4 A	P01297032
C.A 6121	6 x 32	0,2 A	P01297033
C.A 6121	10 x 38	20 A	P01297030
C.A 6160	6 x 32	16 A	P01297086
C.A 6160	5 x 20	2,5 A	P01297085
C.A 6240	6 x 32	12,5 A	P01297091
C.A 6250	5 x 20	2 A	P01297090
C.A 6250	6 x 32	16 A	P01297089
C.A 6421	6 x 32	0,1 A	P01297012
C.A 6423	6 x 32	0,1 A	P01297012
C.A 6425	6 x 32	0,1 A	P01297012
C.A 6460	6 x 32	0,1 A	P01297012
C.A 6462	6 x 32	0,1 A	P01297012
C.A 6470	5 x 20	0,63 A	AT0094
C.A 6472	5 x 20	0,63 A	AT0094

Produit	Standardized dimensions (mm)	Amperage	Reference
C.A 6501	6 x 32	0,2 A	P01297095
C.A 6503	6 x 32	0,2 A	P01297095
C.A 6511	6 x 32	1,6 A	P01297022
C.A 65113	6 x 32	1,6 A	P01297022
C.A 6521	6 x 32	0,63 A	P01297078
C.A 6523	6 x 32	0,63 A	P01297078
C.A 6525	6 x 32	0,63 A	P01297078
C.A 6531	6 x 32	0,63 A	P01297078
C.A 6541	6 x 32	0,1 A	P01297072
C.A 6541	8 x 50	2,5 A	P01297071
C.A 6543	6 x 32	0,1 A	P01297072
C.A 6543	8 x 50	2,5 A	P01297071
C.A 6545	5 x 20	0,1 A	P03297514
C.A 6547	5 x 20	0,1 A	P03297514
C.A 6549	5 x 20	0,1 A	P03297514
CADI 2	5 x 20	12,5 A	P01297004
CADI 2	5 x 20	3,15 A	P01297002
CAMPUS	5 x 20	0,16 A	P03297508
CAMPUS	6 x 32	3,15 A	P01100726
CdA 651	6 x 32	3,15 A	P01100726
CdA 651M	6 x 32	3,15 A	P01100726
CdA 778N	6 x 32	2 A	P03297513
CdA 778N	6 x 32	10 A	P03297502
CdA 791	8 x 32	6 A	P03100801
CdA 800	5 x 20	0,1 A	P03100201
CdA LAB'X 9000	5 x 20	1,6 A	P03297501
CdA100-A	6 x 32	0,4 A	P01297020
CONPAMATIC 2	10 x 38	10 A	P01100731
CONPAMATIC 2	6 x 32	3,15 A	P01100726
DETEC 220	5 x 20	0,315 A	P01297014
DTR 8500	5 x 20	1 A	P01297031
DTR 8500	5 x 20	4 A	P01297041
DTR 8500	5 x 20	0,5 A	P01297042
IMEG 500	5 x 20	0,2 A	P02297302
IMEG 500N	5 x 20	0,2 A	P02297302
ISOL 1000N G4	6 x 32	0,315 A	P01101724
ISOL 5000N G4	6 x 32	0,315 A	P01101724
LOCAT 110	5 x 20	0,1 A	P03297514
LOCAT 220	5 x 20	0,1 A	P03297514
MANIP W1	6 x 32	1,25 A	P01297015
MANIP Z10	5 x 20	0,16 A	P03297508
MAN'X 015	6 x 32	1,6 A	P01297017
MAN'X 02S	6 x 32	2 A	P03297513
MAN'X 02S	10 x 38	10 A	P01100731
MAN'X 04B	8 x 32	10 A	P03100830
MAN'X 04B	5 x 20	1,6 A	P03297501
MAN'X 102	5 x 20	0,160 A	P03297508
MAN'X 102	6 x 32	3,15 A	P01100726
MAN'X 500	6 x 32	2 A	P03297513
MAN'X 500	6 x 32	16 A	P03297505
MAN'X 520A	6 x 32	0,315 A	P03297509
MAN'X 520A	6 x 32	16 A	P03297505
MAN'X TOP	6 x 32	0,315 A	P03297509
MAN'X TOP	6 x 32	16 A	P03297505
MAN'X TOP PLUS	6 x 32	0,315 A	P03297509
MAN'X TOP PLUS	6 x 32	16 A	P03297505
MAX 2000	6 x 32	1 A	P03297510
MAX 2000	6 x 32	10 A	P03297510
MAX 3000	6 x 32	1 A	P03297510
MAX 3000	6 x 32	10 A	P03297510
MH600	5 x 20	0,16 A	P01297043
MH600	5 x 20	0,310 A	P01297045
MH600	5 x 20	0,315 A	P01297074
RO600	5 x 20	2 A	P01297069
RO600	5 x 20	0,25 A	P01297070
Tellurohm C.A 2	6 x 32	0,1 A	P01297012

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Air temperature sensors	E-3-7, E-3-8
Analogue multimeter	A-2-0 to A-2-3
Analogue/digital multimeter	A-2-3
Anemometer	E-4-1, E-4-3 to E-4-5
Artificial neutral box	B-2-8
Bb	
BT or USB modem	B-3-8
Cc	
Cable (see measurement leads)	J-2-0 to J-2-3
Cable locator	B-5-6
Cable tester	B-5-6, F-1-1, F-1-2
Cable, wiring (testers)	B-5-6
Calibrator	E-1-1 to E-1-3
Continuity test	A-1-1 to A-4-5, B-1-0 to B-1-3, B-2-1 to B-2-4, B-2-6, B-3-1, B-3-4 to B-3-6, B-4-1 to B-4-4, B-5-1 to B-5-3
Crocodile clip	J-2-2
Current clamp	I-1-0 to I-1-7
Current logger	C-1-5 to C-1-10, D-1-1 to D-1-8
