THEORY OF OPERATION

The Y8101A AC Current Transformer (as shown in Figure 3) is a clamp-on probe designed to extend current measurement range of a meter up to 150 amperes. Electrically, the probe is a 1000 turn coil and is equivalent to a transformer's secondary winding. The current-carrying conductor serves as the primary when inserted into the transformer's jaws. Current from the primary is coupled to the secondary, attenuated 1000:1, and used to drive the input of a meter.

MAINTENANCE

Performance Test

Verify the probe accuracy by measuring the output of a 10A (0.2%, 60 Hz current source. When used with a compatible (.25% voltmeter, the probe should measure the source current with (3% accuracy. No calibration adjustments are provided.

Cleaning

Use a soft cloth dampened in a mild solution of detergent and water to clean the Y8101A. Do not use solvents. A light coating of dripless oil on the jaw sufaces will prevent corrosion.

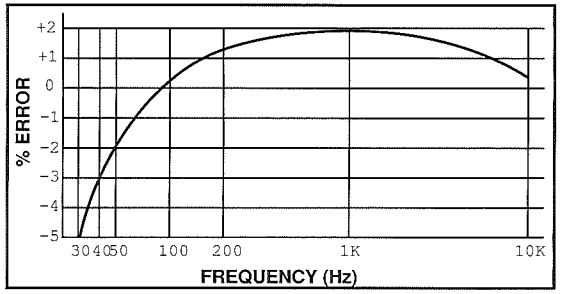

Figure 2. Typical Frequency Responce for a Primary Current of 10A Measure on 20 mA Range (10Ω Shunt)

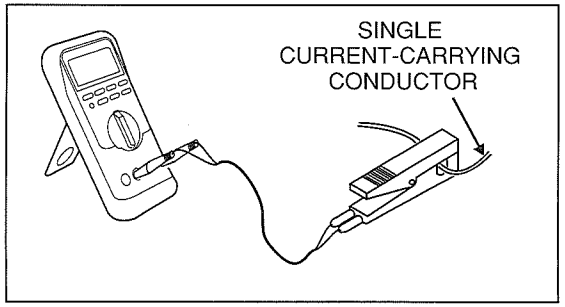

Figure 3. Y8101A in Use

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Fluke Corporation
P.O. Box 9090
Everett WA
98206-9090

Fluke Europe B.V
P.O. Box 1186
5602 B.D
Eindhoven
The Netherlands

PN 943944
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FLUKE®

Instruction Sheet
Model Y8101A
AC Current Transformer

INTRODUCTION

The Model Y8101A (Figure 1) is a small clamp-on current transformer designed to extend the current measuring capability of an ac current meter or DMM up to 150 amperes. A clamp-on coil designed into the probe allows measurements to be made without breaking the circuit under test. This coil serves as the secondary of a 1:1000 transformer. The current-carrying conductor being measured serves as the primary.

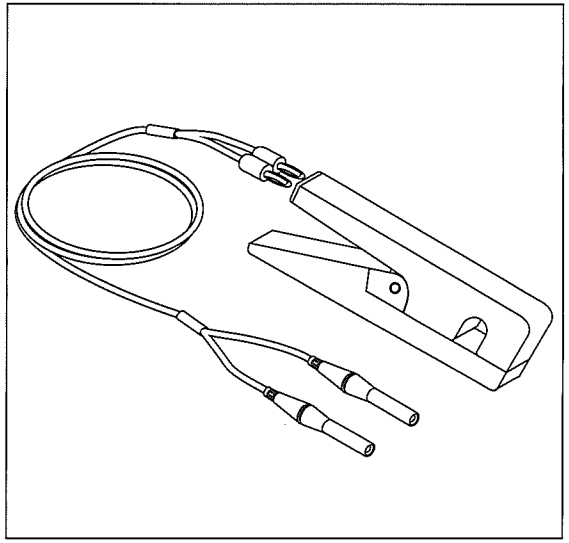

Figure 1. Model Y8101A AC Current Transformer

SPECIFICATIONS

Current Range: 2A to 150A

Accuracy: 48 Hz to 440 Hz (±2.5% + 0.15A)
440 Hz to 1200 Hz (±-3% + 0.15A)

Division Ratio: 1000:1

Working Voltage: 300V ac rms max.

