

# **GUILDLINE**

**OPERATION MANUAL**

**FOR**

**SERIES 7340**

**AC CURRENT SHUNTS**

NOTICE

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**OM7340-D2-00**  
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# Table of Contents

1.0	Introduction	1-1
1.1	Unpacking and Inspection	1-1
1.2	Warranty	1-2
1.3	To Obtain Warranty or Calibration and Repair Service	1-3
1.4	Safety Information	1-4
2.0	7340 Product Overview	2-1
3.0	Specifications	3-1
3.1	General Specifications	3-3
4.0	Options	4-1



# List Of Figures

FIGURE 1 - MECHANICAL OUTLINE .....	2-2
FIGURE 2 - 73401 INSTALLED ON 7340 .....	2-3
FIGURE 3 - SCHEMATIC DETAIL .....	2-4



## 1.0 INTRODUCTION

This manual provides an overview of the 7340 Series of AC/DC Current Shunts. General product information, description of case styles and performance specifications are also included.

This manual applies to all models of the 7340 Series unless otherwise noted.

The phone number in the USA and Canada to obtain Product Support, Calibration Service or Replacement Parts is (800) 310-8104.

To Contact Guildline Instruments, the following information is provided.

USA and Canada Telephone: (613) 283-3000

USA and Canada Fax: 1-613-283-6082

Outside US and Canada Telephone: + [0] [1] 613 283-3000

Outside US and Canada Fax: + [0] [1] 613 283-6082

You can also contact Guildline Instruments Limited via their Email or Websites.

Email is: [sales@guildline.com](mailto:sales@guildline.com)

Website is: [www.guildline.com](http://www.guildline.com)

### 1.1 Unpacking and Inspection

Every care is taken in the choice of packing material to ensure that your equipment will reach you in perfect condition. If the equipment has been subject to excessive handling in transit, the fact will probably be visible as external damage to the shipping carton.

In the event of damage, the shipping container and cushioning material should be kept for the carrier's inspection.

Carefully unpack the equipment and check for external damage to the standard. If the shipping container and packing material are undamaged, they should be retained for use in return shipments. If damage is found notify the carrier and Guildline immediately.



## 1.2 Warranty

Guildline Instruments warrants its products to be free of defects in manufacture and normal operation for a period of two (2) years from the date of purchase, except as otherwise specified. This warranty applies only in the country of original purchase and only to the original purchaser, who is also the end user. Equipment, which is defective or fails within the warranty period, will be repaired or replaced at our factory without charge at the discretion of Guildline Instruments.

In addition, standards and systems manufactured by Guildline Instruments are warranted to be free of defects in overall system operation for a period of two (2) years from the date of receipt by the original purchaser.

Third party system components purchased by Guildline carry the warranty of the original equipment manufacturer and will be accepted for claim by Guildline Instruments at our factory only after warranty authorization by the original manufacturer.

### **Limitation of Warranty**

Warranty coverage does not apply to equipment which has failed due to misuse, neglect, accident or abnormal conditions of operation or if modifications or repairs have been made without prior written authorization of Guildline instruments.

Temperature probes are not warranted against failure due to mechanical shock.  
Fuses, lamps and non-rechargeable batteries are not warranted against breakage.

### **Damage in Shipment to Original Purchase**

Shunts should be thoroughly inspected immediately on receipt for visible damage. Any damage should be reported to the carrier and further inspection and operational tests should be carried out if appropriate to determine if there is internal damage. Contact Guildline Instruments before returning for repair. The Customer or purchaser must complete all final claims with the carrier.

Regular charges will apply to non-warranty service. External service charges and expenses will be billed at cost plus handling.



# Section 1

## 1.3 To Obtain Warranty or Calibration and Repair Service

**Call for a Return Material Authorization (RMA) number. RMA's are required for all Warranty Returns and/or Calibration and Repair Service Requests.** Telephone, Fax and email addresses to contact Guildline are provided previously.

