



Flex current clamps

A 1179

A 1257

A 1395

User Manual

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Mark on your equipment certifies that this equipment meets the requirements of the EC (European Community) regulations concerning safety and electromagnetic compatibility.

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1 Introducing the A1179/A1257/A1395

The A1179/A1257 (A1179 has measuring ranges 20A/200A/2000A, A1257 has measuring ranges 30A/300/3000A) Flexible Current Clamps consist of three flexible sensors and an electronic module. The A1395 has measuring ranges 30A/300/3000A and two flexible sensors and an electronic module.

A current measurement can be carried out on the two/three phases simultaneously, with a suitable output voltage for the Measuring ANALYZER / Multimeter. The flexible sensor permits measurements on conductors where standard clamp-on current transformers can not be used. It is particularly useful for installation in tight spaces, or around breaker panels, cable bundles, wide or large bus bars and irregular shapes. Unlike standard current transformers, this flexible CP does not use magnetic cores. The transformation principle is based on an air core. It presents virtually no load to the system under test, has a low phase shift and excellent frequency response.

The electronic module can detect if the measured current amplitude is too big for the selected range (crest factor of the amplifier is 3.0). This overrange detection is indicated by a blinking range LED diode for currently selected range. If the overrange current was detected but is not currently present, the user can reset the blinking Range LED by pressing the key. If the overrange is present also when the key is pressed, the range will be changed to the less sensitive range. The electronic module has low battery indication as well.

Additionally, A1179/A1257/A1395 cannot be damaged by overloads. The A1179/A1257/A1395 Flexible Current Clamps are insensitive to DC current and measure only the AC component of the measured signal.

2 Features

- Direct connection to 1V AC input on measuring device, and optional connection to other meters (data logger, multi-meters, etc.), on demand
- Switch ON, switch OFF and two/three measuring ranges with one key selection (2000/3000 Arms, 200/300 Arms and 20/30 Arms)
- Overrange indication for measurement circuitry (blinking LED at corresponding range)
- mV output
- Waterproof sensor
- Minimum angle shift to accomplish accurate power measurements
- High accuracy
- Simultaneous measurement of the two/three phases
- Total rejection of d.c. component
- Friendly-use of the closing-opening system of the current sensor (even if wearing gloves) due to its highly ergonomic design
- It is possible to set the seal on the closing system of the current clamp.
- Very light, flexible and fully adaptable to busbar trunking system and insulated cables
- Strengthened security, regardless the working environment: industrial or services
- Possibility of external power supply at 220 V a.c./12 V d.c.
- Build in charger (Low Bat LED on)
- Low battery indication (blinking Low Bat LED)

3 Safety



Read the operating instructions before use and follow all safety instructions.



If the test equipment is used in a manner that is not specified in this user manual, the protection provided by the equipment might be impaired!



Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.



Before each use, inspect the Current Clamps and its latching system for any damage. Pay particular attention to the insulation surrounding the flexible measuring head. Look for cracks or missing portions of the clamp housing or output cable insulation. Also look for loose or weakened components.



Do not use a clamp that is cracked, damaged, or has a defective cable.



Never use the clamp on a circuit with voltages higher than 1000 V CAT III or 600V CAT IV.



De-energize the installation on which current will be measured or adopt safe operating procedures during application and removal of the current clamp.



Use extreme caution when working around bare conductors or bus bars.



Do not use the Current Clamp to measure bare conductors carrying a voltage from 30V up to 1000V unless you are wearing protective clothing suitable for high-voltage work. Contact with the conductor could result in electric shock. Always use appropriate equipment for personal protection.









Use caution when working with voltages above 60 V dc, 30 V ac rms or 42 V ac peak. Such voltages pose a shock hazard.



Do not expose the A1179/A1257/A1395 unit to water.

4 Symbols

Symbol	Description
	Important information. Refer to the manual.
	Risk of Electric Shock.
	Product is protected by Double/Reinforced insulation
	Do not apply around or remove from HAZARDUS LIVE conductors.
	Do not dispose of this product as unsorted municipal waste. Contact Metrel or a qualified recycler for disposal.
	Complies with the relevant European standards.

5 Output connecting

The A1179/A1257/A1395 Flexible Current Clamps can be used with any Metrel Power Analyzer, Oscilloscope, or Multimeter that has the following features:

- D01 3 Pin Receptacle Panel Mount input connector or appropriate adapter.
- Input accuracy of 1% or better to take full advantage of the accuracy of the Current Clamps.
- Input impedance of greater than or equal to 10 k Ω , and for full bandwidth and accuracy, a maximum input capacity of 100 pF.
- A pass band of more than four times the frequency of the waveform to be measured.