Current measurement clamp	A-4-0 to A-4-5, C-1-2, C-1-3, I-1-0 to I-1-7
Current measurement	I-1-0 to I-1-7
Current sensor	I-1-0 to I-1-5, D-1-4 to D-1-8, D-1-12
Current transformer (measurement on secondary)	I-1-6
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Data acquisition	D-1-0 to D-1-13
Data logging	D-1-0 to D-1-14
Decade box (resistance, capacitance)	H-1-5, H-1-6
Digital multimeter	A-3-0 to A-3-5
Digital ohmmeter	B-2-4 to B-2-8
Ee	
Earth clamp	B-3-8
Earth measurement	B-1-0 to B-1-5, B-3-0 to B-3-9
Earth resistance	B-1-3 to B-1-5, B-3-0 to B-3-9
Earth tester	B-1-0 to B-1-5, B-3-0 to B-3-9
Educational measuring instruments	H-1-1 to H-1-6
Electrical energy analyser	C-1-0 to C-1-12
Electrical equipment (tester)	B-4-0 to B-5-8
Electrical equipment tester	B-4-0 to B-4-5
Electrical installation tester	B-1-0 to B-1-5
Electrical installation tester	B-1-0 to B-1-5
Electromagnetic disturbance analysers	F-1-1 to G-1-3
Electromagnetic field measurement	F-1-1 to G-1-3
Energy analyser software	C-1-11
Energy management and analysis	C-1-0 to C-1-11
Energy measurement, analysis or management	C-1-0 to C-1-12, D-1-1 to D-1-3
ESSAILEC adapter unit	C-1-10, C-1-12
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Fault detector (cuts, short-circuits)	B-5-6
Field meter	G-1-1 to G-1-3
Flexible core (current sensor)	A-4-0 to A-4-2, I-1-4, I-1-5
Flexible current sensor	A-4-0 to A-4-2, I-1-4, I-1-5
Free-space propagation	F-1-1 to F-1-5
Fuse	J-4-0
Gg	
Gas detector	E-4-10 to E-4-12
Gaussmeter	G-1-2
Guided propagation	F-1-1 to F-1-5
Hh	
Hall-effect clamps	I-1-0
Hard cases	J-1-0 to J-1-3
Harmonics clamp	A-4-4, A-4-5, C-1-0 to C-1-10
Humidity detector	E-4-1, E-4-2, E-4-4, E-4-10, E-4-11
Hygrometry measurement	E-4-1, E-4-2, E-4-4, E-4-10, E-4-11
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Laboratory shunt	H-1-6
LAN tester	F-1-1, F-1-2
Laser (thermometer sight)	E-3-1 to E-3-4
Leakage current clamp	B-2-13, B-3-8, I-1-1, I-1-6
Light meter	E-4-1, E-4-7
Lighting measurement	E-4-1, E-4-7
Loop ohmmeters	B-1-0 to B-1-5, B-3-8
Loop tester	B-1-1 to B-1-5, B-3-8, B-4-4
Luminance measurement	E-4-1, E-4-7
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Kelvin clamp	B-5-2, B-5-3, I-1-6
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Laboratory measuring instrument	G-1-4 to H-1-4
Laboratory shunt	H-1-6
LAN tester	F-1-1, F-1-2
Laser (thermometer sight)	E-3-1 to E-3-4
Leakage current clamp	B-2-13, B-3-8, I-1-1, I-1-6
Light meter	E-4-1, E-4-7
Lighting measurement	E-4-1, E-4-7
Loop ohmmeters	B-1-0 to B-1-5, B-3-8
Loop tester	B-1-1 to B-1-5, B-3-8, B-4-4
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Measurement lead	J-2-0 to J-3-0
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Micro-ohmmeter	B-5-0 to B-5-3
Microwave measurement	G-1-1 to G-1-6
Milliohmeter	B-5-2, B-5-3
Multi-function tester	B-1-3 to B-1-4, B-4-2 to B-4-5, E-4-4, E-4-5
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Multimeter clamp	A-4-0 to A-4-5, C-1-2, C-1-3
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Oo	
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Test accessory	J-2-0 to J-3-0
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C.A 6240	B-5-1, B-5-2, B-5-8		
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