Maximum Conductor Size: 7/16 in. (1.11 cm)

Protection Class II: As defined in IEC 348 and ANSI C39.5

MEASUREMENT CONSIDERATIONS

WARNING

THE CORD SET PROVIDED IS INTENDED TO BE USED WITH THE Y8101A ONLY. TO PREVENT SHOCK HAZARD, DO NOT USE THE CORD SET FOR ANY OTHER PURPOSE.

The following paragraphs contain measurement information that should be considered before attempting to use the probe.

Meter Compatibility

The Y8101A is compatible with any ac current meter or DMM capable of reading a current equal to 1/1000 of the current to be measured. The meter must also accept standard diameter, 0.16" (4mm) safety-shrouded banana plugs and have an ac mA range. To take full advantage of the probe's accuracy, a DMM accuracy of ±0.5% of reading is recommended.

A voltmeter fitted with an external shunt will qualify as a suitable meter. However, to ensure the probe's accuracy, the shunt should be selected for a burden voltage (I.R drop at rated current) of not more than 200 mV. See Table 1.

When making a measurement, the current-carrying conductor is not broken, and remains electrically isolated from the meter input terminals. As a result, the meter's low-input terminal may be either floated or grounded.

Meter Readings

When the Y8101A is connected to a compatible meter and clamped around a single current-carrying conductor the meter will provide a current reading. The reading will be 1000th of the actual current in the cable. For example, a 5 ampere current will cause the meter to read 5 milliamperes. See Table 1.

Table 1. Typical DMM Range Selection Guide

INPUT CURRENT RANGE	RECOMMENDED DMM RANGE OR SHUNT	EQUIVALENT DISPLAY FOR 3 1/2 DIGIT DMM
2A to 10A	20 mA (10Ω Shunt)	2.00 to 10.00
10A to 150A	200 mA (1Ω Shunt)	10.0 to 150.0

NOTE

The range selection on the meter should always be 20 mA or greater (10 ohm shunt), as shown in Table 1. Lower ranges with higher shunt values will cause reading errors.

When measuring current in an AC line cord, the jaws should be clamped around only one conductor. If the jaws are clamped around both conductors, the current will cancel and produce a zero reading.

If the probe is clamped around two wires carrying current in the same direction, the sum will be read. Reversing one of the wire causes the difference to be read.

Low-Level Current Measurements

The Y8101A Current Transformer is specified to measure primary currents of 2A or greater. Primary currents less than 2A will produce meter readings that are below the true value. Low-level currents below 2A can be measured by looping the primary wires though the jaws so that the sum of the current through the jaws is greater than 2A. The actual current can then be calculated by taking the meter reading and dividing it by the number of turns looped through the jaws.

EXAMPLE
To measure a current of 300 mA (0.3A), form a loop of 10 turns. Clamp the jaws of Y8101A around all 10 turns. The meter reading will be 3 mA, which corresponds to a primary current of 3A. The actual current in the cable will be 3A divided by 10 turns, or 300 mA.

OPERATION

Use the following procedure to operate the Y8101A.

1. Select and energize a compatible ac meter.

NOTE

Refer to Table 2 to determine the appropriate input jack and proper function setting for use with a Fluke handheld DMM. Use Table 1 for use with other typical DMMs.

2. Select the appropriate current range.

3. Clamp the probe around the desired current-carrying conductor. Make sure the jaws are tightly clamped.

4. Multimeter readings displayed in milliamps (mA) can be read directly as amperes of conductor current. Reading displayed in amperes (A) must be multiplied times 1000 to obtain the amperes of conductor current.

5. Typical performance on 20 mA range with 10A primary current is shown in Figure 2.

Table 2. Clamp/Meter Setup Guide for Fluke Meters

FLUKE MODEL	INPUT JACK (for red lead)	FUNCTION
21	300 mA	A~
23	300 mA	
21 Series II, 23 Series II		A~
25, 27	mAμA	mA/A~
75, 77	300 mA	A~
75 Series II 77 Series II		
29, 79 Series II	40 mA 10A for ≥40A	A~
83, 85, 87	mAμA	mA/A~
8060A,8062A	A	AC~, A *
8020A, 8020B, 8021B, 8022A, 8024A, 8024B, 8026B	mA	AC~,mA*

* 20 mA range for up to 20A
200 mA range for up to 150A