6 Using A1179/A1257/A1395 Flexible Current Clamps

6.1 Battery and charging

The A1179/A1257/A1395 uses two AA size alkaline or rechargeable Ni-Cd or Ni-MH battery cells. Nominal operating time is declared for cells with nominal capacity of 2200 mAh. In case the battery is weak, the A1179/A1257/A1395 indicates this with **Low bat** LED blinking.

The battery is charged whenever the power supply adapter is connected to the A1179/A1257/A1395. Internal circuit controls charging assuring maximum battery lifetime. Power supply socket polarity is shown in Picture 6.1.



Picture 6.1: Power supply socket polarity

The A1179/A1257/A1395 automatically recognizes connected power supply adapter and controls charging. After 24 hours of continuous charging it is switched off.



Before opening battery compartment cover disconnect all measuring accessories connected to the clamps and power off the A1179/A1257.

- ❑ Insert cells correctly, otherwise the A1179/A1257/A1395 will not operate and the battery could be discharged.
- ❑ Remove all battery cells from the battery compartment if the A1179/A1257/A1395 is not used for longer period.
- ❑ Do not charge alkaline battery cells!
- ❑ Take into account handling, maintenance and recycling requirements that are defined by related regulatives and manufacturer of alkaline or rechargeable batteries!
- ❑ Use only power supply adapter delivered from manufacturer or distributor of the test equipment to avoid possible fire or electric shock!
- ❑ Do not use battery cells with different capacity.

6.1.1 New battery cells or cells unused for a longer period

Unpredictable chemical processes can occur during charging of new battery cells or cells that were unused for a longer period (more than 3 months). Ni-MH and Ni-Cd battery cells are affected to capacity degradation (sometimes called as memory effect). As a result, the A1179/A1257/A1395 operation time can be significantly reduced.

Recommended procedure for recovering battery cells:

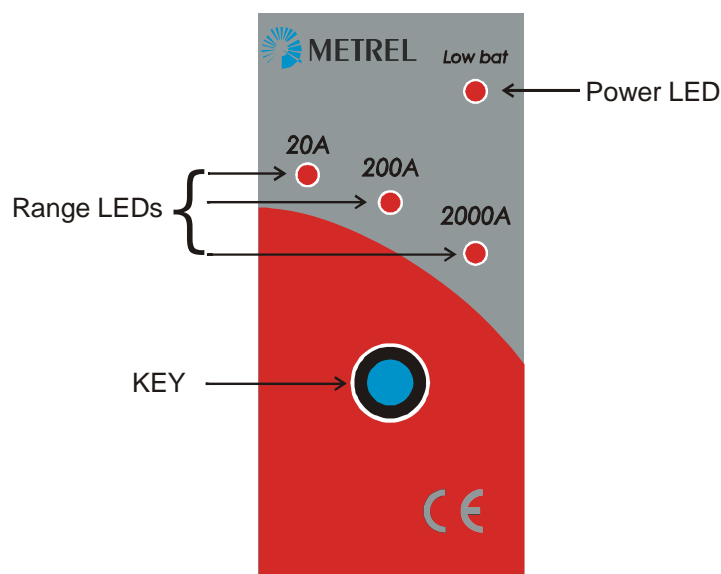
Procedure	Notes
➤ Completely charge the battery.	<i>Time depends on the battery capacity (10 – 24 hours)</i>
➤ Completely discharge the battery.	<i>Can be performed with normal work with the A1179/A1257/A1395.</i>
➤ Repeat the charge / discharge cycle for at least two times .	<i>Four cycles are recommended.</i>

Complete discharge / charge cycle is performed automatically for each cell using external intelligent battery charger.

Notes:

- ❑ The charger in the A1179/A1257/A1395 is a pack cell charger. This means that the battery cells are connected in series during the charging. The battery cells have to be equivalent (same charge condition, same type and age).
- ❑ One different battery cell can cause an improper charging and incorrect discharging during normal usage of the entire battery pack (it results in heating of the battery pack, significantly decreased operation time, reversed polarity of defective cell,...).
- ❑ If no improvement is achieved after several charge / discharge cycles, then each battery cell should be checked (by comparing battery voltages, testing them in a cell charger, etc). It is very likely that only some of the battery cells are deteriorated.
- ❑ The effects described above should not be mixed with normal decrease of battery capacity over time. Battery also loses some capacity when it is repeatedly charged / discharged. Actual decreasing of capacity, versus number of charging cycles, depends on battery type. It is provided in the technical specification from battery manufacturer.