Guildline Instruments will pay for all warranty costs including shipping from Guildline to the original shipment point. However, if the instrument is purchased within one country and shipped to another, Guildline will only pay for shipping to the original ship to country or customer point. The customer is responsible for paying for the shipping costs to return an item to Guildline.

### **USA Warranty Return Address.**

USA Customers should use the following address to return instruments for warranty service or calibration support.

Guildline Instruments Limited  
C/O AN Deringer  
835 Commerce Park Drive  
Ogdensburg, NY 13669

Mark on the outside of the box:

RMA # \_\_\_\_\_

Model # \_\_\_\_\_

Serial # \_\_\_\_\_

The Statement: "Canadian manufactured goods being returned for repair."

### **For all other countries, including Canada please ship to:**

Guildline Instruments Limited  
21 Gilroy Street, PO Box 99  
Smiths Falls, ON K7A 4S9

Mark on the outside of the box:

RMA # \_\_\_\_\_

Model # \_\_\_\_\_

Serial # \_\_\_\_\_

The Statement: "Canadian manufactured goods being returned for repair."

## 1.4 Safety Information

**WARNING: Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 42 V dc. These voltages pose a shock hazard.**

The 7340 AC/DC Current Shunts are designed to work within specifications at between 0.001 W to 40 W of power depending on the model. Applying more than the recommended power or voltage will damage the unit and voids the warranty.

Do not use the Current Shunts in wet environments.

Never use the Current Shunt with the cover removed or the case open.

When making electrical connections, connect the voltage test lead before connecting the live current test lead; when disconnecting, disconnect the live current lead before disconnecting the voltage test lead.

Inspect the Current Shunt for damage such as cracked connectors prior to use. If unit has a burned smell or smoke is visible during use, discontinue use immediately.

If test equipment used with Current Shunts overloads or trips, this could be a sign that the Current Shunt requires repair.

Inspect all test leads used with the Current Shunt for damaged insulation or exposed metal. Check all test leads for continuity.

Ensure all test leads are correctly connected prior to applying current or voltage.

Do NOT use Current Shunts around explosive gas, vapor or dust.

### 2.0 7340 PRODUCT OVERVIEW

The Guildline 7340 Series of four-terminal ACDC/ CURRENT SHUNTS are designed as high accuracy and stability standards with very low temperature and power coefficients. These Shunts are designed to have extremely small values of reactance up to a frequency of 100 kHz and output voltages in the range of 0.2 to 1 Volt over specific current ranges from 1 mA to 100 A. The 7340 Series, although no specifications are provided above 100 kHz, are stable when operated up to 2 MHz.

The 7340 AC Current Shunts can be used for a variety of AC/DC current measurement applications and have nominal impedances in the range of 1000  $\Omega$  to 0.004  $\Omega$ . Applications include the calibration of precision AC current sources, multi-function calibrators, high accuracy digital multi-meters and transconductance amplifiers. The current shunts may also be used to provide traceable currents up to 100 A with the utilization of traceable voltages sources from DC to 100 kHz. The lower resistance value shunts may be used as burdens for current transformers and for AC power and energy measurements. The very low phase shift of the shunts makes accurate higher frequency power measurements practical. The 7340 Series can be operated up to 2 MHz with a stable output signal. The output voltage of the shunts faithfully reproduces the current waveform even under highly distorted current conditions.

The shunts are designed to operate at specific current ranges. Models for currents below 10 A are specified with natural cooling. Models above 3 A require forced air cooling. Model 73401 Forced Air Convection Unit is recommended to provide forced air cooling and a stabilized environmental temperature for the shunts. Resistance values vary depending on specific current ranges from 0.004  $\Omega$  to 1000  $\Omega$  in a 1, 3, 10 ratio series.

For models with currents of 25 A and lower, a UHF type connector on the back face of the shunt is provided for connection to the current source to be measured. A BNC connector on the front face is provided for connection to a voltmeter or other potential measuring device. The enclosure is isolated from the input and output connector shells and a separate binding post is provided for connection to an earth ground or a guard potential. For models above 25 A an LC type connector is provided for connection to the current source.

