



## **Iron Current Clamp**

**A 1398 PQA**

### **Instruction manual**

*Version 1.1.1; Code No. 20 753 248*



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Mark on your equipment certifies that it meets requirements of all subjected EU regulations



Hereby, Metrel d.d. declares that the A 1398 PQA is in compliance with subjected EU directives. The full text of the EU declaration of conformity is available at the following internet address <https://www.metrel.si/DoC>.

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# 1 General Description

The **A 1398 PQA** current clamps are designed for measuring alternating currents on insulated conductors on low power installations: 50 mA ÷ 20 A. They are designed for Metrel Power Quality Instruments MI 2893 / MI 2892 / MI 2885 / MI 2884 / MI 2883.

The current transducer is housed in a plastic case that maintains double insulation. Parts are shown on figure below:

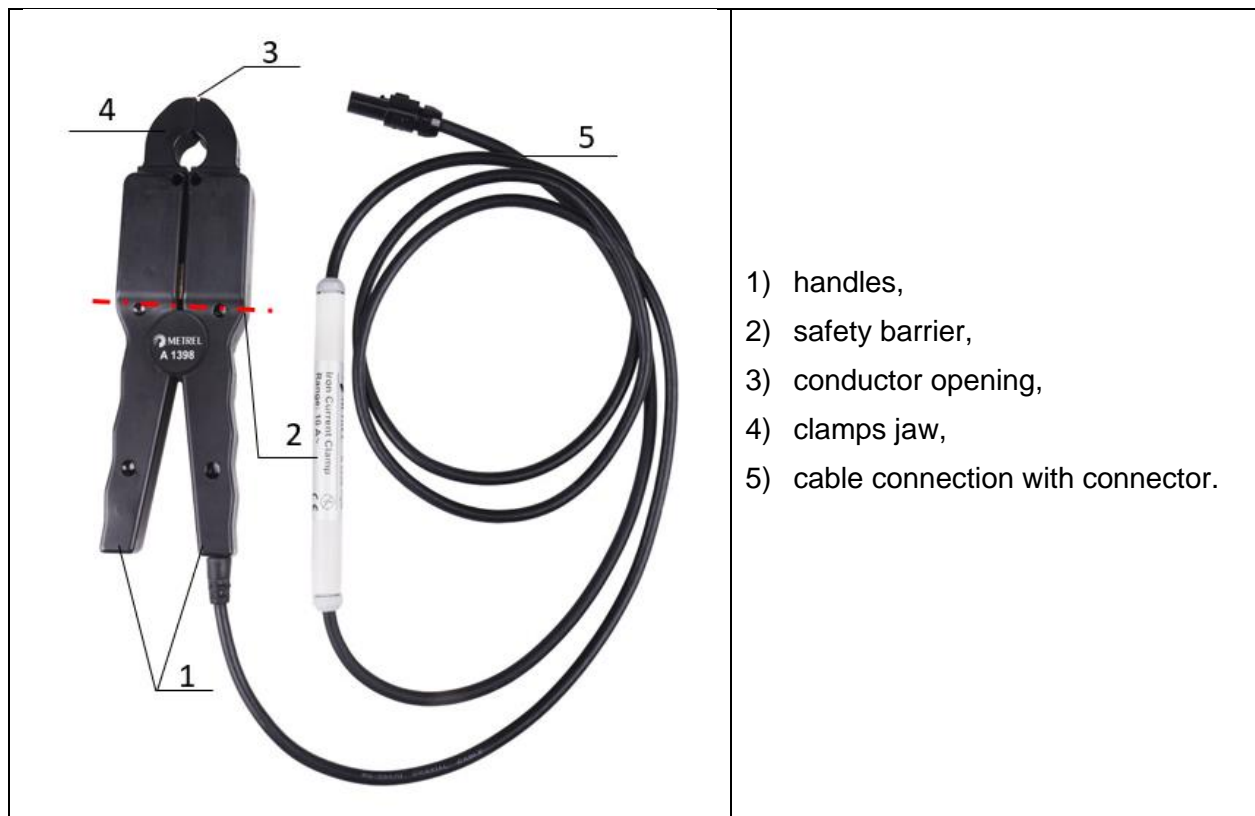


Figure 1: A 1398 PQA current clamps

## 1.1 Typical applications

### Power Quality Measurement

The A 1398 PQA current clamps have linear response through wide frequency bandwidth. Therefore, they are well suited for:

- Power Quality auditing,
- EN 50160 or troubleshooting. Particularly for:
  - o Current distortion measurement
  - o Inrush measurement
  - o Functional testing of appliances, machines, etc.