6.2 User interface



Picture 6.2: Front user interface view for A1179

- Range LEDs:** one of these LEDs indicates corresponding measuring range of the output signal. If the LED is blinking (1 s ON – 1s OFF) A1179/A1257/A1395 detect overrange event at the currently selected range. With pressing the KEY one can reset overrange detection. If all Range LEDs are OFF it indicates power off the A1179/A1257/A1395.
- Power LED:** OFF – normal operation
 Blinking (1 s ON – 1s OFF) – low battery indication, the battery is too weak for correct measurement results.
 ON – The battery cells are charged.
- KEY:** Turns the A1179/A1257/A1395 ON, change the measuring range, reset overrange detection, if held in for more then 3 seconds it turns the A1179/A1257/A1395 module OFF.

See detailed description of A1179/A1257/A1395 operating states in chapter 6.2.1 and 6.2.2.

6.2.1 A1179/A1257/A1395 states regarding power supply

The use of the A1179/A1257/A1395 module is very easy and intuitive. In following tables (Table 6.1 and Table 6.2) the A1179/A1257/A1395 module states regarding power supply and charging and actions to change between them are defined.

State	How is it indicating?	What is happening?
POWER OFF	All LED diodes OFF, External power supply is not connected.	A1179/A1257/A1395 is not working. Battery is not charged.
NORMAL	One of the Range LED is ON, Low bat is OFF .	A1179/A1257/A1395 is working from the battery. Battery is not charged.
EXTERNAL NORMAL	Low bat LED is ON, External power supply is connected and batteries are not present.. One of the Range LED is ON.	A1179/A1257/A1395 is working from the external power supply. Battery is not charged.
LOW BATTERY	Low bat LED is blinking.	A1179/A1257/A1395 is working. Battery is low, Measuring results may not be in specifications. Battery is not charged.
CHARGE + NORMAL	One of the Range LED is ON, Low bat is ON External power supply is connected and rechargeable batteries are present.	Battery is charged. A1179/A1257/A1395 is powered from external power supply (not from batteries).
CHARGE	All Range LEDs are OFF. Low bat is ON External power supply is connected and rechargeable batteries are present.	Battery is charged. No measuring is possible.

Table 6.1 Power supply state indications

State before	Action to change the state	New state
POWER OFF	Press the key	NORMAL
POWER OFF	Connect external power supply	CHARGE
NORMAL	Ubat < 2.1 V	LOW BATTERY
NORMAL	Connect external power supply	CHARGE + NORMAL
LOW BATTERY	Connect external power supply	CHARGE + NORMAL
NORMAL	Long press the key	POWER OFF
CHARGE + NORMAL	Long press the key	CHARGE
EXTERNAL NORMAL	Long press the key	POWER OFF
POWER OFF	Insert the batteries into the battery compartment	POWER OFF
CHARGE	Press the key	CHARGE + NORMAL

Table 6.2 Allowed change state table regarding power supply

6.2.2 A1179/A1257/A1395 states regarding measuring ranges

Changing of the measuring range is done just by pressing the key. After switch ON (also by pressing the key) module is at 20/30 A range. If you pressing the key again the 200/300 A range is selected etc. (see Table 6.4).

A1179/A1257/A1395 module has overrange current detection as noted in chapter 1. It means that A1179/A1257/A1395 module informs the user if the selected range is too small for measured current amplitude (peak value). If the overrange current was detected but currently it is not present any more the user can reset blinking Range LED by pressing the key (see Table 6.5). If the overrange is present also when the key is pressed the range will be changed to the less sensitive range (see Table 6.6).

State indications:

State	How is it indicating?	What is heppening?
RANGE 2000/3000 A	2000/3000 A Range LED diode is ON. Others are OFF.	A1179/A1257/A1395 is working on 0.5/0.333mV/A rms range.
RANGE 200/300 A	200/300 A Range LED diode is ON. Others are OFF	A1179/A1257/A1395 is working on 5/3.33mV/A rms range.
RANGE 20/30 A	20/30 A Range LED diode is ON. Others are OFF	A1179/A1257/A1395 is working on 50/33.3mV/A rms range.
OVERRANGE DETECTION 20/30 A	20/30 A Range LED diode is blinking.	A1179/A1257/A1395 has detected an overrange at 20/30 A range.
OVERRANGE DETECTION 200/300 A	200/300 A Range LED diode is blinking.	A1179/A1257/A1395 has detected an overrange at 200/300 A range.
OVERRANGE DETECTION 2000/3000A	2000/3000 A Range LED diode is blinking.	A1179/A1257/A1395 has detected an overrange at 2000/3000 A range.