Figure 1 details mechanical outline. Figure 2 shows schematic detail. Series adapters are available for connecting the shunts in series with the device to be calibrated. When using the series adapter above 10 kHz it is advisable to make two sets of measurements; one with the normal positioning of the reference and UUT shunt and a second set of measurements with the shunt position reversed. This will remove the effect of the parallel capacitance between the two shunts when the average of the two measurements is calculated.

Maintenance of the shunt consists of routinely inspecting the unit for physical damage and cleanliness. The screws around the circumference of the enclosure and the connectors should be checked for tightness periodically. Cleaning with a dry clean cloth is recommended. Water or other solvents should not be used as this may damage the surface of the shunt panels.

The following pages provide mechanical overviews.

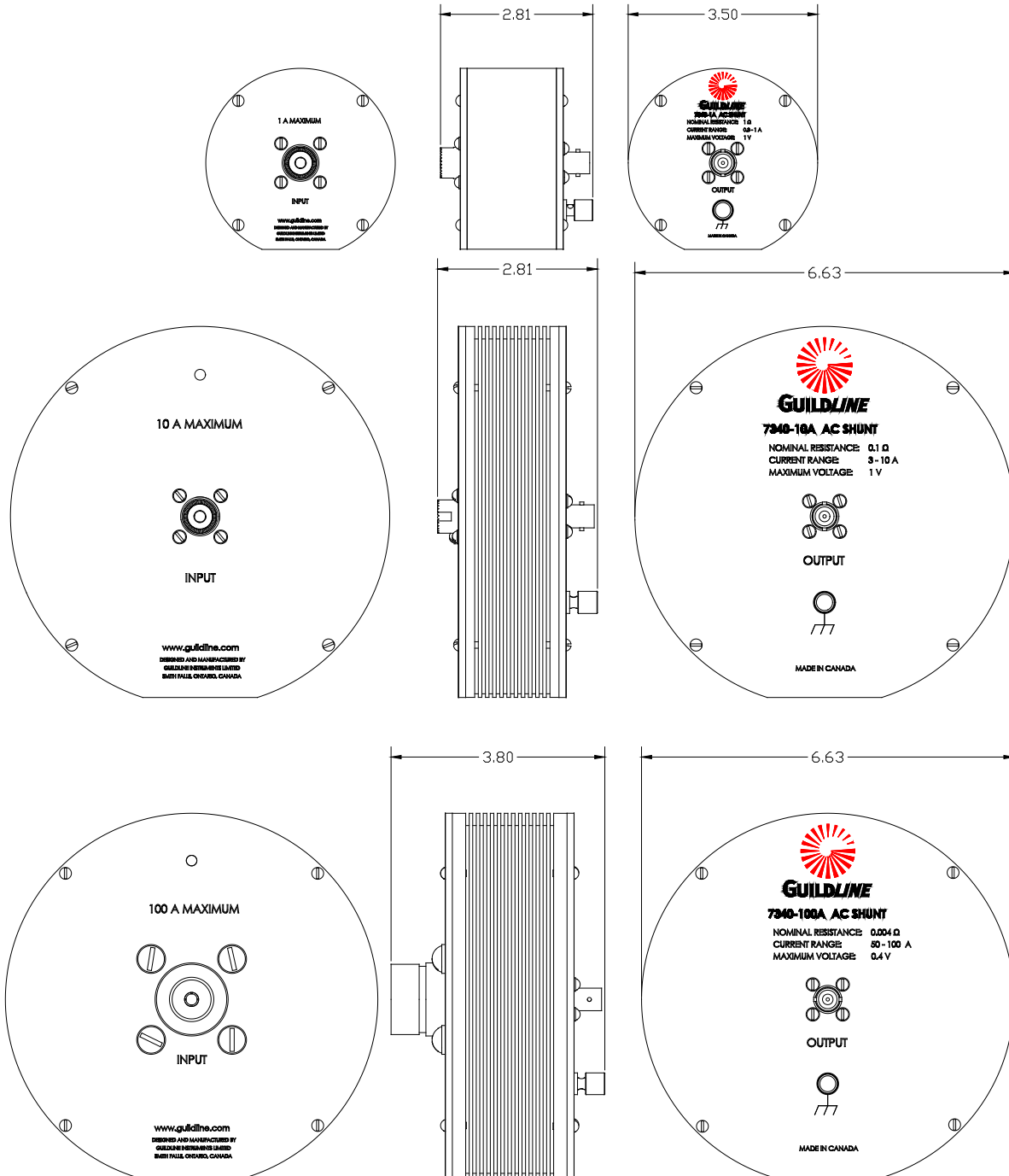


Figure 1 - Mechanical Outline

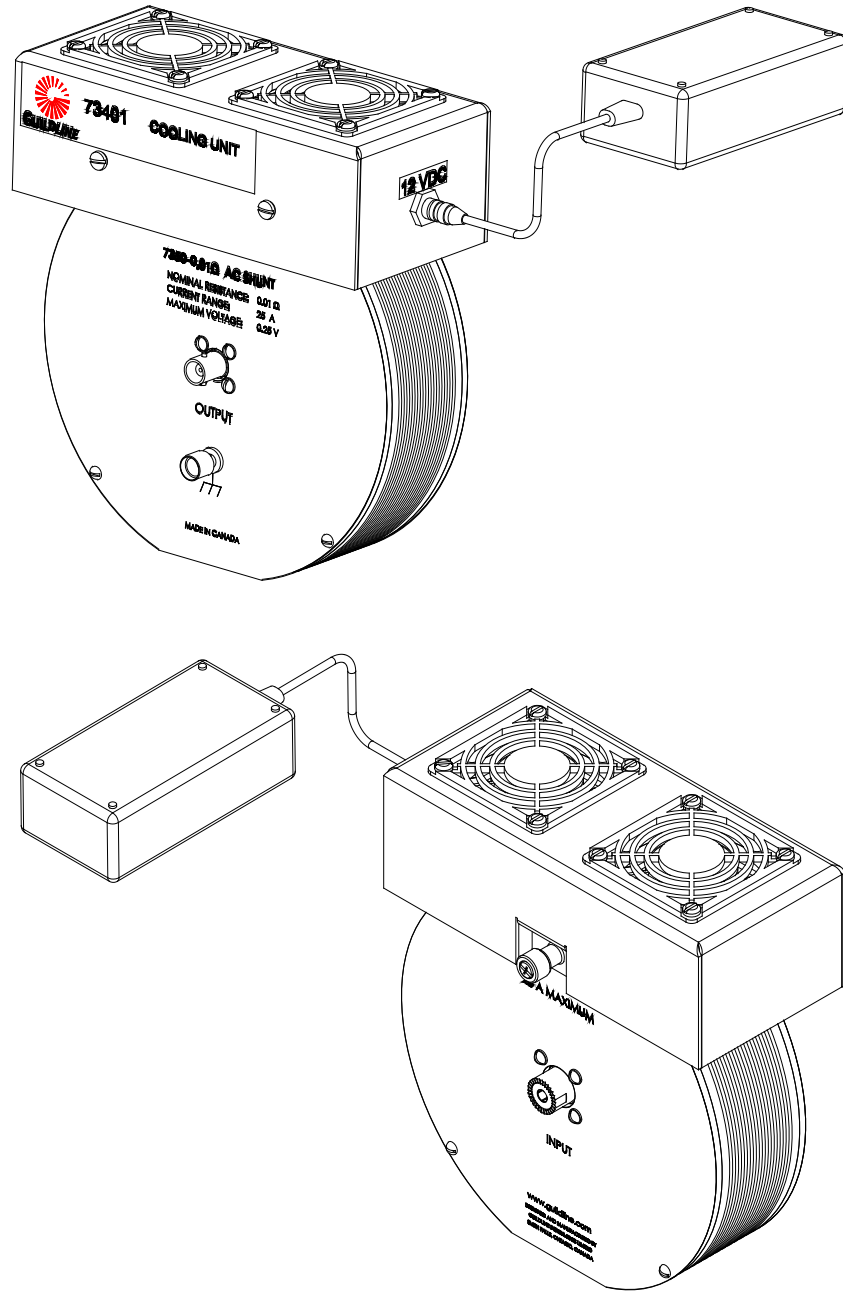


Figure 2 - 73401 Installed on 7340

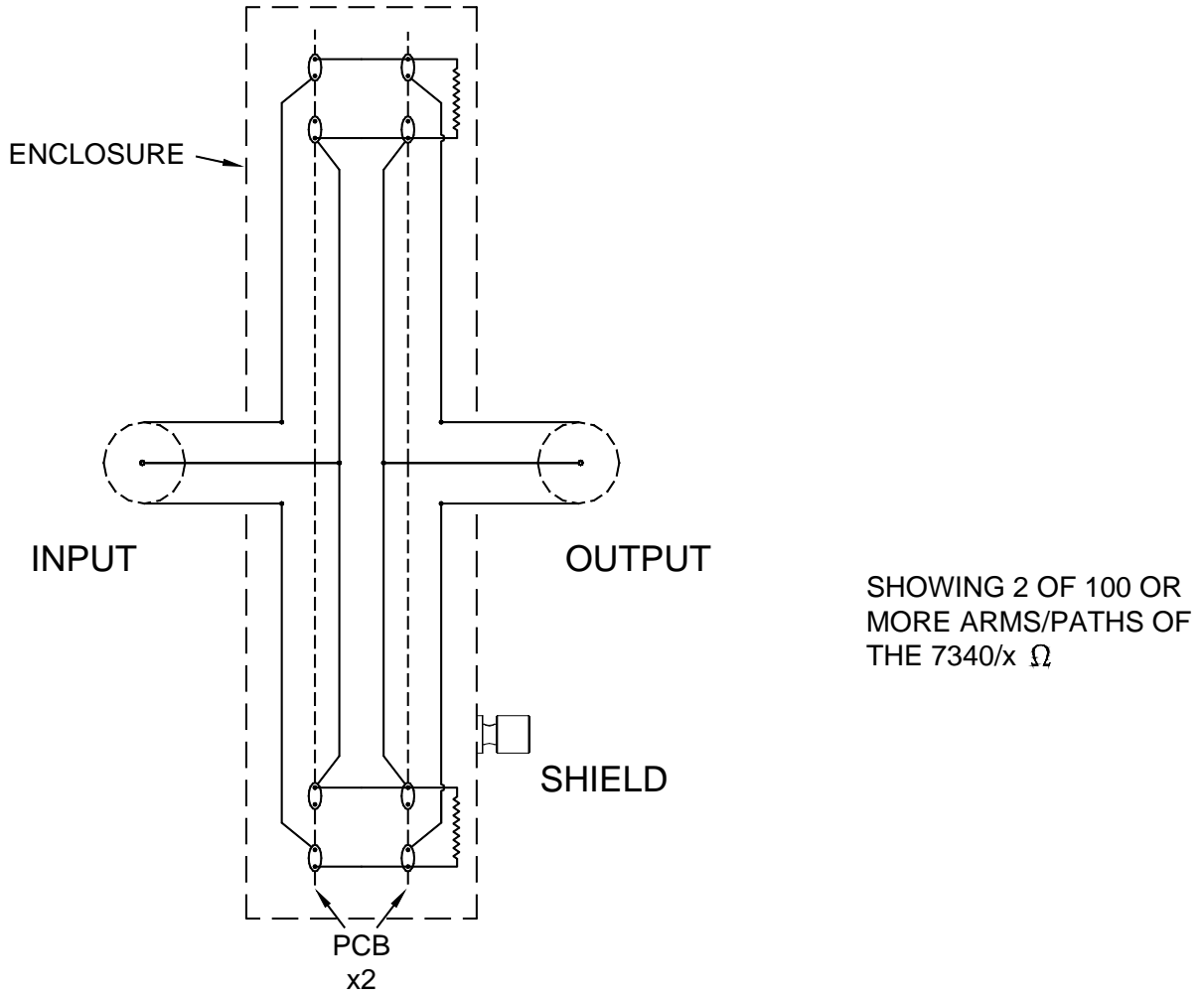


Figure 3 - Schematic Detail

## 3.0 SPECIFICATIONS

<b>7340 SERIES (VOLTAGE BASED)</b>					<b>12 MONTH MAXIMUM AC-DC DIFFERENCE <sup>1</sup> (in ppm @ 23°C ± 2°C &lt;50% RH)</b>			