High precision and measurement range up to 20A can cover most current measurements on the secondary side of current transformer (CT) without opening of current circuit.

### Energy and Power Measurement



The A 1398 PQA current clamps have small phase shift over wide frequency range. Therefore, they are well suited for:

- Power and energy measurements (active, reactive, apparent)
- Power factor measurements
- Power/Energy efficiency





## 2 Safety and operational considerations

### 2.1 Warnings and notes

In order to maintain the highest level of operator safety while carrying out various tests and measurements Metrel recommends keeping your A 1398 PQA Iron Current Clamp in good condition and undamaged. When using the A 1398 PQA, consider the following general warnings:

- ❑ The  symbol on the A 1398 PQA means »Read the Instruction manual with special care for safe operation«. The symbol requires an action!
- ❑ If the test equipment is used in a manner that is not specified in this Instruction 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 A 1398 PQA Iron Current Clamp and its latching system for any damage. Pay particular attention to the insulation surrounding the jaw. Look for cracks or missing portions of the clamp housing or output cable insulation. Also look for loose or weakened components. Don't use current sensor if the wear indicator of the cable connection is visible.
- ❑ Do not use a clamp that is cracked, damaged, or has a defective cable.
- ❑ Do not use the A 1398 PQA Iron Current Clamp to measure bare conductors carrying a voltage higher than 30 V ac rms or 42 V ac peak.
- ❑ Never use the clamp on a circuit with voltages higher than 300 V CAT II (insulated conductors).
- ❑ 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 (follow the requirements of EN 50191).
- ❑  Do not apply around or remove from UNINSULATED HAZARDOUS LIVE conductors, which may render electric shock, electric burn, or arc flash.

**Markings on the A 1398 PQA:**

Symbol	Description
	<b>Read the Instruction manual with special care to safety operation«. The symbol requires an action!</b>
	<b>Do not apply around or remove from HAZARDOUS LIVE conductors.</b>
	<b>Mark on your equipment certifies that it meets requirements of all subjected EU regulations.</b>
	<b>This equipment should be recycled as electronic waste.</b>

## 2.2 Standards applied

The A 1398 PQA Iron Current Clamp is manufactured and tested in accordance with the following regulations:

*Electromagnetic compatibility (EMC)*

<b>EN 61326 - 1</b>	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
<b>EN 61326 - 2 - 2</b>	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-2: Particular requirements - Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems

*Safety (LVD)*

<b>EN 61010 - 1</b>	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements
<b>EN 61010 - 2 - 032</b>	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement

**Note about EN and IEC standards:**

- Text of this manual contains references to European standards. All standards of EN 6XXXX (e.g. EN 61010) series are equivalent to IEC standards with the same number (e.g. IEC 61010) and differ only in amended parts required by European harmonization procedure.

### 3 Current clamp operation

**Step 1**

Connect A 1398 PQA Iron Current Clamps to the desired input on the measuring instrument.

**Step 2**

Clamp the probe around the insulated current-carrying conductor(s) to be measured. Make sure that probe jaws are tightly closed around the conductor(s). In the case of measuring current near live, naked conductor(s), remove electrical power from wires, before clamping (follow the requirements of EN 50191).

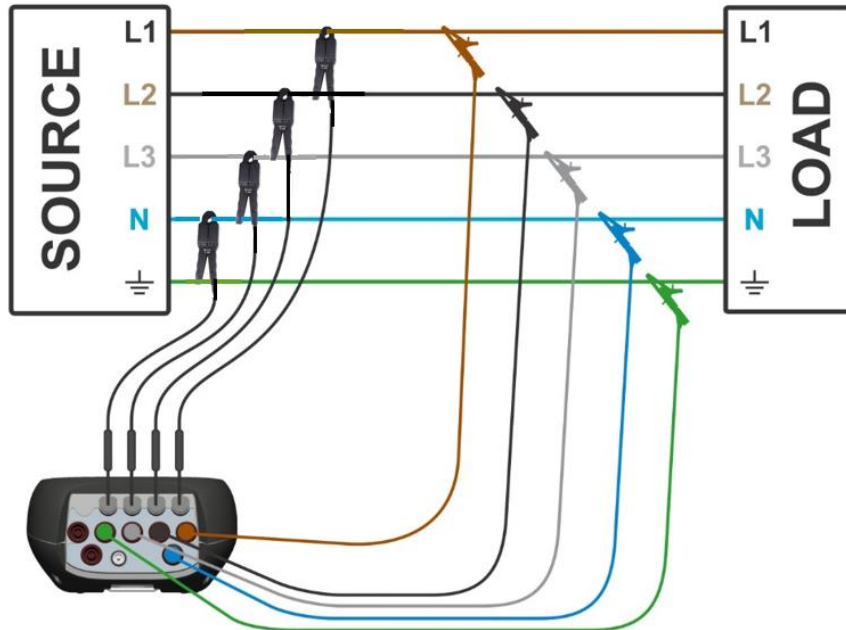


Figure 2: Current clamps A 1398 PQA - connection to the measuring instrument

**Step 3**

Select Phase and Neutral clamps to **Smart Clamp** in Connection setup menu on your instrument.