Table 6.3 Range state indications

State before	Action to change state	New state
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POWER OFF	press the key	RANGE 20/30 A
RANGE 20/30 A	press the key	RANGE 200/300 A
RANGE 200/300 A	press the key	RANGE 2000/3000 A
RANGE 2000/3000 A	press the key	RANGE 20/30 A

Table 6.4: Change range state table

State before	Action to change state	New state
RANGE 20/30 A	Single overrange	OVERRANGE DETECTION 20/30 A
OVERRANGE DETECTION 20/30 A	Press the key	RANGE 20/30 A
RANGE 200/300 A	Single overrange	OVERRANGE DETECTION 200/300 A
OVERRANGE DETECTION 200/300 A	Press the key	RANGE 200/300 A
RANGE 2000/3000 A	Single overrange	OVERRANGE DETECTION 2000/3000 A
OVERRANGE DETECTION 2000/3000 A	Press the key	RANGE 2000/3000 A

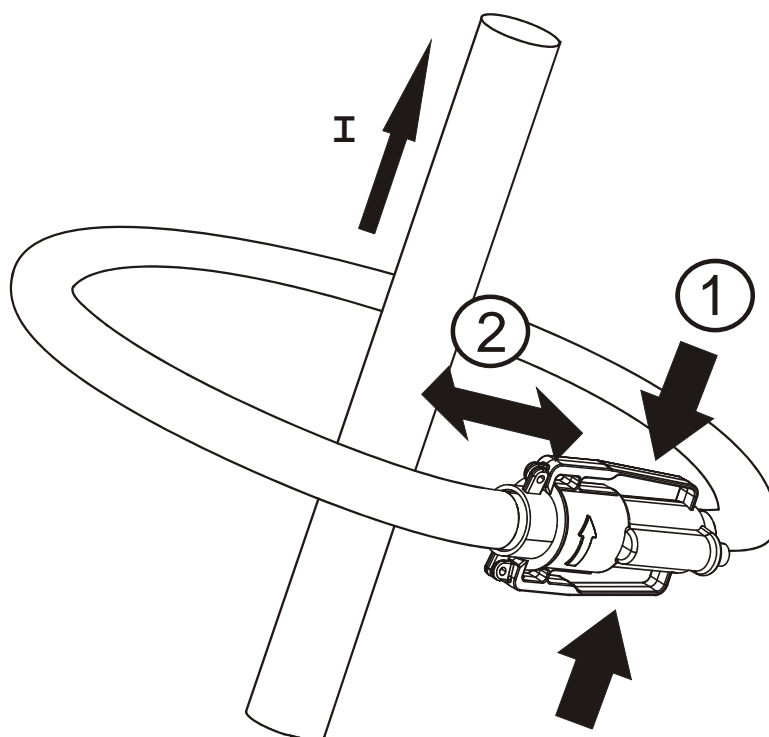
Table 6.5: Change state table when single overrange is detected

State before	Action to change state	New state
RANGE 20/30 A	Permanent overrange	OVERRANGE DETECTION 20/30 A
OVERRANGE DETECTION 20/30 A	Press the key	RANGE 200/300 A
RANGE 200/300 A	Permanent overrange	OVERRANGE DETECTION 200/300 A
OVERRANGE DETECTION 200/300 A	Press the key	RANGE 2000/3000 A
RANGE 2000/3000 A	Permanent overrange	OVERRANGE DETECTION 2000/3000 A
OVERRANGE DETECTION 2000/3000 A	Press the key	*RANGE 20/30 A

*This is just for indication that permanent overrange exists. You should use clamps with higher upper current limit.

Table 6.6: Change state when permanent overrange is detected

7 Measuring current with A1179/A1257/A1395



Picture 7.1: Wrap the measured cable with the measuring clamp

To use the A1179/A1257/A1395 Flexible Current Clamps, follow these instructions:

1. Connect the D01 3 Pin connector of the A1179/A1257/A1395 Flexible Current Clamps to the desired input on the measuring instrument (power meter, digital multimeter, oscilloscope,...) .
2. On the A1179/A1257/A1395 Flexible Current Clamps unit, select the least sensitive range (set the range to '2000/3000 A' – 0.5/0.333 mV/A).
3. Select the corresponding sensitivity (.. mV/A) on your instrument. If you are using a multimeter, select an appropriate AC voltage range.
4. Wrap the flexible measuring head around the conductor to be tested, close coupling (See Picture 7.1) .
5. It is very important that the conductor is as the center and perpendicular to the measuring head. (if it is no possible additional error of 2% of full scale can occur).
6. Do not measure close to other current-carrying conductors if possible. (An external field of 40 A/m can cause an additional measurement error of 1% of full scale).
7. Make sure that the arrow marked on the clamp coupling points toward the correct orientation for correct phase display on the oscilloscope. (See Picture 7.1)
8. Keep the clamp coupling more than 2.5 cm (1 inch) away from the conductor to be tested and other nearby conductors.
9. Observe the current value and waveform on the instrument's display. If desired, select the lower range on the A1179/A1257/A1395 module and set the corresponding sensitivity on the measurement instrument. If the A1179/A1257/A1395 is used with a multimeter, the actual current value can be calculated from the displayed AC voltage value.