<b>Model</b> (Nominal Current)	<b>National Measurement Institute (NMI) Verification</b>				<b>Guildline (Factory) Verification</b>			
	<b>1 kHz</b>	<b>10 kHz</b>	<b>30 kHz <sup>2</sup></b>	<b>100 kHz</b>	<b>1 kHz</b>	<b>10 kHz</b>	<b>30 kHz <sup>2</sup></b>	<b>100 kHz</b>
7340-0.001A	± 15	0 ~ + 50	0 ~ + 60	-0 ~ + 150	± 25	-0 ~ + 75	-0 ~ + 90	-0 ~ + 200
7340-0.003A	± 15	0 ~ + 30	0 ~ + 40	-0 ~ + 130	± 25	-0 ~ + 50	-0 ~ + 60	-0 ~ + 175
7340-0.01A	± 10	-0 ~ + 10	-0 ~ + 20	-0 ~ + 80	± 25	-0 ~ + 25	-0 ~ + 50	-0 ~ + 100
7340-0.03A	± 10	-0 ~ + 10	-0 ~ + 15	-0 ~ + 40	± 25	-0 ~ + 25	-0 ~ + 45	-0 ~ + 60
7340-0.1A	± 10	± 10	± 10	± 25	± 25	± 25	± 30	± 35
7340-0.3A	± 10	± 10	± 10	± 20	± 25	± 25	± 30	± 35
7340-1A	± 10	± 10	± 10	± 20	± 25	± 30	± 30	± 35
7340-3A	± 10	± 15	± 20	-50 ~ + 0	± 25	± 30	± 30	-70 ~ + 0
7340-10A	± 25	± 30	± 45	-100 ~ + 0	± 30	± 40	± 70	-140 ~ + 0
7340-25A	± 35	± 40	-60 ~ + 0	-140 ~ + 0	± 35	± 60	-80 ~ + 0	-160 ~ + 0
7340-50A	± 35	-40 ~ + 0	-60 ~ + 0	-150 ~ + 0	± 35	-80 ~ + 0	-100 ~ + 0	-180 ~ + 0
7340-100A	± 40	-60 ~ + 0	-110 ~ + 0	-250 ~ + 0	± 40	-100 ~ + 0	-140 ~ + 0	-300 ~ + 0

*Above uncertainties are stated at k=2 and include both relative uncertainties and complete measurement uncertainties.*