CONNECTION SETUP		13:22
Nominal voltage L-N	230V	
Phase Curr. Clamps	Smart clamps/T (0.0mA/V)	
Neutral Curr. Clamps	Smart clamps/T (0.0mA/V)	
Connection	4W	
Synchronization	U1	
System frequency	50Hz	
Connection check	X	
Factory reset		

Select Clamps		13:23
Smart clamps/T		
Custom		
None		
A1033	(1000A, 100A)	
A1069	(100A, 10A)	
A1122	(5A, 500mA)	
A1037	(5A, 500mA)	
A1120	(30A, 300A, 3000A)	

**Step 4**

Observe the current value and waveform on the instrument's display.

## 4 Inspection

To maintain operator safety and ensure reliability of the A 1398 PQA Iron Current Clamp, it is good practice to inspect it on a regular basis. Check that the enclosure and optional connection are without defects such as scratches or breaks.

Jaw surface must be clean. Pollution on jaw surfaces reduces the current clamp sensitivity.

## 5 Cleaning

No special maintenance is required for the housing. To clean the surface of the A 1398 PQA use a soft cloth slightly moistened with soapy water or alcohol. Then leave the A 1398 PQA to dry totally before use.



### **Warnings:**

- ❑ **Do not use liquids based on petrol or hydrocarbons!**
- ❑ **Do not spill cleaning liquid over the A 1398 PQA!**

## 6 Service and Calibration

It is essential that your clamp is regularly calibrated in order to guarantee the technical specification listed in this Instruction manual. We recommend 2-year calibration interval. Metrel encloses an original calibration certificate with every new instrument and clamp.

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



### **Warning:**

- ❑ **Only a competent, authorized person is allowed to carry out service intervention!**



## 7 Technical specifications

Nominal current ( $I_{Nom}$ ) .....	10 A
Nominal current range .....	5 % $I_{Nom}$ ... 200 % $I_{Nom}$
Maximal current ( $I_{Max}$ ) .....	20 A
Crest factor @ Nominal current .....	4,0
Peak current .....	40 A
Bandwidth .....	40 Hz ... 400 Hz
Uncertainty .....	$\pm$ (0,5 % of reading $\pm$ 10 mA)
Phase Error .....	$\pm \leq 0,45^\circ$ (50 – 60 Hz)
External fields .....	30 A/m (No influence)
Continuity of measurements .....	20 A (continuous) 30 A (40 min / 20 min intermitted)

**Dimensions & Mechanical data:**

Current sensor type.....	D
Length of connection cable .....	1,2 m
Jaw opening.....	13 mm
Maximum conductor sizes.....	fi < 13 mm
Length of connection cable .....	1,2 m
Dimensions (W x H x L) .....	27 mm x 52 mm x 170 mm
Weight .....	340 g

**Safety specification:**

Over-voltage category .....	No CAT, (can be used on insulated conductors in 300 V CAT II)
Pollution degree .....	2
Degree of protection .....	IP 40

**EMC:**

Emission.....	Class B
Immunity .....	Portable equipment

**Environment conditions:**

Working temperature range .....	-10 °C ... 50 °C
Storage temperature range.....	-20 °C ... 60 °C
Humidity range .....	0 %RH ... 80 %RH
Reference temperature range.....	25 °C $\pm$ 5 °C @ 40 %RH ... 60 %RH
Altitude.....	up to 2000 m
Operation .....	Indoor use

**Substitute Electric Model for A 1398 PQA Iron Current Clamp**

Equivalent circuit diagram for current clamp measurement:

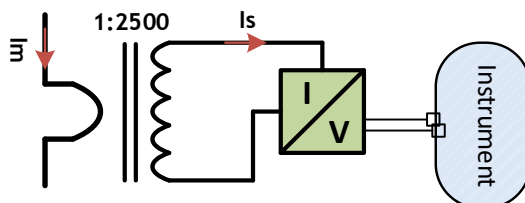


Figure 3: A 1398 PQA Iron Current Clamp - block diagram

Symbols on circuit diagrams have following meaning:

$I_m$	Measured (AC) current, primary current
$I_s$	Secondary transformer current