8 Cleaning

Use soft patch, slightly moistened with soap water or alcohol, to clean the surface of the A1179/A1257/A1395 and leave it to dry totally, before using it.



Do not use liquids based on petrol or hydrocarbons!



Do not spill cleaning liquid over the A1179/A1257/A1395!

9 Service

For repairs under or out of warranty time please contact your Metrel distributor for further information.

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10 Technical specifications

FEATURES	NOTES	DESCRIPTION
Length of the sensor		48 cm
Measuring range A1179		20 A / 200 A / 2000A ac rms
Measuring range A1257/A1395		30 A / 300 A / 3000A ac rms
Overscale A1179		40A / 400A / 4000 A sinus
Overscale A1257/A1395		60A / 600A / 6000 A sinus
Sensitivities A1179		50 mV / A; 5 mV / A; 0.5 mV / A
Sensitivities A1257/A1395		33.3 mV / A; 3.33 mV / A; 0.333 mV / A
Bandwidth	1	10 Hz up to 8 kHz
Accuracy	2,3,4	+/-1 %
Linearity (10 % to 100 %)	2,3,4	+/-0,2 %
Position sensitivity	6	+/-2 % of full scale
Temperature dependency	9	+/-0.02 % of reading / °C
External fields	7	+/- 1% of full scale
Noise (residual current) A1179	2,4	<4 mV/ <1 mV/ <1 mV, equivalent to 0.08 A (range 20 A) / 0.2 A (range 200 A) / 2 A (range 2000 A)
Noise (residual current) A1257/A1395	2,4	<4 mV/ <1 mV/ <1 mV, equivalent to 0.12 A (range 30 A) / 0.3 A (range 300 A) / 3 A (range 3000 A)
Nominal output voltage		1 V at full scale
Minimum load impedance in output	2	10 kΩ (internal output is 150 Ω)
Phase error		<1° @ 50Hz <10° @ 1.5kHz
Crest factor		Up to 3.0
Overrange indication		Corresponding range LED indication starts blinking
Power supply		2 x 1,2 V AA NIMiH rechargeable batteries or 2 x 1,5 V AA alkaline Low battery indication: Low Bat blinking
Auxiliary External Power Supply		Standard Power Supply 220 VA C / 12 V DC, maximum consumption 30mA.
Autonomy	5	>120 h
External power supply		12 V DC 300 mA
Battery Charger		Integrated battery charger with constant current cca 160mA. Charging battery indication: Low Bat ON
Electrical Security		Double insulation EN 61010 – 1000 V- Cat III- Contamination Deg. 2
Environment Conditions	8	Sensor: Usage and storage: -20 to 85 °C and 15 % to 85 % RH (without condensing) Module: Usage and storage: -20 to 70 °C and 15 % to 85 % RH (without condensing)
Dimensions / Weight		Enclosure : 120 x 65 x 22 mm / 220 g Attached signal cable: 1 m (other lengths upon request)
Weight of flexible sensor		< 130 g
Water and dustproofing		Sensor: IP 64 Module: IP 40

- 1: Limits of bandwidth corresponding to a relative gain > -3 dB
- 2: Reference conditions: 45 Hz – 65 Hz, conductor is in the center and perpendicular to the measuring head, temperature between 15 °C to 25 °C; 10 k Ω of load impedance; laboratory environment electrical noise free.
- 3: Error of reading in reference conditions.
- 4: Expression of error measurement in reference conditions
error % = (I residual / I measured) x 100 + linearity + Accuracy
- 5: Full charged NiMH 2200 mAh at 25 °C
- 6: Distance between cable and clamp coupling should be >25 mm (1").
- 7: Adjacent conductor ≥ 20 cm or 8 inch from head. (<40 A/m)
- 8: This data can be changed regarding the temperature ranges of the used batteries.
- 9: No additional error in range 15 °C – 25°C,
 - for higher temperatures: Temp. error = (Temp - 25°C) * Temperature dependency
 - for lower temperatures: Temp. error = (15°C - Temp) * Temperature dependency