7340 SERIES (VOLTAGE BASED)			GENERAL SPECIFICATIONS (@ 23 °C ± 2 °C <50% RH)				
MODEL (NOMINAL CURRENT)	CURRENT RANGE (A)	NOMINAL RESISTANCE (Ω)	INITIAL TOLERANCE <sup>3</sup> (± ppm)	OUTPUT VOLTAGE RANGE (V)	DC STABILITY (± ppm)	COEFFICIENTS <sup>4</sup>	
						TEMPERATURE ± ppm/°C	POWER ± ppm/WATT
7340-0.001A	0.0003-0.001	1000	100	0.3 – 1	16	2.5	3
7340-0.003A	0.001-0.0033	300	100	0.3 – 1	16	2.5	3
7340-0.01 A	0.003 – 0.01	100	100	0.3 – 1	16	2.5	3
7340-0.03 A	0.01 – 0.033	30	100	0.3 – 1	16	3.5	3
7340-0.1 A	0.03 – 0.1	10	100	0.3 – 1	16	2.5	3
7340-0.3 A	0.1 – 0.33	3	100	0.3 – 1	16	3.5	3
7340-1 A	0.3 – 1	1	100	0.3 – 1	16	4.0	3
7340-3 A	1 – 3.3	0.3	100	0.3 – 1	16	4.0	4
7340-10 A	3 – 10	0.1	100	0.3 – 1	16	4.0	4.5
7340-25 A	10 – 25	0.03	100	0.3 – 0.75	16	4.5	5
7340-50 A	25 – 50	0.01	125	0.25 – 0.5	16	4.5	5.5
7340-100 A	50 - 100	0.004	150	0.20 – 0.4	16	4.5	6

7340 SERIES DIMENSIONS AND CONNECTORS								
7340 MODEL	Width <sup>5</sup>		Diameter		Weight		Connector	
	inch	mm	inch	mm	lbs	kg	Output	Input
All Models 0.001 A to 1A	2.8	71.4	3.5	88.9	0.8	0.35	BNC	UHF
All Models 3 A to 25 A	2.8	71.4	6.63	168.4	1.8	0.82	BNC	UHF
50 A & 100 A Models	3.8	115	6.63	168.4	2.6	1.2	BNC	LC

### Notes: All Specifications

Note 1: Calibrated in air at the minimum and maximum of the current range at 23 °C ± 2 °C at DC and 1kHz, 10 kHz, 30 kHz and 100 kHz frequencies. Models with currents above 3 A are calibrated with the forced convection unit model 73401. Calibration of resistance and AC-DC Difference values are referred to the unit of resistance as maintained by a National Metrology Institute and are expressed as a total uncertainty with a coverage factor of k=2. AC-DC Difference is defined as the difference between a sinusoidal alternating current required for a given output.

Note 2: The unique design of the 7340's means that for higher frequencies, and dependent on the ohmic value, the AC-DC Difference t will either be capacitive or inductive producing only a positive or negative difference. The final reported result could be outside these parameters (e.g. slightly positive or slightly negative) depending on the uncertainty of the laboratory performing the measurement.

Note 3: Initial Tolerance is defined as the maximum variation of resistance mean DC values as initially adjusted at the point of sale.

Note 4: Power coefficients are specified using the 73401 Forced Convection Unit for currents above 3A for the model 7340 Series.

Note 5: Width Size is case to case and does not include terminal size.

## 3.1 General Specifications

7340 SERIES TYPICAL PHASE DISPLACEMENT			
Input Current	1 kHz	20 kHz	100 kHz
1 mA – 300 mA	< 0.001 °	< 0.004 °	< 0.025 °
300 mA to 3A	< 0.002 °	< 0.008 °	< 0.050 °
3A to 25 A	< 0.004 °	< 0.010 °	< 0.060 °
25A to 100A	< 0.008 °	< 0.040 °	< 0.150 °

ENVIRONMENTAL						
Operating	Temperature	Humidity		Storage	Temperature	Humidity
	18 °C to 28 °C	< 50% RH non-condensing			-20 °C to 60 °C	15% to 80% RH



## Section 3

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## 4.0 OPTIONS

MODEL #	DESCRIPTION	GUILDLINE PART #
73401	Forced Air Cooling Unit (fits all standard models)	30806-01-09
73404A	AC Buffer Amplifier	33599-01-05
73411	Adapter LC Male to N Female	003-09237
73412	Adapter LC Male to LC Male	003-09569
73413	Adapter LC TO Cable	31127-01-11
73414	Adapter LC Female to N Female	003-09298
73503	Cable and Adapter Kit	31133-01-09
73502-30	Serial Connection Adapter (UHF 30A)	30798-01-11
73502-100	Serial Connection Adapter (LC 100A)	30799-01-11